FINAL

SITE SAFETY AND HEALTH PLAN ADDENDUM NO. 1

FOR THE

PHASE II REMEDIAL INVESTIGATION OF LOAD LINE 12 AT THE RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO

PREPARED FOR

US Army Corps of Engineers®

LOUISVILLE DISTRICT

CONTRACT No. DACA62-00-D-0001
DELIVERY ORDER CY06

September 2000

SAIC

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APPROVALS

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RAVENNA, OHIO

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TABLES

ACRONYMS

AOC	area of concern
CIH	Certified Industrial Hygienist
CSP	Certified Safety Professional
DNT	dinitrotoluene
EC&HS	Environmental Compliance and Health and Safety
EOD	explosives ordnance disposal
FP	flash point
FSHP	Facility-wide Safety and Health Plan
GFCI	ground-fault circuit interruptor
H&S	Health and Safety
HAZWOPER	Hazardous Waste Site Operations
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
IDLH	immediately dangerous to life and health
IDW	investigation-derived waste
IP	ionization potential
LEL	lower explosive limit
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
OE	ordnance and explosives
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PID	photoionization detector
PPE	personal protective equipment
PVC	polyvinyl chloride
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
STEL	short-term exposure limit
TLV	threshold limit value
TNB	trinitrobenzene
TNT	2,4,6-trinitrotoluene
TWA	time-weighted average
USACE	U.S. Army Corps of Engineers
VP	vapor pressure

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 our employees, the public, and the environment. To this end, the Ravenna Army Ammunition Plant (RVAAP) 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. These plans are driven by requirements contained in USACE 1992 and USACE 1996. SAIC activities are also subject to the requirements of the SAIC corporate Environmental Compliance and Health and Safety (EC&HS) program and procedures. All field personnel are required to comply with the requirements of these programs and 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 II Remedial Investigation at Load Line 12. Copies of the FSHP and this SSHP Addendum will be present at the work site during all field work.

SAIC will perform field investigations at the former Load Line 12. From 1941 to 1943, Load Line 12 was used to produce ammonium nitrate for military applications. From 1946 to 1949, fertilizer grade ammonium nitrate was produced for commercial purposes. After serving as a fertilizer production facility, Load Line 12 was primarily used for the demilitarization of munitions by Firestone and subsequent contractors (1945 to 1992). Explosives were melted out of bomb casings using steam in Building FJ-904 and shipped off site. Building FJ-905 was also used for demilitarization operations by hot water washout and later by steam. Additional uses of the area of concern included commercial industrial use of some of the facilities during a 2-year period for possible aluminum fabrication. These activities involved the use of large quantities of aluminum chloride with reported high levels of air emissions.

Demolition of facilities at Load Line 12 was conducted in two phases with completion of demolition in 1999. Buildings 901, 902, FF-19, and 906 were demolished between 1973 and 1975. Building 54 was demolished in the 1980s. The remaining structures were removed ending in 1999.

Soil sample analyses have indicated that some of the site soils are contaminated with explosives residues. Detected contaminants include 2,4,6-trinitrotoluene (TNT); trinitrobenzene (TNB); dinitrotoluene (DNT) isomers; octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX); and hexahydro-1,3,5-trinitro-1,3,5-trizine (RDX). Maximum TNT concentrations detected to date in soil were 19,000 mg/kg. Explosives detections were clustered around Building 904 and the pink wastewater treatment plant.

Planned site activities consist of environmental sampling and support tasks. These tasks include soil sampling, water sampling, sediment sampling, a survey of existing sewer lines, drilling and monitoring well installation; operation of field metals and explosives laboratories, and trenching.

Potential hazards posed by the planned tasks include ordnance and explosives (OE); noise and cut hazards associated with clearing vegetation; striking, rotation, and noise hazards from drilling equipment; lifting, noise, and strain hazards associated with operating soil sampling equipment (power auger); fuel or decontamination solvent fires; chemical exposure; temperature extremes; stinging/ biting insects; poisonous plants; and snakes.

The potential for chemical overexposure appears to be very low given the nature of planned tasks. All of the potential contaminants have low vapor pressures, making overexposure through vapor inhalation very unlikely. All of the 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 augers, drilling and Geoprobe equipment, and hand-operated power tools (chainsaw, etc.). 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 PPE is required. A detailed analysis of these hazards and specific appropriate controls is presented in Section 2.0, Table 2-2.

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 as necessary by the SSHO based on established action levels or judgment.

1.0 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.1 SITE DESCRIPTION

Ravenna Army Ammunition Plant (RVAAP) is located in northeastern Ohio within Portage and Trumbull Counties, approximately 4.8 km (3 miles) northeast of the Town of Ravenna. The installation consists of 8668 ha (21,419 acres) in a 17.7-km (11-mile) long, 5.6-km (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, TolTest, 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 mm or more and 2000-pound bombs.

Load Line 12 covers approximately 32 ha (80 acres) and is situated in the southeast portion of the plant. From 1941 to 1943, Load Line 12 was used to produce ammonium nitrate for military applications. From 1946 to 1949 fertilizer grade ammonium nitrate was produced for commercial purposes. A total of 518,264 tons of ammonium nitrate was produced during operation of the production facility. After serving as a fertilizer production facility, Load Line 12 was primarily used for the demilitarization of munitions by Firestone and subsequent contractors (1945 to 1992). Explosives were melted out of bomb casings using steam in Building FJ-904 and shipped off site. Building FJ-905 was also used for demilitarization operations by hot water and steam washout. Building FJ-904 was washed down weekly and the water flowed into two stainless-steel tanks. One tank was used for settling and the other for filtration. Prior to 1981, the tank effluent was routed through an unlined ditch from Building FJ-904 to a settling pond (Load Line 12 Settling Pond), where ultimately the water drained into Upper and Lower Cobbs Ponds. Approximately 85,536 gallons of pink water were generated per month when the plant was fully operational in the 1950s. A pink wastewater treatment plant was installed in 1981 to process the pink water from the demilitarization operations at Building FJ-904. The treatment plant, which was in operation for two years, consisted of a dual-mode activated-carbon filtration system. The plant was built in 1981, within the confines of Load Line 12. The plant was designed to treat 20 gallons of wastewater per minute and averaged 5,000 gallons per day. Following this use, the treatment plant was used to collect and treat explosives-contaminated stormwater from various RVAAP locations until 1998 when final demolition was completed.

