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SAMPLING AND ANALYSIS PLAN ADDENDUM NO. 3
FOR THE ...munition Plant
BIOLOGICAL MEAUREMENTS
AT ...ia, Ohio
WINKLEPECK BURNING GROUNDS
AT THE
RAVENNA ARMY AMMUNITION PLANT,
RAVENNA, OHIO

May 2002

Prepared for

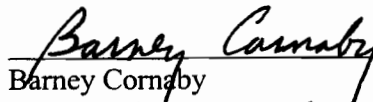
U.S. Army Corps of Engineers
Louisville District
Contract No. F44650-99-D-0007
ECAS Control No. 0275

Prepared by

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
151 Lafayette Drive, P.O. Box 2502
Oak Ridge, Tennessee 37831


CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Science Applications International Corporation (SAIC) has completed this Sampling and Analysis Plan Addendum No. 3 for the Biological Measurements at Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives; technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy.



Barney Cornaby
Study/Design Team Leader

May 3, 2002
Date




Kevin Jago
Independent Technical Review Team Leader

5-3-02
Date

Significant concerns and the explanation of the resolution are as follows:

Reference SAIC Document Review Record

As noted above, all concerns resulting from independent technical review of the project have been considered.



Principal w/ A-E firm

5/3/02
Date

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FINAL

Part I

**Sampling and Analysis Plan Addendum
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at
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ACRONYMS

IDW	investigation-derived waste
Ohio EPA	Ohio Environmental Protection Agency
QA	quality assurance
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound
WBG	Winklepeck Burning Grounds

1.0 INTRODUCTION

In an effort to develop, conduct, analyze, and report on new procedures to quantitatively evaluate ecological field conditions, especially as related to mathematically determined hazard quotients, Science Applications International Corporation (SAIC) has completed a significant amount of ecological field work at the Winklepeck Burning Grounds (WBG), located at the Ravenna Army Ammunition Plant (RVAAP) (see Figure 1-1). However, additional coordination with the Ohio Environmental Protection Agency (Ohio EPA) is required to address remaining issues, establish Ecological Protection Levels, and determine whether small mammals are adversely impacted by residual contaminants in the environment. As part of this effort, SAIC will conduct surface soil sampling at the three reference areas within the RVAAP facility (Figure 1-1).

This Sampling and Analysis Plan (SAP) Addendum for Biological Measurements at WBG has been prepared by SAIC under contract F44650-99-D-0007, ECAS Control Number 0275, with the U.S. Army Corps of Engineers (USACE), Louisville District. This SAP Addendum has been developed to tier under and supplement the *Facility-Wide Sampling and Analysis Plan for the Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 2001); hereafter referred to as the Facility-wide SAP. Except where provided in this SAP Addendum, the Facility-wide SAP provides all necessary information to execute this sampling effort. Only that information that is not provided in the Facility-wide SAP needed to execute this project is provided in this Addendum. Copies of the Facility-wide SAP and this SAP Addendum will be present at the work site.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

Table 2-1 presents the project organization and responsibilities for each position in the organization.

3.0 FIELD ACTIVITIES

As stated above, soil sampling locations for this study are located within three reference sites established during previous vegetation sampling during the summer of 2000 (Figures 3-1 through 3-3). Each reference site was subdivided into two parts, each measuring approximately 15 x 20 meters, during the vegetation sampling. Each part was further subdivided into 300 1 x 1 meter plots, numeric identifications were assigned, and 27 plots were selected for vegetation sampling using a random number generator.

For this soil sampling effort, the 27 previously selected 1 x 1 meter vegetation plots in each part of the reference sites were located and flagged in the field in April 2002 by the field operations manager and the field team leader for the vegetation sampling. Three to four of the 27 plots were then randomly selected and flagged for soil sampling.

Seven (7) representative surface soil samples from each of the three reference sites will be collected from a depth range of 0 to 0.3 meters (0 to 1 foot) for a total of 21 samples. These reference sites were selected based on common features to selected pads at WBG (Table 3-1). Each of the 21 samples will be subjected to laboratory analyses for explosives, target analyte list metals, cyanide, semivolatile organic compounds, volatile organic compounds (VOCs), pesticides, and polychlorinated biphenyls. Additionally, one sample from each of the three reference areas will be analyzed for propellants. The sampling locations at each reference site are shown on Figures 3-1 through 3-3. Table 3-1 presents the rationale for the location of samples.

Surface soil samples analyzed for explosives and propellants will be composite samples derived from three subsamples collected from about 0.9 meter (3 feet) from one another in a roughly equilateral triangle pattern as described in the Facility-wide SAP. Samples for all other analyses will be discrete samples from a point located at the approximate center of the triangle. VOC analyses will be collected at the center of the interval (0.5 feet) immediately upon extraction from the boring unless a zone of obvious contamination is observed.

If a zone of obvious contamination is observed, then the VOC sample will be collected from that zone. The surface soil samples will be collected in accordance with the Facility-wide SAP. A portable geopositioning system will be used to obtain final coordinate locations of each soil sample.

Field quality control will consist of field duplicates and split samples at a frequency of approximately 10 percent. Two (2) field duplicates and two (2) USACE quality assurance (QA) split samples will be collected during the sampling event. Split samples will be submitted to the USACE contract laboratory for independent analysis for QA testing. Duplicate and split samples will be derived from the same sampling station, selected on a random basis, and submitted for the same analyses as the environmental samples. Two rinsate blanks will be collected for surface soil equipment. Trip blanks will accompany all shipments containing aqueous VOCs.

Because sample locations are in clean reference locations, excess soil cuttings from surface soil locations will be used to backfill the 0 to 1 feet surface soil borings. In the case where insufficient excess soil cuttings are available to backfill the boring, the borings will be topped off with bentonite chips.

No unexploded ordnance avoidance support will be required during this sampling effort.

4.0 SAMPLE CHAIN OF CUSTODY/DOCUMENTATION

The sample identification listing is presented in Table 4-1. All other required information is included in the Facility-wide SAP.

5.0 SAMPLE PACKAGING AND SHIPPING REQUIREMENTS

The contract laboratory will provide courier service for coolers containing samples. Chain-of-custody forms will be hand carried by the courier to the laboratory. No airbills, "THIS END UP," or "FRAGILE" stickers will be required.

Coolers containing QA split samples that are designated for the USACE QA subcontractor laboratory will be prepared and shipped in accordance with the Facility-wide SAP.

6.0 INVESTIGATION-DERIVED WASTE

Only one type of investigation-derived waste (IDW) is anticipated for this project. Less than one 55-gallon drum of decontamination fluids is anticipated to be generated. All liquid non-indigenous (decontamination rinses) IDW will be contained in a labeled, Department of Transportation-approved, 55-gallon closed top drum staged at Building 1036. This drum will be characterized for disposal on the basis of a sample submitted for laboratory analysis for Toxicity Characteristic Leaching Procedure. A letter report will be submitted to the USACE, Ohio EPA, and RVAAP Environmental Coordinator documenting the characterization of the wastes and recommendations for disposal. Upon approval of the IDW classification report, the IDW will be removed from the site and disposed of by a licensed waste disposal contractor. The project goal is to characterize and dispose of all IDW within 90 days of completion of the field project.

