

**FINAL
SAMPLING AND ANALYSIS PLAN
(FIELD SAMPLING PLAN AND QUALITY
ASSURANCE PROJECT PLAN)**

**NON-TIME-CRITICAL REMOVAL ACTION
for
ARSENIC CONTAMINATED SOIL**

**SITE 95 MAGNOLIA ROAD
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**



Prepared for
Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic Division

Contract No. N40085-08-D-1409
CTO: 0003

April 2010

Prepared by
Rhēa Engineers & Consultants, Inc.



SAP Worksheet #1 -- Title and Approval Page

**SAMPLING AND ANALYSIS PLAN
(Field Sampling Plan and Quality Assurance Project Plan)
Non-Time-Critical Removal Action
For
Arsenic Contaminated Soil
Site 95 Magnolia Road
Marine Corps Base, Camp Lejeune, North Carolina**

April 2010

Prepared for
Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic
Camp Lejeune, North Carolina

Prepared by
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Prepared under
Contract No. N40085-08-R-1409
CTO: 0003

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Beth Cockcroft 5/10/2010
Beth Cockcroft/Rhēa/Chemist/Date

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DN: c=US, o=U.S. Government, ou=DoD, ou=PKI,
ou=USN, cn=BOWERS.KENNETH.A.1230092474
Date: 2009.10.28 14:38:48 -04'00'
Kenneth Bowers NAVFAC (QAO) Chemist/Date

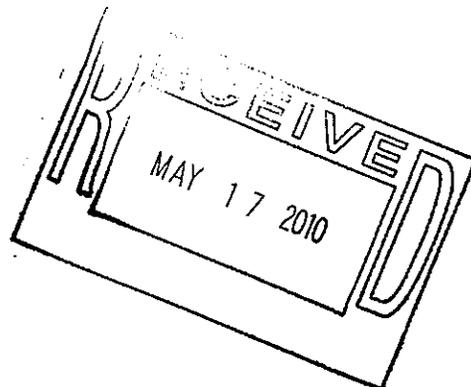
Other Approval Signatures:

David Cleland 13 April 2010
David Cleland/NAVFAC
Remedial Project Manager/Date

Robert Lowder 5/6/10
Robert Lowder/Camp Lejeune EMD/Date

Gena Townsend 4/13/2010
Gena Townsend/USEPA RPM/Date

Randy McElveen 5/6/2010
Randy McElveen/NCDENR RPM/Date



EXECUTIVE SUMMARY

This Sampling and Analysis Plan (SAP) provides the procedures and requirements to be implemented for collecting the proposed soil samples for Magnolia Road (Site 95) at Marine Corps Base Camp Lejeune (MCB CamLej), North Carolina, and was prepared in accordance with the requirements of the Uniform Federal Policy - Sampling and Analysis Plan (UFP-SAP) (United States Environmental Protection Agency [USEPA 2005]) and USEPA Guidance for Quality Assurance Project Plans, USEPA QA/G-5, QAMS (USEPA 2002). The Navy, Naval Facilities Engineering Command (NAVFAC), Mid-Atlantic Division, and MCB CamLej Environmental Management Division (EMD) are conducting this sampling under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). USEPA Region 4 is the lead regulatory agency and North Carolina Department of Environment and Natural Resources (NCDENR) is the state regulatory agency.

The objective of the soil sampling is to confirm the clean-up of arsenic contaminated soil at Site 95. Thirty locations will be screened with an X-ray fluorescence (XRF) unit. Five soil samples will be collected from the final excavation based on field observations and XRF results. One sample will be collected from each sidewall and one from the bottom. Soil samples will be analyzed for Total Arsenic by USEPA Method 6010. Katahdin Analytical Services, Inc. will provide analytical services for this project. Data validation will occur on the confirmation samples to ensure proper laboratory procedures were used and the resulting data is of the quality necessary to obtain site closure.

This SAP serves to guide the sampling effort so that the analytical data generated from the soil sampling will meet the quantity and quality necessary to provide technically sound and defensible assessment for the clean-up of the identified arsenic contaminated soil at Site 95.

Included within the scope of work of the Non-Time-Critical Removal Action (NTCRA) is the abandonment of the nine existing monitoring wells at the three Site 95 locations, Magnolia Road, Lyman Road and Jaybird Road. The well abandonment will be conducted in accordance with North Carolina well abandonment regulations.

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LIST OF ACRONYMS & ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirement
Baker	Baker Environmental, Inc.
Base	Camp Lejeune Marine Corps Base
bgs	below ground surface
CAS	Chemical Abstracts Service
CCV	Continuing Calibration Verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chain of Custody
CTO	Contract Task Order
DDD	4,4'- Dichlorodiphenyldichloroethane
DDE	4,4' -Dichlorodiphenyldichloroethylene
DDT	4,4' -Dichlorodiphenyltrichloroethane
DUP	Duplicate Sample
DQI	Data Quality Indicators
EB	Equipment Blank
EDD	Electronic Data Deliverable
EE/CA	Engineering Evaluation/Cost Analysis
EMD	Environment Management Division
EQB	Environmental Quality Branch
FB	Field Blank
FTL	Field Team Leader
GIS	Global Information System
GPS	Global Positioning System
HAZWOPER	Hazardous Waste Operations and Emergency Response
HHR	Human Health Risk
ICP	Inductively Coupled Plasma
ICP-AES	Inductively Coupled Plasma-Atomic Emissions Spectrometry
ID	Identification Number
IDW	Investigation Derived Waste

Katahdin	Katahdin Analytical Services, Inc.
LCS	Laboratory Control Sample
LFB	Laboratory Fortified Blank
LUCs	Land Use Controls
MCB CamLej	Marine Corps Base Camp Lejeune
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
mg/kg	milligram per kilogram
mg/L	milligram per liter
MSL	Mean Sea Level
MS/MSD	Matrix Spike/Matrix Spike Duplicate
N/A	Not Applicable
NAVFAC	Naval Facilities Engineering Command
NCDENR	North Carolina Department of Environment and Natural Resources
NC SSL	North Carolina Soil Screening Levels
NCTSV	North Carolina Federal Remediation Branch Target Screening Values
NIRIS	Naval Installation Restoration Information Solution
NTCRA	Non-Time-Critical Removal Action
NELAC	National Environmental Laboratory Accreditation Conference
OU	Operable Unit
PCB	Polychlorinated biphenyls
PPE	Personal Protective Equipment
PRGs	Preliminary Remediation Goals
PQL	Practical Quantitation Limit
PQOs	Project Quality Objectives
PT	Performance Test
QAMS	Quality Assurance Management System
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QL	Quantitation Limit
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
Rhēa	Rhēa Engineers & Consultants, Inc.
RPD	Relative Percent Difference

RPM	Remedial Project Manager
RSLs	Regional Screening Levels
RSD	Relative Standard Deviation
SAP	Sampling and Analysis Plan
SHPO	State Historic Preservation Office
SHSO	Site Health and Safety Officer
Site 95	Site 95 Magnolia Road
SI	Site Investigation
SOPs	Standard Operating Procedures
SSL	Soil Screening Level
SVOCs	Semi Volatile Organic Compounds
TAL	Target Analyte List
TBC	To Be Considered
TBD	To Be Determined
TCLP	Toxicity Characteristic Leaching Procedure
UFP-SAP	Uniform Federal Policy – Sampling and Analysis Plan
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
XRF	X-ray Fluorescence

SAP Worksheet #2 -- Identifying Information

Site Name/Project Name: Site 95 Magnolia Road

Title: Site 95 NTCRA

Site Location: MCB CamLej

Revision Number: 4

Site Number/Code: Site 95

Revision Date: 4/2/10

Operable Unit: Not Applicable (N/A)

Contractor Name: Rhēa Engineers & Consultants, Inc. (Rhēa)

Contractor Number: N40085-08-R-1409

Contract Title:

Work Assignment Number: Task Order No. 0003

1. This Sampling and Analysis Plan (SAP) was prepared in accordance with the requirements of the Uniform Federal Policy - Sampling and Analysis Plan (UFP-SAP) [United States Environmental Protection Agency (USEPA) 2005] and Guidance for Quality Assurance Project Plans (QAPP), EPA QA/G-5, QAMS (USEPA 2002).
2. Identify regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
3. The SAP is (select one): Generic Project Specific
4. List dates of scoping sessions that were held:
 - Partnering Team Meeting October 2008
 - Partnering Team Meeting January 2009
 - Partnering Team Meeting April 2009
 - Partnering Team Meeting November 2009
 - Partnering Team Meeting February 2010
5. List dates and titles of SAP documents written for previous site work, if applicable:
Refer to UFP-SAP Worksheet #13 for previous documents related to previous site investigations.
6. List organizational partners (stakeholders) and connection with lead organization:
 - Lead Organization: United States Navy (Naval Facilities Engineering Command (NAVFAC) – Mid Atlantic) and Marine Corps Base Camp Lejeune (MCB CamLej)
 - Lead Regulatory Agency: USEPA, Region 4;
 - State Regulatory Agency: North Carolina Department of Environment and Natural Resources (NCDENR); and
 - Local Organization: MCB CamLej Environment Management Division (EMD).
7. List data users:
 - Lead Organization and Regulatory Agencies.
8. If any required SAP elements and required information are not applicable to the project, then circle the omitted SAP elements and required information on the attached table. Provide an explanation for their exclusions below:

All required SAP elements are included within this document; therefore, the crosswalk table is not required and has been removed from this document.

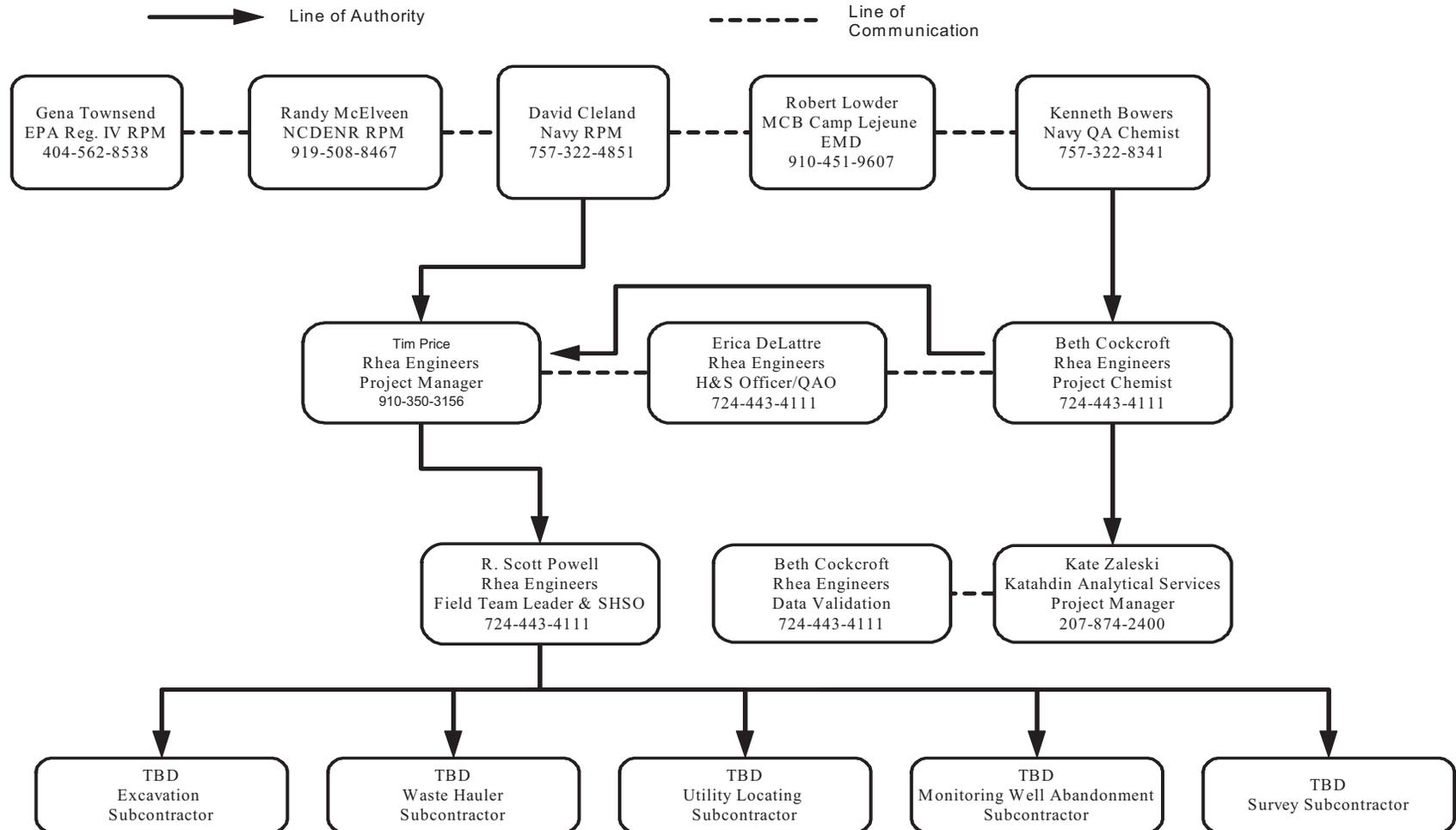
SAP Worksheet #3 -- Distribution List

SAP Recipients	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control Number (Optional)
Mr. David Cleland	Remedial Project Manager	NAVFAC-Mid-Atlantic	(757) 322-4851	(757) 322-8280	david.t.cleland@navy.mil	
Mr. Robert Lowder	EMD/EQB	MCB CamLej	(910) 451-9607	(910) 451-5997	robert.a.lowder@usmc.mil	
Ms. Gena Townsend	Remedial Project Manager	USEPA Region 4	(404) 562-8538	(404) 562-8518	Townsend.Gena@epa.gov	
Mr. Randy McElveen	Remedial Project Manager	NCDENR	(919) 508-8467	(919) 733-4811	Randy.McElveen@ncdenr.gov	
Mr. Tim Price	Project Manager	Rhēa	(910) 350-3156	(910) 350-2987	tim@rhea.us	
Ms. Erica DeLattre	Health and Safety Officer and Quality Assurance Officer (QAO)	Rhēa.	(724) 443-4111	(724) 443-4187	erica@rhea.us	
Ms. Beth Cockcroft	Project Chemist	Rhēa	(724) 443-4111	(724) 443-4187	beth@rhea.us	
Mr. R. Scott Powell	Field Team Leader (FTL)/Site Health and Safety Officer (SHSO)	Rhēa	(724) 443-4111	(724) 443-4187	scott@rhea.us	
Ms. Kate Zaleski	Project Manager/ Chemist	Katahdin Analytical Services, Inc. (Katahdin)	(207) 874-2400	(207) 775-4029	kzaleski@katahdinlab.com	

SAP Worksheet #4 -- Project Personnel Sign-Off Sheet

Site 95 Magnolia Road (Site 95) – Arsenic Removal				
Project Personnel	Title	Telephone Number	Signature	Date SAP Read
Tim Price	Rhēa/Project Manager	(910) 350-3156		
Erica DeLattre	Rhēa/Project Health & Safety Officer and QAO	(724) 443-4111		
Beth Cockcroft	Rhēa/Project Chemist	(724) 443-4111		
R. Scott Powell	Rhēa/Field Team Leader and SHSO	(724) 443-4111		
Kate Zaleski	Katahdin/Project Manager/Chemist	(207) 874-2400		
To Be Determined (TBD)	Rhēa/Field Team Members			

SAP Worksheet #5 -- Project Organizational Chart



SAP Worksheet #6 -- Communications Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Point of Contact with Partnering Team	NAVFAC-Mid-Atlantic/Remedial Project Manager	David Cleland	(757) 322-4851	Primary point of contact for Navy; all materials and information pertaining to the project will be forwarded to the Partnering Team following review.
Environmental Manager	MCB CamLej EMD/EQB	Robert Lowder	(910) 451-9607	Oversees all remedial activities at MCB CamLej. Any issues that may impact the MCB CamLej operations are to be reported to him immediately.
Primary Point of Contact for All of Rhēa Activities	Rhēa/Project Manager	Tim Price	(910) 350-3156	Issues reported to the Navy EMD immediately and follow up in writing within two business days. Implement modifications to the SAP.
SAP changes in the field	Rhēa Field Team Leader	R. Scott Powell	(248) 909-7290	Notify Rhēa by phone and/or email of changes to the SAP made in the field and the reasons within 24 hours. Changes will be documented.
Reporting Lab Data Quality Issues	Laboratory Project Manager	Kate Zaleski Katahdin	(207) 874-2400	All QA/QC issues with the project samples will be reported by the lab to the Project Chemist and QAO within two business days.
Release of Analytical Data	Rhēa Project Chemist	Beth Cockcroft	(724) 443-4111	No analytical data can be released until validation is completed and the Project Chemist has approved the release.

SAP Worksheet #7 -- Personnel Responsibilities and Qualification Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Mr. David Cleland	Remedial Project Manager	NAVFAC Mid-Atlantic	Coordinates Environmental Restoration (CERCLA/MRP) activities at MCB CamLej	
Mr. Robert Lowder	EMD/EQB	MCB CamLej	Oversight for Environmental Restoration Program at MCB CamLej	
Tim Price	Project Manager	Rhēa	Project Manager	B.S. Construction Engineering and Management Professional Engineer North Carolina 8 Years Experience
Beth Cockcroft	Project Chemist/Data Validation	Rhēa	Project Chemist, Data Validation	B.S. Civil Engineering M.S. Environmental Engineering 28 Years Experience
Erica DeLattre	Health and Safety Officer and QAO	Rhēa	Program Health and Safety and Quality Assurance Manager	B.S. Civil Engineering Professional Engineer North Carolina 14 Years Experience
R. Scott Powell	Field Team Leader/SHSO	Rhēa	Manage Field Activities and Site Health and Safety	B.S. Geoenvironmental Engineering 10 Years Experience

SAP Worksheet #8 -- Special Personnel Training Requirements Table

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/ Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
Field Team Leader/SHSO	Hazards Waste Operations and Emergency Response (HAZWOPER) 40 Hour Training and 8 Hour Refresher	Young’s Environmental Cleanup, Inc. and others	Refresher	All Managers and all personnel entering the Exclusion Zone	R. Scott Powell/Rhēa	Rhēa - Human Resources Department
Field Team Leader/SHSO	HAZWOPER Supervisor Training	JC Safety & Environmental, Inc. and others	N/A	All Managers	R. Scott Powell/Rhēa	Rhēa - Human Resources Department
Field Team Leader/SHSO	Cardiopulmonary Resuscitation, Basic First Aid and Automated External Defibrillator Training	American Red Cross	Annually	Field Team Leader	R. Scott Powell/Rhēa	Rhēa - Human Resources Department
Field Team Leader/SHSO	Competent Person Training	Washington State Department of Labor and Industry, Online Safety Course, "Excavations Trenching and Shoring http://www.lni.wa.gov/Safety/TrainTools/Online/Courses/default.asp?PID=121	Annually	At least one field crew member must be designated as the Competent Person when excavations occur	R. Scott Powell/Rhēa	Rhēa - Human Resources Department

SAP Worksheet #9-1 -- Project Scoping Session Participants Sheet

Project Name: Arsenic Soil Removal			Site Name: Site 95	
Projected Date(s) of Sampling: Fall 2009			Site Location: MCB CamLej	
Project Manager: Marcella G. Johnson				
Date of Session: October 27, 2008				
Scoping Session Purpose: Partnering Team Meeting				
Name	Title/Project Role	Affiliation	Phone #	E-mail Address
Robert Lowder	EMD/Environmental Quality Branch (EQB)/Base Project Manager	MCB CamLej	(910) 451-9607	robert.a.lowder@usmc.mil
Andrew Smith	EMD/EQB/Base Project Manager	MCB CamLej	(910) 451-9017	stephen.a.smith@usmc.mil
Gary Tysor	Remedial Project Manager	NAVFAC Mid-Atlantic	(757) 322-4851	gary.tysor@navy.mil
Bryan Beck	Remedial Project Manager	NAVFAC Mid-Atlantic	(757) 322-4734	bryan.k.beck@navy.mil
Gena Townsend	Remedial Project Manager	USEPA Region 4	(404) 562-8538	townsend.gena@epa.gov
Randy McElveen	Remedial Project Manager	NCDENR	(919) 508-8467	Randy.McElveen@ncdenr.gov
Beth Hartzell	Remedial Project Manager	NCDENR	(919) 508-8489	beth.hartzell@ncdenr.gov
Marti Morgan	Remedial Project Manager	NCDENR	(919) 733-4811	Martha.morgan@ncdenr.gov
Chris Bozzini	Project Manager	CH2M HILL	(704) 544-5163	Chris.bozzini@CH2M.com
Matt Louth	Project Manager	CH2M HILL	(757) 671-6240	Matt.Louth@CH2M.com
Kim Henderson	Project Manager	CH2M HILL	(757) 671-6231	kimberly.henderson@CH2M.com
Bill Schmitsorst	CH2M HILL	CH2M HILL		bill.schmitsorst@CH2M.com
Joe Collela	Shaw Environmental Project Manager	Shaw Environmental		joe.collela@shawgrp.com
Marcella G. Johnson	Project Manager	Rhēa	(724) 443-4111	marcy@rhea.us
Comments: Discussed previously reported elevated arsenic concentrations in surface and subsurface soil and recommendations for source removal. The Team discussed the remediation goal for arsenic and Applicable or Relevant and Appropriate Requirements (ARARs). See Appendix A for Partnering Team Meeting Minutes for Site 95.				
Action: Mr. Lowder – Send Ms. Johnson the archeological report and State Historical Preservation Office (SHPO) clearance for Site 95. Present UFP-SAP at the January 2009 Partnering Team Meeting.				
Consensus Decision: Mr. Lowder stated if the soil is non-hazardous, it can be disposed in the Base landfill. The Team assumed the concrete associated with the dipping vat and debris from clearing activities is not contaminated and will be disposed at the MCB CamLej Recycling Center.				

SAP Worksheet #9-2 -- Project Scoping Session Participants Sheet

Project Name: Arsenic Soil Removal			Site Name: Site 95	
Projected Date(s) of Sampling: Fall 2009			Site Location: MCB CamLej	
Project Manager: Marcella G. Johnson				
Date of Session: January 21 - 22, 2009				
Scoping Session Purpose: Partnering Team Meeting				
Name	Title/Project Role	Affiliation	Phone #	E-mail Address
Robert Lowder	EMD/EQB/Base Project Manager	MCB CamLej	(910) 451-9607	robert.a.lowder@usmc.mil
Andrew Smith	EMD/EQB/Base Project Manager	MCB CamLej	(910) 451-9017	stephen.a.smith@usmc.mil
Gary Tysor	Remedial Project Manager	NAVFAC Mid-Atlantic	(757) 322-4851	gary.tysor@navy.mil
Bryan Beck	Remedial Project Manager	NAVFAC Mid-Atlantic	(757) 322-4734	bryan.k.beck@navy.mil
Gena Townsend	Remedial Project Manager	USEPA Region 4	(404) 562-8538	townsend.gena@epa.gov
Randy McElveen	Remedial Project Manager	NCDENR	(919) 508-8467	Randy.McElveen@ncdenr.gov
Beth Hartzell		NCDENR	(919) 508-8489	beth.hartzell@ncdenr.gov
Marti Morgan		NCDENR	(919) 733-4811	Martha.morgan@ncdenr.gov
Chris Bozzini	Project Manager	CH2M HILL	(704) 544-5163	Chris.bozzini@CH2M.com
Kim Henderson	Project Manager	CH2M HILL	(757) 671-6231	kimberly.henderson@CH2M.com
Joe Collela	Shaw Environmental Project Manager	Shaw Environmental		joe.collela@shawgrp.com
Tim Flood			(727) 867-2610	tflood1@tampabay.rr.com
Bruce Reed		NCDENR		bruce.reed@ncdenr.gov
Mark Pisarcik	Shaw Environmental Project Manager	Shaw Environmental	(757) 640-6936	mark.pisarcik@shawgrp.com
Theron Grim	CH2M HILL	CH2M HILL		theron.grim@CH2M.com
Mike Mason		Catlin	(910) 452-5861	Mike.d.mason@catlinusa.com
Marcella G. Johnson	Project Manager	Rhēa	(724) 443-4111	marcy@rhea.us
Comments: Discussed site background, Engineering Evaluation/Cost Analysis (EE/CA) and UFP-SAP objectives, the Remedial Action Objective (RAO), and schedule. TCLP samples were collected in December 2008 and the results indicated the soil was non-hazardous. Ms. Townsend stated because Site 95 is only a site, no Operable Unit (OU) number is needed. Therefore, the OU 22 designation should not be used in the future. See Appendix A for Partnering Team Meeting Minutes for Site 95.				
Action: Ms. Johnson to provide Site 95 ARARs to USEPA attorney for review, identify the alternatives they apply, whether they are state or federal, and include the as a North Carolina Soil Screening Levels (NC SSL) To Be Considered (TBC).				
Consensus Decision: The NC SSL should be included as a TBC in the ARARs table.				