Additional uses of the AOC included commercial industrial use of some of the facilities during a 2-year period for possible aluminum fabrication. These activities involved the use of large quantities of aluminum chloride with reported high levels of air emissions.

Demolition of facilities at Load Line 12 was conducted in two phases with completion of demolition in 1999. Buildings 901, 902, FF-19, and 906 were demolished between 1973 and 1975. Building 54 was demolished in the 1980s. The remaining structures were removed ending in 1999.

Soil sample analyses have indicated that some of the site soils are contaminated with explosives residues. Detected contaminants include 2,4,6-trinitrotoluene (TNT); trinitrobenzene (TNB); dinitrotoluene (DNT); octahydro-1,3,5,7-tetranitro-1,3,5,6-tetrazocine (HMX); and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX). Maximum TNT concentrations detected to date in soil were 19,000 mg/kg. Explosives detections were clustered around Building FJ-904 and the pink wastewater treatment plant. For additional area of concern (AOC) information, see the Sampling and Analysis Plan (SAP) Addendum.

1.2 CONTAMINANTS

Table 1-1 lists contaminants known to occur in soil at the former Load Line 12. Inclusion in this table indicates the potential to encounter a contaminant during Phase II Remedial Investigation (RI) field activities, but does not necessarily indicate that the contaminant is present in sufficient quantity to pose a health risk to workers.

Table 1-1. Maximum Concentrations of Principal Contaminants at the Former Load Line 12

Contaminant	Maximum Reported Concentration[a]
Chromium	163 mg/kg in surface soil
Cadmium	6.6 mg/kg in surface soil
DNT	13 mg/kg in surface soil
HMX	180 mg/kg in surface soil
Lead	589 mg/kg in surface soil
RDX	6,800 mg/kg in surface soil
TNB	4.6 mg/kg in surface soil
TNT	19,000 mg/kg in surface soil

[a] *Source*: USACE 1997

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 (only if sewer line manholes are entered)
	X	Excavation entry (excavations will not be entered)
X		Heavy equipment (power augers, drill rigs, backhoe)
X		Fire and explosion (fuels)
	X	Electrical shock (utilities and tools)
X		Exposure to chemicals (contaminants and chemical tools)
X		Temperature extremes
X		Biological hazards (poison ivy, Lyme disease)
	X	Radiation or radioactive contamination
X		Noise (power auger, drill rig)
X		Drowning (if samples are collected in Cobb's Pond)
X		OE (potential to encounter unexploded ordnance)

Specific tasks are as follows:

- soil sampling with hand augers or scoops;
- soil sampling with hand-operated power augers;
- vegetation clearing with machetes and chainsaws;
- surface water and sediment sampling from the headwaters of Cobbs Pond using hand tools on foot;
- camera survey of inactive sanitary sewer lines;
- sediment and water sampling from manholes in sanitary sewer lines;
- field screening for metals conducted by an Science Applications International Corporation (SAIC) subcontractor in an on-site laboratory;
- field screening for explosives conducted by SAIC personnel in an on-site laboratory;
- excavation of test pits at background (uncontaminated) locations;
- civil surveying;
- investigation-derived waste (IDW) handling and disposition;

- subsurface soil sampling, piezometer installation, and monitoring well installation using Geoprobe rigs and hollow stem auger drill rigs;
- well development and groundwater sampling; and
- sampling equipment decontamination.

2.1 TASK-SPECIFIC HAZARD ANALYSIS

Table 2-2 presents task-specific hazards, relevant hazard controls, and required monitoring, if appropriate, for all of the planned tasks.

2.2 POTENTIAL EXPOSURES

Prior sampling results indicate that the primary contaminants of concern at Load Line 12 are metals and explosives residues. Information on the potential contaminants, as well as the reagents and chemicals that will be used for the project is contained in Table 2-3. It is important to note that the contaminants listed in Table 2-3 have been detected in a number of locations at RVAAP and might be expected to occur at any former operations area. 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 2-2. Hazards Analysis