7.0 REFERENCES

USACE 2001. *Facility-wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant, Ravenna, Ohio*, DACA62-00-D-0001, Delivery Order CY02, Final, March.

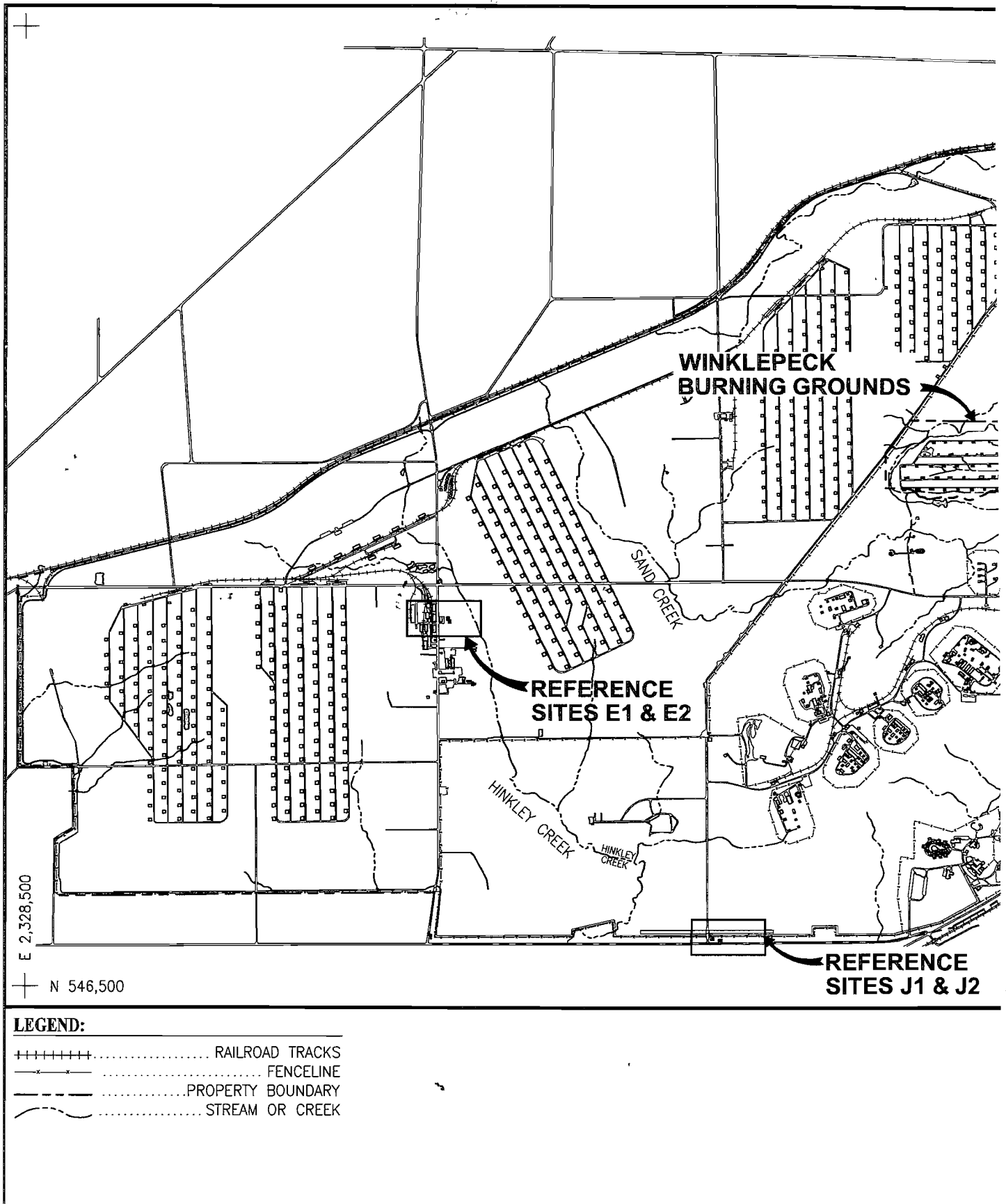
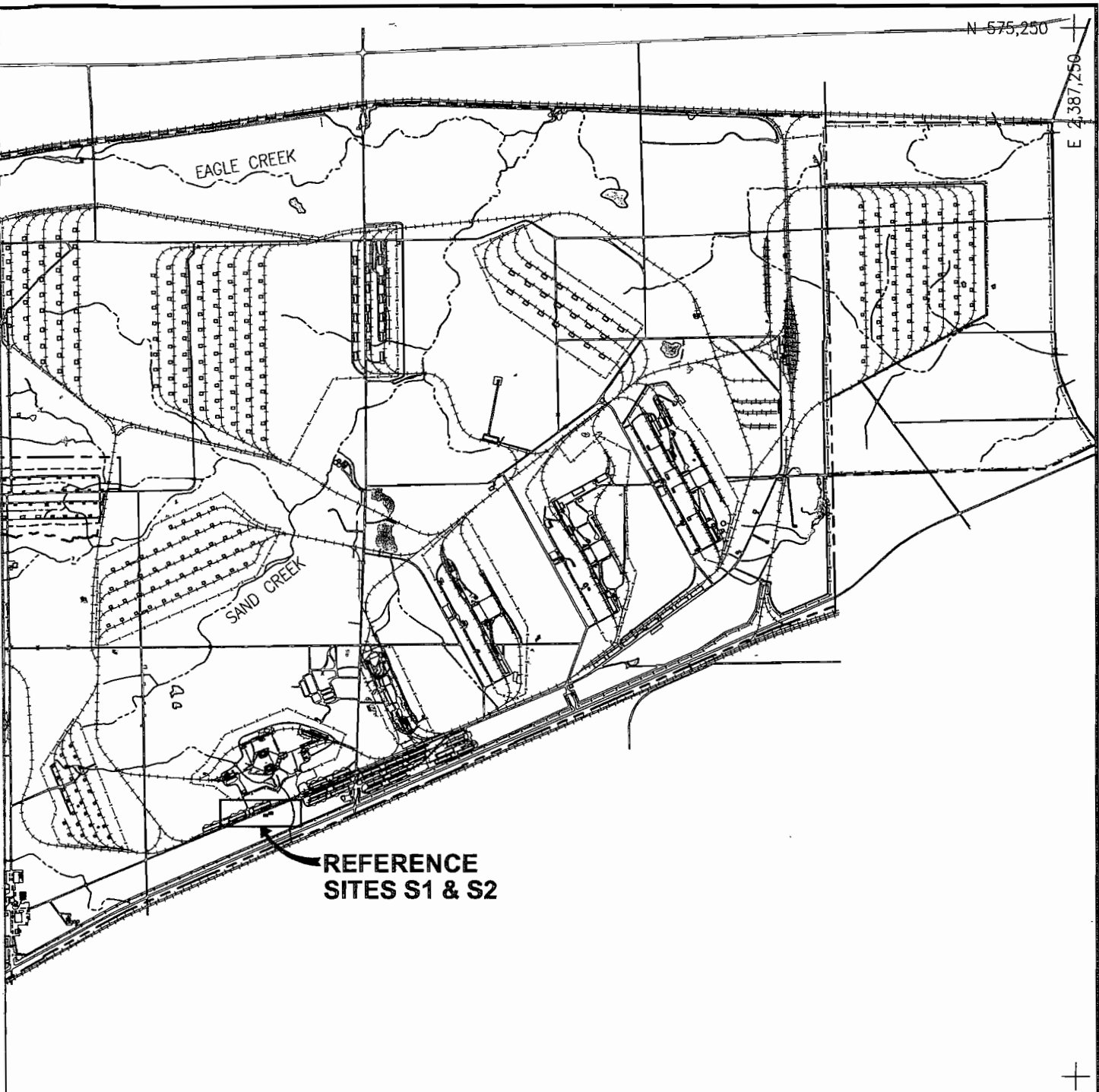
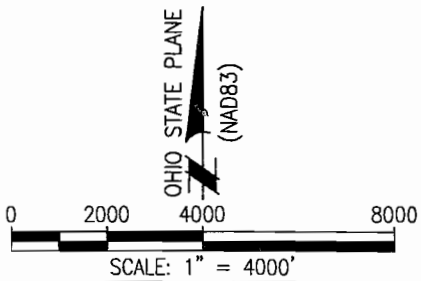