SAP Worksheet #9-3 -- Project Scoping Session Participants Sheet

Project Name: Arsenic Soil Removal			Site Name: Site 95	
Projected Date(s) of Sampling: Fall 2009			Site Location: MCB CamLej	
Project Manager: Marcella G. Johnson				
Date of Session: April 28 - 29, 2009				
Scoping Session Purpose: Partnering Team Meeting				
Name	Title/Project Role	Affiliation	Phone #	E-mail Address
Robert Lowder	EMD/EQB/Base Project Manager	MCB CamLej	(910) 451-9607	robert.a.lowder@usmc.mil
Andrew Smith	EMD/EQB/Base Project Manager	MCB CamLej	(910) 451-9017	stephen.a.smith@usmc.mil
Bryan Beck	Remedial Project Manager	NAVFAC Mid-Atlantic	(757) 322-4734	bryan.k.beck@navy.mil
Gena Townsend	Remedial Project Manager	USEPA Region 4	(404) 562-8538	townsend.gena@epa.gov
Randy McElveen	Remedial Project Manager	NCDENR	(919) 508-8467	Randy.McElveen@ncdenr.gov
Beth Hartzell		NCDENR	(919) 508-8489	beth.hartzell@ncdner.gov
Marti Morgan		NCDENR	(919) 733-4811	Martha.morgan@ncdenr.gov
Chris Bozzini	Project Manager	CH2M HILL	(704) 544-5163	Chris.bozzini@CH2M.com
Matt Louth	Project Manager	CH2M HILL	(757) 671-6240	Matt.Louth@CH2M.com
Kim Henderson	Project Manager	CH2M HILL	(757) 671-6231	kimberly.henderson@CH2M.com
Kirk Stevens	Remedial Project Manager	NAVFAC Mid-Atlantic	(757) 322-4589	Kirk.a.stevens@navy.mil
Tim Flood			(727) 867-2610	Tflood1@tampabay.rr.com
David Buxbaum		USEPA Region 4		Buxbaum.david@epa.gov
Mark Pisarcik	Shaw Environmental Project Manager	Shaw Environmental	(757) 640-6936	Mark.pisarcik@shawgrp.com
Tom Roth	CH2M HILL	CH2M HILL		Tom.roth@ch2m.com
Marcella G. Johnson	Project Manager	Rhēa	(724) 443-4111	marcy@rhea.us
<p>Comments: Discussed site background, RAOs, ARARs, TBCs, sample collection and schedule. Previously reported arsenic concentrations exceed the USEPA Region 9 Preliminary Remediation Goals (PRGs). Ms. Townsend stated the PRGs have been superseded by the Regional Screening Levels (RSLs) and should be used for comparison. Ms. Townsend requested revision of the RAOs to reflect the removal action will meet USEPA's acceptable human health risk (HHR) criteria, and recommended only including alternatives that would result in no further action. See Appendix A for Partnering Team Meeting Minutes for Site 95.</p>				
<p>Action: Submit the draft EE/CA by the end of May 2009 (posted to the Enterprise web site), field mobilization in September 2009, and the closeout report in early 2010.</p>				
<p>Consensus Decision: The Team recommended collecting chip samples from the concrete dipping vat for TCLP analysis to confirm the vat is not contaminated.</p>				

SAP Worksheet #9-4 -- Project Scoping Session Participants Sheet

Project Name: Arsenic Soil Removal			Site Name: Site 95	
Projected Date(s) of Sampling: Spring 2010			Site Location: MCB CamLej	
Project Manager: Marcella G. Johnson				
Date of Session: November 18 and 19, 2009				
Scoping Session Purpose: Partnering Team Meeting				
Name	Title/Project Role	Affiliation	Phone #	E-mail Address
Robert Lowder	EMD/EQB/Base Project Manager	MCB CamLej	(910) 451-9607	robert.a.lowder@usmc.mil
Bryan Beck	Remedial Project Manager	NAVFAC Mid-Atlantic	(757) 322-4734	bryan.k.beck@navy.mil
Dave Cleland	Remedial Project Manager	NAVFAC Mid-Atlantic	(757) 322-4851	david.t.cleland@navy.mil
Gena Townsend	Remedial Project Manager	USEPA Region 4	(404) 562-8538	townsend.gena@epa.gov
Randy McElveen	Remedial Project Manager	NCDENR	(919) 508-8467	Randy.McElveen@ncdenr.gov
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Mike Cree	Project Manager	Osage	(757) 440-0400	mccree@osageva.com
Shaun Whitworth		Osage	(757) 440-0400	swhitworth@osageva.com
Mark Pisarcik	Shaw Environmental Project Manager	Shaw Environmental	(757) 640-6936	Mark.pisarcik@shawgrp.com
Marcella G. Johnson	Project Manager	Rhēa	(724) 443-4111	marcy@rhea.us
Comments: The recent NCSSL revision identified a change in the cleanup criteria for arsenic. The draft UFP-SAP was submitted for Team review. See Appendix A for Partnering Team Meeting Minutes for Site 95.				
Action: Revise EE/CA and UFP-SAP excavation and sample location figures based on new NCSSL criteria. Excavation work planned for March/April 2010.				
Consensus Decision: The Team indicated that the Action Memo could be completed following the public meeting, by the end of February.				

SAP Worksheet #9-5 -- Project Scoping Session Participants Sheet

Project Name: Arsenic Soil Removal			Site Name: Site 95	
Projected Date(s) of Sampling: Spring 2010			Site Location: MCB CamLej	
Project Manager: Marcella G. Johnson				
Date of Session: February 3 and 4, 2010				
Scoping Session Purpose: Partnering Team Meeting				
Name	Title/Project Role	Affiliation	Phone #	E-mail Address
Robert Lowder	EMD/EOB/Base Project Manager	MCB CamLej	(910) 451-9607	robert.a.lowder@usmc.mil
Bryan Beck	Remedial Project Manager	NAVFAC Mid-Atlantic	(757) 322-4734	bryan.k.beck@navy.mil
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Gena Townsend	Remedial Project Manager	USEPA Region 4	(404) 562-8538	townsend.gena@epa.gov
Randy McElveen	Remedial Project Manager	NCDENR	(919) 508-8467	Randy.McElveen@ncdenr.gov
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Shaun Whitworth		Osage	(757) 440-0400	swhitworth@osageva.com
Mark Pisarcik	Shaw Environmental Project Manager	Shaw Environmental	(757) 640-6936	Mark.pisarcik@shawgrp.com
Marcella G. Johnson	Project Manager	Rhēa	(724) 443-4111	marcy@rhea.us
Tim Price	Project Manager	Rhēa	(910) 350-3156	tim@rhea.us
Comments: The Team discussed the confirmation soil sampling approach, closeout report, Naval Installation Restoration Information Solution (NIRIS) web site, and schedule. See Appendix A for Partnering Team Meeting Minutes for Site 95.				
Action: Rhēa to place a copy of the EE/CA in the local public library during the public comment period.				
Consensus Decision: Mr. McElveen will screen soil from the excavation limits using an X-ray fluorescence (XRF) meter. Rhēa will submit at least five samples, one from each side wall and the bottom of the excavation, to an analytical laboratory. The closeout report will act as the No Further Action Decision Document after excavation activities are completed.				

SAP Worksheet #10 -- Problem Definition

10.1 SITE BACKGROUND

NAVFAC Mid-Atlantic Division, contracted with Rhēa to conduct a NTCRA for the arsenic soil removal at Site 95, MCB CamLej (Base). Refer to Figures 1 and 2 for the General Location Map and Site Location Map.

10.2 RELEASE HISTORY

The site was used as a pesticide application station for local farm animals. The federal government required the use of this type of facility starting in 1906 for the purposes of preventing domestic animal diseases associated with biting insects, namely ticks. The site is estimated to have been in use until about 1962. The dipping vat at the location is four feet wide, four feet deep and about 25 feet long.

10.3 SITE HISTORY

Site 95 is located west of the New River estuary. The site is located approximately 1,500 feet west of the river off an unnamed connector dirt road which branches south of Magnolia Road to Old Town Point Road. Refer to Figure 2 for the Site Location Map. The site is located west of the dirt road. A natural drainage feature occurs to the east of the site, which leads directly to the New River. Topographic variations at the site are +/- two feet.

The cattle dipping vat was used from about 1906 to 1962. The purpose of the vat was to provide a central location for pesticide applied to farm animals for the purpose of preventing biting insect related diseases. From 1906 to the mid 1940s, an arsenic solution was the primary pesticide in use. After the mid 1940s, chlorinated pesticides became the pesticide of choice until the end of the vat operations around 1962.

The chronological history of Site 95 based on the various reports developed and issued is summarized in Worksheet #13. Milestone events are summarized below.

A Site Investigation (SI) began after the discovery of the vats from an archaeological investigation of the Base. An initial assessment was published in 2004 as “Suspected Dripping Vat Sampling and Suspected Asbestos Shingle/Transit Board Sampling,” (Baker, 2004).

SAP Worksheet #10 -- Problem Definition (cont'd)

Initial Site Assessment

Two soil samples were collected from inside the vat, which were later analyzed for pesticides and Resource Conservation and Recovery Act (RCRA) metals. According to the report, detected arsenic concentrations exceeded the USEPA RSL, the North Carolina Soil-to-Groundwater standard (applicable at the time of the initial assessment), and Base background concentrations. The report listed the following pesticides detected at concentrations exceeding regulatory driven criteria in soil samples collected from the dipping vat at Site 95:

- 4,4'- Dichlorodiphenyldichloroethane (DDD);
- 4,4'- Dichlorodiphenyltrichloroethane (DDT); and
- 4,4'- Dichlorodiphenyldichloroethylene (DDE).

Further review of the data revealed the regulatory driven criteria were incorrectly reported and pesticides were not detected at concentrations exceeding the regulatory criteria (CH2M HILL, 2007).

Site Investigation

The SI at Site 95 was completed from 2006 to 2007 (CH2M HILL, 2007). The objective of the SI was to further characterize and delineate potential contamination and sources at Site 95 in an effort to evaluate whether additional investigations and/or remediation activities were necessary.

Investigative activities conducted during the SI included the following:

- Surface and subsurface soil sampling;
- Installation of three monitoring wells;
- Groundwater sampling of the site monitoring wells; and
- Survey of monitoring well and soil boring locations.

10.4 GEOLOGY AND HYDROGEOLOGY

The geology of the investigation area at Site 95 is consistent with the facility and regional published geology literature. As part of the SI three borings were advanced to 15 feet bgs, and 17 borings were advanced to four feet bgs.

SAP Worksheet #10 -- Problem Definition (cont'd)

The surface soil to one foot bgs is primarily composed of brown to gray silty sand or very fine to fine sand. The underlying soil is composed of tan to gray fine sands, which have varying amounts of silts and clays. Tan to gray clay lenses, ranging from 0.1 to one foot thick, are noted throughout the area at depths ranging from four to 15 feet bgs.

Groundwater elevations at Site 95 ranged from 12.67 to 12.94 feet above Mean Seal Level (MSL) during the water level survey conducted. Data collected indicate the direction of groundwater flow is northeasterly across the site towards the New River. The average hydraulic gradient is 0.0072 feet/foot.

10.5 GENERAL PROBLEMS TO ADDRESS

Soil Samples

Surface soil samples were collected at each boring location at depths from zero to one foot bgs and sent for laboratory analysis. Seventeen subsurface soil samples were collected from above the groundwater table at depths of three to four feet bgs and sent for laboratory analysis. The soil samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCB), Target Analyte List (TAL) metals, and pesticides.

Surface Soil (zero to one foot bgs)

VOCs were not detected in surface soil samples collected from the site exceeding Method Detection Limits (MDLs).

Eight SVOCs were detected at concentrations exceeding MDLs in surface soil samples, including di-n-butylphthalate, bis(2-ethylhexyl)phthalate, benzaldehyde, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene. The laboratory reported SVOCs at concentrations below screening criteria.

Two pesticides, aldrin and endrin, were detected in surface soil samples exceeding MDLs; however, neither pesticide was detected at concentrations in exceedance of screening criteria. PCBs were not detected at concentrations exceeding MDLs in surface soil samples collected at Site 95.

SAP Worksheet #10 -- Problem Definition (cont'd)

Fourteen metals including aluminum, antimony, barium, beryllium, calcium, chromium, cobalt, copper, lead, magnesium, nickel, potassium, silver, and vanadium were detected at concentrations exceeding MDLs, but less than the screening criteria for the surface soil samples. Arsenic concentrations detected in the surface soil samples exceeded the Region 9 Residential Preliminary Remediation Goals (PRGs) [USEPA 2004] and the NC SSL [NCDENR, 2005] in nine locations. The maximum arsenic concentration was 188 milligram per kilogram (mg/kg) in the surface soil sample collected from IR95B-IS115.

Arsenic concentrations exceeded the acceptable HHR (10^{-4}) in three locations. Soil samples collected from within the vat during the initial site assessment also listed arsenic concentrations in exceedance of the acceptable HHR.

Subsurface Soil (one to four feet bgs)

Three VOCs, acetone, 2-butanone, and methylene, were detected in subsurface soil samples at concentrations exceeding MDLs, but not exceeding screening criteria. Two SVOCs, bis(2-ethylehxy)phthalate and di-n-butylphthalate, were detected in subsurface soil samples at concentrations exceeding MDLs; however, the concentrations did not exceed the screening criteria. Pesticides and PCBs were not detected in subsurface soil samples exceeding MDLs.

Eighteen metals including, aluminum, antimony, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, lead, magnesium, manganese, nickel, potassium, silver, sodium, vanadium, and zinc, were detected in subsurface soil samples exceeding MDLs, but at levels below the screening criteria. Arsenic concentrations detected in subsurface soil samples exceeded the Residential PRG in 13 locations and exceeded the SSL in five locations. The maximum concentration of 436 mg/kg was collected from sample location IR95B-IS115. Arsenic concentrations in subsurface soil exceeded the acceptable HHR in two locations. Iron was detected at concentrations exceeding the SSL at 15 locations, but remains below the Base background concentration. The former mercury SSL was exceeded in one sample IR95B-IS109; however, the detected mercury concentration was below the Base background concentration.

Rhēa collected soil and concrete samples that were analyzed under the USEPA TCLP method for off-site disposal characterization to determine if they would be classified as hazardous. Based on the results of the soil sample analysis, the total arsenic concentration was reported as 40 mg/kg and the arsenic TCLP concentration was 0.115 milligrams per liter (mg/L), which is below the TCLP hazardous waste level of 5 mg/L. Therefore, the soil is considered non-hazardous. In addition, the TCLP analysis of the concrete vat structure (0.04 mg/L) was below hazardous levels.

SAP Worksheet #10 -- Problem Definition (cont'd)

10.6 Problem Definition

In October 2009, the NCDENR revised the SSL Table to reflect the EPA Region 4 decision to use the updated EPA RSL tables rather than the outdated Region 9 tables. The NCDENR, Division of Waste Management, Federal Remediation Branch Target Screening Values (Soil to Groundwater) [NCTSV] table is currently an NCDENR internal document compiled from RSL data and state specific calculations for groundwater criteria. The updated NCTSV table lists the soil to groundwater protection criteria for arsenic at 5.44 mg/kg.

Based on review of the previous reports, analytical data listed nine surface sample and five subsurface sample exceedances of regulatory criteria for arsenic in soil. Arsenic concentrations in surface and subsurface soil at Site 95 were identified with the potential to pose unacceptable risks to human health and the environment and contaminate the groundwater. Arsenic concentrations exceeded the acceptable USEPA RSL of 39 mg/kg for human health risk (10^{-4}) and the NCTSV (Soil to Groundwater) of 5.44 mg/kg. A removal action to address the arsenic exceedance was recommended in the SI report. As a result of the analytical testing completed during the SI, Rhea estimated 376 cubic yards of soil, based on the equation below, would require excavation and appropriate disposal, or treatment, removal, and appropriate disposal.

$$\begin{aligned} \text{Excavation Area X Depth} &= \text{Volume of Excavation} \\ 2897 \text{ square feet X } 3.5 \text{ feet} &= 10,140 \text{ cubic feet} = 376 \text{ cubic yards} \end{aligned}$$

SAP Worksheet #11 -- Project Quality Objectives (PQO)/Systematic Planning Process Statements

Who will use the data?

The data will be used by the Navy and the stakeholder agencies (USEPA and NCDENR) to ensure arsenic contaminated soil is adequately removed from the site within the shortest amount of time.

What will the data be used for?

The data will be used to confirm the removal of arsenic contaminated soil above the remediation goal.

What types of data are needed? (target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques)

Field screening will be conducted by the NCDENR with an XRF unit. Five confirmatory soil samples will be collected at selected XRF screening locations in accordance with the attached Field SOPs (Appendix B) and tested at an independent analytical laboratory for total arsenic concentrations.

How “good” do the data need to be in order to support the environmental decision?

The data will be of the quantity and quality necessary to provide technically sound and defensible assessments of potential risks to human receptors posed by the contaminants identified. For high-level decisions, laboratory methods will meet CERCLA, USEPA Region 4, and Navy Guidance and the data will be validated by a validator using national functional guidance, methodology, and Laboratory SOPs in Appendix C, as appropriate.

How much data are needed? (number of samples for each analytical group, matrix, and concentration)

The NCDENR will screen soil with the XRF at 30 locations along the excavation sidewall and bottom, as depicted on Figure 3.

Five confirmatory soil samples will be collected and submitted for laboratory analysis based on the XRF results.

SAP Worksheet #11 -- Project Quality Objectives (PQO)/Systematic Planning Process Statements – (cont'd)

Where, when, and how should the data be collected/generated?

Five confirmatory soil samples will be collected within the excavation, one from the bottom and one from each sidewall. The final sample locations will be determined in the field based on field personnel observations and XRF results.

Samples will be collected in accordance with the procedures outlined in this UFP-SAP, and Rhēa SOP 22.0 Surface and Subsurface (to Four-foot Depth) Soil Sampling (Appendix B). The FTL will be responsible for the sample collection, storage, and shipment of the confirmatory soil samples.

Who will collect and generate the data?

NCDENR staff will screen soil from the excavation and collect XRF data. Soil samples will be collected by Rhēa staff. Analytical Testing will be performed by Katahdin. The field screening and soil analytical data will be presented in a Closeout Report.

Hard copy, Level IV data deliverables and corresponding Electronic Data Deliverables (EDDs) will be provided. EDDs will be in Microsoft Excel format to be uploaded into Naval Installation Restoration Information Solution (NIRIS).

How will the data be reported?

The data will be summarized into tables. Tag maps will be prepared summarizing the results and the locations of the sample points and published within the Closeout Report.

How will the data be archived?

The data will be archived electronically in NIRIS. Hard copy data will be archived in Rhēa's Gibsonia, Pennsylvania office.

**SAP Worksheet #11 -- Project Quality Objectives (PQO)/Systematic Planning
Process Statements – (cont'd)**

List the Project Quality Objectives (PQOs) in the form of if/then qualitative and quantitative statements.

The decision tree to be used for the evaluation during this investigation is presented in Figure 4.

Soil adjacent to analytical results above the NCTSV of 5.44 mg/kg will be excavated horizontally and/or vertically to a limit determined in the field. After additional excavation is completed an additional confirmatory sample will be collected and analyzed. If the analytical result of the additional sample is below the NCTSV of 5.44 mg/kg, it will be concluded the soil meets the PQO and will remain in place.

SAP Worksheet #12 -- Measurement Performance Criteria Table

Matrix	Surface and Subsurface Soils				
Analytical Group	Metals				
Concentration Level	Various				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S+A)
Rhēa SOP 22.0	SW846 6010B/ CA-608	Bias/Contamination	No analyte detected >PQL	Equipment Rinsate Blank	S + A
	SW846 6010B/ CA-608	Bias/Contamination	No analyte detected >PQL	Ambient Field Blank	S + A
	SW846 6010B/ CA-608	Accuracy / Representativeness	4°C (± 2° C)	Cooler Temperature Blank	S
	SW846 6010B/ CA-608	Precision		Field Duplicate	S + A
	SW846 6010B/ CA-608	Accuracy/Bias and Precision	70-130 %	Matrix Spike/ Matrix Spike Duplicate (MS/MSD)	A

¹Field SOPs are summarized on Worksheet #21 and presented in Appendix B.

²Laboratory SOPs are summarized on Worksheet #23 and presented in Appendix C.

Note: QA/QC Sample frequency is outlined in Worksheet 14.3.

SAP Worksheet #13 -- Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data Will Be Used	Limitations on Data Use
Baker 2004 Report	Baker, <i>Suspected Dipping Vat Sampling and Suspected Asbestos Shingle/Transit Board Sampling Report</i> , June 2004	Two soil samples collected from inside dipping vat on 4-1-04.	Data determines if vats contain contamination. Data also determines if the shingles / transit board contains asbestos.	None Known
Site Investigation Report	CH2M Hill, <i>Site 95 – OU 22 Historical Livestock Dipping Vats</i> , June 2007	31 soil samples (surface and subsurface) collected to delineate arsenic contamination on October 2 and 3, 2006.	Summarizes field investigation activities, data evaluation results, arsenic contamination delineation and site recommendations.	None Known

SAP Worksheet #14 -- Summary of Project Tasks

14.1 SAMPLING TASKS

Prior to mobilization, NAVFAC, MCB CamLej, NCDENR, and USEPA will be notified to allow for appropriate oversight and coordination. As part of the field mobilization, Rhēa will procure subcontractors to support the arsenic removal activities. Tasks associated with the excavation and off-site disposal of arsenic contaminated soil at Site 95 include the following:

- Site Preparation including;
 - Construction Speed Limit Signs,
 - Site Clearing,
 - Utility Locating,
 - Temporary Access Road Construction,
 - Monitoring Well Abandonment,
- Erosion and Sedimentation Control Plan Implementation;
- Arsenic Removal Excavation;
- Disposal of Excavated Soil;
- Confirmatory Soil Sampling;
- Site Restoration;
 - Backfill of excavation with clean fill;
 - Reseeding of Disturbed Area, and
 - Final Site Survey.

14.1.1 Site Preparation

Access to the site will be along Old Town Point Road, an unimproved road used mainly by troops during field exercises. In an effort to protect troops in the field, construction zone speed limit signs (15 miles per hour) will be posted at the entrance, half way to the site, and at the site on Old Town Point Road. These speed limit signs will be visible from both directions and will be located with the greatest visual distance possible. All construction vehicles will be required to obey the speed limit.