Safety and Health Hazards	Controls	Monitoring Requirements
Civil surveys, visual surveys in potentially contaminated areas		
General safety hazards (moving equipment, slips, falls)	Level D PPE: long pants, shirts with sleeves, safety glasses, safety shoes or boots, hardhats if overhead hazards are present. (See Section 5.0 of the FSHP). Hazardous waste safety (40-hour) and site-specific training, buddy system, proper housekeeping.	Daily safety inspections.
Contact with OE	Pre-entry screening survey and continuous escort by OE specialist support. On-site training in ordnance recognition for all field personnel. Withdrawal of all SAIC and subcontractor personnel from immediate area and field marking of suspect area if ordnance or suspected ordnance is discovered.	Visual and instrument surveys for ordnance conducted by OE expert personnel.
Exposure to chemicals	Nitrile or similar gloves for contact with potentially contaminated material. Gloves will be disposed after single use. Washing face and hands and any other exposed areas prior to taking anything by mouth. Hazardous waste medical clearance. Site training must include hazards and controls for exposure to site contaminants and chemicals used on site. MSDSs on site. All chemical containers labeled to indicate contents and hazard.	None.
Gunfire (deer hunting with shotguns loaded with slugs is allowed in some areas on Friday and Saturday during season, October and November)	Field work will not be conducted during hunt days. Official work, sample management, and analytical work may be conducted in the SAIC staging building (Building 1036) if approved by the RVAAP Environmental Coordinator.	None.
Biological hazards (bees, ticks, Lyme disease, Histoplasmosis, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry. Inspect for ticks during the day and at the end of each work day (See Section 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (See Section 9.0 of FSHP).	Visual survey.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP). Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice daily. Pulse rates at the start of each break if wearing impermeable clothing.
Field screening for explosives in samples using colorimetric analyses		
General safety hazards (splash, cuts, slips, falls)	Level D PPE, including nitrile or PVC gloves to handle samples (see Section 5.0 of FSHP). Standard procedures for operating field laboratory will be available on site for review. Hazardous waste safety training. Exclude unauthorized personnel. Laboratory personnel trained to requirements of standard procedures and requirements of 29 *CFR* 1910.1450 and other relevant standards.	Daily site safety inspections conducted by laboratory supervisor.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Noise	None, unless SSHO determines that equipment potentially exceeds 85 dBA.	Daily safety inspection.
Fire (fuels/solvents)	Fuel stored in safety cans with flame arresters. Solvent containers kept closed or placed in open outside area to vent. Fire extinguisher rated ABC stored in laboratory. No ignition sources in screening area. Flammables cabinet for indoor storage of ≥25 gallons of flammable material.	Daily site safety inspections.
Exposure to chemicals	PPE (Level D) including nitrile or PVC gloves to handle samples and chemicals Forced exhaust ventilation (this can be a tight-fitting fan mounted in a window and positioned to blow out the window) must be provided and screening must be performed immediately in front of the exhaust so that vapors are carried from the work area. Wash face and hands prior to taking anything by mouth. Medical clearance for HAZWOPER work. 15-minute eyewash within 100 feet. Site training must include hazards and controls of exposure to contaminants and chemicals used on site. MSDSs kept on site. All chemical containers labeled with contents and hazard. Laboratory personnel will be briefed on the project SSHP, emergency phone numbers, and other health and safety information relevant to their tasks.	Daily site safety inspections. PID monitoring during initial sample screening to verify that controls are adequate. If PID readings exceed 5 ppm in the breathing zone, screening must be stopped and additional controls implemented.
Electrical shock	GFCI for all electrical hand tools	Daily safety inspection.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP). Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice daily. Pulse rates at the start of each break if wearing impermeable clothing.
Metals analysis by XRF performed by SAIC subcontractor in field laboratory and in situ		
General safety hazards (moving equipment, slips, falls)	Subcontractor personnel must comply with requirements for relevant task if they participate or closely observe activities other than laboratory analyses. Hazardous waste safety training. Standard procedures for operation of field laboratory and in-situ equipment will be available on site for review. Exclude unauthorized personnel. Laboratory personnel trained to requirements of standard procedures and requirements of 29 CFR 1910.1450 and other relevant standards. PPE (Level D) including nitrile or PVC gloves to handle samples.	Daily safety inspections conducted by laboratory supervisor.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Fire (fuels/solvents)	Fuel stored in safety cans with flame arresters. Solvent containers kept closed or placed in open outside area to vent. Fire extinguisher rated ABC stored in laboratory. No ignition sources in screening area. Flammables cabinet for indoor storage of ≥25 gallons of flammable material	Daily safety inspections.
Exposure to chemicals	Subcontractor's chemical hygiene plan must be available on site. PPE (Level D) including nitrile or PVC gloves to handle samples and chemicals Forced exhaust ventilation (this can be a tight-fitting fan mounted in a window and positioned to blow out the window) must be provided and screening must be performed immediately in front of the exhaust so that vapors are carried from the work area. Wash face and hands prior to taking anything by mouth. Medical clearance for HAZWOPER work. 15-minute eyewash within 100 feet. Site training must include hazards and controls of exposure to contaminants and chemicals used on site. MSDSs kept on site. All chemical containers labeled with contents and hazard. Laboratory personnel will be briefed on the project SSHP, emergency phone numbers, and other health and safety information relevant to their tasks	Daily safety inspections. PID monitoring during initial sample screening to verify that controls are adequate. If PID readings exceed 5 ppm in the breathing zone, screening must be stopped and additional controls implemented.
Electrical shock	GFCI for all electrical hand tools	Daily safety inspection.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP). Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice daily. Pulse rates at the start of each break if wearing impermeable clothing.
Sewerline video survey and sediment/surface water sampling in manholes		
General safety hazards (moving equipment, slips, falls)	Level D PPE: long pants, shirts with sleeves, safety glasses, safety shoes or boots, hardhats if overhead hazards are present (see Section 5.0 of FSHP). Hazardous waste safety (40-hour) and site-specific training, buddy system, proper housekeeping.	Daily safety inspections.
Manhole entry (confined space entry)	Manholes will be monitored with at least a PID or equivalent prior to performing survey. If it becomes necessary to enter a manhole that is deeper than 4 feet to place or retrieve a camera, the manhole will be treated as a confined space and SAIC EC&HS Procedure 10 or equivalent will be followed. This will include at least; 1. Confined space entry permit (as required by RVAAP or USACE) 2. Testing for oxygen content (must be 19.5 to 22%), flammability (must be less than 10%), and toxicity using PID or equivalent (must be less than 5 ppm) 3. Two-person crew (entrant and attendant) 4. Continuous forced ventilation	PID or equivalent for all manholes. Oxygen, flammability, and PID or equivalent for entering manholes deeper than 4 feet.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Manhole entry (confined space entry) (continued)	If entry must be made into any part of the system other than the manhole, the subcontractor must perform an entry assessment and entry in full compliance with the OSHA confined space entry standard. Requirements include, but are not limited to: 1. Manhole entry requirements listed above 2. Harness and retrieval system 3. Formal training for entrants and attendant	
Fire	Fuels stored in closed safety cans with flame arrestors, no ignition sources within 50 feet of open manholes, fire extinguisher kept in immediate work area.	Daily safety inspections.
Contact with OE	Pre-entry screening survey and continuous escort by OE specialist support. On-site training in ordnance recognition for all field personnel. Withdrawal of all SAIC and subcontractor personnel from immediate area and field marking of suspect area if ordnance or suspected ordnance is discovered.	Visual and instrument surveys for ordnance conducted by OE expert personnel.
Exposure to chemicals	Nitrile or similar gloves for contact with potentially contaminated material. Gloves will be disposed after single use. Washing face and hands and any other exposed areas prior to taking anything by mouth. Hazardous waste medical clearance. Site training must include hazards and controls for exposure to site contaminants and chemicals used on site. MSDSs on site. All chemical containers labeled to indicate contents and hazard.	PID or equivalent.
Gunfire (deer hunting with shotguns loaded with slugs is allowed in some areas on Friday and Saturday during season, October and November)	Video survey and sampling field work will not be conducted on hunt days. Office work, sample management, and analytical work may be conducted in the SAIC staging building (Building 1036) if approved by the RVAAP Environmental Coordinator.	None.
Biological hazards (bees, ticks, Lyme disease, Histoplasmosis, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry. Inspect for ticks during the day and at the end of each work day (see Section 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Section 9.0 of FSHP).	Visual survey.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP) Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice daily. Pulse rates at the start of each break if wearing impermeable clothing.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Soil boring and soil sampling using a hand-operated power auger		
General safety hazards (rotating machinery, moving equipment, slips, falls)	Level D PPE: long pants, shirts with sleeves, safety glasses, safety shoes or boots (see Section 5.0 of FSHP) plus hardhat if overhead hazards are present. Buddy system. Operate auger per manufacturer's directions. Only experienced operators will be allowed to operate auger. Positive action control (Deadman switch) or easily accessible kill switch on power auger. Hazardous Waste Safety training. Lifts of >50 pounds will be performed by two or more personnel or with mechanical assistance, extensive heavy lifting will require additional lifting training. Exclusion zone if there is a potential for unauthorized entry.	Daily safety inspections.