Figure 1-1. WBG and R



**REFERENCE
SITES S1 & S2**



 **U.S. ARMY ENGINEER DISTRICT**
CORPS OF ENGINEERS
 US Army Corps of Engineers
 Louisville District
LOUISVILLE, KENTUCKY

**RAVENNA ARMY
AMMUNITION PLANT
RAVENNA, OHIO**

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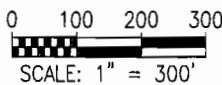


LEGEND:

- PRIMARY BUILDING
- REFERENCE AREA
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- STREAM
- POND
- WETLAND
- GROUND CONTOUR (10 FT. INT.)
- GROUND CONTOUR (2 FT. INT.)
- TREE OR TREELINE

OHIO STATE PLANE

(NAD 83)

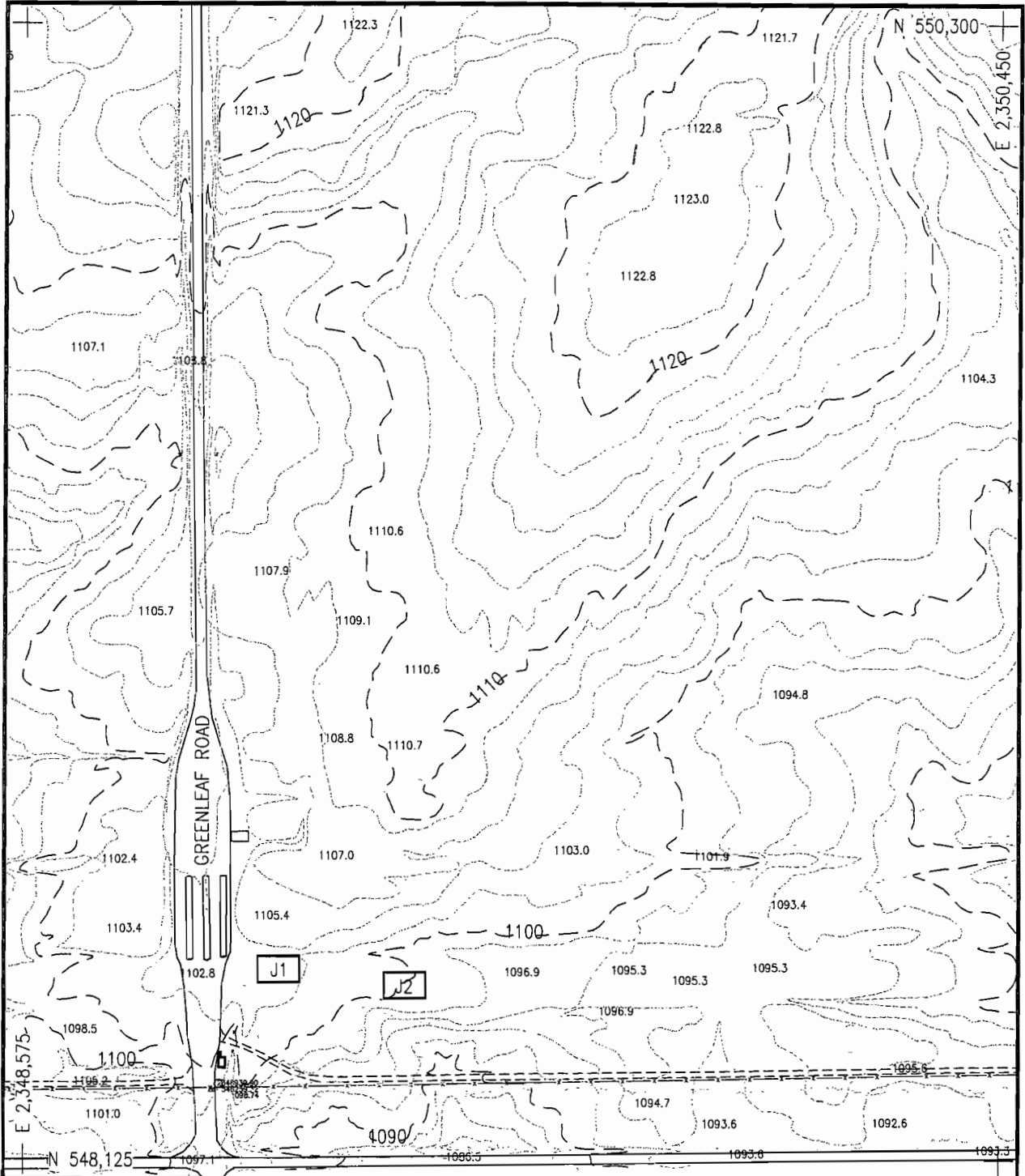


U.S. ARMY ENGINEER DISTRICT
 CORPS OF ENGINEERS
 US Army Corps of Engineers
 Louisville, Kentucky
 Louisville District

RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

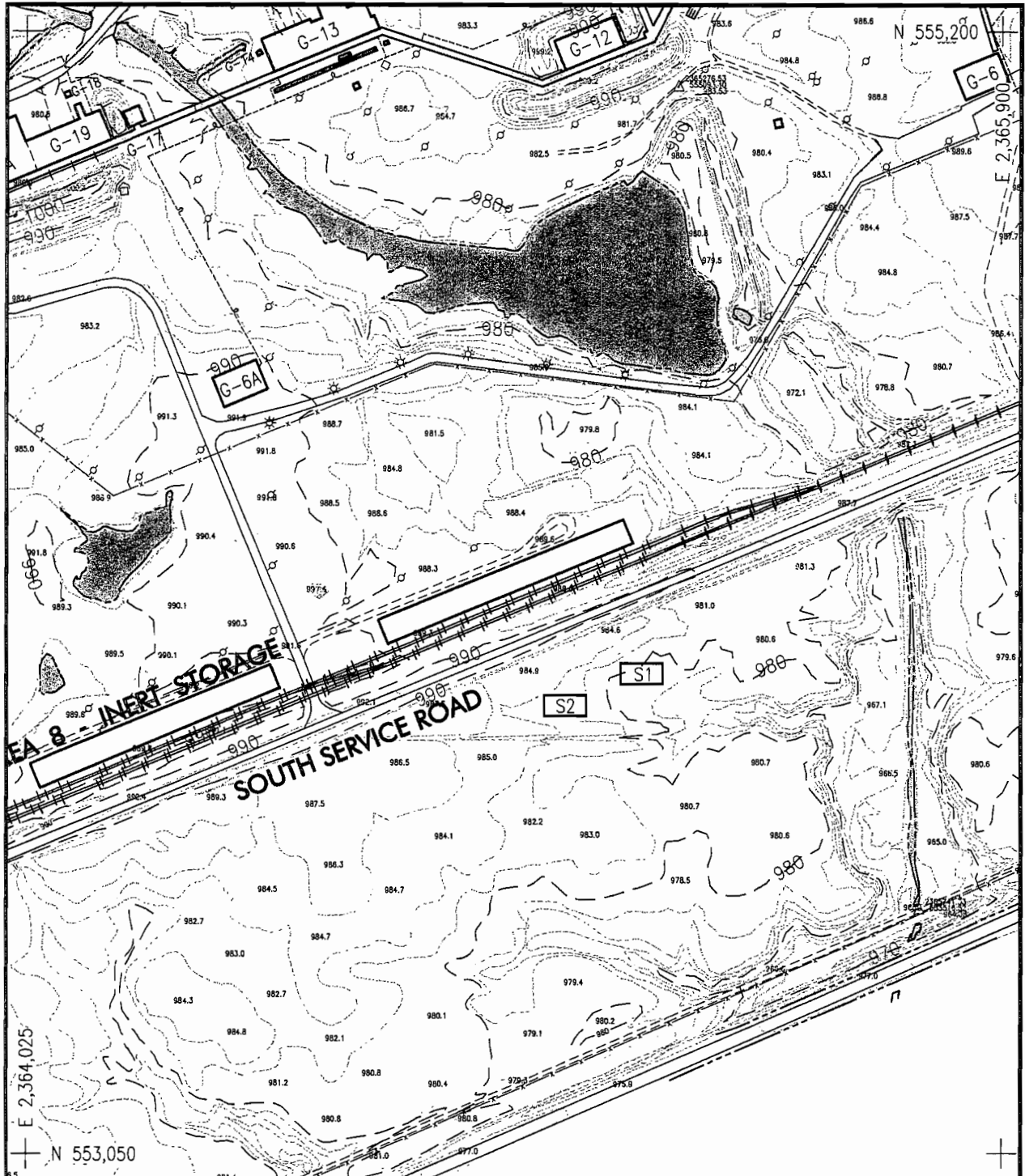
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Figure 3-1. Reference Sites E1 and E2



<p>LEGEND:</p> <ul style="list-style-type: none"> PRIMARY BUILDING REFERENCE AREA ASPHALT ROAD GRAVEL ROAD RAILROAD TRACKS FENCE LINE STREAM POND WETLAND GROUND CONTOUR (10 FT. INT.) GROUND CONTOUR (2 FT. INT.) TREE OR TREELINE 		<p>OHIO STATE PLANE (NAD 83)</p> <p>0 100 200 300</p> <p>SCALE: 1" = 300'</p>	<p> U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS US Army Corps of Engineers Louisville District LOUISVILLE, KENTUCKY</p> <p>RAVENNA ARMY AMMUNITION PLANT RAVENNA, OHIO</p>
<p>DRAWN BY: R. BEELER</p>	<p>REV. NO./DATE: 0 / 04-17-02</p>	<p>CAD FILE: /98026/DWGS/P37J1J2</p>	

Figure 3-2. Reference Sites J1 and J2



LEGEND: 	 SCALE: 1" = 300'	U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS Louisville District
RAVENNA ARMY AMMUNITION PLANT RAVENNA, OHIO		
DRAWN BY: R. BEELER	REV. NO./DATE: 0 / 04-15-02	CAD FILE: /98026/DWGS/P3751S2

Figure 3-3. Reference Sites S1 and S2

Table 2-1. Project Organization

POSITION	NAME
RVAAP Commanders Representative	John Cicero
RVAAP Environmental Coordinator	Mark Patterson
USACE – Louisville District Project Manager	Glen Beckham
USACE – Louisville District Technical Manger	John Jent
SAIC Program Manager	Bob Smith
SAIC Project Manager	Barney Cornaby
SAIC Technical Manager	Kevin Jago
SAIC Safety and Health Officer	Steve Davis
SAIC QA/QC Officer	Glen Cowart
SAIC CQC Field Operations Manager	Martha Clough
SAIC Logistics and IDW Coordinator	Martha Clough
SAIC Site Safety and Health Officer	Martha Clough
SAIC Laboratory Coordinator	Nile Luedtke
SAIC CQC Field Representative	Martha Clough
Waste Disposal Services	August Mack, Inc. (Joe Staneck)
Analytical Laboratory	Severn Trent Laboratories (Debbie Budd)
USACE QA Laboratory	GPL Laboratories (Debbie Griffiths)

CQC = contractor quality control.

IDW = investigation-derived waste.

QA = quality assurance.

RVAAP = Ravenna Army Ammunition Plant.

SAIC = Science Applications International Corporation.

USACE = U.S. Army Corps of Engineers.

Table 3-1. Rationale for Soil Sampling

Reference Site	WBG Burning Pads	Common Features of Burning Pads and Reference Sites	Reference Site Description	Sampling Rationale
E1 and E2	37 and 38	Slag, recent disturbance, flat, used to store materials, created 1980 and last used 1992.	Old field hospital site, graded and covered with slag, adjacent to Building A-9, Portage Army Depot.	Randomly selected surface soil samples collected from vegetation sampling areas.
J1 and J2	66 and 67	No surface slag or UXO, flat, herbaceous, created 1941 and last used no later than 1980.	Unpaved old air strip south of NACA test site.	Randomly selected surface soil samples collected from vegetation sampling areas.
S1 and S2	58 and 59	Little or no surface slag, flat and wet, bermed, shrubs and small trees adjacent, created 1941 and last used 1973.	Borrow pit off South Service Road near Load Line 4.	Randomly selected surface soil samples collected from vegetation sampling areas.

NACA = National Advisory Committee on Aeronautics.

UXO = unexploded ordnance.

WBG = Winklepeck Burning Grounds.