The site will be cleared of vegetation within the excavation site and associated access areas. The vegetative debris will be left on site. In addition, two large trees, greater than 12 inches in diameter, will be removed due to their proximity to the excavation site. The tree trunks will be cut into lengths for removal and the limbs and tree tops will be ground. Stumps will be ground to the soil surface only.

SAP Worksheet #14 -- Summary of Project Tasks (cont'd)

A utility subcontractor will verify the absence or presence of utilities below the excavation area prior to excavation activities.

The temporary access road will be constructed of approved North Carolina Department of Transportation ABC Stone with geotextile placed between the fill and ground surface. The access road will be able to support one-way traffic and consist of at least six-inches of uncompacted ABC stone. The length of the access road will be determined based on the ability of the excavation equipment to directly load the disposal vehicles at the excavation site. Refer to Figure 5 for the Excavation Site Layout.

The existing monitoring wells at Site 95 Magnolia Road will be abandoned in accordance with state regulations. The wells will be abandoned prior to excavation activities. Furthermore, existing monitoring wells at Site 95 Jaybird and Lyman roads will be abandoned.

Upon completion of the site clearing and monitoring well abandonment, the excavation area will be surveyed with a Handheld GPS Unit (Trimble GeoXT), and the project datum will be established.

14.1.2 Erosion and Sedimentation Control Plan Implementation

The Erosion and Sedimentation Control Plan will consist of silt fence located on the down gradient slopes adjacent to the excavation site and access roads. Stockpiles of fill material will likewise have silt fence on the down gradient slopes to prevent siltation of local water bodies or channels. Figure 5 details the location of the proposed silt fences.

14.1.3 Arsenic Removal Excavation

Prior to excavation of the arsenic contaminated soil, the concrete vat will be removed, cleaned of all soil, loaded, and disposed of at MCB CamLej's concrete recycling Facility located on Pine Green Road. Cleaning will consist of pressure washing the concrete with potable water on site within the excavation area.

After the site preparations are complete and the waste disposal subcontractor is on site, the arsenic contaminated soil will be excavated to the dimensions and depth identified in Figure 3 and directly loaded into waiting dump trucks. The trucks will be loaded immediately adjacent to the excavation area to minimize the potential for cross contamination. Extreme care will be taken during the loading process to prevent releases.

SAP Worksheet #14 -- Summary of Project Tasks (cont'd)

Releases which might occur would be promptly cleaned up. During excavation activities, visual dust monitoring will occur. In the event dust becomes an issue, a tank with potable water will be on site and used to suppress the dust. In the event dust suppression cannot occur, respirators with particulate filters will be required and will remain within an individual's reach at all times within the exclusion zone.

14.1.4 Disposal of Excavated Soil

The waste hauling drivers will be required to secure their vehicle's load in accordance with all state and federal department of transportation requirements prior to driving on public roads. The vehicles will be weighted in and out at the landfill. The weight recording will document the amount of soil removed and also verify the vehicles were below the weight requirements of the local and state roads.

The waste haulers will dispose of the soil in a preapproved non-hazardous Subtitle D Landfill.

14.1.5 Confirmatory Soil Sampling

Five confirmatory soil samples will be collected within the excavation, one from the bottom and each sidewall. The sample locations will be determined in the field based on field personnel observations and XRF results. The samples will be collected in accordance with this document. The sample analytical results will be turned around within 48 hours to verify the removal of the contamination in accordance with the PQO. Soil adjacent to analytical results above the NCTSV of 5.44 mg/kg will be excavated horizontally and/or vertically to a limit determined in the field. After additional excavation is completed, an additional confirmatory sample will be collected and analyzed. If the analytical result of the additional sample is below the NCTSV of 5.44 mg/kg, it will be concluded the soil meets the PQO and will remain in place. Confirmatory sample locations will be surveyed using a handheld GPS unit.

SAP Worksheet #14 -- Summary of Project Tasks (cont'd)

14.1.6 Site Restoration

Site restoration will consist of backfilling the excavation with clean fill from the Base borrow pit or another acceptable source. The excavation will be backfilled to the pre-existing ground surface elevation after the confirmatory samples have been reported and the arsenic contamination has been removed in accordance with the PQO.

After the excavation has been backfilled, the excavation site will be seeded with a local seed mixture and mulched.

When the backfilling and reseeding operations are complete, the access road will be removed. The stone used for the access road will be transferred to Old Town Point Road and the Unnamed Connector Road and spread out filling in any potholes or ruts created by the excavation operations.

The geotextile will be disposed of in a dumpster.

Once the area has been restored, the disturbed areas free of vegetation will be reseeded.

The site will be surveyed by a hand held GPS unit at the completion of all work defining the alterations made to the site. The data will be included in the Closeout Report and made available to the base Global Information System (GIS) Department.

14.2 ANALYSIS TASKS

The Contaminant of Concern consists of arsenic. Sampling and analysis of soil will be performed to verify the removal of arsenic contaminated soil to a value of 5.44 mg/kg (NCTSV). It is assumed confirmatory analytical testing will consist of total arsenic only.

- Total Arsenic – USEPA method 6010B (soil).

SAP Worksheet #14 -- Summary of Project Tasks (cont'd)

14.3 SOIL SAMPLING PROCEDURES

The soil sample locations will be located with survey-grade Global Positioning System (GPS) equipment and the locations will be marked with pin flags prior to sampling.

Five confirmatory soil samples will be collected within the excavation, one from the bottom and each sidewall. The final sample locations will be determined in the field.

Prior to sample collection and after each sample location, sampling equipment will be decontaminated. An equipment blank will be collected at a rate of one per day of sampling.

The sample location will be surveyed and the FTL will determine the depth of the sample based on the results of the SI Report, XRF results, and the soil conditions.

Once identified, the soil will be collected in a shovel or from the excavator bucket and transferred to the appropriate container. The label will be filled out and the sample number will be defined. The sample will be stored in a cooler with ice until the completion of the day's soil sampling activities. At the end of the day, the chain of custody (COC) will be completed and the sample coolers prepared for shipment. Refer to Worksheet # 21 for related SOPs.

14.4 QUALITY CONTROL TASKS

QA/QC samples will be collected for analysis. The number of QA/QC samples will be determined based on the following criteria:

- Field Duplicate -10% of field samples;
- MS/MSD - 5% of field samples;
- Equipment Blank - One per day; and,
- Field Blank - One per week.

Estimated numbers of QA/QC Samples are presented in Worksheet #20.

SAP Worksheet #14 -- Summary of Project Tasks (cont'd)

Sample and XRF field screening nomenclature will be consistent with Section 4.1 of the Master Project Plans, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina (CH2M HILL, August 2008). The format will be:

Site Number: The Site will be referred to as CL95, for MCB CamLej Site 95.

Station Number: Excavation sidewall samples and XRF field screening locations will be marked according to the Sidewall Orientation. The sidewalls will be labeled SW1, SW2, SW3, or SW4 in a clockwise orientation with north as the start point and will include the depth below ground surface. Bottom samples and field screening locations will be labeled in consecutive order and include the depth below ground surface.

The station numbers for confirmation samples will be sequential, in order of completion, e.g., CL95-SW1-01 (#'), CL95-SW1-02 (#') and CL95-B1 (#'), CL95-B2 (#'). The station numbers for field screening locations will also be sequential, in order of completion, e.g., CL95-SW1-FS01 (#'), CL95-SW1-FS02 (#') and CL95-BFS01 (#'), CL95-BFS02 (#').

QA/QC: For QA/QC samples, the designations below will replace or be added to the end of the sample designation/station number:

- DUP for duplicate;
- MS for matrix spike;
- MSD for matrix spike duplicate;
- EB for equipment blank; and
- FB for field blank.

Examples: The first sample from the excavation in the investigation will be identified as CL95-SW1-01 (2'). A duplicate sample taken will be identified as CL95-DUP. The first equipment blank taken during the investigation will be CL95-EB-01. Bottom samples, if more than one is collected, will have the following example nomenclature: CL95-B1 (3.5'), CL95-B2 (3.5'), CL95-B2-MS (3.5'), and CL95-B2-MSD (3.5').

SAP Worksheet #14 -- Summary of Project Tasks (cont'd)

14.5 Sampling Equipment Decontamination

Sampling equipment will be decontaminated at the beginning of each day and after each sampling location. Sampling equipment will be decontaminated in accordance with SOP 2.0 Decontamination of Sampling Equipment summarized on Worksheet #21 and presented in Appendix B.

14.6 Data Validation

Data will be validated as described in the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, and SW-846. Data qualifiers and data validation reason codes (as appropriate) will be added to EDD files. Rhēa's data manager will check the EDDs for completeness and accuracy, and will compare the EDD to the hard copy version of the reports. Final validated data will be incorporated into an excel table once it is cleared by both the data validator/project chemist and data manager. Final data will be uploaded into NIRIS.

SAP Worksheet #15 -- Reference Limits and Evaluation Table

Matrix	Soil					
Analytical Group	Metals					
Concentration Level	Variable					
Analyte	Chemical Abstracts Service (CAS) Number	Project Action Limit (applicable units)₁	Practical Quantitation Limit (applicable units)²	Analytical Method	Achievable Laboratory Limits³	
				MDLs	MDLs	Quantitation Limit (QL)
Total Arsenic	7440-38-2	5.44 mg/kg	0.80 mg/kg	USEPA 6010B	0.27 mg/kg	0.80 mg/kg

¹Soil results will be compared to the NCTSV.

²Practical Quantitation Limit Goals were determined based on the Laboratory's achievable Quantitation Limit.

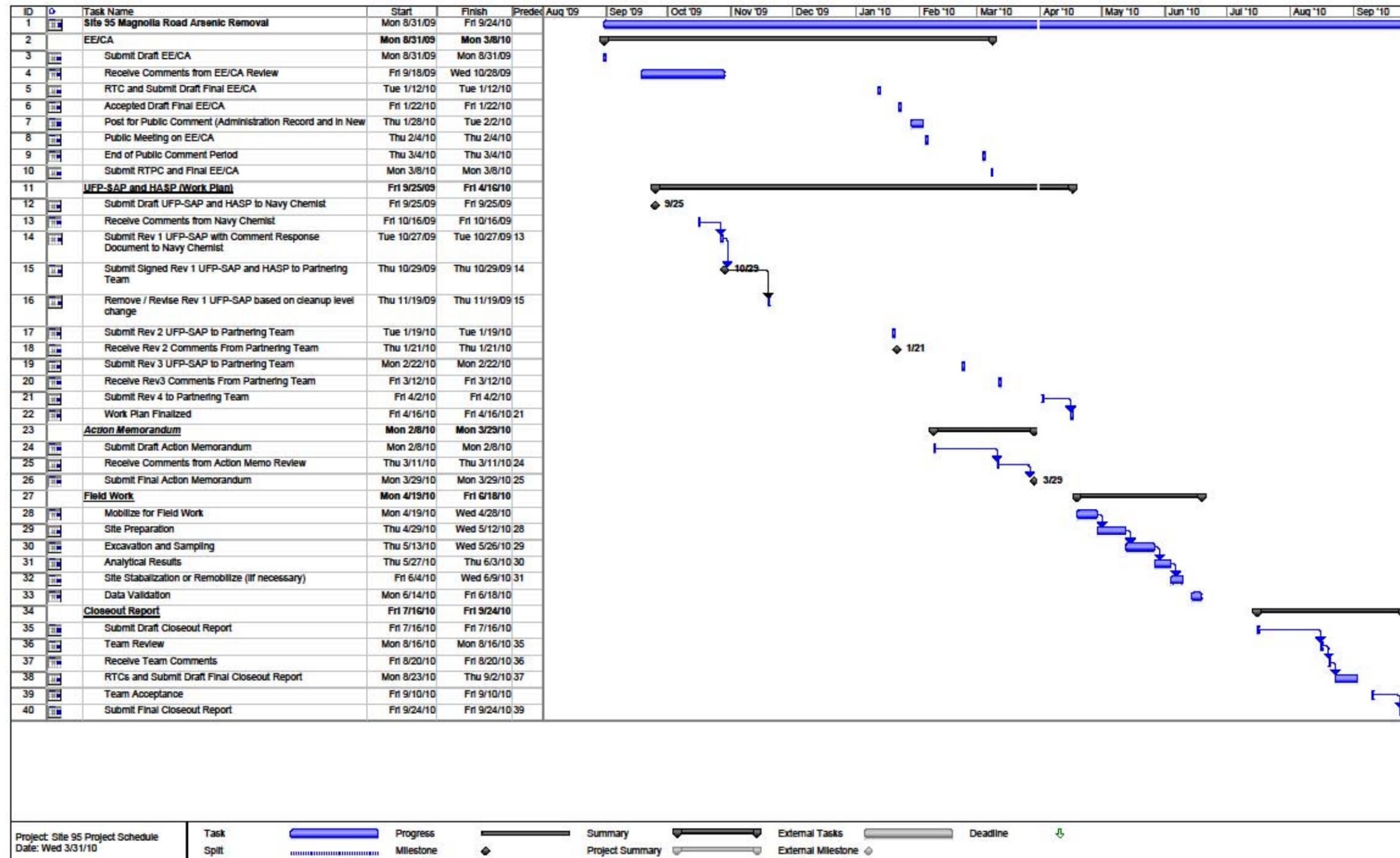
³Laboratory-specific MDLs and QLs are limits an individual laboratory can achieve when performing a specific analytical method.

SAP Worksheet #16 -- Project Schedule Timeline Table

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Post EE/CA for Public Review/Public Comment	Rhēa	1-28-10	2-2-10	Not Applicable	Not Applicable
Submit Final EE/CA	Rhēa	3-8-10	3-8-10	Not Applicable	Not Applicable
Action Memorandum	Rhēa	2-8-10	4-19-10	Not Applicable	Not Applicable
Mobilize for field work	Rhēa	4-19-10	4-28-10	Not Applicable	Not Applicable
Site Preparation	Rhēa	4-29-10	5-12-10	Not Applicable	Not Applicable
Excavation and Sampling	Rhēa	5-13-10	5-26-10	Not Applicable	Not Applicable
Analytical Results	Katahdin	5-27-10	6-3-10	Not Applicable	Not Applicable
Remobilize-if necessary	Rhēa	6-4-10	6-9-10	Not Applicable	Not Applicable
Data Validation	Rhēa	6-14-10	6-18-10	Not Applicable	Not Applicable
Closeout Report	Rhēa	7-16-10	9-24-10	Closeout Report	9-24-10

See Timeline diagram below.

SAP Worksheet #16 -- Project Schedule Timeline Table (cont'd)



SAP Worksheet #17 -- Sampling Design and Rationale

Five confirmatory soil samples will be collected within the excavation based on field personnel observations and XRF results, one sample from the bottom at a depth of 3.5 feet and one sample from each sidewall at a depth of 2 feet below the ground surface. XRF results will be collected at 30 locations as identified on Figure 3. In addition to confirmatory samples, QA/QC samples will be taken for analysis. The number of QA/QC samples will be determined based on the following:

- Field Duplicate – 10 percent of field samples;
- MS/MSD – 5 percent of field samples;
- Equipment Blank – One per day;
- Field Blank – One per week; and
- Temperature Blank – One per cooler.

QA/QC Samples will be in accordance with Master Project Plans, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina (CH2M HILL, August 2008).

SAP Worksheet #18 -- Sampling Locations and Methods/SOP Requirements Table

Sampling Location/Identification Number (ID)	Matrix	Depth	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference¹	Rationale for Sampling Location
Excavation sidewall samples and XRF field screening locations will be marked according to the Sidewall Orientation. The sidewalls will be labeled SW1, SW2, SW3, or SW4 in a clockwise orientation with north as the start point and include the depth below ground surface. Bottom samples and field screening locations will be labeled in consecutive order and include the depth below ground surface.	Soil	Varies	Total Arsenic	0.27mg/kg (MDL)	Total of 5 confirmatory samples. Duplicates collected at a rate of 10%, MS/MSD at 5% one equipment blank per day, and one field blank	Rhēa SOP 2.0 Decontamination of Sampling Equipment and Rhēa SOP 22.0 Surface and Subsurface Soil Sampling	Excavation confirmatory samples

¹Field SOPs are summarized on Worksheet #21 and presented in Appendix B.

SAP Worksheet #19 -- Analytical SOP Requirements

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference ¹	Sample Volume	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time ² (preparation/analysis)
Soil	Metals	0.27 mg/kg (MDL)	USEPA 6010B (soil)/CA-608	4 oz widemouth jar with Teflon-lined cap	TBD, 4 oz widemouth jars with Teflon-lined cap	4-degrees Celsius	3 Days

¹Analytical SOPs are summarized in Worksheet #23 and presented in Appendix C.

²Maximum holding time is calculated from the time the sample is collected to the time the sample is prepared/extracted.

SAP Worksheet #20 -- Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Sampling Locations¹	No. of Field Duplicate Pairs	Inorganic No. of MS	No. of Field Blanks	No. of Equip. Blanks	No. of PT Samples	Total No. of Samples to Lab²
Soil	Metals	0.27 mg/kg (MDL)	USEPA 6010B/CA-608	5	1	1	1	2	TBD	TBD

¹ The number of samples identified only includes samples collected from the primary sample locations identified in Worksheets #18.

² Number may change depending on if the first round of confirmatory samples indicates some contamination left in place.

SAP Worksheet #21 -- Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Check if yes)	Comments
SOP 2.0	Decontamination of Sampling Equipment	Rhēa	Backhoe bucket, shovels, spoons, bowls	<input type="checkbox"/>	
SOP 4.0	Respiratory Protection Devices	Rhēa	Respirator, filters, cleaning supplies	<input type="checkbox"/>	
SOP 5.0	Waste and Water Management / Disposal	Rhēa	Drums, waste bags, labels	<input type="checkbox"/>	
SOP 6.0	Personal Protective Equipment	Rhēa	See project specific HASP	<input type="checkbox"/>	
SOP 7.0	Soil and Water Sample Handling	Rhēa	Chan-of-custody documents, sample preservatives	<input type="checkbox"/>	
SOP 8.0	Decontamination Pad Construction	Rhēa	Decontamination Pad Materials	<input type="checkbox"/>	
SOP 10.1	North Carolina Well Abandonment Procedures	Rhēa	North Carolina procedures related to Monitoring Well Abandonment.	<input type="checkbox"/>	
SOP 12.0	GPS Surveying with GEO XT Handheld GPS Unit	Rhēa	GPS Receiver	<input type="checkbox"/>	
SOP 22.0	Surface and Subsurface Soil Sampling	Rhēa	Sampling equipment, decontamination supplies	<input type="checkbox"/>	

Note: Field SOPs are summarized on Worksheet #21 and presented in Appendix B.

SAP Worksheet #22 -- Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference¹
NITON XRF	Check verses a standard blank.	NCDENR requirements	Screening soil for arsenic.	NCDENR SOP requirements	Daily	NCDENR requirements	Recalibrate and/or perform necessary equipment maintenance.	NCDENR Personnel	NC 1.0

¹Analytical Equipment SOPs are summarized on Worksheet #23 and presented in Appendix C.

SAP Worksheet #23 -- Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
Mobil Metals Analysis						
NC 1.0	NC Division of Waste Management Radiation Protection Program	Screening Data	METAL	NITON XRF	NCDENR	N
Fixed Based Laboratory						
CA-101	Equipment Maintenance, 07/08, Revision 7	N/A	VARIOUS	VARIOUS	Katahdin	N
CA-608	Trace Metals Analysis by Inductively Coupled Plasma-Atomic Emissions Spectrometry (ICP-AES) Using USEPA Method 6010	Definitive	METAL	Inductively Coupled Plasma (ICP)	Katahdin	N
SD-902	Sample Receipt and Internal Control, 05/09, Revision 8.	N/A	VARIOUS	N/A	Katahdin	N
SD-903	Sample Disposal, 05/09, Revision 4.	N/A	VARIOUS	N/A	Katahdin	N

Note: Laboratory SOPs are provided in Appendix C.

SAP Worksheet #24 -- Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference¹
Mobil Metals Analysis						
NITON XRF	TBD	TBD	TBD	Recalibrate and/or perform necessary equipment maintenance.	NCDENR	NC 1.0
Fixed Based Laboratory						
ICP	Initial calibration	At the beginning of each day or if QC is out of criteria.	One point calibration per manufacturer's guidelines	Recalibrate and/or perform necessary equipment maintenance. Check calibration standards	Analyst, Supervisor	CA-608
	Continuing calibration	At the beginning and end of each run sequence and every 10 samples	90-110% of True Values	Check problem, recalibrate and reanalyze any samples not bracketed by passing Continuing Calibration Verification (CCV).	Analyst, Supervisor	

¹Analytical SOPs are summarized on Worksheet #23 and presented in Appendix C.

SAP Worksheet #25 -- Analytical Instrument and Equipment Maintenance, Testing and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference¹
ICP - Metals	Clean torch assembly and spray chamber when discolored or when degradation in data quality is observed. Clean nebulizer, check argon, replace peristaltic pump tubing as needed. Other maintenance specified in lab Equipment Maintenance SOP.	QC standards	Torch, nebulizer chamber, pump, pump tubing	Prior to initial calibration and as necessary	Acceptable calibration or CCV	Correct the problem and repeat calibration or CCV	Analyst, Department Manager	CA-608

¹Analytical SOPs are summarized on Worksheet #23 and presented in Appendix C.

SAP Worksheet #26 -- Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Field Team Member/Rhēa Field SOPs are provided in Appendix B.
Sample Packaging (Personnel/Organization): Field Team Leader/Rhēa
Coordination of Shipment (Personnel/Organization): Field Team Leader/Rhēa
Type of Shipment/Carrier: Overnight/FedEx
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Sample Receipt Personnel/Katahdin
Sample Custody and Storage (Personnel/Organization): Sample Receipt Personnel/Katahdin
Sample Preparation (Personnel/Organization): Extraction Personnel/Katahdin
Sample Determinative Analysis (Personnel/Organization): Analytical Personnel/Katahdin
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): N/A
Sample Extract/Digestate Storage (No. of days from extraction/digestion): Extracts may be disposed of 90 days after extraction.
Biological Sample Storage (No. of days from sample collection): N/A
SAMPLE DISPOSAL
Personnel/Organization: Environmental Health and Safety Officer/Katahdin
Number of Days from Analysis: Samples may be disposed of 90 days after report mail date.

SAP Worksheet #27 -- Sample Custody Requirements Table

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): A COC record will be completed for each shipping container of samples. The COC record will typically be completed on a carbon-copy form provided by the laboratory.

The record will, at a minimum, contain the following:

- Site name;
- Full name of sampler;
- Sample identification number for each sample;
- Date and time of collection for each sample;
- Sample matrix (liquid or solid);
- Number of containers for each sample;
- Description of sample location for each sample;
- Required analyses for each sample;
- Preservation for each sample, if required;
- Notation whether samples shipped on ice or not;
- Notation if sample is expected to be highly contaminated;
- Signature of person(s) involved in chain of possession; and
- Transfer date(s) and time(s) in chain of possession.

The preparer of the COC form, i.e., sampler, will retain a copy of the form and attach the form to daily field logs for the project. If the samples are shipped by common carrier, the COC form will be placed in a sealed plastic bag inside the shipping container and the shipping container secured with strapping tape and a custody seal. Thus, in the case of the common carrier, two signatures will occur on the final COC; one signature by the preparer of the form, and one signature of the sample custodian assigned by the laboratory. The sample custodian assigned by the laboratory will open the shipping container and will denote any breaks to the custody seal of the shipping container and/or damage to the shipping container or sample containers on the COC form.

Laboratory Sample Custody Procedures (receipt of samples, archiving, disposal): Please refer to Katahdin SOP SD-902 (Appendix C).

Sample Identification Procedures: Please refer to Katahdin SOP SD-902 (Appendix C).