Contact with OE	Pre-entry screening survey and continuous escort by OE specialist support. Down-hole monitoring at 2-foot intervals. On-site training in ordnance recognition for all field personnel. Withdrawal of all SAIC and subcontractor personnel from immediate area and field marking of suspect area if ordnance or suspected ordnance is discovered.	Visual and instrument surveys for ordnance conducted by OE expert personnel.
Exposure to chemicals	Nitrile or similar gloves for contact with potentially contaminated material. Gloves will be disposed after single use. Washing face and hands prior to taking anything by mouth. Hazardous waste medical clearance. Site training must include hazards and controls for exposure to site contaminants and chemicals used on site. MSDSs on site. All chemical containers labeled to indicate contents and hazard.	PID or equivalent.
Gunfire (deer hunting with shotguns loaded with slugs is allowed in some areas on Friday and Saturday during season, October and November)	Field work will not be conducted on hunt days. Office work, sample management, and analytical work may be conducted in the SAIC staging building (Building 1036) if approved by the RVAAP Environmental Coordinator.	None.
Noise	Hearing protection within 7.6 m (25 feet) of equipment when operating.	Daily safety inspections.
Fire (fuels)	Fuel in safety cans with flame arrestors. No ignition sources in fuel storage or refueling areas. Fire extinguisher in all fuel use areas. Bonding (metal to metal) contact while pouring. Gas powered equipment must be shut down and allowed to cool for 5 minutes prior to fueling.	Daily safety inspections.
Biological hazards (bees, ticks, Lyme disease, Histoplasmosis, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry. Inspect for ticks during the day and at the end of each work day (see Section 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Section 9.0 of FSHP).	Visual survey.
Electric shock	Identification and clearance of underground utilities.	Visual survey of all work areas.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP) Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice daily. Pulse rates at the start of each break if wearing impermeable clothing.
Groundwater well development, groundwater monitoring, groundwater sampling and sample preservation		
General safety hazards (moving equipment, lifting, slips, falls)	Level D PPE: long pants, shirts with sleeves, safety glasses, safety shoes or boots, hardhats if overhead hazards are present (see Section 5.0 of FSHP). Buddy system. Lifts of >50 lbs will be performed by two or more personnel or with mechanical assistance, extensive heavy lifting will require additional lifting training. Hazardous waste safety training. Exclusion zone if there is a potential for unauthorized entry.	Daily site safety inspections.
Noise	None, unless SSHO determines that equipment potentially exceeds 85 dBA.	Daily safety inspection.
Fire (fuels)	Fuel stored in safety cans with flame arresters. Fire extinguisher in all fuel use areas. No ignition sources in fuel storage areas. Bonding (metal to metal contact) during pouring. Gasoline powered equipment must be shut down and allowed to cool for 5 minutes prior to fueling	Daily site safety inspections.
Exposure to chemicals	PPE (Level D) including nitrile or PVC gloves to handle potentially contaminated material. Minimal contact, wash face and hands prior to taking anything by mouth. Medical clearance for HAZWOPER work. 15-minute eyewash within 100 feet when pouring corrosive sample preservatives, eyewash bottle within 10 feet when adding water to pre-preserved sample containers. Site training must include hazards and controls of exposure to contaminants and chemicals used on site. MSDSs for chemical tools kept on site. All chemical containers labeled with contents and hazard.	Daily site safety inspections. PID monitoring if prior monitoring during soil boring indicated a potential for exposure.
Gunfire (deer hunting with shotguns loaded with slugs allowed on Friday and Saturday during season)	Field work will not be conducted on hunt days. Office work, sample management, and analytical work may be conducted in the SAIC staging building (Building 1036) if approved by the RVAAP Environmental Coordinator.	None.
Electrical shock	GFCI for all electrical hand tools	Daily safety inspection.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP) Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice daily. Pulse rates at the start of each break if wearing impermeable clothing.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Biological hazards (bees, ticks, Lyme disease, Histoplasmosis, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry. Inspect for ticks during the day and at the end of each work day (see Section 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Section 9.0 of FSHP).	Visual survey.
Soil sampling (trenching) using excavation equipment in background (uncontaminated) locations		
Safety hazards associated with excavation equipment	Level D PPE long pants, shirts with sleeves, safety shoes or boots, safety glasses , hardhat (unless under protective shelter such as roll-over cage) (see Section 5.0 of FSHP). Buddy system. Unnecessary personnel will stay well clear of operating equipment and out of the arc of the backhoe arm. Functional back-up alarm. Exclusion zone around excavation areas if there is any potential for unauthorized entry. Only experienced operators will be allowed to operate equipment. Hazardous waste safety training is not required unless site conditions indicate that the area being excavated is contaminated.	Daily safety inspections of operations. Initial and at least weekly inspections of excavation equipment conducted by operator and verified by SSHO.
Potential excavation cave-in	No personnel will enter trenches deeper than 4 feet. Personnel will keep at least 0.9 m (3 feet) distance from excavation edges if trench is deeper than 4 feet. Observation of trench will be made from trench ends and digging will be discontinued during such observation. Unattended trenches left open overnight or during a work shift will be clearly marked with flagging and/or caution tape. Samples will be collected from outside the excavation by sampling soil in the backhoe bucket or soil from the bottom of the excavation using an auger extension. Prior to sampling from excavations deeper than 1.5 m (5 feet) deep, excavation edges will be visually examined and approached only at points that are clearly cohesive and show no signs of collapse. If there is any doubt about the safety of the edge, plywood sheeting will be placed over the edge to spread the weight of the person collecting the sample.	Daily safety inspections of operations. Examine excavation edge for signs of spalling or collapse.
Contact with unexploded ordnance	On-site training in ordnance recognition for all field personnel. Clearance of sites by OE personnel for intrusive work. Continuous escort by OE expert personnel when in areas with a potential to encounter OE. Withdrawal of all non-OE personnel if ordnance or suspected ordnance is discovered.	Visual and instrument surveys by OE technicians.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Exposure to chemicals	Hazard communication training. MSDSs for chemical tools on site. Chemical containers labeled to indicate contents and hazard. Medical clearance for hazardous waste work is not required unless site observation indicates potential contamination of excavation area.	None.
Gunfire (deer hunting with shotguns loaded with slugs allowed on Friday and Saturday during season)	Field work will not be conducted on hunt days. Office work, sample management, and analytical work may be conducted in the SAIC staging building (Building 1036) if approved by the RVAAP Environmental Coordinator.	None.
Fire (vehicle fuels and flammable contaminants)	Fuels stored in safety cans with flame arrestors. Bonding (metal to metal) and grounding during fuel transfers. Fuel storage areas marked with no smoking or open flames signs. Fire extinguishers in all fuel use areas.	Daily safety inspection.
Noise	None unless the SSHO determines necessary.	None, unless there is some doubt about backhoe noise being less than 85 decibels.
Biological hazards (bees, ticks, Lyme disease, Histoplasmosis, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry. Snake chaps if working in overgrown areas. Inspect for ticks during the day and at the end of each work day (see Section 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Section 9.0 of FSHP).	Visual survey.
Electric shock	Identification and clearance of overhead and underground utilities.	Visual of all work areas.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP). Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice daily. Pulse rates at the start of each break if wearing impermeable clothing.
Soil boring, soil sampling, and monitoring well installation using drill rig or Geoprobe rig.		
General safety hazards (rotating machinery, suspended loads, moving equipment, slips, falls)	Level D PPE: long pants, shirts with sleeves, safety glasses, work gloves for material handling (see Section 5.0 of FSHP) plus hard hat. Buddy system. No employees under lifted loads. At least two functional kill switches. Functional back-up alarm. Drill rig manual on site. Only experienced operators. .	Daily site safety inspections. Weekly drill rig inspections.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
General safety hazards (rotating machinery, suspended loads, moving equipment, slips, falls) (continued)	Exclusion zone at least equal to mast height if there is any potential for unauthorized entry. Hazardous waste safety training	
Noise	Hearing protection within 7.6 m (25 feet) of rig unless rig-specific monitoring indicates noise exposure of less than 85 dBA.	Daily safety inspections.
Fire (vehicle fuels or subsurface contaminants)	Fuels stored in safety cans with flame arrestors. Bonding (metal to metal) and grounding during fuel transfers. Fuel storage areas marked with no smoking or open flames signs. Fire extinguishers in all fuel use areas.	Combustible gas indicator if buried organic material or other source of flammable gas is suspected.
Contact with unexploded ordnance	Downhole monitoring every 2 feet until cleared for continuous drilling by OE personnel. On-site training in ordnance recognition for all field personnel. Clearance of sites by OE personnel for intrusive work. Continuous escort by OE personnel in areas with a potential to encounter OE. Withdrawal of all non-OE personnel if ordnance or suspected ordnance is discovered.	Visual and instrument surveys by OE technicians.
Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Staying upwind of any dust-generating activities. Site training must include hazards and controls for site contaminants and all chemicals used on site. MSDSs for chemical tools on site. Chemical containers labeled to indicate contents and hazard. Medical clearance for hazardous waste work.	PID or other sampling as appropriate.
Gunfire (deer hunting with shotguns loaded with slugs allowed on Friday and Saturday during season)	Field work will not be conducted on hunt days. Office work, sample management, and analytical work may be conducted in the SAIC staging building (Building 1036) if approved by the RVAAP Environmental Coordinator.	None.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (See Section 8.0 of FSHP). Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice per day. Pulse rates at the start of each break if wearing impermeable clothing.
Biological hazards (bees, ticks, Lyme disease, Histoplasmosis, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize potential for tick entry. Snake chaps if working in overgrown areas. Inspect for ticks during the day and at the end of each work day (see Section 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Section 9.0 of FSHP).	Visual survey.