Table 4-1. WBG Biological Sampling at Reference Areas – Surface Soil

Reference Area	Plot	Depth (feet)	Station	Sample ID	Exp	Prop ^a	TAL Metals/Cyanide	SVOCs/PCBs/Pest	VOCs
E1	146	0 to 1	REF-001	REFss-001-3031-SO	1		1	1	1
	154	0 to 1	REF-002	REFss-002-3032-SO	1	1	1	1	1
	223	0 to 1	REF-003	REFss-003-3033-SO	1		1	1	1
E2	7	0 to 1	REF-004	REFss-004-3034-SO	1		1	1	1
	142	0 to 1	REF-005	REFss-005-3035-SO	1		1	1	1
	156	0 to 1	REF-006	REFss-006-3036-SO	1		1	1	1
	173	0 to 1	REF-007	REFss-007-3037-SO	1		1	1	1
J1	35	0 to 1	REF-008	REFss-008-3038-SO	1		1	1	1
	37	0 to 1	REF-009	REFss-009-3039-SO	1		1	1	1
	108	0 to 1	REF-010	REFss-010-3040-SO	1		1	1	1
	109	0 to 1	REF-011	REFss-011-3041-SO	1	1	1	1	1
J2	46	0 to 1	REF-012	REFss-012-3042-SO	1		1	1	1
	212	0 to 1	REF-013	REFss-013-3043-SO	1		1	1	1
	249	0 to 1	REF-014	REFss-014-3044-SO	1		1	1	1
S1	88	0 to 1	REF-015	REFss-015-3045-SO	1		1	1	1
	92	0 to 1	REF-016	REFss-016-3046-SO	1		1	1	1
	110	0 to 1	REF-017	REFss-017-3047-SO	1		1	1	1
	190	0 to 1	REF-018	REFss-018-3048-SO	1		1	1	1
S2	37	0 to 1	REF-019	REFss-019-3049-SO	1	1	1	1	1
	147	0 to 1	REF-020	REFss-020-3050-SO	1		1	1	1
	298	0 to 1	REF-021	REFss-021-3051-SO	1		1	1	1
Trip blanks ^b		NA	NA	TBD					1
Equip. Rins.		NA	NA	TBD	2	1	2	2	2
Duplicates		0 to 1	TBD	TBD	2	1	2	2	2
QA Splits (USACE)		0 to 1	TBD	TBD	2	1	2	2	2
Source Water		NA	NA	TBD	1	1	1	1	1
Total Samples				TBD	28	7	28	28	29

^aNitroguanidine, nitrocellulose, and nitroglycerine.

^bTrip blanks will be included only for shipments containing aqueous volatile organic compound samples.

NA = not analyzed.

TBD = to be determined.

FINAL

Part II

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ACRONYMS

GS	gas chromatography
MS	mass spectrometry
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QMP	Quality Management Plan
STL	Severn Trent Laboratories, Inc.
USACE	U.S. Army Corps of Engineers

Table 4-1. Container Requirements for Water, Soil, and Sediment Samples for the Load Lines 2, 3, and 4 Phase II RIs at RVAAP^{a, b}

Analyte Group	Approx. No. of Containers Incl. Field QC	Container	Minimum Sample Size	Preservative	Holding Time
<i>Trip Blanks, Source Water, and Equipment Rinsate (liquid)</i>					
VOCs	4	Three 40-mL glass vials with Teflon [®] -lined septum (no headspace)	80 mL	HCl to pH <2 Cool, 4°C	14 days
SVOCs	3	Two 1-L amber glass bottles with Teflon [®] -lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Pesticide compounds	3	Two 1-L amber glass bottles with Teflon [®] -lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
PCB compounds	3	Two 1-L amber glass bottles with Teflon [®] -lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Explosive compounds	3	Two 1-L amber glass bottles with Teflon [®] -lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Propellant compounds	2	Two 1-L amber glass bottles with Teflon [®] -lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Metals (total)	3	1-L polybottle	500 mL	HNO ₃ to pH <2 Cool, 4°C	180 days
Cyanide	3	1-L polybottle	500 mL	NaOH to pH >12 Cool, 4°C	14 days
<i>Soil</i>					
VOCs	25	One 2-ounce glass jar with Teflon [®] -lined cap (no headspace)	20 grams	Cool, 4°C	14 days
SVOCs	25	One 8-ounce wide-mouth glass jar with Teflon [®] -lined cap	100 grams	Cool, 4°C	14 days (extraction) 40 days (analysis)
Pesticide compounds	-	One 8-ounce wide-mouth glass jar with Teflon [®] -lined cap or use same container as SVOC, where possible	100 grams	Cool, 4°C	14 days (extraction) 40 days (analysis)
PCB compounds	-	One 8-ounce wide-mouth glass jar with Teflon [®] -lined cap or use same container as metals where possible	100 grams	Cool, 4°C	14 days (extraction) 40 days (analysis)
Explosive compounds	25	One 4-ounce glass jar with Teflon [®] -lined cap	100 grams	Cool, 4°C	14 days (extraction) 40 days (analysis)
Propellant compounds	5	One 4-ounce glass jar with Teflon [®] -lined cap	100 grams	Cool, 4°C	14 days (extraction) 40 days (analysis)
Metals	25	One 8-ounce wide-mouth glass jar with Teflon [®] -lined cap	50 grams	Cool, 4°C	180 days
Cyanide	-	Use same container as metals	25 grams	Cool, 4°C	14 days

^aAdditional sample will be collected on 5 percent of the samples for the completion of matrix spike/matrix spike duplicate.

^bSeparate containers required per the analytical laboratory for Toxicity Characteristic Leaching Procedure characterization samples.

PCB = polychlorinated biphenyl.

QC = quality control.

RI = remedial investigation

RVAAP = Ravenna Army Ammunition Plant.

SVOC = semivolatile organic compound.

VOC = volatile organic compound.

*Double check totals.

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QA	quality assurance
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STL	Severn Trent Laboratories, Inc.
USACE	U.S. Army Corps of Engineers

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) Addendum addresses supplemental project-specific information in relation to the Facility-wide QAPP for the Ravenna Army Ammunition Plant (USACE 2001). Except where provided in this QAPP Addendum, the Facility-wide QAPP provides all necessary information to execute this sampling effort. Only that information that is not provided in the Facility-wide QAPP needed to execute this project is provided in this Addendum. Copies of the Facility-wide QAPP and this QAPP Addendum will be present at the work site.

2.0 PROJECT DESCRIPTION

Sample matrix types, analytical parameters, and analytical methods are summarized in Table 2-1, in conjunction with anticipated sample numbers, quality assurance (QA) sample frequencies, and field quality control (QC) sample frequencies.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Analytical support for this work has been assigned to Severn Trent Laboratories, Inc. (STL). The majority of analysis will be completed by STL's North Canton, Ohio, facility, with explosive determinations being performed by the Knoxville, Tennessee, facility and nitrocellulose/nitroguanidine analyses being performed by the Sacramento, California, facility. These laboratories are validated by the U.S. Army Corps of Engineers (USACE) Hazardous, Toxic, and Radioactive Waste Center of Expertise, Omaha, Nebraska. STL's Quality Management Plan (QMP), Revision 4, January 2001, is available for review upon request. The laboratory's organizational structure, roles, and responsibilities are identified in Section 1 of their QMP and facility-specific Laboratory QMP. Addresses and telephone numbers for each of the STL facilities are listed below.