Chain-of-custody Procedures: Please refer to Katahdin SOP SD-902 (Appendix C).

SAP Worksheet #28 -- Laboratory QC Samples Table

Matrix	Soil					
Analytical Group	Metals					
Concentration Level	Medium					
Surface and Subsurface Sampling	Rhēa SOP 22.0					
Analytical Method/SOP Reference	USEPA 6010B/CA-608					
Sampler's Name	R. Scott Powell					
Field Sampling Organization	Rhēa					
Analytical Organization	Katahdin					
No. of Sample Locations	15					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix Spike/Matrix Spike Duplicate	Collected at a frequency of 5% based on the number of confirmatory samples	MS recovery 70 – 130 % MSD recovery 70 – 130 % MS/MSD Relative Percent Difference (RPD) < 20 %	Reanalysis of MS / MSD, Qualification of data	Analyst, Supervisor, QA Manager	Precision / Accuracy	MS recovery 70 – 130 % MSD recovery 70 – 130 % MS/MSD RPD < 20 % Surrogate recoveries of TCMX and DCB: 70 – 130 %
Method Blank	1/batch (20 samples)	Less than RL	- Re-analyze -Re-prep/reanalyze	Primary Analyst / Department Manager	Accuracy/Bias-Contamination	No Target Compounds>RL

SAP Worksheet #28 -- Laboratory QC Samples Table (cont'd)

Matrix	Soil					
Analytical Group	Metals					
Concentration Level	Medium					
Surface and Subsurface Sampling	Rhēa SOP 22.0					
Analytical Method/SOP Reference	USEPA 6010B/CA-608					
Sampler's Name	R. Scott Powell					
Field Sampling Organization	Rhēa					
Analytical Organization	Katahdin					
No. of Sample Locations	15					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample (LCS)	1/batch (20 samples)	MLG Limits 75-125%	- Re-analyze -Re-prep/reanalyze	Primary Analyst/ Department Manager	Accuracy/Bias	Laboratory % Recovery Control Limits
Performance Test (PT)	2/year	N/A	- If possible, determine cause - Perform Remedial PT	Technical Manager / Department Manager		National Environmental Laboratory Accreditation Conference (NELAC) established limits
Laboratory Fortified Blank (LFB)	1/batch (20 samples)	MLG Limits 75-125%, <20% Relative Standard Deviation (RSD)	- Re-analyze - Report and flag data	Primary Analyst / Department Manager	Accuracy/Bias/ Precision	Laboratory % Recovery/ RPD Control Limits

SAP Worksheet #29 -- Project Documents and Records Table

Document	Where Maintained
Field Notebooks, Field Data Collection Sheets	Rhēa office
Chain-of Custody Records	Rhēa office
Airbills	Rhēa office
Communication Logs	Rhēa Office
Corrective Action Forms	Rhēa office
Documentation of corrective action results	Rhēa office
Documentation of deviation from methods	Rhēa office
Documentation of internal QA review	Rhēa office
Electronic data deliverables	Lab data will be uploaded to Naval Installation Restoration Information Solution (NIRIS). EDDs will be saved on Rhēa’s network server. Hardcopies will be stored in Rhēa’s office.
Identification of QC samples	Rhēa office
Meteorological data from field (e.g., temperature)	Rhēa office
Sampling instrument decontamination records	Rhēa office
Sampling Instrument calibration logs	Rhēa office
Sampling location and sampling plan	Rhēa office
Investigation Derived Waste (IDW) Disposal Chit	Rhēa office

SAP Worksheet #29 – Project Documents and Records Table (cont'd)

Document	Where Maintained
Laboratory Reports	Lab data will be uploaded to NIRIS or Rhēa ftp site. EDDs will be saved on Rhēa's network server. Hardcopies will be stored in Rhēa's office.
Data Validation Reports	Rhēa's server
Closeout Report	Rhēa's server, Distribution List, and MCB CamLej's Administrative Record

SAP Worksheet #30 -- Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Location/ID Numbers	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Soil	Metals	0.27 mg/kg (MDL)	All	CA-608	Next day preliminary results	Katahdin	N/A

SAP Worksheet #31 -- Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Action (Title and Organizational Affiliation)
Laboratory Audit	Each Sample Group	Internal	Rhēa	Beth Cockcroft/ Project Chemist/Rhēa	Tim Price/Project Manager Rhēa	Tim Price/Project Manager Rhēa	Tim Price/Project Manager Rhēa
Field Audit ¹	Minimum of one field audit every six months	Internal	Rhēa	Erica DeLattre/Project QA Officer/Rhēa-will verify that field team members are following sampling protocols and applicable SOPs	Field Team Leader and/or Project Manager	Project Manager	Project Manager

¹ Field audits are generally performed every six months on a representative sampling project in accordance with Rhēa’s quality control program. A field audit may be conducted on this project.

SAP Worksheet #32 -- Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Time Frame for Response
Laboratory Audit ¹	Phone Log or Email	Kate Zaleski/ Katahdin	Prior to project	Appropriate certification documents	Tim Price/Project Manager Rhēa	Prior to project
Field Audit ²	Written Audit Report	Rhēa Project Manager	Notification within 48 hours, audit report within 2 weeks	Memorandum	Rhēa QAO and Field Team Members	Implement Corrective Action measures as soon as possible

¹ Laboratories will be required to have current NELAC and NCDENR certifications.

Laboratories without these certifications will not be permitted to perform analyses.

² Field audits are generally performed every six months on a representative sampling project in accordance with Rhēa’s quality control program.

SAP Worksheet #33 -- QA Management Reports Table

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Closeout Report	After sampling event	Final September 24, 2010	Tim Price/Rhēa	Stakeholders, see Worksheet #4

The Closeout Report will include the following:

- Summary of project QA/QC requirements and procedures;
- Conformance of project activities to UFP-SAP requirements and procedures;
- Status of project schedule;
- Deviations from the approved UFP-SAP and approved amendments;
- Results of data review activities (how much usable data was generated);
- Corrective actions implemented and their effectiveness (if needed);
- Data usability in terms of precision, accuracy, representativeness, completeness, comparability, and sensitivity; and
- Limitations on the use of data.

SAP Worksheet #34 --Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Chain of custody & Sample management	Chain of custody forms will be reviewed internally upon their completion and verified against the packed sample coolers they represent. Once review is complete, the COC will be signed. A copy of the form will be retained and the remaining copies will be placed inside the sample cooler for shipment	Internal	Rhēa Field Team Leader – R. Scott Powell
Sample receipt and management	Samples will be cross-referenced against the COC upon arrival at the laboratory. The laboratory project manager will communicate any discrepancies between the COC and samples to Rhēa.	Internal	Katahdin Employees Kate Zaleski/ Project Manager
Analytical data package	All analytical data packages will be verified internally by the laboratory performing the work for completeness prior to submittal. The laboratory shall complete the appropriate form documenting the organization and complete contents of each data package.	Internal	Katahdin Project Manager-Kate Zaleski
Field Notebooks and forms	Field notes will be reviewed for accuracy and completeness	Internal	Rhēa Field Team Leader – R. Scott Powell
Review of Analytical Reports	Analytical reports will be compared with the chain of custody for completeness and accuracy (i.e., correct sample identifications, sample dates, and analyses, etc.). Quality control samples will be verified for completeness.	Internal	Rhēa Data Manager – Zach Wicks

SAP Worksheet #35 --Validation (Steps IIa and IIb) Process Table

Step IIa/IIb¹	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	Sampling Methods & Procedures / SOPs	Confirm required sample handling, receipt, and storage procedures were followed, and deviations were documented.	Rhēa Field Leader – R. Scott Powell
IIa	Analytical Methods & Procedures	Establish required analytical methods were used and any deviations were noted.	Rhēa Field Leader – R. Scott Powell Rhēa Data Validator/Chemist – Beth Cockcroft
IIa	Holding Times	Confirm samples were analyzed within the required holding time.	Rhēa Field Leader – R. Scott Powell Rhēa Data Validator/Chemist – Beth Cockcroft
IIa	Analytes	Confirm the required lists of analytes were reported as specified as per the COC.	Rhēa Field Leader – R. Scott Powell
IIa	Data Qualifiers	Determine the laboratory data qualifiers were defined and applied as specified in methods, procedures, or contracts.	Rhēa Data Validator/Chemist – Beth Cockcroft
IIa	Data Validation Report	Summarize deviations from methods, procedures, or contracts.	Rhēa Data Validator/Chemist – Beth Cockcroft
IIb	Sampling Plan & Procedures	Determine whether the sampling plan was executed as specified, and evaluate whether the sampling procedures were followed with respect to equipment and proper sampling support.	Rhēa QAO – Erica DeLattre
IIb	Co-located Field Duplicates	Compare results of co-located field duplicates.	Rhēa Data Validator/Chemist – Beth Cockcroft

SAP Worksheet #35 --Validation (Steps IIa and IIb) Process Table (cont'd)

Step IIa/IIb¹	Validation Input	Description	Responsible for Validation (Name, Organization)
IIb	Project Quantification Limits	Determine sample results met the project quantification and action limits specified in Worksheet #15.	Rhēa Field Leader – R. Scott Powell Rhēa Data Validator/Chemist – Beth Cockcroft
IIb	Performance Criteria	Evaluate QC data against project-specific performance criteria.	Rhēa Data Validator/Chemist – Beth Cockcroft
IIb	Data Validation Report	Summarize outcome of comparison of analytical data to measurement performance criteria.	Rhēa Data Validator/Chemist – Beth Cockcroft

¹ IIa=compliance with methods, procedures, and contracts
IIb=comparison with measurement performance criteria in the SAP.

SAP Worksheet #36 -- Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa	Soil	Metals	0.27 mg/kg (MDL)	Analytical methods and laboratory SOPs as presented in this SAP will be used to evaluate compliance with QA/QC criteria.	Rhēa Data Validator/ Chemist – Beth Cockcroft
IIb	Soil	Metals	0.27 mg/kg (MDL)	Comparison to Project Action Limits and method performance criteria	Rhēa Data Validator /Chemist – Beth Cockcroft

Data validation will be conducted as described in the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Review, and SW-846.

SAP Worksheet #37 -- Usability Assessment

Describe the evaluative procedures used to assess overall measurement error associated with the project. Identify the personnel responsible for performing the usability assessment:

Individual analytes will be checked to confirm they are within acceptable quantitation and qualification limits (see Worksheet #15). Non-detected analytes will be evaluated to confirm the required project quantitation limits were achieved. If project quantitation limits were achieved and the verification and validation yielded acceptable data, then the data is considered useable.

Laboratory qualifiers will be added to data when deficiencies or uncertainties arise. The data qualifiers will be added to denote minor deficiencies or uncertainties:

J – The associated value is an estimated quantity;

U - Not detected above associated value;

UJ – The analyte was analyzed for, but was not detected. The associated detection limit is an estimated value and may be inaccurate or imprecise;

K – The analyte is present. The reported value may be biased high. The actual value is expected to be lower than reported;

L – The analyte is present. The reported value may be biased low. The actual value is expected to be higher than reported; and

UL- The analyte was not detected; the reported quantitation limit is probably higher than reported.

A ‘R’ qualifier will denote a major QC deficiency. ‘R’ qualified data is typically not considered useable. Analytical data will be checked to ensure the numerical values and qualifiers are appropriately transferred to the EDDs. Deviations from the SAP will be reviewed to assess whether corrective action is warranted and to assess impacts to achievement of project objectives. Beth Cockroft, (Rhēa Data Validator) and Tim Price (Rhēa Project Manager) will be responsible for performing the usability assessment.

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

The Closeout Report will present the data, identify trends and relationships, and document anomalous results. Analytical data summary tables and data validation narratives will be

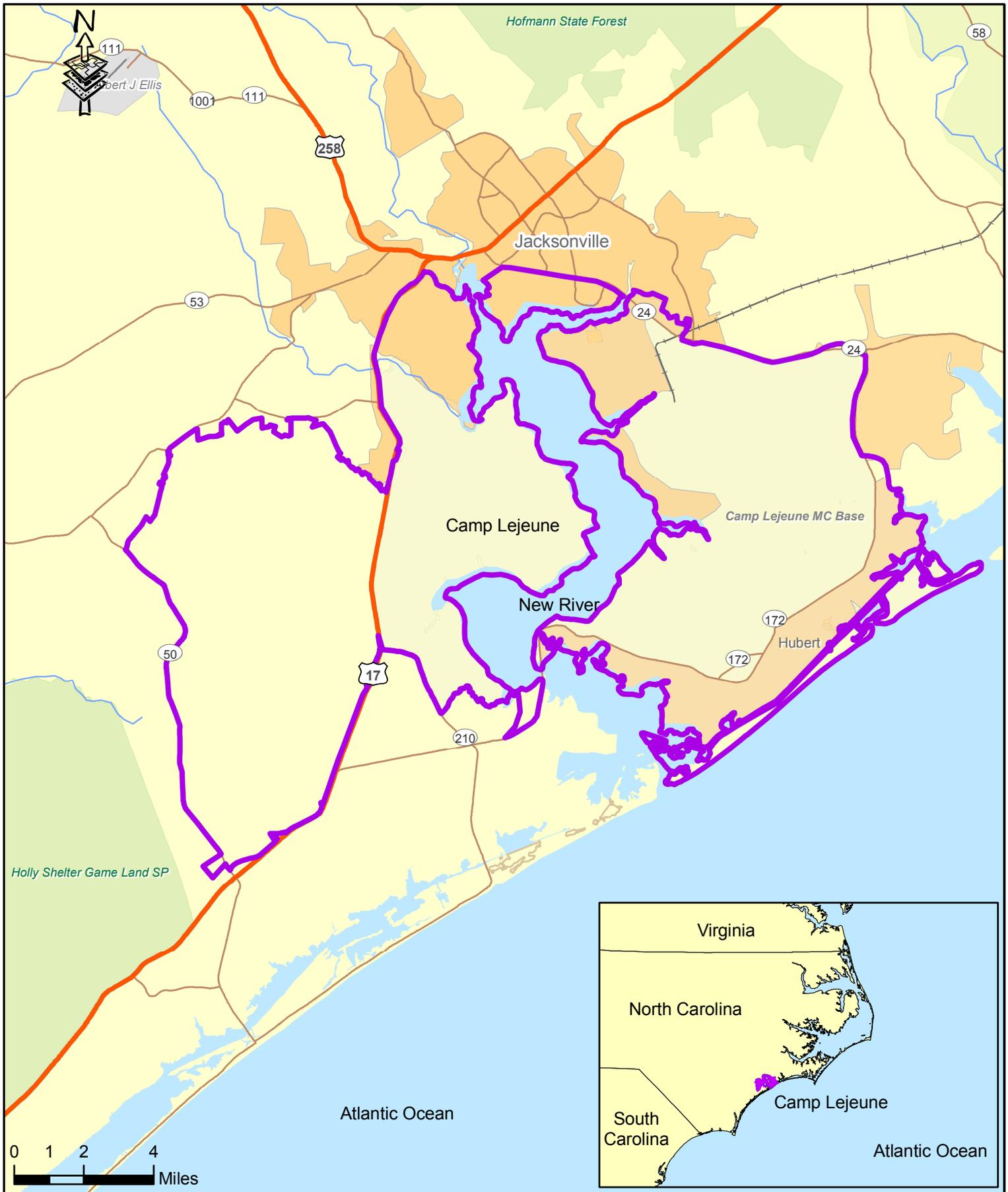
SAP Worksheet #37 -- Usability Assessment (cont'd)

included in the Closeout Report. Analytical data will be compared against the applicable screening criteria (i.e., screening levels for industrial soils). Data qualifiers will be included in the tables and discussed in the Closeout Report. The data validation narratives will include text evaluating data in regards to completeness, COC documentation, holding times, calibrations, blanks, surrogate recoveries, field duplicates, matrix spike and matrix spike duplicated, LCS analyses, compound identifications, and quantitation/reporting limits.

Discuss how the entire project team should reconvene to perform the usability assessment to ensure that the PQOs are understood and the full scope is considered. Describe how data quality issues will be addressed and how limitations on the use of the data will be handled:

Data quality issues and limitations will be identified in the Closeout Report. The results of the sampling, including a discussion of any data gaps and/or usability of the data, will be presented to the Partnering Team during one of the scheduled meetings. The Partnering Team will determine a course of action if it is determined the PQOs were not achieved.

FIGURES



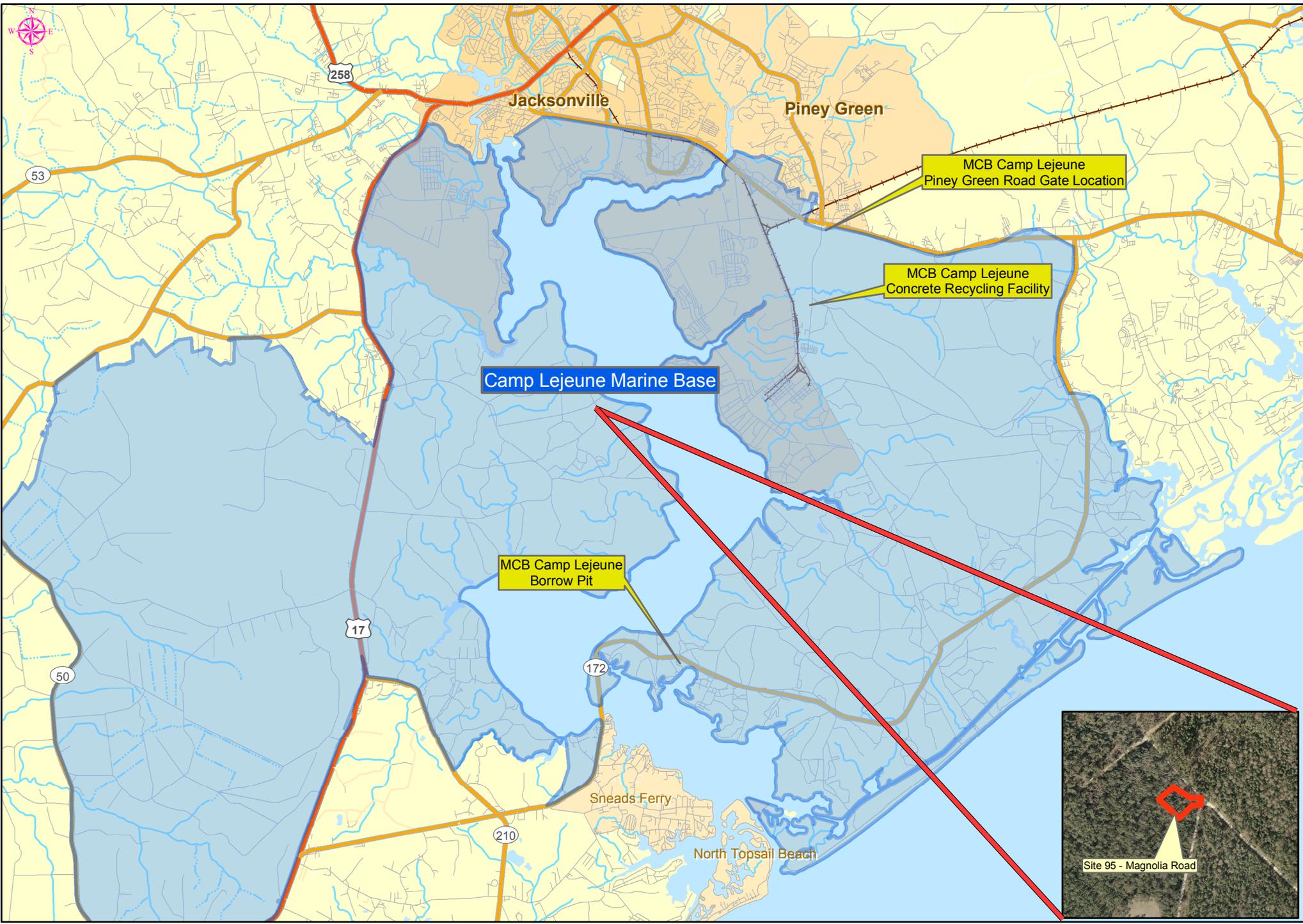
- Legend**
-  Camp Lejeune Base Area
 -  Highway
 -  Major Road
 -  Stream
 -  Counties

Source: North Carolina Center for Geographic Information and Analysis, "Federal Land Ownership," Retrieved November 14, 2007, from NC One Map Web Site: <http://www.nconemap.com/Default.aspx?tabid=286>