Electric shock	Identification and clearance of overhead and underground utilities.	Visual of all work areas.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Soil sampling using hand augers or scoops		
General safety hazards (manual lifting, slips, falls)	Level D PPE: long pants, shirts with sleeves, safety shoes or boots, safety glasses, work gloves for manual work (see Section 5.0 of FSHP). Buddy system. Hazardous waste safety training.	Daily site safety inspections.
Contact with unexploded ordnance	On-site training in ordnance recognition for all field personnel. Clearance of sites by OE personnel for intrusive work. Continuous escort by OE personnel when in areas with potential to encounter OE. Withdrawal of all non-OE personnel if ordnance or suspected ordnance is discovered.	Visual and instrument surveys by OE technicians.
Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Staying upwind of any dust-generating activities. Site training must include hazards and controls for exposure to site contaminants and chemicals used on site. MSDSs for chemical tools on site. Chemical containers labeled to indicate contents and hazard. Medical clearance for hazardous waste work	Photoionization detector or other sampling as appropriate.
Gunfire (deer hunting with shotguns loaded with slugs allowed on Friday and Saturday during season)	Field work will not be conducted on hunt days. Office work, sample management, and analytical work may be conducted in the SAIC staging building (Building 1036) if approved by the RVAAP Environmental Coordinator.	None.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP) Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice daily Pulse rates at the start of each break if wearing impermeable clothing.
Biological hazards (bees, ticks, Lyme disease, Histoplasmosis, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry. Snake chaps if working in overgrown areas. Inspect for ticks during the day and at the end of each work day (see Section 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Section 9.0 of FSHP).	Visual survey.
Surface water and sediment sampling on foot in the headwaters of Cobbs Pond		
General safety hazards (moving equipment, slips, falls)	Level D PPE: long pants, shirts with sleeves, safety glasses, safety shoes or boots (see Section 5.0 of FSHP). Hazardous waste safety training. Buddy system.	Daily site safety inspections.
Drowning	Coast Guard-approved flotation vests if working near or over water deeper than 4 feet.	None.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Noise	None.	None.
Fire	None.	None.
Contact with unexploded ordnance	On-site training in ordnance recognition for all field personnel. Clearance of sites by OE personnel for intrusive work. Continuous escort by OE personnel when in areas with potential for OE. Withdrawal of all non-OE personnel if ordnance or suspected ordnance is discovered.	Visual and instrument surveys by OE technicians.
Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Minimal contact. Site training must include hazards and controls for exposure to site contaminants and chemicals used on site. MSDSs for chemical tools on site. Chemical containers labeled to indicate contents and hazard. Medical clearance for hazardous waste work	None.
Gunfire (deer hunting with shotguns loaded with slugs allowed on Friday and Saturday during season)	Field work will not be conducted on hunt days. Office work, sample management, and analytical work may be conducted in the SAIC staging building (Building 1036) if approved by the RVAAP Environmental Coordinator.	None.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP). Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice a day. Pulse rates at the start of each break if wearing impermeable clothing.
Biological hazards (bees, ticks, Lyme disease, Histoplasmosis, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry. Inspect for ticks during the day and at the end of each work day (see Section 9.0 of FSHP). Snake chaps if working in overgrown areas. Avoidance of accumulations of bird or bat droppings (see Section 9.0 of FSHP).	Visual survey.
Vegetation clearing with chainsaws, machetes, sling blades		
General safety hazards (contact with sharp edges, slips, falls)	Level D PPE (see Section 5.0 of FSHP) long pants, shirts with sleeves, safety shoes or boots, safety glasses, plus heavy duty work gloves and hard hat. Buddy system. Only experienced operators. Personnel operating brush clearing tools must maintain separation of at least 15 feet. Machetes equipped with lanyard and lanyard looped around wrist. Tools must be inspected daily and taken out of service if damaged.	Daily site safety inspections.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
General safety hazards (contact with sharp edges, slips, falls) (continued)	Exclusion zone if there is a potential for entry of unauthorized personnel. Hazardous waste safety training.	
Chainsaw kickback and related hazards	Chainsaw chaps. Saws must have automatic chain brake or kickback device. Idle speed adjusted so chain does not move when idling. Saws must not be used to cut above shoulder height. Saws must be held with both hands when operating. Additional requirements at 385-1-1 Section 31.	Daily inspection.
Noise (chainsaw)	Hearing protection within 7.6 m (25 feet) of operating chainsaw unless rig-specific monitoring indicates noise exposure of less than 85 dBA.	Daily safety inspections.
Fire (fuels)	Fuels stored in safety cans with flame arrestors. Bonding (metal to metal) and grounding during fuel transfers. Fuel storage areas marked with no smoking or open flames signs. Fire extinguishers in all fuel use areas. Gasoline powered equipment turned off and allowed to cool for at least five minutes prior to fueling.	Daily safety inspection.
Contact with unexploded ordnance	On-site training in ordnance recognition for all field personnel. Clearance of sites by OE personnel for intrusive work. Escort by OE personnel when in areas with potential to encounter OE. Withdrawal of all non-OE personnel if ordnance or suspected ordnance is discovered.	Visual and instrument surveys by OE technicians.
Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Site training must include the hazards and appropriate controls for site contaminants and chemicals to be used or stored on site. Chemical containers labeled to indicate contents and hazard. Medical clearance for hazardous waste work	Daily safety inspection.
Gunfire (deer hunting with shotguns loaded with slugs allowed on Friday and Saturday during season)	Field work will not be conducted on hunt days. Office work, sample management, and analytical work may be conducted in the SAIC staging building (Building 1036) if approved by the RVAAP Environmental Coordinator.	None.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP) Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice per day. Pulse rates at the start of each break if wearing impermeable clothing.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Biological hazards (bees, ticks, Lyme disease, Histoplasmosis, wasps, snakes)	PPE (boots, work clothes). Insect repellant on boots and pants and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize potential for tick entry. Snake chaps if working in overgrown areas. Inspect for ticks during the day and at the end of each work day (see Section 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Section 9.0 of FSHP).	Visual survey.
Investigation-derived waste handling		
General hazards (lifting equipment, manual lifting, slips)	Level D PPE: long pants, shirts with sleeves, safety glasses, safety shoes or boots, heavy duty gloves for materials handling and hardhat if overhead hazards are present (see Section 5.0 of FSHP). Buddy system. Unnecessary personnel will stay well clear of operating equipment. Functional back-up alarm on fork trucks, bobcats, trucks, etc. Documented forklift training for forklift operators. Only experienced operators will be allowed to operate equipment. No personnel allowed under lifted loads. Lifts of over 50 pounds will be made with two or more personnel or with lifting equipment. Hazardous waste safety training. Compliance with EM 385-1-1 Sections 14 and 16.	Daily safety inspections of operations. Daily inspection of equipment to verify brakes and operating systems are in proper working condition.
Contact with unexploded ordnance	On-site training in ordnance recognition for all field personnel. Clearance of sites by OE personnel for intrusive work. Continuous escort by OE personnel if working in areas with potential for OE. Withdrawal of all non-OE personnel if ordnance or suspected ordnance is discovered.	Visual and instrument surveys by OE technicians.
Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Site training must include hazards and controls for exposure to site contaminants and chemicals used on site. Medical clearance for hazardous waste work.	Daily safety inspections.
Gunfire (deer hunting with shotguns loaded with slugs allowed on Friday and Saturday during season)	Field work will not be conducted on hunt days. Office work, sample management, and analytical work may be conducted in the SAIC staging building (Building 1036) if approved by the RVAAP Environmental Coordinator.	None.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Fire (vehicle fuels and flammable contaminants)	Fuels stored in safety cans with flame arrestors. Bonding (metal to metal) and grounding during fuel transfers. Fuel storage areas marked with no smoking or open flames signs. Gasoline powered equipment will be shut down and allowed to cool for 5 minutes before fueling. Fire extinguishers in all fuel use areas.	Daily safety inspection.
Noise	Hearing protection within 7.6 m (25 feet) of any noisy drum moving equipment unless equipment-specific monitoring indicates exposures less than 85 decibels.	Daily safety inspections.
Biological hazards (bees, ticks, Lyme disease, Histoplasmosis, wasps, snakes)	PPE (boots, work clothes). Insect repellant on pants and boots and elsewhere, as necessary. Pant legs tucked into boots or otherwise closed to minimize tick entry. Snake chaps if working in overgrown areas. Inspect for ticks during the day and at the end of each work day (see Section 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Section 9.0 of FSHP).	Visual survey.
Electric shock	Identification and clearance of overhead utilities. GFCI for all electrical hand tools.	Visual survey of all work areas.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP) Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice daily. Pulse rates at the start of each break if wearing impermeable clothing.
Equipment decontamination (hot water washing, soap and water washing, HCl and methanol rinse)		
General equipment decontamination hazards (hot water, slips, falls, equipment handling)	Level D PPE (see Section 5.0 of FSHP) plus: Nitrile or PVC gloves. Face shield and Saranax or rain suit when operating steam washer. Hazardous waste safety training	Daily safety inspections.
Noise (spray washer)	Hearing protection when washer is operating unless equipment-specific monitoring indicates that exposure is less than 85 dBA.	None.
Fire (decontamination solvents and gasoline)	Flammable material stored in original containers or in safety cans with flame arrestors. Fire extinguisher kept near decon area	Daily safety inspection.