STL – general analytical services:

Debbie Budd
North Canton, Ohio Facility
4101 Shuffel Drive, N.W.
North Canton, OH 44720

Tel: (330) 497-9396
Fax: (330) 497-0772

STL – explosives analyses:

Knoxville, Tennessee Facility
5815 Middlebrook Pike
Knoxville, TN 37921

Tel: (865) 588-6401
Fax: (865) 584-4315

STL – nitrocellulose/nitroguanidine analyses:

Sacramento, California Facility
880 Riverside Parkway
West Sacramento, CA 95605

Tel: (916) 373-5600
Fax: (916) 372-1059

The QA laboratory contracted through the Louisville USACE is:

GP Environmental, Inc.
202 Perry Parkway
Gaithersburg, MD 20877

Contact: Debbie Griffiths (301) 926-6802

4.0 SAMPLING PROCEDURES

Table 4-1 summarizes sample container, preservation, and holding time requirements for the soil samples to be collected for this investigation. The number of containers required is listed in this table.

5.0 ANALYTICAL PROCEDURES

STL's QMP Section 8.0 and the facility-specific addenda for the North Canton, Knoxville, and Sacramento facilities will be followed during the analysis of these samples. The following laboratory standard operating procedures will implement the defined U.S. Environmental Protection Agency methods.

- Gas Chromatograph (GC)/Mass Spectrometer (MS) Volatile Organics Analysis Based on Methods 8240B and 8260B, SW-846, CORP-MS-0002, Rev. 2, 12/15/97.
- GC/MS Semivolatile Analysis Based on Methods 8270C, SW-846, CORP-MS-0001, Rev. 2, 12/15/97.
- GC Analysis Based on Methods 8000A, 8010B, 8020A, 8021A, 8080A, 8081, 8082, 8150B, and 8051, SW-846, CORP-GC-0001, Rev. 5.1, 03/30/99.
- Extraction and Cleanup of Organic Compounds from Water and Soil, Based on SW-846 3500 Series, 3600 Series, 8150, 8151, and 600 Series Methods, CORP-OP-0001, Rev. 3.4, 04/15/99.
- Analysis of Nitroaromatic and Nitramine Explosives by HPLC, KNOX-LC-0001, Rev. 1, 04/28/97.
- Total Organic Carbon and Total Inorganic Carbon, NC-WC-0017, Rev. 2, 02/15/99.
- Inductively Coupled Plasma-Atomic Emission Spectroscopy, Spectrometric Method for Trace Element Analysis, Methods 6010B and 200.7, CORP-MT-0001, Rev. 2, 12/15/97.
- Graphite Furnace Atomic Absorption Spectroscopy, SW-846 Methods 7000A and MCAWW 200 series methods, CORP-MT-0003, Rev. 1, 08/22/95.
- Mercury in Solid Samples by Cold Vapor Atomic Absorption, SW846 7471A and McAWW 245.5, CORP-MT-0005NC, Rev. 1.1, 04/19/97.
- Preparation and analysis of Nitrocellulose in Aqueous, Soil, and Sediments by Colorimetric Autoanalyzer, SAC-WC-0050, Rev. 0.

- Determination of Nitroaromatics, Nitramines, and Specialty Explosives in Water and Soil by High Performance Liquid Chromatography/Ultraviolet Detector (HPLC/UV) and Liquid Chromatography/Thermospray/Mass Spectrometry (LC/TSP/MS), SAC-LC-0001, Rev. 5.0.

STL facilities will at all times maintain a safe and contaminant-free environment for the analysis of samples. The laboratories will demonstrate, through instrument blanks, holding blanks, and analytical method blanks, that the laboratory environment and procedures will not and do not impact analytical results.

STL facilities will also implement all reasonable procedures to maintain project reporting levels for all sample analyses, as specified in the Facility-wide QAPP. Where contaminant and sample matrix analytical interferences impact the laboratory's ability to obtain project reporting levels, the laboratory will institute sample cleanup processes, minimize dilutions, adjust instrument operational parameters, or propose alternative analytical methods or procedures. Elevated reporting levels will be kept to a minimum throughout the execution of this work. When samples require dilution, both the minimum dilution and quantified dilution must be reported. STL will screen all samples to determine optimum dilution ranges. Dilution runs will be performed to quantitate high target analyte concentrations within the upper half of the calibration range, thus reducing the degree of dilution as much as possible. In addition, a five-times less diluted run will then be performed to report other target analyte reporting levels as low as possible without destroying analytical detectors and instrumentation. If there are matrix interferences, or high non-target analyte or target analyte concentrations that preclude analysis of an undiluted sample, the laboratory project manager will contact SAIC and Louisville District, forward analytical and chromatographic information from diluted runs, and obtain direction on how to proceed.

6.0 INTERNAL QUALITY CONTROL CHECKS

Two (2) QC field duplicates and two (2) USACE QA split samples will be collected during this investigation. One source water blank of water used for decontamination will be collected. Trip blanks will accompany all aqueous samples for volatile organic compound analysis. Two rinsate blanks will be collected from the soil sampling equipment.

7.0 REFERENCES

USACE 2001. Facility-wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant, Ravenna, Ohio, DACA62-00-D-0001, Delivery Order CY02, Final, March.

Table 2-1. Sampling and Analytical Requirements

Parameter	Methods	Field Samples	Field Duplicate Samples	Site Source Water ^a	Rinsate Samples	Trip Blanks ^b	Total A-E Samples	USACE QA Split Samples	USACE Trip Blanks
<i>Soil</i>									
Volatile organics, TCL	SW-846, 5030/8260B	21	2	1	2	1	27	2	-
Semivolatile organics, TCL	SW-846, 3540/8270C	21	2	1	2	-	26	2	-
Pesticides, TCL	SW-846, 3540/8081A	21	2	1	2	-	26	2	-
PCBs, TCL	SW-846, 3540/8082	21	2	1	2	-	26	2	-
Explosives	SW-846, 8330	21	2	1	2	-	26	2	-
Propellants ^c	SW-846, 8330/9056	3	1	1	1	-	6	1	-
Metals, TAL	SW-846, 6010B/7471	21	2	1	2	-	26	2	-
Cyanide	SW-846, 9011/9012A	21	2	1	2	-	26	2	-

^aNitroguanidine, nitrocellulose, and nitroglycerine.

^bTrip blanks will be included only with aqueous samples for volatile organic compound analyses.

A-E = Architect-Engineer.

PCBs = polychlorinated biphenyls.

QA = quality assurance.

TCL = target compound list.

USACE = U.S. Army Corps of Engineers.