File: NAVFAC/1409/390/Reports/R2/WP



Figure 1
General Location Map
MCB Camp Lejeune, North Carolina

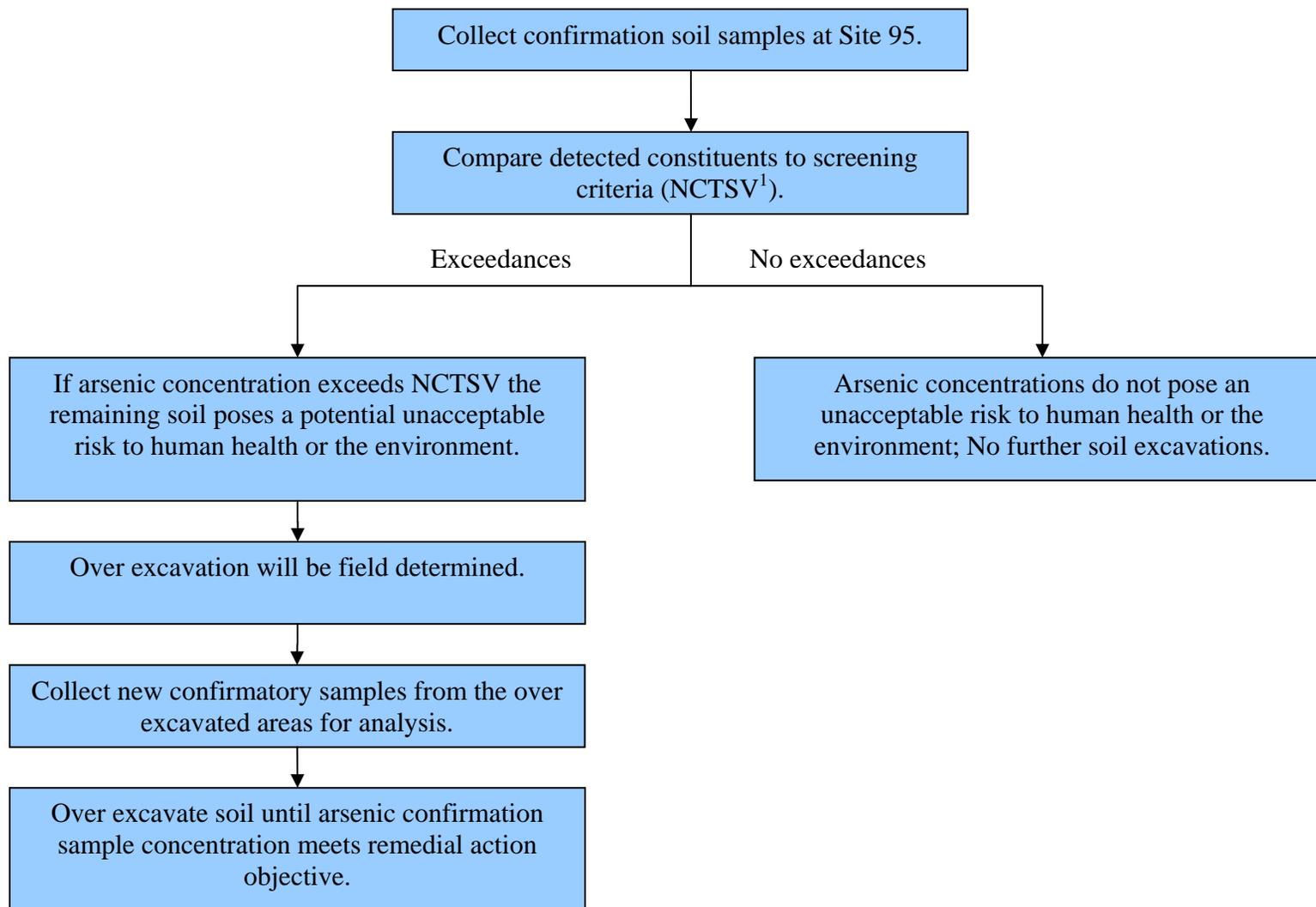


310 155 0 310 Feet

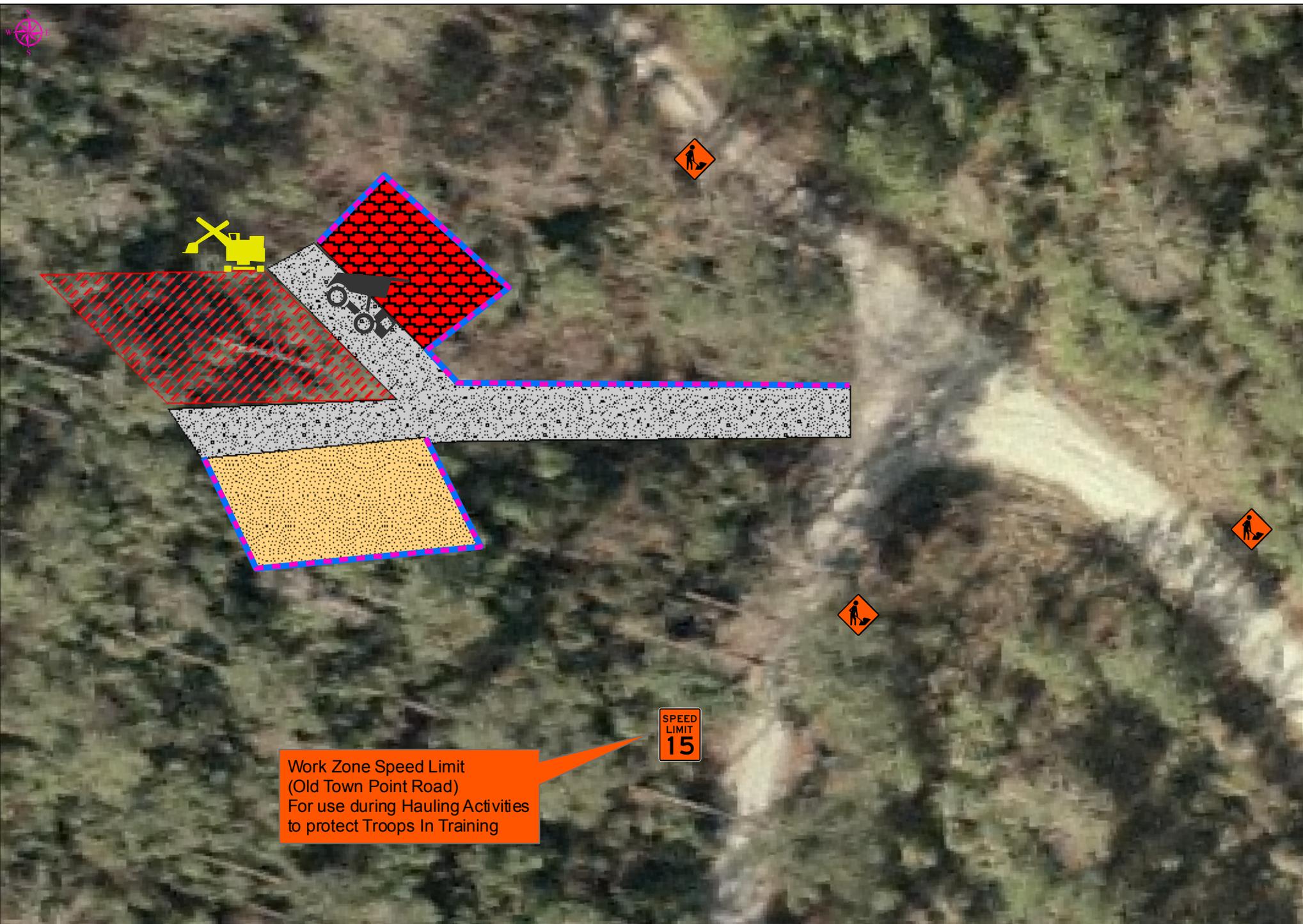


Figure 2
Site Location Map
Site 95
MCB Camp Lejeune, North Carolina

Figure 4
Decision Tree – Site 95 Magnolia Road
Marine Corps Base Camp Lejeune, North Carolina



1. NCTSV – North Carolina Federal Remediation Branch Target Screening Values



Work Zone Speed Limit
 (Old Town Point Road)
 For use during Hauling Activities
 to protect Troops In Training

- Legend**
-  E&S Controls (Silt Fence)
 -  Excavated Soil Storage Area (if needed)
 -  Clean Soil Staging Area
 -  New Construction Road
 -  Excavation Area

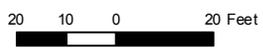


Figure 5
 Excavation Site Layout
 Site 95, Magnolia Road
 MCB Camp Lejeune, North Carolina

APPENDIX A

PARTNERING TEAM MEETING MINUTES

MARINE CORPS BASE CAMP LEJEUNE – IR PARTNERING TEAM
SITE 95 MEETING MINUTES*
OCTOBER 27, 2008

XIV. Site 95 EE/CA

A presentation Site 95 Non-Time-Critical Removal Action (NTCRA) Presentation.ppt was reviewed by Ms. Marcella Johnson. Site 95 consists of three separate sites (Jaybird Road, Magnolia Road, and Lyman Road) with known animal dipping vats at each location. Baker Environmental, Inc. (Baker) completed the “Suspected Dipping Vat Sampling and Suspected Asbestos Shingle/Transit Board Sampling Report” in 2004. Two surface soil samples collected at Magnolia Road in the vat location indicated elevated arsenic concentrations of 565 milligram per kilogram (mg/kg) and 457 mg/kg.

CH2M HILL completed a Site Investigation and 31 surface soil samples [0 to 1 ft below ground surface (bgs)] and 15 subsurface soil samples (1 to 4 ft bgs) were collected. The highest arsenic detections were 188 mg/kg from surface soil samples and 436 mg/kg from subsurface soil samples. CH2M Hill recommended removal of impacted soil.

The purpose of the Engineering Evaluation and Cost Analysis (EE/CA) is to address soil contamination at Magnolia Road as identified in prior investigations and reports. The Team discussed the remediation goal for arsenic. The EE/CA will outline a preliminary remediation goal of 39 mg/kg for arsenic removal for the protection of human health.

The Team discussed Applicable or Relevant and Appropriate Requirement (ARAR) and the requirements. Ms. Gena Townsend indicated that under CERCLA, if no risk is identified then ARARs do not apply. Therefore, the State standards would not be applied. Mr. Randy McElveen indicated if the site is a PA/SI site and no risk is identified (i.e., Site 40 has no risk, it is not a site) that State standards do not apply. He also stated once a Remedial Investigation (RI) is conducted, the site becomes a site and State standards apply. The Team recommended the ARARs from the Site 89 EE/CA or Site 84 Record of Decision (ROD) be used as examples for the Site 95 EE/CA. The archaeological sites should also be included in the EE/CA as an ARAR.

Action: Mr. Robert Lowder – Send Ms. Johnson the archeological report and State Historical Preservation Office (SHPO) clearance for Site 95. Based on the results of the soil analytical data, 370 cubic yards of soil were estimated for removal. The aerial extent of soil is 2,500 sq. ft. and the maximum excavation depth is assumed to be 4 ft. If confirmation samples exceed 39 mg/kg, re-mobilization for further excavation will occur but is not scoped. The soil is assumed to be non-hazardous (arsenic <5 mg/kg) and one composite disposal sample is planned for full toxicity characteristic leaching procedure (TCLP) analysis for verification prior to excavation.

Mr. Lowder questioned whether this meets the State's contained-in policy. The policy states that samples are required for every 25 cubic yards of listed waste; however, arsenic is not a listed waste. Mr. Lowder stated if the soil is non-hazardous, it can be disposed in the Base landfill.

The Team assumed the concrete associated with the dipping vat and debris from clearing activities is not contaminated and will be disposed at the MCB CamLej Recycling Center. Clean fill for excavation backfill will be obtained from the MCB Borrow Pit. The nine existing monitoring wells will be abandoned in accordance with State requirements at the three Site 95 locations. Following the removal action, a survey will be completed and used for "as built" drawings.

Ms. Townsend stated a Closeout Report will be needed after the EE/CA. The report must clearly state that contamination has been removed based on sidewall and floor confirmation sample results below the remediation goal, and there was no groundwater contamination above the Maximum Contaminant Level (MCL) of 10 mg/kg. A paragraph should also be included in the EE/CA to state the number of monitoring wells sampled, the results were below screening criteria, and that the only recommendation is for soil removal.

The schedule for submittal of the Draft EE/CA is November 20, 2008. Ms. Townsend expressed concern with the schedule because she will be out of the office starting the week of Thanksgiving 2008 through January 5, 2009 and needs to coordinate with an USEPA attorney. The goal is to conduct the removal action in June 2009. Ms. Townsend stated if comments are received in January 2009 and the public meeting can be held in February 2009, the removal action schedule should still be met. Mr. Chris Bozzini recommended the UFP-SAP be presented at the January 2009 partnering meeting as the scoping session to expedite the process.

MARINE CORPS BASE CAMP LEJEUNE – IR PARTNERING TEAM
SITE 95 MEETING MINUTES*
JANUARY 21 AND 22, 2009

XX. Site 95 EE/CA

Objective: Discuss site background, EE/CA to address soil contamination, UFP-SAP, and schedule.

Overview: A presentation (*Site 95 NTCRA.ppt*) was reviewed by Marcy. Site 95 consists of three separate sites (Jaybird Road, Magnolia Road, and Lyman Road) with known animal dipping vats at each location. The SI identified elevated arsenic concentrations in soil at the Magnolia Road location. An EE/CA is being prepared to address arsenic concentrations in a 2,500 ft² area to a depth of 4 ft bgs (370 cubic yards). Toxicity Characteristic Leaching Procedure (TCLP) samples were collected in December 2008 and the results indicated that the soil was non-hazardous. Discussions with the Base landfill revealed that they have space limitations and will not accept the soil/debris but that backfill is available for use. Based on discussions with Base forestry, the trees and vegetation can be removed. The Remedial Action Objective (RAO) was identified as: Remediate surface and subsurface arsenic-contaminated soil above the Human Health Risk (HHR) level of 39 mg/kg from the identified source area and reduce exposure to human receptors. Gena requested that the RAO be revised to reflect that this will result in meeting the acceptable risk range of 10⁻⁴ to 10⁻⁶. The Team discussed how the 39 mg/kg clean-up level was determined and whether or not concentrations were above the North Carolina Soil Screening Levels (NC SSL). If so, the RAO would need to state that the NC SSL, or protective value, needed to be achieved for protection of groundwater. The NC SSL should also be included as a To Be Considered (TBC) in the ARARs table. The North Carolina regulations do state that site-specific information can be used to calculate a different value.

Action Marcy - Provide Site 95 ARARs to USEPA attorney for review, identify the alternatives they apply to, whether they are state or federal, and include the NC SSL as a TBC.

Four removal action alternatives were identified:

- No action
- Soil excavation and offsite disposal
- In-situ vitrification and Land Use Controls (LUCs)
- Separation geotextile and soil cover with LUCs

The major components, advantages and disadvantages, and relative costs of each alternative were discussed. Based on comparative analysis, soil excavation and offsite disposal is the preferred alternative. The schedule for submittal of the Draft EE/CA is February 2009. The EE/CA will be completed in parallel with the UFP-SAP Work Plan to expedite the schedule.

Gena indicated that because Site 95 is only a site, that no Operable Unit (OU) number is needed. Therefore, the OU 22 designation should not be used in the future.

MARINE CORPS BASE CAMP LEJEUNE – IR PARTNERING TEAM
SITE 95 MEETING MINUTES*
APRIL 28 AND 29, 2009

XX. Site 95 NTCRA Work Plan

Objective: Discuss site background, EE/CA to address soil contamination, UFP-SAP, and schedule.

Overview: A presentation (*Site 95 NTCRA.ppt*) was reviewed by Marcy. Site 95 consists of three separate sites (Jaybird Road, Magnolia Road, and Lyman Road) with known animal dipping vats at each location. The SI identified elevated arsenic concentrations in soil at the Magnolia Road location and soil removal was recommended. Arsenic concentrations exceed the USEPA Region 9 Preliminary Remediation Goals (PRGs) for soil of 39 mg/kg. Gena indicated that the PRGs have been superseded by the Regional Screening Levels (RSLs) and should be used for comparison.

An EE/CA is being prepared to address arsenic concentrations in a 2,500 ft² area to a depth of 4 ft bgs (370 cubic yards). TCLP samples were collected in December 2008 and the results indicated that the soil was non-hazardous. The RAO was presented as: “Remediate surface and subsurface arsenic-contaminated soil above the HHR level of 39 mg/kg and above the NC Groundwater Protection Standard of 30 mg/kg from the identified source area and reduce exposure to human receptors.” Gena requested that the RAO be revised to reflect that the removal action will result in meeting USEPA’s acceptable risk range of 10⁻⁴ to 10⁻⁶. Randy recommended that the RAO also consider protection of groundwater (NC SSLs) as discussed at the January partnering meeting. The previous partnering meeting minutes (January 2009) provide language for the RAO as discussed. The removal action alternatives were identified as:

- No action
- Soil excavation and offsite disposal
- In-situ vitrification and LUCs
- Separation geotextile and soil cover with LUCs

The ARARs and TBCs were reviewed. Soil excavation and offsite disposal is the preferred alternative. Marcy asked about whether the EE/CA alternatives need to all result in no further action, LUCs are included in some alternatives. Gena indicated that any site that has LUCs must be addressed ROD. The goal for this site was to completely remove contamination in an EE/CA so that the site is not carried through as an OU and a ROD is not needed. Gena recommended only including alternatives that would result in no further action (e.g., removal, treatment). Randy recommended phytoremediation.

Marcy reviewed the ARARs and TBCs, the UFP-SAP content, Rhēas’ Standard Operating Procedures (SOPs), details of the laboratory SOPs, Quality Assurance/Quality Control (QA/QC) sample frequency, data reporting, personal and chemical hazards, Personal Protective Equipment

(PPE), site layout, and erosion and sediment control. Bob indicated that the safety plan should reflect the troop training exercises in the area. Minimal site clearing will be conducted and the plan was approved by Base forestry. Following clearing, a gravel access road will be installed and removed upon completion. The excavation area is approximately 25 ft x 75 ft x 4ft (or to the depth of groundwater). The Base landfill may not accept soil/debris from the excavation. Bob indicated that the soil may be used as daily cover and to contact Joe Powers. The concrete dipping vat is assumed not to be contaminated and will be disposed at MCB Recycling Center. The Team recommended collecting concrete chip samples for confirmation that the vat is not contaminated.

Fifteen confirmation samples will be collected, 1 soil sample per 666 ft³ and analyzed for arsenic. If concentrations are greater than 30 mg/kg, based on the North Carolina action level, additional excavation and confirmation sampling may be necessary. The nine existing monitoring wells (3 at each of the former dipping vat locations) will be abandoned. Gena stated the closeout report should focus on the soil NTCRA because groundwater was previously closed out with no further action.

A final site survey will be conducted to identify the limits of the removal in the final closeout report. Bob indicated that Global Positioning System (GPS) can be used to survey the boundary. Clean fill from the Base borrow pit will be used to fill the excavation and seeding and mulch will be installed.

The schedule is to submit the draft EE/CA by the end of May (posted to the Enterprise web site), field mobilization in September, and the closeout report in early 2010. The EE/CA is awaiting ARARs review by USEPA legal.

MARINE CORPS BASE CAMP LEJEUNE – IR PARTNERING TEAM
SITE 95 MEETING MINUTES*
NOVEMBER 18 AND 19, 2009

XXVI. Site 95 Update

Objective: Discuss the cleanup level for arsenic contaminated soil, discuss comments and responses on the EE/CA, present the UFP-SAP, and discuss the schedule.

Overview: A presentation was reviewed by Marcy. The recent NCSSL revision identified a change in the standard for arsenic from 30 to 5.44 mg/kg. Randy requested review of a figure of the locations and concentrations. Randy indicated that it is acceptable if the average concentrations are below 5.44 mg/kg and that 30 mg/kg can be referred to since it is already included in the EE/CA and work plan but that the confirmation sample results should be collected and averaged, if the average concentration is below 5.44 mg/kg backfilling can be conducted. There is one concentration of 6.8 mg/kg that was identified as an outlier. Marcy will revise the EE/CA and UFP-SAP.

The Draft EE/CA was submitted 9-8-09, comments were received from 9-18-09 through 10-28-09. The EE/CA comments and responses were reviewed.

- **NCDENR Comment:** Clarify that 39 mg/kg for human health is the 10^{-4} risk-based concentration. **Response:** Revision made on page 9 of EE/CA.
- **NCDENR Comment:** Correct the SSL from 5.24 to 30 mg/kg at bottom of Figures 4 and 5. **Response:** Revisions will be made as discussed.
- **EPA Comment:** Executive Summary – Clarify Purpose Statement of EE/CA. **Response:** Corrected.
- **EPA Comment:** EPA Comment Removal Action Alternatives – Replace “Remedial” with “Removal” within text. **Response:** Corrected.
- **EPA Comment:** EPA Attorney Comments on ARARs. **Response:** Corrected. NC Attorney Wallace Finlator identified that the document is acceptable and on 11-16-09.

The project scope for the UFP-SAP includes the organizational chart, problem definition, PQOs, and summary of project tasks. The problem definition is that analytical results indicated exceedances of regulatory criteria for arsenic in soil, arsenic exceeded the NCSSL of 30 mg/kg and a removal action is needed for approximately 370 cy of soil as recommended in the SI Report.

The PQOs are to collect 15 confirmatory soil samples for arsenic analysis following excavation. The laboratory results will be data validated and if results exceed the cleanup level, additional excavation will be performed and confirmatory soil samples collected and analyzed until the cleanup level is reached horizontally and vertically. Samples will be collected and analyzed as per applicable Rhea or laboratory SOPs attached to the UFP-SAP. A decision tree was prepared in the form of if/then qualitative and quantitative statements.

Project tasks include site preparation (site clearing, utility locating, monitoring well abandonment, temporary access road construction, and erosion and sedimentation control implementation), excavation and disposal of arsenic-contaminated soil, confirmatory soil sampling and survey, and site restoration including backfilling and revegetation.

Bob questioned whether a disposal facility has been identified. Gena asked whether the concrete was tested. Marcy indicated that a disposal facility was identified and the concrete tested, clean and it will be disposed of at a concrete processing facility.

The UFP-SAP was completed and submitted to the NAVFAC Chemist on 9-25-09, comments were received 10-20-09, and Revision 1 was resubmitted on 10-28-09 and signed. The UFP-SAP was submitted to the Team on 10-29-09. The anticipated schedule is as follows:

- Receive comments and finalize UFP-SAP by 1-8-2010
- Complete Draft Final EE/CA by 12-7-09
- Conduct Public Comment/Public Meeting by 1-26-10
- Finalize EE/CA by 2-10-10
- Complete Action Memo by 5-3-10
- Conduct Field Work 5-10-10 Through 6-30-10
- Complete Closeout Report by 8-30-10

The Team indicated that the Action Memo should not take long to be prepared and that it could be completed following the public meeting, by the end of February. The excavation may then be moved up to March/April 2010 to ensure the RC in FY2010.

MARINE CORPS BASE CAMP LEJEUNE – IR PARTNERING TEAM
SITE 95 MEETING MINUTES*
FEBRUARY 3 AND 4, 2010

XXIV Site 95 UFP-SAP Update

Objective: Review changes since UFP-SAP Rev 1, provide responses to Rev 2 comments, discuss whether a Decision Document is needed, provide the current status of UFP-SAP approvals, and provide tentative schedule.

Overview: A presentation was reviewed by Marcy. The major revision to the UFP-SAP was the 2009 criteria change for arsenic, from 30 to 5.44 mg/kg which altered the removal area boundaries. The responses to key NCDENR and EPA comments were reviewed as follows:

- **Response to NCDENR Specific Comment 1:** Excavation will be conducted to 3.5 ft over the entire area to avoid groundwater and confirmatory samples taken.
- **Response to NCDENR Specific Comment 2:** Figure 5 was revised to reflect the confirmatory sample scheme.
- **Response to NCDENR Specific Comment 3:** Excavation will be to 3.5 ft bgs in accordance with OSHA Regulation 29 CFR 1926.652(a)(1)(ii), excavations to 5 ft bgs do not require protective systems. Samples will be collected directly from the excavation with a hand shovel, or from an excavation bucket if warranted. Randy will be on-site to collect and analyze XRF data.
- **Response to NCDENR Specific Comment 4:** The estimated total volume of soil to be excavated is 376 cy based on the revised cleanup level of 5.44 mg/kg.
- **Response to NCDENR Specific Comment 6:** The project schedule will be included as an 11x17 following Worksheet No. 16.
- **Response to NCDENR Specific Comment 7:** The “SW No.” labels identify which wall the sample will be collected from as depicted on Figure 5.
- **Response to NCDENR Specific Comment 8:** TCLP composite samples of soil and concrete were already collected and analyzed and the results were non-hazardous. Soil disposal is planned in a Subtitle D Landfill. Concrete disposal will be taken to the Base Recycling Center.
- **Response to NCDENR HASP Comment 1:** PPE Level C evaluation will be based on SHSO Observations of dust in the air originating from the excavation activities.
- **Response to NCDENR HASP Comment 2:** Appropriate respirator cartridges have been identified in the HASP.
- **Response to EPA Comment 1:** Please refer to NCDENR Specific Comments/Responses. In Addition, the planned 30 confirmatory samples will be analyzed individually and the results averaged for comparison.

The Team discussed the confirmation soil sampling approach. Randy will collect and analyze a sample using XRF. Rhēa will send a representative sample to an off-site lab to verify the results for at least 5 samples, one from each side wall and the bottom of the excavation. If the results are above the site cleanup level of 5.44 mg/kg, additional excavation will be conducted and confirmatory samples collected. Marcy indicated that Rhēa may not have funding to complete additional excavation and Dave indicated that Osage may have funding to provide support.

The UFP-SAP was completed and submitted to the NAVFAC Chemist on 9-25-09, comments were received 10-20-09, and Revision 1 was resubmitted on 10-28-09 and signed. The UFP-SAP was submitted to the Team on 10-29-09. UFP-SAP Rev 2 was posted for Team approval on 1-19-10 and comments were received 1-21-10. The planned schedule is as follows:

- Submit Rev 3 UFP-SAP with responses to comments - March 2010
- Submit Final UFP-SAP - April 2010
- Field Work Mobilization – April through June 2010
- Submit Closeout Report - July 2010, followed by a Final Report in September 2010

The Team discussed the need for a site closeout report or NFA Decision Document to document that the removal action was complete and no risks remain to human health or the environment and NFA is needed.

XXV. Site 95 EE/CA and NTCRA

Objective: Review the Site 95 EE/CA presentation planned for the Public Meeting.

Overview: The presentation was reviewed by Marcy and modified by the Team.

Marcy will be providing a handout with information regarding review of the EE/CA and access to the Administrative Record. The Team discussed that the NIRIS web site for the Administrative Record is not searchable and the EE/CA is the last on the list. The Team requested Marcy place a copy of the EE/CA in the library during the public comment period.