Table 2-2. (continued)

Safety and Health Hazards	Controls	Monitoring Requirements
Exposure to chemicals	PPE (Level D) plus nitrile or equivalent gloves for contact with contaminated material. Washing face and hands prior to taking anything by mouth. Minimal contact. Site training must include hazards and controls for exposure to site contaminants and chemicals used on site. MSDSs on site. All chemical containers labeled to indicate contents and hazard. Medical clearance for hazardous waste work.	None.
Temperature extremes	Administrative controls (see Section 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Section 8.0 of FSHP) Chilled drinks if temperature exceeds 70°F.	Temperature measurements at least twice a day. Pulse rates at the start of each break if wearing impermeable clothing.

EC&HS = Environmental Compliance and Health and Safety
FSHP = Facility-wide Safety and Health Plan
GFCI = ground-fault circuit interruptor
HAZWOPER = Hazardous Waste Site Operations
MSDS = Material Safety Data Sheet
OE = Ordinance and Explosives
OSHA = Occupational Safety and Health Administration
PID = photoionization detector
PPE = personal protective equipment
PVC = polyvinyl chloride
RVAAP – Ravenna Army Ammunition Plant
SAIC = Science Applications International Corporation
SSHO= Site Safety and Health Officer
SSHP = Site Safety and Health Plan
USACE = U.S. Army Corps of Engineers