Table 4-1. Container Requirements for Water, Soil, and Sediment Samples for the Load Lines 2, 3, and 4 Phase II RIs at RVAAP^{a, b}

Analyte Group	Approx. No. of Containers Incl. Field QC	Container	Minimum Sample Size	Preservative	Holding Time
<i>Trip Blanks, Source Water, and Equipment Rinsate (liquid)</i>					
VOCs	4	Three 40-mL glass vials with Teflon [®] -lined septum (no headspace)	80 mL	HCl to pH <2 Cool, 4°C	14 days
SVOCs	3	Two 1-L amber glass bottles with Teflon [®] -lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Pesticide compounds	3	Two 1-L amber glass bottles with Teflon [®] -lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
PCB compounds	3	Two 1-L amber glass bottles with Teflon [®] -lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Explosive compounds	3	Two 1-L amber glass bottles with Teflon [®] -lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Propellant compounds	2	Two 1-L amber glass bottles with Teflon [®] -lined lid	1,000 mL	Cool, 4°C	7 days (extraction) 40 days (analysis)
Metals (total)	3	1-L polybottle	500 mL	HNO ₃ to pH <2 Cool, 4°C	180 days
Cyanide	3	1-L polybottle	500 mL	NaOH to pH >12 Cool, 4°C	14 days
<i>Soil</i>					
VOCs	25	One 2-ounce glass jar with Teflon [®] -lined cap (no headspace)	20 grams	Cool, 4°C	14 days
SVOCs	25	One 8-ounce wide-mouth glass jar with Teflon [®] -lined cap	100 grams	Cool, 4°C	14 days (extraction) 40 days (analysis)
Pesticide compounds	-	One 8-ounce wide-mouth glass jar with Teflon [®] -lined cap or use same container as SVOC, where possible	100 grams	Cool, 4°C	14 days (extraction) 40 days (analysis)
PCB compounds	-	One 8-ounce wide-mouth glass jar with Teflon [®] -lined cap or use same container as metals where possible	100 grams	Cool, 4°C	14 days (extraction) 40 days (analysis)
Explosive compounds	25	One 4-ounce glass jar with Teflon [®] -lined cap	100 grams	Cool, 4°C	14 days (extraction) 40 days (analysis)
Propellant compounds	5	One 4-ounce glass jar with Teflon [®] -lined cap	100 grams	Cool, 4°C	14 days (extraction) 40 days (analysis)
Metals	25	One 8-ounce wide-mouth glass jar with Teflon [®] -lined cap	50 grams	Cool, 4°C	180 days
Cyanide	-	Use same container as metals	25 grams	Cool, 4°C	14 days

^aAdditional sample will be collected on 5 percent of the samples for the completion of matrix spike/matrix spike duplicate.

^bSeparate containers required per the analytical laboratory for Toxicity Characteristic Leaching Procedure characterization samples.

PCB = polychlorinated biphenyl.

QC = quality control.

RI = remedial investigation

RVAAP = Ravenna Army Ammunition Plant.

SVOC = semivolatile organic compound.

VOC = volatile organic compound.

*Double check totals.

FINAL

Part III

**SITE SAFETY AND HEALTH PLAN ADDENDUM NO. 3
FOR THE
BIOLOGICAL MEASUREMENTS
AT
WINKLEPECK BURNING GROUNDS
AT THE
RAVENNA ARMY AMMUNITION PLANT,
RAVENNA, OHIO**

May 2002

Prepared for

**U.S. Army Corps of Engineers
Louisville District
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Prepared by

**SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
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APPROVALS

**SITE SAFETY AND HEALTH PLAN ADDENDUM NO. 3
FOR THE
BIOLOGICAL MEASUREMENTS
AT THE
WINKLEPECK BURNING GROUNDS
AT THE
RAVENNA ARMY AMMUNITION PLANT,
RAVENNA, OHIO**

May 2002

Barney W. Cornaby _____ *May 3, 2002*
Barney Cornaby, Phone 865-481-8721 Date
SAIC Project Manager

Stephen L Davis _____ *5/3/02*
Stephen Davis, CIH (#4213), CSP (#10044), Phone 865-481-4755 Date
SAIC Health and Safety Officer

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ACRONYMS

FSHP	Facility-wide Safety and Health Plan
SAIC	Science Applications International Corporation
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
UXO	unexploded ordnance

1.0 INTRODUCTION

The Facility-wide Safety and Health Plan (FSHP) addresses the program issues and hazards and hazard controls common to the entire Ravenna Army Ammunition Plant. This Site Safety and Health Plan (SSHP) Addendum to the FSHP serves as the lower-tier document addressing the hazards and controls specific to this project. Where information is presented in the FSHP, it will not be repeated here. Copies of the FSHP and this SSHP Addendum will be present at the work site.

Science Applications International Corporation (SAIC) will perform surface soil sampling at three reference areas correlating to burn pads at Winklepeck Burning Grounds chosen based on similarities in soil, vegetation, and other environmental characteristics. These reference areas are clean, non-contaminated, and free of any unexploded ordnance (UXO).

Specific tasks to be conducted include:

- Collect surface soil samples from the three (3) reference areas
- Decontaminate sampling equipment.

Potential hazards posed by the tasks planned include hand tools for vegetation clearing, decontamination solvent fires, chemical exposure, temperature extremes, stinging/biting insects, poisonous plants, and snakes. These hazards will be minimized through the application of various control measures detailed elsewhere in this document.

The potential for chemical overexposure appears to be very low given the nature of the planned tasks. This investigation will be performed in Level D personal protection equipment, plus chemical-resistant gloves will be used when handling soils, unless the potential for increased risk becomes apparent during the investigation. Protective procedures, including protective clothing, will be upgraded as necessary by the Site Safety and Health Officer (SSHO) based on judgment. A detailed analysis of these hazards and specific appropriate controls is provided.

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.

Specific tasks are as follows:

- surface soil sampling with hand augers or scoops,
- vegetation clearing with machetes,
- civil surveying,
- investigation-derived waste handling and disposition, 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

Information on the reagents and chemicals that will be used for the project is contained in Table 2-3. Site contaminants are not expected since the sampling areas chosen are reported to be non-contaminated and free from UXO. Exposure to chemical tools, such as corrosive sample preservatives or flammable fuels, is a possibility and will be controlled through standard safe handling practices.

3.0 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

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.

4.0 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

Since the sample areas are expected to be non-contaminated and free of UXO, no monitoring is planned for this task. The SSHO will examine site conditions and will contact the Health and Safety Manager and initiate monitoring if there is any indication of potential airborne exposure.

5.0 SITE CONTROL MEASURES

The planned activities will not require site control measures under normal circumstances. If site conditions require site control, it will be implemented as described in the FSHP.

6.0 EMERGENCY PROCESURES 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 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.

Each field team shall have a hand-held, two-way radio for communications purposes.

During field operations, at least one American Red Cross 43-hour Emergency Response-certified person shall be present. All on-site personnel shall have current Hazardous Waste Site Operations training, respirator fit test, medical clearance, and CPR/first aid training.

7.0 REFERENCES

USACE 2001. *Facility-wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant, Ravenna, Ohio*, DACA62-00-D-0001, Delivery Order CY02, Final, March.