APPENDIX B

FIELD SOPS

Non-Time-Critical Removal Action for Arsenic Contaminated Soil
 Site 95 Magnolia Road
 MCB CamLej, North Carolina
 Summary of Field Standard Operating Procedures

SOP Name	Title	Brief Description / Purpose
Rhēa SOPs:		
Rhēa SOP 2.0	Decontamination of Sampling Equipment	To provide technical guidance for the decontamination of sampling equipment.
Rhēa SOP 4.0	Respiratory Protection Devices	To provide technical guidance for the use of respiratory protection devices.
Rhēa SOP 5.0	Waste and Water Management/Disposal	To provide technical guidance for waste and water management/disposal.
Rhēa SOP 6.0	Personal Protective Equipment (PPE)	To provide technical guidance for the proper use of personal protective equipment.
Rhēa SOP 7.0	Soil and Water Sample Handling	To provide technical guidance for soil and water sample handling procedures.
Rhēa SOP 8.0	Decontamination Pad Construction	To provide technical guidance for decontamination pad construction.
Rhea SOP 10.1	North Carolina Well Abandonment Procedures	To provide technical guidance for the abandonment and change-of-status of monitoring wells in North Carolina.
Rhēa SOP 12.0	GPS Surveying with GEO XT Handheld GPS Unit	To provide technical guidance for the collection of real-time coordinates for objects or sample locations encountered during field activities.
Rhēa SOP 22.0	Surface and Subsurface Soil Sampling	To provide technical guidance for surface soil sampling.
North Carolina Department of Environment and Natural Resources, Division of Waste Management SOPs:		
NC 1.0	NC Division of Waste Management Radiation Protection Program	Serves as guidance to ensure the safe operation and use of radioactive materials.

STANDARD OPERATING PROCEDURE

DECONTAMINATION OF SAMPLING EQUIPMENT

I. Purpose

To provide technical guidance for the decontamination of sampling equipment.

II. Scope

Review of appropriate procedures, equipment and supplies required for decontamination of sampling equipment.

III. Related SOPs

Rhēa SOP 5.0 Waste and Water Management/Disposal

Rhēa SOP 8.0 Decontamination Pad Construction

IV. Equipment and Materials

Sample collection equipment to be decontaminated (e.g., shovel, spoon, and buckets)

Water source (e.g., tap, distilled, or deionized)

Alconox or other industrial detergent

Appropriate brush(s) and buckets

Other chemical cleaning solutions (e.g., isopropanol or acetone)

Latex or nitrile gloves

V. Procedures and Guidelines

1. Construct a decontamination pad in accordance with Rhēa SOP 8.0 Decontamination Pad Construction.
2. Hand held sample collection equipment (e.g., shovel, spoon, and buckets) should be decontaminated on the decontamination pad prior to and after each use in accordance with the following procedure:
 - a) Prepare one bucket with tap water and detergent solution, one bucket with tap water for initial rinse, one container with isopropanol or acetone for rinse by pouring, and one container with distilled or deionized water for final rinse by pouring.

- b) Wearing appropriate gloves, thoroughly wash the sampling equipment with a stiff or soft bristle brush, as appropriate, in tap water detergent solution.
 - c) Initially rinse the sampling equipment in the tap water bucket.
 - d) Rinse the sampling equipment twice with isopropanol or acetone.
 - e) Rinse the sampling equipment twice with the distilled or deionized water.
3. Miscellaneous site materials such as Tyvec, decontamination pad construction materials, and nitrile gloves will be cleaned in accordance with Sections 2a through 2e. Once clean, the materials can be considered waste, and disposed of accordingly.
4. Mechanical soil sampling equipment, including backhoe/excavator buckets, will be decontaminated on the decontamination pad by the subcontractor in accordance with the following procedure (unless alternate recommendations are provided by the equipment manufacturer):
 - a) Prepare one bucket with tap water and detergent solution.
 - b) Wearing appropriate gloves, thoroughly wash the sampling equipment surface that came in contact with soil with a stiff bristle brush, using the tap water and detergent solution.
 - c) Initially rinse the sampling equipment with tap water.
 - d) Rinse the sampling equipment twice with isopropanol or acetone.
 - e) Rinse the sampling equipment twice with the distilled or deionized water.
5. At the completion of sampling activities, all sampling equipment must be decontaminated. This includes large machinery like excavators, backhoes, dump trucks, or any other equipment which entered the exclusion zone. The owner, renter or operator of the equipment will be responsible for performing the equipment decontamination. The subcontracting firms will verify that decontamination of the equipment follows decontamination protocol. The following procedures will be followed prior to the cleaning:
 - a) Move equipment onto the decontamination pad.
 - b) Ensure the decontamination pad is constructed to contain the equipment and spray from cleaning.
 - c) Use a pressure washer to clean all exterior surfaces of the equipment including tracks, tire treads and beneath the equipment.
 - d) Inspect the equipment for any remaining soil or debris and repeat steps 5a through 5c if necessary.
 - e) Once clean, remove from decontamination pad.

f) Transfer contaminated water and soil to drums or other disposal apparatus in accordance with Rhēa SOP 5.0 Waste and Water Management.

6. The wastewater collected should be contained and disposed of in accordance with Rhēa SOP 5.0 Waste and Water Management/Disposal.

VI. Key Checks and Items

- Verify sampling equipment is clean and in proper working condition.
- Verify the sampling equipment is decontaminated prior to and after each use.

STANDARD OPERATING PROCEDURE

RESPIRATORY PROTECTION DEVICES

I. Purpose

To provide technical guidance for the use of respiratory protection devices.

II. Scope

Review of appropriate procedures, equipment and supplies required for respiratory protection.

III. Related SOPs

Rhēa SOP 6.0 Personal Protective Equipment

Rhēa SOP 19.0 Asbestos Building Inspection

IV. Equipment and Materials

Air Purifying Respirator

Appropriate filter type

Manufacturer's disinfecting solution or wipes (e.g., benzoalkaloid or isopropyl alcohol)

Soft bristled brush (if necessary)

Mild detergent (i.e., household dish soap)

Clean water source

Latex or nitrile gloves

V. Procedures and Guidelines

1. Use only the issued respirator the individual is fit tested and approved to wear.
2. Clean and Disinfect Air Purifying Respirators (APRs).

APRs in routine use will be cleaned and disinfected at least once a day, at the end of the field work period. Where respirators are used occasionally, or when they are in storage, the respirators will be cleaned after each use and thoroughly inspected prior to each subsequent use.

The steps for cleaning and disinfecting APRs after use are as follows:

- The respirator should be washed with a mild detergent and rinsed with water to remove “dirt” and build-up from site work. The respirator should be subsequently disinfected. Use of household ammonium compounds is recommended.
- Respirators will be wiped with disinfectant wipes (benzoalkaloid or isopropyl alcohol) only between work periods (breaks) to “refresh” the respirator seal. Disinfectant wipes are not sufficient for end of day cleaning.
- Respirators will be thoroughly inspected before each use to ensure they are in proper working condition in accordance with Item 3 below, and were adequately cleaned from the previous use.

3. APR Inspection and Checkout

- Visually inspect the entire respirator for obvious damage, defects, and/or deteriorated rubber.
- Make sure the respirator harness is not damaged. Serrated portions of harnesses can fragment, preventing proper face seal adjustment.
- Inspect full facepiece respirator lenses for damage and proper seal.
- Inspect exhalation valves by removing the cover and checking valves and valve seats for debris and damage that could cause leakage.
- Inspect inhalation valves by removing cartridges/canisters and visually inspecting valves and valve seats. Make sure the inhalation valves and cartridge receptacle gaskets are in place and in good condition.
- Make sure a protective lens cover is in place.

- Make sure the speaker diaphragm retainer ring is hand tight.
- Make sure the air purifying cartridges are the correct type for expected exposure situations.
- Don the respirator, and perform negative and positive pressure fit tests.

4. Storage of Respirators

- Respirators will be stored in clean and secure areas, which minimize the chance for contamination or unsanitary conditions. Respirators will be stored in clean Ziploc bags (or equivalent); and will be placed in a position that will not distort the facepiece.
- OSHA requires protection from the following elements during storage of respirators:
 - Dust
 - Sunlight
 - Heat
 - Extreme cold
 - Excessive moisture
 - Damaging chemicals
 - Mechanical damage

VI. Key Checks and Items

- Verify cleaned and disinfected respirators are rinsed thoroughly in clean warm water to remove all traces of detergent and disinfectant.
- Respirators will be thoroughly inspected before each use to ensure adequate cleaning, and to examine the respirator for damages and proper seal.
- Verify respirators are properly stored in clean and secure areas, which minimize the chance for contamination or unsanitary conditions.

STANDARD OPERATING PROCEDURE

WASTE AND WATER MANAGEMENT / DISPOSAL

I. Purpose

To provide technical guidance for waste and water management/disposal.

II. Scope

Review of appropriate procedures, equipment and supplies required for waste and water management/disposal.

III. Related SOPs

Rhēa SOP 2.0 Decontamination of Sampling Equipment

Rhēa SOP 8.0 Decontamination Pad Construction

IV. Equipment and Materials

Open and/or closed-top drums (if necessary)

Plastic trash bags

Drum labels (if necessary)

Waste management documents and forms (e.g., IDW Management Form, if necessary)

Latex or nitrile gloves

V. Procedures and Guidelines

1. Waste Handling

Examples of waste debris accumulated at a site include plastic sheeting, personal protection equipment (PPE), and disposable sampling equipment. These items are further characterized according to the waste they are associated with.

- i) Non-hazardous: Waste debris associated with non-hazardous waste should be collected in a plastic waste bag and placed in an on-site dumpster for disposal in an approved RCRA Subtitle D Landfill.

- ii) Hazardous Waste: Waste debris associated with hazardous waste should be collected in a plastic waste bag and placed in a drum or dumpster designated for hazardous waste collection. If hazardous material can dissolve plastic, waste debris should be placed directly in metal drum for disposal. The drum or dumpster contents should be disposed at an approved RCRA Subtitle C Landfill.
- iii) Drums containing waste debris will be appropriately labeled with at least the following:
 - (1) Rhēa Project number
 - (2) Contents (waste debris)
 - (3) Date of waste generation
 - (4) Site name or reference name

2. Wastewater

Examples of wastewater accumulated at a site include monitoring well purge water and decontamination water. Wastewater can be further characterized according to the waste it is associated with based on the residual concentration.

- i) Non-hazardous: Wastewater associated with non-hazardous chemicals or waste, does not contain free product, or does not have constituent concentrations above applicable regulatory criteria will be collected in drums or portable tanks and stored on site until proper disposal arrangements are made.
- ii) Hazardous: Wastewater with reported analytical concentrations or properties classifying it as a hazardous waste will be containerized in drums or portable tanks for disposal at an appropriate treatment facility.
- iii) Drums containing wastewater will be appropriately labeled with at least the following:
 - (1) Rhēa Project number
 - (2) Contents (wastewater)
 - (3) Date of wastewater generation
 - (4) Site name or reference name

3. Off-site Waste Disposal

For off-site disposal of wastes, disposal facilities with proper permits and in good standing with the state and federal agencies will be used. Waste from CERCLA work will be disposed of at facilities approved under the CERCLA off-site rule (see attached).

VI. Key Checks and Items

- Verify the appropriate disposal documents and forms have been properly completed.
- Verify the drums used for on-site waste storage have been property labeled.

Off-Site Rule

What is the Off-Site Rule?

Section 121(d)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund) applies to any CERCLA response action involving the off-site transfer of any hazardous substance, pollutant or contaminant (CERCLA wastes). That section requires that CERCLA wastes may only be placed in a facility operating in compliance with the Resource Conservation and Recovery Act (RCRA) or other applicable Federal or State requirements. That section further prohibits the transfer of CERCLA wastes to a land disposal facility that is releasing contaminants into the environment, and requires that any releases from other waste management units must be controlled. These principles are interpreted in the Off-Site Rule (OSR), set forth in the National Contingency Plan (NCP), at 40 CFR 300.440. The purpose of the OSR is to avoid having CERCLA wastes from response actions authorized or funded under CERCLA contribute to present or future environmental problems by directing these wastes to management units determined to be environmentally sound (preamble to final OSR, 58 FR 49200, 49201, Sept. 22, 1993).

The OSR establishes the criteria and procedures for determining whether facilities are acceptable for the receipt of CERCLA wastes from response actions authorized or funded under CERCLA. The OSR establishes compliance criteria and release criteria, and establishes a process for determining whether facilities are acceptable based on those criteria. The OSR also establishes procedures for notification of unacceptability, reconsideration of unacceptability determinations, and re-evaluation of unacceptability determinations

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institutional controls, under §300.510(c).

(2) A remedy becomes “operational and functional” either one year after construction is complete, or when the remedy is determined concurrently by EPA and the state to be functioning properly and is performing as designed, whichever is earlier. EPA may grant extensions to the one-year period, as appropriate.

(3) For Fund-financed remedial actions involving treatment or other measures to restore ground- or surface-water quality to a level that assures protection of human health and the environment, the operation of such treatment or other measures for a period of up to 10 years after the remedy becomes operational and functional will be considered part of the remedial action. Activities required to maintain the effectiveness of such treatment or measures following the 10-year period, or after remedial action is complete, whichever is earlier, shall be considered O&M. For the purposes of federal funding provided under CERCLA section 104(c)(6), a restoration activity will be considered administratively “complete” when:

(i) Measures restore ground- or surface-water quality to a level that assures protection of human health and the environment;

(ii) Measures restore ground or surface water to such a point that reductions in contaminant concentrations are no longer significant; or

(iii) Ten years have elapsed, whichever is earliest.

(4) The following shall not be deemed to constitute treatment or other measures to restore contaminated ground or surface water under §300.435(f)(3):

(i) Source control maintenance measures; and

(ii) Ground- or surface-water measures initiated for the primary purpose of providing a drinking-water supply, not for the purpose of restoring ground water.

§300.440 Procedures for planning and implementing off-site response actions.

(a) *Applicability.* (1) This section applies to any remedial or removal action involving the off-site transfer of any

hazardous substance, pollutant, or contaminant as defined under CERCLA sections 101 (14) and (33) (“CERCLA waste”) that is conducted by EPA, States, private parties, or other Federal agencies, that is Fund-financed and/or is taken pursuant to any CERCLA authority, including cleanups at Federal facilities under section 120 of CERCLA, and cleanups under section 311 of the Clean Water Act (except for cleanup of petroleum exempt under CERCLA). Applicability extends to those actions taken jointly under CERCLA and another authority.

(2) In cases of emergency removal actions under CERCLA, emergency actions taken during remedial actions, or response actions under section 311 of the Clean Water Act where the release poses an immediate and significant threat to human health and the environment, the On-Scene Coordinator (OSC) may determine that it is necessary to transfer CERCLA waste off-site without following the requirements of this section.

(3) This section applies to CERCLA wastes from cleanup actions based on CERCLA decision documents signed or consent decrees lodged after October 17, 1986 (“post-SARA CERCLA wastes”) as well as those based on CERCLA decision documents signed and consent decrees lodged prior to October 17, 1986 (“pre-SARA CERCLA wastes”). Pre-SARA and post-SARA CERCLA wastes are subject to the same acceptability criteria in §300.440(b)(1) and (2).

(4) EPA (usually the EPA Regional Office) will determine the acceptability under this section of any facility selected for the treatment, storage, or disposal of CERCLA waste. EPA will determine if there are relevant releases or relevant violations at a facility prior to the facility’s initial receipt of CERCLA waste. A facility which has previously been evaluated and found acceptable under this rule (or the preceding policy) is acceptable until the EPA Regional Office notifies the facility otherwise pursuant to §300.440(d).

(5) Off-site transfers of those laboratory samples and treatability study CERCLA wastes from CERCLA sites set out in paragraphs (a)(5)(i) through (iii) of this section, are not subject to

the requirements of this section. However, those CERCLA wastes may not be transferred back to the CERCLA site unless the Remedial Project Manager or OSC assures the proper management of the CERCLA waste samples or residues and gives permission to the laboratory or treatment facility for the samples and/or residues to be returned to the site.

(i) Samples of CERCLA wastes sent to a laboratory for characterization;

(ii) RCRA hazardous wastes that are being transferred from a CERCLA site for treatability studies and that meet the requirements for an exemption for RCRA under 40 CFR 261.4(e); and

(iii) Non-RCRA wastes that are being transferred from a CERCLA site for treatability studies and that are below the quantity threshold established at 40 CFR 261.4(e)(2).

(b) *Acceptability criteria.* (1) *Facility compliance.* (i) A facility will be deemed in compliance for the purpose of this rule if there are no relevant violations at or affecting the unit or units receiving CERCLA waste:

(A) For treatment to standards specified in 40 CFR part 268, subpart D, including any pre-treatment or storage units used prior to treatment;

(B) For treatment to substantially reduce its mobility, toxicity or persistence in the absence of a defined treatment standard, including any pre-treatment or storage units used prior to treatment; or

(C) For storage or ultimate disposal of CERCLA waste not treated to the previous criteria at the same facility.

(ii) Relevant violations include significant deviations from regulations, compliance order provisions, or permit conditions designed to: ensure that CERCLA waste is destined for and delivered to authorized facilities; prevent releases of hazardous waste, hazardous constituents, or hazardous substances to the environment; ensure early detection of such releases; or compel corrective action for releases. Criminal violations which result in indictment are also relevant violations. In addition, violations of the following requirements may be considered relevant:

(A) Applicable subsections of sections 3004 and 3005 of RCRA or, where applicable, other Federal laws (such as the

Toxic Substances Control Act and subtitle D of RCRA);

(B) Applicable sections of State environmental laws; and

(C) In addition, land disposal units at RCRA subtitle C facilities receiving RCRA hazardous waste from response actions authorized or funded under CERCLA must be in compliance with RCRA section 3004(o) minimum technology requirements. Exceptions may be made only if the unit has been granted a waiver from these requirements under 40 CFR 264.301.

(2) *Releases.* (i) Release is defined in §300.5 of this part. Releases under this section do not include:

(A) *De minimis* releases;

(B) Releases permitted under Federal programs or under Federal programs delegated to the States (Federally permitted releases are defined in §300.5), except to the extent that such releases are found to pose a threat to human health and the environment; or

(C) Releases to the air that do not exceed standards promulgated pursuant to RCRA section 3004(n), or absent such standards, or where such standards do not apply, releases to the air that do not present a threat to human health or the environment.

(ii) Releases from units at a facility designated for off-site transfer of CERCLA waste must be addressed as follows:

(A) *Receiving units at RCRA subtitle C facilities.* CERCLA wastes may be transferred to an off-site unit regulated under subtitle C of RCRA, including a facility regulated under the permit-by-rule provisions of 40 CFR 270.60 (a), (b) or (c), only if that unit is not releasing any hazardous waste, hazardous constituent, or hazardous substance into the ground water, surface water, soil or air.

(B) *Other units at RCRA subtitle C land disposal facilities.* CERCLA wastes may not be transferred to any unit at a RCRA subtitle C land disposal facility where a non-receiving unit is releasing any hazardous waste, hazardous constituent, or hazardous substance into the ground water, surface water, soil, or air, unless that release is controlled by an enforceable agreement for corrective action under subtitle C of RCRA or other applicable Federal or

State authority. For purposes of this section, a RCRA "land disposal facility" is any RCRA facility at which a land disposal unit is located, regardless of whether a land disposal unit is the receiving unit.

(C) *Other units at RCRA subtitle C treatment, storage, and permit-by-rule facilities.* CERCLA wastes may not be transferred to any unit at a RCRA subtitle C treatment, storage or permit-by-rule facility, where a release of any hazardous waste, hazardous constituent, or hazardous substance from non-receiving units poses a significant threat to public health or the environment, unless that release is controlled by an enforceable agreement for corrective action under subtitle C of RCRA or other applicable Federal or State authority.

(D) *All other facilities.* CERCLA wastes should not be transferred to any unit at an other-than-RCRA subtitle C facility if the EPA Regional Office has information indicating that an environmentally significant release of hazardous substances has occurred at that facility, unless the release is controlled by an enforceable agreement for corrective action under an applicable Federal or State authority.

(iii) Releases are considered to be "controlled" for the purpose of this section as provided in § 300.440 (f)(3)(iv) and (f)(3)(v). A release is not considered "controlled" for the purpose of this section during the pendency of administrative or judicial challenges to corrective action requirements, unless the facility has made the requisite showing under § 300.440(e).

(c) *Basis for determining acceptability.*

(1) If a State finds that a facility within its jurisdiction is operating in non-compliance with state law requirements including the requirements of any Federal program for which the State has been authorized, EPA will determine, after consulting with the State as appropriate, if the violation is relevant under the rule and if so, issue an initial determination of unacceptability.

(2) If a State finds that releases are occurring at a facility regulated under State law or a Federal program for which the State is authorized, EPA will determine, after consulting with

the State as appropriate, if the release is relevant under the rule and if so, issue an initial determination of unacceptability.

(3) EPA may also issue initial determinations of unacceptability based on its own findings. EPA can undertake any inspections, data collection and/or assessments necessary. EPA will then notify with the State about the results and issue a determination notice if a relevant violation or release is found.

(d) *Determination of unacceptability.*

(1) Upon initial determination by the EPA Regional Office that a facility being considered for the off-site transfer of any CERCLA waste does not meet the criteria for acceptability stated in § 300.440(b), the EPA Region shall notify the owner/operator of such facility, and the responsible agency in the State in which the facility is located, of the unacceptability finding. The notice will be sent by certified and first-class mail, return receipt requested. The certified notice, if not acknowledged by the return receipt card, should be considered to have been received by the addressee if properly sent by regular mail to the last address known to the EPA Regional Office.

(2) The notice shall generally: state that based on available information from a RCRA Facility Assessment (RFA), inspection, or other data sources, the facility has been found not to meet the requirements of § 300.440; cite the specific acts, omissions, or conditions which form the basis of these findings; and inform the owner/operator of the procedural recourse available under this regulation.

(3) A facility which was previously evaluated and found acceptable under this rule (or the preceding policy) may continue to receive CERCLA waste for 60 calendar days after the date of issuance of the notice, unless otherwise determined in accordance with paragraphs (d)(8) or (d)(9) of this section.

(4) If the owner or operator of the facility in question submits a written request for an informal conference with the EPA Regional Office within 10 calendar days from the issuance of the notice, the EPA Regional Office shall provide the opportunity for such conference no later than 30 calendar days after the date of the notice, if possible,

to discuss the basis for the underlying violation or release determination, and its relevance to the facility's acceptability to receive CERCLA cleanup wastes. State representatives may attend the informal conference, submit written comments prior to the informal conference, and/or request additional meetings with the EPA Region, relating to the unacceptability issue during the determination process. If no State representative is present, EPA shall notify the State of the outcome of the conference. An owner/operator may submit written comments by the 30th day after issuance of the notice, in addition to or instead of requesting an informal conference.

(5) If the owner or operator neither requests an informal conference nor submits written comments, the facility becomes unacceptable to receive CERCLA waste on the 60th day after the notice is issued (or on such other date designated under paragraph (d)(9) of this section). The facility will remain unacceptable until such time as the EPA Regional Office notifies the owner or operator otherwise.

(6) If an informal conference is held or written comments are received, the EPA Region shall decide whether or not the information provided is sufficient to show that the facility is operating in physical compliance with respect to the relevant violations cited in the initial notice of unacceptability, and that all relevant releases have been eliminated or controlled, as required in paragraph (b)(2) of this section, such that a determination of acceptability would be appropriate. EPA will notify the owner/operator in writing whether or not the information provided is sufficient to support a determination of acceptability. Unless EPA determines that information provided by the owner/operator and the State is sufficient to support a determination of acceptability, the facility becomes unacceptable on the 60th calendar day after issuance of the original notice of unacceptability (or other date established pursuant to paragraphs (d)(8) or (d)(9) of this section).