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]
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
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: 404°F	Inhalation Absorption Ingestion Contact
Gasoline (used for fuel)	TLV/TWA: 300 ppm IDLH: Ca	Potential carcinogen per NIOSH, dizziness, eye irritation, dermatitis	Liquid with aromatic odor; FP: -45°F; VP: 38-300 mm	Inhalation Ingestion Absorption Contact
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
Isopropyl alcohol (potentially used for equipment decontamination)	TLV/TWA: 400 ppm STEL: 500 ppm IDLH: 2000 ppm	Irritation of eyes, skin, respiratory system; drowsiness, headache	Colorless liquid with alcohol odor; VP: 33 mm; IP: 10.10 eV; FP: 53°F	Inhalation Ingestion Contact
Lead	TLV/TWA: 0.05 mg/m^3, A3 PEL/TWA: 0.05 mg/m^3 IDLH: 100 mg/m^3	Weakness, anorexia, abdominal pain, anemia	Solid metal; VP: 0 mm; FP: NA; IP: NA	Inhalation Ingestion Contact
Liquinox (used for decontamination)	TLV/TWA: None	Inhalation may cause local irritation to mucus membranes	Yellow odorless liquid (biodegradable cleaner); FP: NA	Inhalation Ingestion
Methanol (potentially used for equipment decontamination)	TLV/TWA: 200 ppm Skin notation IDLH: 6000 ppm	Irritation of eyes, skin, respiratory system; headache; optic nerve damage	Liquid; VP: 96 mm; IP: 10.84 eV; FP: 52°F	Inhalation Absorption Ingestion Contact