Table 2-1. Hazards Inventory

Yes	No	Hazard
	X	Confined space entry
	X	Excavation entry (excavations will not be entered)
	X	Heavy equipment (drill rigs, backhoe)
X		Fire and explosion (fuels)
	X	Electrical shock (utilities and tools)
X		Exposure to chemicals (chemical tools)
X		Temperature extremes
X		Biological hazards (poison ivy, Lyme disease)
	X	Radiation or radioactive contamination
	X	Noise (excavation equipment, powered auger, drill rig)
	X	Drowning
	X	OE (potential to encounter unexploded ordnance)

Table 3-1. Staff Organization

Position	Name	Phone
Program Manager	Bob Smith	(702) 792-0203
Health and Safety Manager	Steve Davis CIH, CSP	(865) 481-4755
Project Manager	Barney Cornaby	(865) 481-8721
Technical Manager	Kevin Jago	(865) 481-4614
Field Operations Manager	Martha Clough	(330) 405-5804
Site Safety and Health Officer (SSHO)	Martha Clough	(330) 405-5804
Emergency Responder	Martha Clough	(330) 405-5804

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

Table 2-2. Hazard Analysis

Safety and Health Hazard	Controls	Monitoring
<i>Vegetation Clearing with Chainsaws, Machetes, and Sling Blades</i>		
General safety hazards (contact with sharp edges, slips, falls)	Level D PPE: long pants, shirts with sleeves, safety shoes or boots, safety glasses, plus heavy-duty work gloves and hard hat (see Chapter 5.0 of FSHP). 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. Exclusion zone if there is a potential for entry of unauthorized personnel. Chainsaw use requires: hearing protection, safety shoes or boots, safety glasses or faceshield, heavy duty work gloves, and chainsaw chaps. Chainsaws must have anti-kickback protection and be adjusted so that the chain does not turn when idling. Chainsaws must be allowed to cool 5 minutes before fueling. Chainsaws must not be started in fuel storage area.	Daily site safety inspections.
Temperature extremes	Administrative controls (see Chapter 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Chapter 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.
4 Biological hazards (bees, ticks, Lyme disease, histoplasmosis, wasps, snakes, West Nile Virus)	PPE (boots, work clothes). Insect repellent on boots, pants, and elsewhere, as necessary to repel ticks and mosquitoes. 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 workday (see Chapter 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Chapter 9.0 of FSHP).	Visual survey.
<i>Soil Sampling Using Hand Augers or Scoops</i>		
General safety hazards (manual lifting, slips, falls)	Level D PPE: long pants, shirts with sleeves, safety shoes or boots, safety glasses, and work gloves for manual work (see Chapter 5.0 of FSHP). Buddy system. Hazardous waste safety training.	Daily site safety inspections.
Exposure to chemicals	Level D PPE plus nitrile or equivalent gloves for contact with contaminated material. Wash face and hands prior to taking anything by mouth. Stay upwind of any dust-generating activities. Hazardous waste 40-hour certification training and medical clearance must be current. Site training must include hazards and controls for all chemicals used on-site. MSDSs for chemical tools on-site. Chemical containers labeled to indicate contents and hazard.	Visual monitoring for dust.
Temperature extremes	Administrative controls (see Chapter 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Chapter 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. Hazard Analysis (continued)

Safety and Health Hazard	Controls	Monitoring
Biological hazards (bees, ticks, Lyme disease, histoplasmosis, wasps, snakes, West Nile Virus)	PPE (boots, work clothes). Insect repellent on boots, pants, and elsewhere, as necessary to repel ticks and mosquitoes. 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 workday (see Chapter 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Chapter 9.0 of FSHP).	Visual survey.
<i>Investigation-Derived Waste Handling</i>		
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 hard hat if overhead hazards are present (see Chapter 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 greater than 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.
Exposure to chemicals	Level D PPE plus nitrile or equivalent gloves for contact with contaminated material. Wash face and hands prior to taking anything by mouth. Hazardous waste 40-hour certification training and medical clearance must be current. Site training must include hazards and controls for exposure to site contaminants and chemicals used on-site.	Daily safety inspections.
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 meters (25 feet) of any noisy drum moving equipment unless equipment-specific monitoring indicates exposures less than 85 dBA.	Daily safety inspections.
Biological hazards (bees, ticks, Lyme disease, histoplasmosis, wasps, snakes, West Nile Virus)	PPE (boots, work clothes). Insect repellent on pants, boots, and elsewhere, as necessary to repel ticks and mosquitoes. 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 workday (see Chapter 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Chapter 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 Chapter 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Chapter 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. Hazard Analysis (continued)

Safety and Health Hazard	Controls	Monitoring
<i>Equipment Decontamination (Soap and Water Washing, HCl, and Methanol Rinse)</i>		
General equipment decontamination hazards (hot water, slips, falls, equipment handling)	Level D PPE plus nitrile or PVC gloves (see Chapter 5.0 of FSHP). Hazardous waste safety training.	Daily safety inspections.
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.
Exposure to chemicals	Level D PPE plus nitrile or equivalent gloves for contact with contaminated material. Wash face and hands prior to taking anything by mouth. Minimal contact. Hazardous waste 40-hour certification training and medical clearance must be current. 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. Fifteen-minute eyewash on-site if working with more than 40 mL of hydrochloric acid.	None.
Temperature extremes	Administrative controls (see Chapter 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Chapter 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.
<i>Civil Surveys and Visual Surveys</i>		
General safety hazards (moving equipment, slips, falls)	Level D PPE: long pants, shirts with sleeves, safety glasses, safety shoes or boots, and hard hats if overhead hazards are present (see Chapter 5.0 of the FSHP). Hazardous waste safety (40-hour) and site-specific training, buddy system, proper and housekeeping.	Daily safety inspections.
Exposure to chemicals	Nitrile or similar gloves for contact with potentially contaminated material. Gloves will be disposed after single use. Wash 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.
Biological hazards (bees, ticks, Lyme disease, histoplasmosis, wasps, snakes, West Nile Virus)	PPE (boots, work clothes). Insect repellent on boots, pants, and elsewhere, as necessary to repel ticks and mosquitoes. Pant legs tucked into boots or otherwise closed to minimize tick entry. Inspect for ticks during the day and at the end of each workday (see Chapter 9.0 of FSHP). Avoidance of accumulations of bird or bat droppings (see Chapter 9.0 of FSHP).	Visual survey.

Table 2-2. Hazard Analysis (continued)

Safety and Health Hazard	Controls	Monitoring
Temperature extremes	Administrative controls (see Chapter 8.0 of FSHP). Cooled (shaded) or warmed break area depending on the season. Routine breaks in established break area (see Chapter 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.

FSHP = Facility-wide Safety and Health Plan.

GFCI = ground fault circuit interrupter.

MSDS = Material Safety Data Sheet.

PPE = personal protective equipment.

PVC = polyvinyl chloride.

Table 2-3. Potential Exposures

Chemical	TLV/PEL/STEL/IDLH ^a	Health Effects/ Potential Hazards ^b	Chemical and Physical Properties ^b	Exposure Route(s) ^b
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 Flammable liquid	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
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 Flammable liquid	Inhalation Absorption Ingestion Contact

^aFrom 1999 Threshold Limit Values, *NIOSH Pocket Guide to Chemical Hazards, 1997*.

^bFrom 1997 *NIOSH Pocket Guide to Chemical Hazards, the Condensed Chemical Dictionary, Tenth Edition*.

FP = flash point (in degrees fahrenheit).

IDLH = immediately dangerous to life and health.

IP = ionization potential (in electron volts).

NA = not applicable.

NIOSH = National Institute for Occupational Safety and Health.

PEL = permissible exposure limit.

ppm = parts per million.

STEL = short-term exposure limit.

TLV = threshold limit value.

TWA = time-weighted average.

VP = vapor pressure (in millimeters).