(7) Within 10 days of hearing from the EPA Regional Office after the informal conference or the submittal of written comments, the owner/operator or the

State may request a reconsideration of the unacceptability determination by the EPA Regional Administrator (RA). Reconsideration may be by review of the record, by conference, or by other means deemed appropriate by the Regional Administrator; reconsideration does not automatically stay the determination beyond the 60-day period. The owner/operator will receive notice in writing of the decision of the RA.

(8) The EPA Regional Administrator may decide to extend the 60-day period if more time is required to review a submission. The facility owner/operator shall be notified in writing if the Regional Administrator extends the 60 days.

(9) The EPA Regional Office may decide that a facility's unacceptability is immediately effective (or effective in less than 60 days) in extraordinary situations such as, but not limited to, emergencies at the facility or egregious violations. The EPA Region shall notify the facility owner/operator of the date of unacceptability, and may modify timeframes for comments and other procedures accordingly.

(e) *Unacceptability during administrative and judicial challenges of corrective action decisions.* For a facility with releases that are subject to a corrective action permit, order, or decree, an administrative or judicial challenge to the corrective action (or a challenge to a permit modification calling for additional corrective action) shall not be considered to be part of a corrective action "program" controlling those releases and shall not act to stay a determination of unacceptability under this rule. However, such facility may remain acceptable to receive CERCLA waste during the pendency of the appeal or litigation if:

(1) It satisfies the EPA Regional Office that adequate interim corrective action measures will continue at the facility; or

(2) It demonstrates to the EPA Regional Office the absence of a need to take corrective action during the short-term, interim period.

Either demonstration may be made during the 60-day review period in the context of the informal conference and RA reconsideration.

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(f) *Re-evaluating unacceptability.* If, after notification of unacceptability and the opportunity to confer as described in §300.440(d), the facility remains unacceptable, the facility can regain acceptability. A facility found to be unacceptable to receive CERCLA wastes based on relevant violations or releases may regain acceptability if the following conditions are met:

(1) *Judgment on the merits.* The facility has prevailed on the merits in an administrative or judicial challenge to the finding of noncompliance or uncontrolled releases upon which the unacceptability determination was based.

(2) *Relevant violations.* The facility has demonstrated to the EPA Region its return to physical compliance for the relevant violations cited in the notice.

(3) *Releases.* The facility has demonstrated to the EPA Region that:

(i) All releases from receiving units at RCRA subtitle C facilities have been eliminated and prior contamination from such releases is controlled by a corrective action program approved under subtitle C of RCRA;

(ii) All releases from other units at RCRA subtitle C land disposal facilities are controlled by a corrective action program approved under subtitle C of RCRA;

(iii) All releases from other units at RCRA subtitle C treatment and storage facilities do not pose a significant threat to human health or the environment, or are controlled by a corrective action program approved under subtitle C of RCRA.

(iv) A RCRA subtitle C corrective action program may be incorporated into a permit, order, or decree, including the following: a corrective action order under RCRA section 3008(h), section 7003 or section 3013, a RCRA permit under 40 CFR 264.100 or 264.101, or a permit under an equivalent authority in a State authorized for corrective action under RCRA section 3004(u). Releases will be deemed controlled upon issuance of the order, permit, or decree which initiates and requires completion of one or more of the following: a RCRA Facility Investigation, a RCRA Corrective Measures Study, and/or Cor-

rective Measures Implementation. The release remains controlled as long as the facility is in compliance with the order, permit, or decree, and enters into subsequent agreements for implementation of additional corrective action measures when necessary, except during periods of administrative or judicial challenges, when the facility must make a demonstration under §300.440(e) in order to remain acceptable.

(v) Facilities with releases regulated under other applicable Federal laws, or State laws under a Federally-delegated program may regain acceptability under this section if the releases are deemed by the EPA Regional Office not to pose a threat to human health or the environment, or if the facility enters into an enforceable agreement under those laws to conduct corrective action activities to control releases. Releases will be deemed controlled upon the issuance of an order, permit, or decree which initiates and requires one or more of the following: a facility investigation, a corrective action study, and/or corrective measures implementation. The release remains controlled as long as the facility is in compliance with the order, permit, or decree, and enters into subsequent agreements for implementation of additional corrective measures when necessary, except during periods of administrative or judicial challenges, when the facility must make a demonstration under §300.440(e) in order to remain acceptable.

(4) Prior to the issuance of a determination that a facility has returned to acceptability, the EPA Region shall notify the State in which the facility is located, and provide an opportunity for the State to discuss the facility's acceptability status with EPA.

(5) An unacceptable facility may be reconsidered for acceptability whenever the EPA Regional Office finds that the facility fulfills the criteria stated in §300.440(b). Upon such a finding, the EPA Regional Office shall notify the facility and the State in writing.

[58 FR 49215, Sept. 22, 1993]

STANDARD OPERATING PROCEDURE

PERSONAL PROTECTIVE EQUIPMENT (PPE)

I. Purpose

To provide technical guidance for the proper use of personal protective equipment.

II. Scope

Review of appropriate procedures, equipment and supplies required for personal protective equipment (PPE).

III. Related SOPs

Rhēa SOP 4.0 Respiratory Protection Devices.

IV. Equipment and Materials

Site-specific PPE based on project HASP; some examples are listed below.

- Appropriate work clothing
- Gloves (leather, cloth, and/or chemical)
- Safety glasses
- Leather or chemical resistant boots or shoes with steel toe and shank
- Hard hat
- Ear protection (if working around heavy equipment)
- Tyvek clothing
- Full-face or half-face air-purifying canister equipped respirator (MSHA/NIOSH approved) available at work area
- Safety glasses

V. Procedures and Guidelines

1. Inspection of PPE

- a) Proper inspection of personal protective equipment includes several sequences of inspection depending on the article of PPE and its frequency of use. The following is a list of several types of inspection:

- i) Inspection and operational testing of PPE received from the factory or distributor
 - ii) Inspection of PPE during use by field team members
 - iii) Inspection of PPE after use or training, and prior to maintenance
 - iv) Periodic inspection of stored PPE and equipment
 - v) Periodic inspection of PPE when a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise
- b) The primary inspection of PPE will occur prior to its immediate use in the field. This inspection will be conducted by the user to ensure the specific device or article is working properly, and the user is familiar with its use.

2. PPE Inspection Checklists

- a) Inspection of protective clothing before use:
- i) Determine if the clothing material is correct for the specified task
 - ii) Visually inspect for imperfect seams, non-uniform coating, tears, and malfunctioning closure
 - iii) Hold up to light and check for pinhole damage
 - iv) Flex the product and observe for cracks or other signs of deterioration
 - v) If product has been used previously, inspect inside and out for signs of chemical deterioration (discoloration, swelling, stiffness)
- b) Cautionary items to be aware while wearing protective clothing during work:
- i) Evidence of chemical attack such as discoloration, swelling, stiffening, or softening. (Note that chemical permeation can occur without physical signs)
 - ii) Closure failure
 - iii) Tears
 - iv) Punctures
 - v) Seam discontinuities

- c) Visually inspect gloves for:
 - i) Imperfect seams
 - ii) Tears
 - iii) Non-uniform coating
 - iv) Pressurize glove with air to listen for pinhole leaks

VI. Key Checks and Items

- Verify the personal protective equipment is adequate for the project based on the site specific HASP.
- Verify the personal protective equipment is in good working condition and is free of damage.

STANDARD OPERATING PROCEDURE

SOIL AND WATER SAMPLE HANDLING

I. Purpose

To provide technical guidance for soil and water sample handling procedures.

II. Scope

Review of appropriate procedures, equipment and supplies required for soil and water sample handling.

III. Related SOPs

Rhēa SOP 1.0 Direct-push Soil Sample Collection

Rhēa SOP 3.0 Subsurface Sampling with Backhoe

Rhēa SOP 16.0 Groundwater Sampling

Rhēa SOP 18.0 Subsurface Soil Sampling During UXO Recovery Operations

Rhēa SOP 22.0 Surface Soil Sampling

Rhēa SOP 23.0 Surface Water Sampling

IV. Equipment and Materials

Chain-of-custody (COC) documents and seals

Shipping labels (if necessary)

Shipping containers (e.g., coolers)

Packing material (e.g., bubble wrap)

Temperature and trip blanks (if necessary)

Sample preservatives (if necessary, e.g., ice)

Shipping container sealant (e.g., duct tape)

V. Procedures and Guidelines

- Individual samples will be placed in on-site cooler with ice or refrigerator as soon as possible until sample collection activities are completed or based on the following in-field sample hold times:

Analysis	Aqueous Sample*	Soil Sample*
VOCs	7 days	24 hours
SVOCs	7 days	3 days
Metals**	7 days	3 days
TPH	7 days	3 days
Pesticides	7 days	3 days
Herbicides	7 days	3 days

Note: *Field hold times verified via personal communication with Kathadin Laboratories, Inc.

**Field hold time for aqueous and soil hexavalent chromium is 24 hours via personal communication with Kathadin Laboratories, Inc.

- Upon completion of sampling activities, samples will be placed in bubble wrapped bags or in sample coolers lined with bubble wrap, with bubble wrap between sample containers, to prevent sample container breakage during shipment.
- Once all samples have been secured in coolers, a temperature blank and trip blank (if necessary) will be placed in the cooler.
- Samples will be maintained at approximately four degrees Celsius during shipping. Shipping containers will be insulated coolers and packed with double bagged water ice (dry ice, blue ice, or chemical cooling packs will not be used).
- COC documents will be completed, which include:
 - Site name
 - Full name of sampler
 - Sample identification number for each sample
 - Date and time of collection for each sample
 - Sample matrix (liquid or solid)
 - Number of containers for each sample
 - Description of sample location for each sample
 - Required analyses for each sample
 - Preservation for each sample, (if required)

- Notation whether the samples are shipped on ice or not
 - Notation if the sample is expected to be highly contaminated
 - Signature of person(s) involved in chain of possession
 - Transfer date(s) and time(s) in chain of possession
6. A copy of the COC will be placed in the sample cooler in a sealed Ziploc® bag or equal, and a copy will be retained for the daily project field log.
 7. The sample cooler will be taped to seal all seams and openings, and around the top to prevent opening during shipment.
 8. COC seals will be added to the front and back of the cooler lid to prevent/detect tampering.
 9. Sample coolers will be either picked up or dropped off at the appropriate shipping facility for delivery to the laboratory. In the case of the common carrier, two signatures will occur on the final COC; one signature by the preparer of the form, and one signature of the sample custodian assigned by the laboratory.
 10. Sample coolers will typically be delivered or shipped to allow for receipt at the laboratory within 24 hours of packaging.
 11. The sample custodian assigned by the laboratory will open the shipping container and will note any breaks to the custody seal of the shipping container and/or damage to the shipping container or sample containers on the COC form.

VI. Key Checks and Items

- Verify the proper COC documents are included in each sample cooler.
- Ensure the sample coolers are properly packed, taped and sealed to prevent breakage and opening during shipment.

STANDARD OPERATING PROCEDURE

DECONTAMINATION PAD CONSTRUCTION

I. Purpose

To provide technical guidance for decontamination pad construction.

II. Scope

Review of appropriate procedures, equipment and supplies required for decontamination pad construction.

III. Related SOPs

Rhēa SOP 5.0 Waste and Water Management/Disposal

IV. Equipment and Materials

Decontamination pad construction materials (e.g., lumber, fasteners, and plastic sheeting)
Latex or nitrile gloves

V. Procedures and Guidelines

A decontamination pad will be constructed as a temporary containment area for the decontamination of equipment, personnel, or as a holding cell for excavated materials.

1. The pad will be constructed according to the project specifications, and/or within reach of the excavating equipment.
2. The pad should be constructed in a manner adjacent to the exclusive zone to collect, contain, and drain all fluids to a central point so the fluids can be separated from solids.
3. The decontamination pad will be constructed of materials that resist puncture or leakage caused by decontamination activities or placement/removal of stored materials.
4. Racks should be built/provided to hold all equipment and materials so all sides can be decontaminated, if applicable.

5. The wastewater collected should be contained and disposed of according to Rhēa SOP 5.0 Waste and Water Management/Disposal.
6. Decontamination pad waste material should be containerized in accordance with Rhēa SOP 5.0 Waste and Water Management/Disposal.
7. Decontamination pad construction materials should be cleaned in accordance with Rhēa SOP 2.0 Decontamination of Sampling Equipment.

VI. Key Checks and Items

- Verify the decontamination pad is constructed within reach of equipment.
- Verify the decontamination pad is constructed of durable puncture resistant materials.
- Verify the decontamination pads integrity is checked prior to use, including tears or punctures.

STANDARD OPERATING PROCEDURE

MONITORING WELL ABANDONMENT

I. Purpose

To provide technical guidance for monitoring well abandonment.

II. Scope

Monitoring well abandonment procedures with attached addendum for North Carolina-specific requirements.

III. Related SOPs

Rhēa SOP 6.0 Personal Protective Equipment

IV. Equipment and Materials

All well removal equipment (e.g., shovels, jack hammer, heavy machinery, if necessary)
Backfill materials (e.g, sand, grout, bentonite, as applicable)
Latex or chemical nitrile gloves

V. Procedures and Guidelines

1. Removal of any surface well material including concrete pad, bollards and monitoring well sleeve, casing, or manhole as applicable.
2. Removal of as much of the well casing and screen as technically feasible or required by State standards (see attached addendum for appropriate North Carolina standards).
3. Backfill of the boring and any remaining monitoring well casing/screen with bentonite, grout, or cement as applicable based on appropriate State standards (see attached addendum for appropriate North Carolina standards).
4. Restoration of the ground surface as appropriate.

VI. Key Checks and Items

- Verify that the monitoring well location has been appropriately restored following abandonment activities.

15a ncac 02c .0113 ABANDONMENT OF WELLS

(a) Any well which has been temporarily abandoned, shall be abandoned in accordance with one of the following procedures:

- (1) Upon temporary removal from service or prior to being put into service, the well shall be sealed with a water-tight cap or seal compatible with casing and installed so that it cannot be removed easily by hand.
- (2) The well shall be maintained whereby it is not a source or channel of contamination during temporary abandonment.
- (3) Every temporarily abandoned well shall be protected with a casing.

(b) Any well which has been abandoned permanently shall be abandoned in accordance with the following procedures:

- (1) Procedures for permanent abandonment of wells, other than bored and hand dug wells:
 - (A) All casing and screen materials may be removed prior to initiation of abandonment procedures if such removal will not cause or contribute to contamination of the groundwaters. Any casing not grouted in accordance with 15A NCAC 2C .0107(e) of this Section shall be removed or properly grouted.
 - (B) The entire depth of the well shall be sounded before it is sealed to ensure freedom from obstructions that may interfere with sealing operations.
 - (C) Using a hypochlorite solution (such as HTH), disinfect the well in accordance with 15A NCAC 2C .0111. Do not use common commercial household liquid bleach, as this is too weak a solution to ensure proper disinfection.
 - (D) In the case of gravel-packed wells in which the casing and screens have not been removed, neat-cement, or bentonite grout shall be injected into the well completely filling it from the bottom of the casing to the top.
 - (E) Wells, other than "bored" wells, constructed in unconsolidated formations shall be completely filled with cement grout, or bentonite grout by introducing it through a pipe extending to the bottom of the well which can be raised as the well is filled.
 - (F) Wells constructed in consolidated rock formations or that penetrate zones of consolidated rock may be filled with cement grout, bentonite grout, sand, gravel or drill cuttings opposite the zones of consolidated rock. The top of the cement grout, bentonite grout, sand, gravel or cutting fill shall terminate at least 10 feet below the top of the consolidated rock or five feet below the bottom of

casing. Cement grout or bentonite grout shall be placed beginning 10 feet below the top of the consolidated rock or five feet below the bottom of casing and extend five feet above the top of consolidated rock. The remainder of the well, above the upper zone of consolidated rock, shall be filled with cement grout or bentonite grout up to land surface. For any well in which the depth of casing or the depth of the bedrock is not known or cannot be confirmed, then the entire length of the well shall be filled with cement grout or bentonite grout up to land surface.

- (G) Temporary wells or monitor wells:
 - (i) less than 20 feet in depth which do not penetrate the water table shall be abandoned by filling the entire well up to land surface with cement grout, dry clay, bentonite grout, or material excavated during drilling of the well and then compacted in place; and
 - (ii) that penetrate the water table shall be abandoned by completely filling with a bentonite or cement - type grout.
- (2) For bored wells or hand dug wells, constructed into unconsolidated material.
 - (A) For wells that do not have standing water in them at any time during the year:
 - (i) Remove all plumbing or piping entering the well, along with any obstructions in the well;
 - (ii) Remove as much of the well casing as possible and then fill the entire well up to land surface with cement grout, concrete grout, bentonite grout, dry clay, or material excavated during drilling of the well and then compacted in place.
 - (B) For wells that do have standing water in them during all or part of the year:
 - (i) Remove all plumbing or piping into the well, along with any obstructions inside the well; and
 - (ii) Remove as much of the well tile casing as possible, but no less than to a depth of three feet below land surface;
 - (iii) Remove all soil or other subsurface material present down to the top of the remaining well casing, and extending to a width of at least 12 inches outside of the well casing on all sides;
 - (iv) Using a hypochlorite solution (such as HTH), disinfect the well in accordance with 15A NCAC 2C .0111 of this

Subchapter. Do not use a common commercial household liquid bleach, as this is too weak a solution to ensure proper disinfection;

- (v) Fill the well up to the top of the remaining casing with cement grout, concrete grout, bentonite grout, dry clay, or material excavated during drilling of the well and then compacted in place;
 - (vi) Pour a one foot thick concrete grout or cement grout plug that fills the entire excavated area above the top of the casing, including the area extending on all sides of the casing out to a width of at least 12 inches on all sides; and
 - (vii) Complete the abandonment process by filling the remainder of the well above the concrete or cement plug with additional concrete grout, cement grout, or soil.
- (c) Any well which acts as a source or channel of contamination shall be repaired or permanently abandoned within 30 days of receipt of notice from the department.
- (d) The drilling contractor shall permanently abandon any well in which the casing has not been installed or from which the casing has been removed, prior to removing his equipment from the site.
- (e) The owner shall be responsible for permanent abandonment of a well except that:
- (1) the well driller is responsible for well abandonment if abandonment is required because the driller improperly locates, constructs, repairs or completes the well; or
 - (2) the person who installs, repairs or removes the well pump is responsible for well abandonment if that abandonment is required because of improper well pump installation, repair or removal.

*History Note: Authority G.S. 87-87; 87-88;
Eff. February 1, 1976;
Amended Eff. April 1, 2001; December 1, 1992; September 1, 1984; April 20, 1978.*

STANDARD OPERATING PROCEDURE

GPS SURVEYING WITH GEO XT HANDHELD GPS UNIT

I. Purpose

To provide technical guidance for the collection of real-time coordinates for objects and/or sample locations encountered during field activities.

II. Scope

Review of appropriate procedures, equipment and supplies required for GPS Surveying of sample locations and/or objects encountered during field activities.

III. Related SOPs

Rhēa SOP 11.0 Elevation Determination using a Leveling Scope.

IV. Equipment and Materials

Geo XT Handheld GPS Receiver

Hurricane Antenna (Optional)

Rover Rod, 5/8-11, GPS, Fly, Yellow (Optional)

Cradle Assembly, Geo XT (Optional)

Geo XT Hurricane Antenna Cable 3M (Tmc To Smb) (Optional)

GeoExplorer 2005 Series Power/Serial Clip

Power to Vehicle Adaptor Cable, Straight Cord, 12-24V

Laptop Computer with TerraSync Professional and GPS Pathfinder Office software

V. Procedures and Guidelines (New File)

1. Remove GeoXT Handheld GPS Receiver from case and assemble Hurricane Antenna Kit, if needed.
2. Turn the unit on by pressing the green power button. The Windows Mobile screen should appear.
3. Select GPS in the lower right corner of the screen. The TerraSync Program should start.

4. Enter the new file name. File name should consist of the Project name and date (example: QuanticoRRL042809).
5. If a keyboard is needed, select keyboard symbol at the base of the screen Center.
6. When the name is entered, select CREATE in the upper right portion of the Screen.
7. The program will request the height of the antenna. If elevation is not required for this project, enter OK.
8. Select the pull down tab next to the word DATA and select SETUP.
9. Select COORDINATE SYSTEM in the lower left corner of the screen.
10. Select the pull down tab on the far right of the word SYSTEM. Select US STATE PLANE 1983.
11. The ZONE will appear below SYSTEM and select the appropriate zone for the area in which you are working.
 - a) Examples:
 - i) Quantico, Virginia – Virginia North 4501
 - ii) Erie, Pennsylvania – Pennsylvania North 3701
 - iii) Pittsburgh, Pennsylvania – Pennsylvania South 3702
 - iv) Cherry Point, North Carolina – North Carolina 3200
12. After the ZONE is selected, select the pull down menu next to DATUM and select NAD 1983 (conus) CORS96.
13. Under ALTITUDE REFERENCE select MEAN SEA LEVEL (MSL).
14. Change the ALTITUDE and the COORDINATE UNITS to FEET, and select OK.
15. In the upper left screen select the pull down menu next to SETUP and select DATA.
16. The next screen identifies the type of feature to map.
 - a) Single object select POINT features
 - b) Pipe, utility, or linear features select LINE features
 - c) Features with two dimensions select AREA features

17. Once the feature type is selected, select CREATE in the upper right portion of the screen.
18. A screen requesting comment identification will appear. Enter the name of the feature. DO NOT SELECT OK at this point.
 - a) The far upper right portion of the screen will contain a symbol similar to this: <= 12ft=> 13. The right number should increase consecutively and indicate the time the satellites are registering that specific point. The number between the arrows is the accuracy number. Watch the accuracy value until it registers the desired accuracy.
19. Once the desired accuracy is achieved, select OK.
20. The screen will return to the feature type screen and repeat steps 16 through 19 until all features are recorded.
21. When all desired features are recorded, select CLOSE in the upper right portion of the screen. The file will be stored and can be reopened at a later time.

VI. Procedures and Guidelines (Open Existing File)

1. To add data to an existing file, select the pull down menu in the upper left portion of the screen next to NEW (T) and select EXISTING FILE.
2. Select the appropriate file on the next screen and select OPEN in the upper right portion of the screen.
3. Enter the appropriate Antenna Height and select OK.
4. Select the pull down tab in the upper left portion of the screen next to UPDATE and select COLLECT FEATURES.
5. Follow steps 16 through 19 in the procedures from Section V.

VII. Procedures and Guidelines (Transferring Files)

1. Install the GeoXT Handheld GPS Receiver into the base and connect it to a computer which contains the program GPS Pathfinder Office (Pathfinder).
2. In Pathfinder, locate UTILITIES in the upper file menu bar and select DATA TRANSFER.

3. A new screen for DATA TRANSFER will appear and computer should connect to the GPS Receiver automatically. To verify a good connection between the units look in the upper right portion of the Data Transfer screen and look for a green checkmark between the computer and GPS Symbol.
4. Make sure the RECEIVE Tab in the mid to upper left portion of the Data Transfer window is selected. Then select ADD on the right side of the screen.
5. A menu below ADD will appear, select DATA FILES.
6. Select the file(s) which needs to be transferred.
7. After selection of the desired file(s), locate the TRANSFER ALL button in the lower right portion of the window, which should highlight. Select TRANSFER ALL.
8. The file(s) will transfer to the computer from the GPS Unit.
9. When the file/s is/are transferred, select CLOSE.