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]
HMX (octogen)	TLV/TWA: None established, toxicity assumed to be similar to RDX as compounds are very similar	Explosive; assumed irritation of eyes and skin, dizziness, weakness	Assumed similar to RDX- FP: explodes; VP: 0.0004 mm at 230°F	Assumed: Inhalation Absorption Ingestion Contact
RDX (cyclonite)	TLV/TWA: 0.5 mg/m^3, A4 Skin notation IDLH: none established	Explosive; irritation of eyes and skin, dizziness, weakness	White powder; FP: explodes; VP: 0.0004 mm at 230°F	Inhalation Absorption Ingestion Contact
TNT	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

[a]The potential chemicals were obtained from the *Ravenna Army Ammunition Plant Phase I Remedial Investigation Report* (USACE 1998).
[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; FP = flash point
PEL = permissible exposure limit; TWA = time-weighted average; IDLH = immediately dangerous to life and health
STEL = short-term exposure limit; VP = vapor pressure
TLV = threshold limit value; NA = not available; NIOSH = National Institute for Occupational Safety and Health

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 staff who will fill key roles. See the FSHP for information on the roles and responsibilities of key positions.

Table 3-1. Staff Organization

Position	Name	Phone
Program Manager (DACA62-00-D-0001)	Ike Diggs	865-481-8710
Health and Safety Manager	Steve Davis CIH, CSP	865-481-4755
Project Manager	Kevin Jago	865-481-4614
Field Operations Manager	TBD	TBD
Site Safety and Health Officer (SSHO)	Martha Clough	937-431-2249

CIH= Certified Industrial Hygienist
CSP = Certified Safety Professional

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4.0 TRAINING

Training requirements are outlined in the FSHP and in Table 2-2 of this SSHP Addendum. 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 (Section 2.0).

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6.0 MEDICAL SURVEILLANCE

Medical surveillance requirements are presented in the FSHP and in Table 2-2 of this SSHP Addendum.

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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 responses, have been established for this monitoring. In addition to the specified monitoring, the SSHO may perform, or require, additional monitoring such as organic vapor monitoring in the field laboratory or equipment decontamination area or personnel exposure monitoring 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 *CFR* 1910.20. The minimum monitoring requirements and action levels are presented in Table 7-1.

Most of the Phase II RI fieldwork is not expected to pose airborne exposure hazards for the following reasons:

- With the exception of field laboratory analyses, which will be performed in well-ventilated buildings, 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.
- The most probable contaminants (metals, explosives, propellants, and semivolatile organic compounds) are materials with relatively low vapor pressures.

Air monitoring of the breathing zone using a photoionization detector (PID) or equivalent is planned during soil sampling, groundwater monitoring well drilling, and Geoprobe work. The SSHO will 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 m (3 ft) from source or 0.36 m (14 in.)] in front of employee's shoulder	One to three feet below ground surface and if site conditions, such as discolored soil or chemical smells, indicate monitoring to be necessary	<5 ppm >5 ppm	Level D Withdraw and evaluate • evaluate need for PPE upgrade • identify contaminants • notify Project Manager and H&S Manager	Explosive screening using test kits, drilling, hand augering, power augering, sewer surveys, other intrusive work.
Flammability and oxygen content with combustible gas indicator	In manholes if manholes deeper than 4 feet will be entered.	Prior to entry.	<10% LEL and between 19.5 and 23.5% O_2 >10% LEL or <19.5% or >23.5% O_2	Continue and evaluate source Withdraw and allow area to ventilate; notify Project Manager and H&S Manager	Entry into manholes deeper than 4 feet
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 within the exclusion zone around power augers or other motorized 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	All	Continuously	Visible dust generation	Stop work; use dust suppression techniques such as wetting surface	All

H&S = Health and Safety
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. Requirements for maintaining standard operating procedures specific to the field laboratory are defined in Table 2-2.

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10.0 SITE CONTROL MEASURES

Site control measures are described in the FSHP. No formal site control is expected to be necessary for this work as the area is somewhat remote, fenced, and bystanders are not anticipated. If the SSHO determines that a potential exists for unauthorized personnel to approach within 25 feet of a work zone or otherwise be at risk due to proximity, then exclusion zones will be established as described in the FSHP.

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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 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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13.0 LOGS, REPORTS, AND RECORD KEEPING

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

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14.0 REFERENCES

Mogul Corporation. 1982. *Soil and Sediment Analysis Performed for Ravenna Arsenal, Ravenna, Ohio*.

NIOSH (National Institute for Occupational Safety and Health) 1997. *NIOSH Pocket Guide to Chemical Hazards, the Condensed Chemical Dictionary, 10th Edition*.

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