VII. Procedures and Guidelines (Post Processing)
INTERNET ACCESS IS REQUIRED FOR THIS STEP

1. In Pathfinder, select DIFFERENTIAL CORRECTION under the UTILITIES Tab in the file menu bar.
2. A Differential Correction Wizard window will appear. The file previously transferred should be automatically loaded. If not, select the plus button in the right side of the window and select the file which needs differential correction.
3. Once the file is selected, select NEXT in the lower central portion of the window.
4. A Processing window will appear. Make sure AUTOMATIC CARRIER and CODE PROCESSING is selected then select NEXT.
5. A Connection Settings window will appear, select NEXT.
6. A Base Data Window will appear. Select SELECT next to the Base Provider Search and select the provider as close to the project site as possible. NOTE: Not all providers provide information, it may be necessary to select a base provider at a greater distance from the site due to the limited availability of differential correction data.
 - a) For Camp Lejeune or Cherry Point, use: CORS, NEW BERN 6 (NBR6), NORTH CAROLINA.

7. Once the provider is selected, select NEXT.
8. Verify the output folder uses the project folder and select START.
9. Once the file has been differentially corrected, select CLOSE.

VIII. Procedures and Guidelines (Data Transfer to GIS)

1. Select EXPORT from the file menu bar under Utilities.
2. Under input files, select BROWSE to select the file to be exported.
3. Once the correct input file is located, verify the output folder is correct, if not, select BROWSE adjacent to the file path.
4. Verify the coordinate system is correct prior to exporting the file.
5. Under Choose an Export Setup, select “NEW ESRI SHAPEFILE.”
6. Select OK in the upper right portion of the window.
7. E-mail the processed files to the GIS Professional for further processing.

IX. Key Checks and Items

- Verify all satellites are registering prior to collection of features.
- Verify the correct coordinate system is used. If not sure, ask the GIS Professional.
- Verify internet connection is available for section VIII.
- Verify file is stored in the correct location on the network.

STANDARD OPERATING PROCEDURE

SURFACE AND SUBSURFACE (TO FOUR-FOOT DEPTH) SOIL SAMPLING

I. Purpose

To provide technical guidance for the collection of surface and subsurface (to four-foot depth) soil samples.

II. Scope

Review of appropriate procedures, equipment and supplies required for soil sampling.

III. Related SOPs

Rhēa SOP 2.0 Decontamination of Sampling Equipment

Rhēa SOP 5.0 Waste and Water Management/Disposal

Rhēa SOP 7.0 Soil and Water Sample Handling

IV. Equipment and Materials

Tape measure

Survey stakes or flags

Camera

Global Positioning System (GPS) unit

Disposable or stainless steel scoop

Sample containers

Graph paper

Disposable gloves

Sample container labels

Field data sheets/Chain of custody (COC) forms

Cooler(s)/Ice

Paper towels

Garbage bags with ties and labels for Investigation Derived Waste (IDW)

V. Procedures and Guidelines

1. Determine the extent of the sampling effort, the methods to be employed, and the types/amount of equipment and supplies that will be required.

2. Use stakes, flags, a GPS unit, or a sketch to identify all sampling locations.
3. Disposable, nitrile gloves will be donned prior to sample collection. Be sure to properly dispose of and change gloves each time a new sample is taken.
4. Soil samples will be collected to the required depth using stainless steel or disposable plastic sampling scoops.
5. If volatile organic compound (VOC) analysis is to be performed, transfer the sample directly into an appropriate, properly labeled container and secure the cap tightly.
6. Samples shall be placed on ice immediately upon collection.
7. If necessary, be sure that the sample location has been properly backfilled.
8. Repeat above steps for additional samples. If using a disposable scoop, properly dispose of it between each sample to avoid cross-contamination. If using a steel scoop or spade, decontaminate it between each sample to avoid cross-contamination.
9. The completion of a COC form supplied by the laboratory is required.

VI. Key Checks and Items

- Coordinate all activities with the Site Supervisor.
- Be sure that the exact location of all samples can easily be found.
- Properly dispose of disposable equipment and gloves and use new disposable scoops and gloves in between each sample to avoid cross-contamination.
- Verify that the test pit/trench made during sampling activities has been properly backfilled.

NC Division of Waste Management Radiation Protection Program

Annual Review due in September

Purpose of Program

The NC Division of Waste Management utilizes a NITON XRF (S/N 6550), which contains radioactive material to detect and qualify the amount of metals in soil and other environmental media. This program serves as guidance to ensure the safe operation and use of radioactive materials.

1. Authorized Users of Radioactive Material:

Only the following employees are authorized to use the NITON XRF for its intended purpose.

Brian N. Polk, RSO	see training certificate
Harry Zinn	see training certificate
James Beatson	see training certificate
Stuart Parker	see training certificate
Dave Lilley	see training certificate
Dave Mattison	see training certificate
Melanie Barlette	see training certificate
Jeanette Stanley	see training certificate
David Lown	see training certificate
Randy McElveen	see training certificate
John Walch	see training certificate
Elizabeth Werner	see training certificate

Or individuals who are employed by the State of North Carolina- Division of Waste Management, having successfully completed a manufacturer's training program for the gauge users, have been instructed in the licensee's routine operating and emergency procedures, and who have been designated in writing having completed these requirements by the Radiation Safety Officer.

2. Radiation Safety Officer

Brian Polk has met the qualifications as outlined in NC DENR DRP Publication L-001 and will serve as Radiation Safety Officer for the Division of Waste Management. The RSO will ensure that all users will: (1) be employees of the Division of Waste Management, (2) have completed the manufacturer's training course, (3) have attended and been instructed in the NC Division of Waste Management's operating and emergency procedures, and (4) be designated in writing by the Radiation Safety Officer prior to using the gauge. The RSO will also ensure that records of training for authorized users will be

maintained on file for a minimum of (3) three years after the employee separates for the Division.

3. Radioactive Material

- | | |
|------------------|--|
| A. Americium-241 | A. Sealed Source (Niton XRF model XLt, no source to exceed 30 mCi) |
| B. Cadmium- 109 | B. Sealed Source (Niton XRF model XLt, no source to exceed 40 mCi) |

4. Use of Radioactive Material:

The device will be used for the analysis of contamination in sites located throughout the State of North Carolina.

5. Radiation Detection Meter:

The Division will maintain access to a calibrated survey meter through the NC Radiation Protection- Radioactive Materials Branch on an as needed basis.

6. Dosimeters:

Each quarter a thermoluminescent dosimeter (TLD) will be issued to all personal who use, transport, or perform maintenance on the Niton XRF and will be exchanged quarterly. The supplier is Troxler Electronic Labs and their NVLAP certification is enclosed. The Division will ensure dosimeter use before the gauge is utilized.

7. Facilities and Equipment:

- A. While in storage, the gauge is locked in the supplied transport case, which is locked in a secured lockable cabinet. The cabinet is attached to the wall. The gauge and cabinet are located inside a locked storage room. The storage room door is locked while the gauge is present and the outside doors to the building are locked after work hours. The building has 24-hour security provided by York Property Security. Access is limited to those employees that have been certified users by the NC Division of Waste Management's radiation safety program. For authorized users to gain access to the gauge, the user must contact the Radiation Safety Officer or Harry Zinn (secondary) to access the storage cabinet. Only the Radiation Safety Office and Harry Zinn have access to the storage cabinet. The user must use the utilization log.
- B. NC Division of Waste Management is committed to keep radiation doses as low as reasonably achievable (ALARA) as outlined in Section D. 1. And 2. Operating and Emergency Procedures of this document. Also attached, calculations used to determine Dose limits for individuals of the public as specified in 15A NCAC 11.1611.
- C. Each permanent storage area has, posted in a conspicuous place, a sign bearing the radiation symbol and the words "Caution Radioactive Material."

Also posted are copies of the "Notice to Employees' and Workers' information as outlined in 15A NCAC 11.1002 and .1604

- D. See Section 14 C.1 through C.3 of this document for procedures on securing gauge to a temporary job site.
- E. See Section 14 D.1 A and B of this document for procedures on maintaining security and constant surveillance of the gauge while in use and how the gauges will be secured from unauthorized removal/damage during off hours.
- F. Whenever possible the gauge will be returned to its permanent storage location. However, when job requirements are such i.e. distance from job site to permanent location, or workload schedule does not allow time for return of the gauge to its permanent storage location, then the gauge will be secured under triple lock within the transport vehicle. The gauge must be chained to the body of the transport vehicle.
- G. The NC Division of Waste Management leases space from York Properties INC. at 401 Oberlin Road. A letter from the building owner, Mr. Thomas Taff is attached indicating that he is aware that the device is stored at 401 Oberlin Road.
- H. The local fire department will be notified of the storage location for the radioactive material at our facility, which is within their jurisdiction. Certified mail receipt is enclosed.

8. Leak Testing:

Gauges will be leak tested at intervals not to exceed six (6) months, and will be performed using the Troxler Model 3880 Leak Test Kit. The leak test will be performed according to the manufacturer's instructions and the results will be provided by Troxler Electronic Laboratories, INC., 3008 Cornwallis Road P.O. Box Research Triangle Park, NC 27709.

9. Maintenance of the Gauge:

- 1. Maintenance will include periodic cleaning of the gauge, at this time personnel monitoring devices will be required.
- 2. No maintenance will be performed in which the radioactive source is removed from the gauge. For this type of maintenance the device will be returned to the manufacture.

10. Transportation of the gauge to and from field locations:

- 1. When traveling to and from the temporary job site, all possible means shall be provided to ensure the instrument is secured in the transporting vehicle and that equipment is away from the passenger compartment. When transporting in an enclosed vehicle, ie van, the vehicle will be locked.
- 2. The gauge will be transported in the NITON transportation case.
- 3. The operator will have properly completed transportation forms for the gauge at all times.

4. When not in use the instrument will be under triple lock.

11. General Operation and Emergency Procedures:

1. Operating Procedures:

- a. In the field, authorized user must maintain control of the gauge at all times. The gauge will never be left unattended. The gauge will be placed in the transporting vehicle when not in use. In addition, the gauge will be chained inside the vehicle when not in use. Vehicle's keys must stay with the user.
- b. The gauge will be placed in the supplied transportation case and returned to its storage area when not in use. The gauge will be used for its intended purpose only.
- c. When using the equipment, the user will wear the personal monitoring device they have been assigned. When equipment is not in use, personal monitoring device is to be stored in a radiation free area.

2. Emergency Procedures:

- a. In the event of physical damage to the gauge, these steps shall be followed:
 1. Immediately cordon off an area around the gauge. An area with a radius of 15 feet will be sufficient.
 2. If a vehicle is involved, it must be stopped until the extent of the contamination, if any can be established.
 3. A visual inspection of the gauge is to be made to determine if the source housing and / or the shielding had been damaged. If physical damage is observed, the instrument must be immediately returned to the manufacturer's transportation case.
 4. At the earliest time possible, when the situation is under control, the user must call immediately Brian Polk, at (919-508-8421, 828-221-0785, 919-270-3003) and describe the present conditions and follow the instruction of the Radiation Safety Officer.
- b. In the event the gauge is lost or stolen; the Radiation Safety Officer as listed above in Item 2.A.4 **shall be notified immediately.**

12. Waste Disposal:

The Division of Waste management will either (1) transfer the gauge to another specifically licensed individual who is licensed for that particular type, form, and quantity of radioactive material, (2) transfer the gauge to the manufacturer, (3) transfer the gauge to a licensed disposal facility.

Additional Documents Required For Licensee

1. To satisfy the requirements of 15A NCAC 11.1603 (C.), "Annual Radiation Production Review," the format in DRP Publication L-001 will be used.
2. Physical inventory of sealed sources is performed, at a minimum, every six months. A copy of the latest in inventory is attached.
3. Utilization logs will be maintained at the permanent storage location and will contain the following: date out, name of authorized user, make, model and serial number of the device, date returned to storage and signature of authorized employee who returned the gauge.
4. The Division of Waste Management is a State agency under the Department of Environment and Natural Resources. The Division Director is Dexter Matthews.
5. A. Occupational Dose Limits for Adults:
The Division is committed to limiting annual exposures to less than 5 rems total effective dose equivalent.
- B. Dose to an Embryo/Fetus per 15A NCAC 11.1610:
The NC Division of Waste Management will ensure that the dose to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, dose not exceed 0.45 rem (4.5 mSv) by the way of monthly field badges. If the dose to the embryo/fetus is found to have exceeded 0.45 rem (4.5 mSv) by the time the woman declares pregnancy the licensee shall be deemed to be in compliance providing additional dose to the embryo/fetus does not exceed 0.05 rem (0.5 mSv) during the remainder of the pregnancy.
- C. Dose Limits to the General Public per 15A NCAC 11.1601:
Regulations require licensees to demonstrate that the total effective radioactive dose equivalent to an individual member of the general public does not exceed 100 mrem per year. Using the formula obtained from Troxler Electronic Labs, Inc. a calculation will be made to determine this dosage for the gauge on an annual basis as needed when conditions change.

Brian N. Polk, RSO

APPENDIX C

LABORATORY SOPs

Non-Time-Critical Removal Action for Arsenic Contaminated Soil
 Site 95 Magnolia Road
 MCB CamLej, North Carolina
 Laboratory Standard Operating Procedures

SOP Name	Title	Brief Description / Purpose
Laboratory SOPs:		
CA-101-07	Equipment Maintenance	To describe the routine maintenance procedures employed for analytical equipment utilized by laboratory personnel for analytical work.
CA-608-08	Trace Metals Analysis by ICP-AES using USEPA Method 6010	To describe the procedures used by the laboratory to analyze aqueous and solid samples for trace metals.
CA-902-08	Sample Receipt and Internal Control	To provide technical guidance for the receiving, acceptance, identification, storage, and distribution of samples accepted for analysis.
SD-903-04	Sample Disposal	To describe the procedures used by the laboratory personnel to dispose of samples, spent preparation and analysis reagents, standards, sample extracts, distillates, and/or digestates.

TITLE: EQUIPMENT MAINTENANCE

Prepared By: Julie Ricardi Date: 8-96

Approved By:

Group Supervisor: _____ Date: _____

Operations Manager: John C. Buxton Date: 12/15/00

QA Officer: Deborah J. Nadeau Date: 12.13.00

General Manager: JCBuxton For D. McGrath Date: 12/15/00

Revision History:

SOP Revision	Changes	Approval Initials	Approval Date	Effective Date
01	Added requirements for recording maintenance in appropriate log. Added Archon maintenance. Modified Lockat maintenance. Attached equipment list.	DN	12.13.00	12.13.00
02	Removed references to General Manager. Removed furnace (GFAA) maintenance from Figure 1 and added ICP-MS. Updated equipment list.	DN	10.22.02	10.22.02
03	Changed Supervisor to department manager. Added maintenance for the ASE and general lab maintenance. Updated equipment list.	HRC	06.03.04	06.03.04
04	Added new equipment list.	LAD	01.28.05	01.28.05
05	Added Horizon SPE Extractor & HPLC maintenance to Table 1. Added TOC analyzer, IC & miscellaneous instrument maintenance to Table 2. Updated equipment list.	DN	03.06	03.06

TITLE: EQUIPMENT MAINTENANCE

Please acknowledge receipt of this standard operating procedure by signing and dating both of the spaces provided. Return the bottom half of this sheet to the QA Department.

I acknowledge receipt of copy ___ of document **CA-101-07**, titled **EQUIPMENT MAINTENANCE**.

Recipient: _____ Date: _____

KATAHDIN ANALYTICAL SERVICES, INC.
STANDARD OPERATING PROCEDURE

I acknowledge receipt of copy ___ of document **CA-101-07**, titled **EQUIPMENT MAINTENANCE**.

Recipient: _____ Date: _____

TITLE: EQUIPMENT MAINTENANCE

1.0 SCOPE AND APPLICATION

The consistent generation of high quality analytical results requires properly operating analytical equipment. Accordingly, Katahdin Analytical Services, Inc. has an equipment maintenance program, which prescribes the necessary maintenance measures required and also schedules the frequency of conduct and documentation of those measures.

The purpose of this SOP is to describe the routine maintenance procedures employed for analytical equipment utilized by Katahdin Analytical personnel. It is applicable to all equipment utilized by laboratory personnel for analytical work. The procedures outlined in this SOP provide general guidance for equipment maintenance and documentation. The appropriate equipment manufacturer's manual(s) and specific analytical SOPs must be available and shall be consulted for specific maintenance and cleaning procedures.

1.1 Definitions

1.2 Responsibilities

It is the responsibility of each technical employee to carry out and document the required routine equipment maintenance at the required frequency for the instrumentation that they use.

It is the responsibility of each Department Manager to ensure that maintenance performed in-house is conducted properly by experienced personnel familiar with the equipment. On a routine basis, the department manager or qualified designee reviews equipment maintenance activities and recordkeeping requirements. Deficiencies are brought to the attention of the analyst who is responsible for an unacceptable procedure or entry, and any corrections are made by the appropriate analyst.

The Quality Assurance Officer is responsible for conducting periodic audits of the equipment maintenance program and documentation in each analytical area. Maintenance logs and contracted vendor maintenance records are reviewed for completeness and frequency of maintenance. Deficiencies are immediately brought to the attention of the Supervisor who is responsible for informing his/her staff and initiating the necessary corrective or improved actions in his/her analytical area.

2.0 SUMMARY OF METHOD

Not applicable.

3.0 INTERFERENCES

Refer to specific instrument manufacturer's operating manuals.

TITLE: EQUIPMENT MAINTENANCE

4.0 APPARATUS AND MATERIALS

Not applicable.

5.0 REAGENTS

Not applicable.

6.0 SAMPLE COLLECTION, PRESERVATION AND HANDLING

Not applicable.

7.0 PROCEDURES

7.1 ROUTINE PREVENTIVE MAINTENANCE

Preventive maintenance (PM) may be conducted by qualified Katahdin personnel or may be performed under contract by authorized service technicians. Between service visits, instruments having PM service contracts are cleaned and maintained according to manufacturer's specifications by experienced Katahdin personnel. Instruments not under service contracts are cleaned and maintained by experienced laboratory personnel according to manufacturer's specifications and based on professional experience. The frequency of maintenance performed depends on the equipment. Preventive maintenance in each analytical section at Katahdin Analytical is scheduled, conducted and documented on a regular basis by the analytical section staff. Many maintenance needs (e.g., accidental breakage, part failure) are not satisfied by scheduled maintenance and are performed as needed. This would apply to routine daily instrument maintenance as well as non-scheduled instrument maintenance (e.g., replacement of GC injection port liners, replacement of volatiles Tekmar traps, etc.). Maintenance procedures indicated in Tables 1 and 2 are documented in appropriate logbooks maintained in each analytical area. Included in the documentation are general remarks describing the maintenance operations performed, the date maintenance was performed, and the signature or initials of the individuals who completed the maintenance. If a specific instrument problem prompted the need for maintenance, the problem and its resolution are documented along with the description of maintenance performed. Specific requirements for maintenance logs are described in Section 7.3.

7.2 PREVENTIVE MAINTENANCE SCHEDULES

Tables 1 and 2 summarize the routine preventive maintenance procedures and schedules followed within Katahdin Analytical for major laboratory instrumentation. These items are required to be documented in the applicable instrument or

TITLE: EQUIPMENT MAINTENANCE

maintenance log. Refer to Section 7.3 for specific requirements for maintenance log documentation.

7.3 MAINTENANCE LOG (or equivalent) REQUIREMENTS

Maintenance must be recorded in either the instrument run log or in a separate maintenance log. For equipment that does not have a run log or does not necessitate a separate maintenance log (i.e. little maintenance required), any maintenance may be recorded in the appropriate logbook (i.e. balance maintenance recorded in the balance calibration log). Attachment A provides a list of analytical equipment for which maintenance activities are recorded. Balances are not listed, although maintenance activities are recorded for these.

7.3.1 Maintenance logs (or equivalent) shall include the type of equipment and the analytical group/analysis for which it is designated, the manufacturer's model number and serial number, as well as any laboratory-assigned identifier (e.g., GC08, MS2, etc.). Each lab-assigned identifier must be unique and each instrument must have only one lab-assigned identifier. As new instrumentation is received, the date acquired, condition when received (new, used, reconditioned), and date put into use should be recorded in the new instrument's maintenance log.

7.3.2 Each page of the maintenance logbook (or equivalent) must clearly indicate the type of equipment and laboratory-assigned identifier in the header information. Maintenance entries shall include the date and signature or initials of the individual performing the maintenance as well as a brief explanation of the maintenance performed. If maintenance was conducted as the result of a suspected or known instrument problem, a summary of the problem and its final resolution must be included. The maintenance record must clearly indicate whether the problem was resolved and the date when return to control was noted.

7.3.3 On a routine basis the Department Manager or qualified designee shall review equipment maintenance activities and adherence to recordkeeping requirements. Deficiencies are brought to the attention of the analyst who was responsible for the unacceptable procedure or entry, and any corrections are made by the appropriate analyst. Documentation of the maintenance log review can be made by initialing and dating each page of the log or by indicating "reviewed by", initials and date on the front cover of the maintenance log (or equivalent).

7.3.4 On a periodic basis the laboratory QA Officer shall conduct audits of the equipment maintenance program and documentation in the analytical areas. Maintenance logs and contracted vendor maintenance records are reviewed for completeness and adherence to this SOP. Deficiencies are immediately brought to the attention of the Department Manager who is responsible for informing his/her staff and initiating the necessary corrective actions in his/her analytical area.

TITLE: EQUIPMENT MAINTENANCE

8.0 QUALITY CONTROL AND ACCEPTANCE CRITERIA

Not applicable.

9.0 METHOD PERFORMANCE

Not applicable.

10.0 APPLICABLE DOCUMENTS/REFERENCES

Applicable equipment manufacturer's operating manuals.

LIST OF TABLES & ATTACHMENTS

TABLE 1 – ROUTINE MAINTENANCE SCHEDULE FOR ORGANICS INSTRUMENTATION
TABLE 2 - ROUTINE MAINTENANCE SCHEDULE FOR INORGANICS INSTRUMENTATION
TABLE 3 - ROUTINE MAINTENANCE SCHEDULE FOR GENERAL LABORATORY EQUIPMENT
ATTACHMENT A – ANALYTICAL EQUIPMENT

TITLE: EQUIPMENT MAINTENANCE

TABLE 1

ROUTINE MAINTENANCE SCHEDULE FOR ORGANICS INSTRUMENTATION

GC/MS

Regularly performed maintenance includes, but is not limited to, the following for GC/MS instrumentation:

- ◆ Check to ensure the pressure on the primary regulator never runs below 100 psi
- ◆ Check to ensure the gas supply is sufficient for the day's activity, and delivery pressures are set as described in the SOP.
- ◆ Change septa weekly or as needed.
- ◆ Replace/cut GC column as needed.
- ◆ Replace GC injector glass liner weekly or as needed.
- ◆ Replace glass jet splitter as needed.
- ◆ Replace pump oil as needed.
- ◆ Change gas line dryers as needed.
- ◆ Replace electron multiplier as needed.

GC

Regularly performed maintenance includes, but is not limited to, the following for GC instrumentation:

- ◆ Check to ensure the pressure on the primary regulator never runs below 100 psi.
- ◆ Check to ensure the gas supply is sufficient for the day's activity, and delivery pressures are set as described in the SOP.
- ◆ Change septa weekly or as needed.
- ◆ Replace/cut GC column as needed.
- ◆ Replace GC injector glass liner as needed.
- ◆ Change O₂/moisture traps as needed
- ◆ Clean/replace GC detector as needed.

TITLE: EQUIPMENT MAINTENANCE

TABLE 1, cont'd

ROUTINE MAINTENANCE SCHEDULE FOR ORGANICS INSTRUMENTATION

Purge and Trap Sample Concentrator

Regularly performed maintenance includes, but is not limited to, the following:

- ◆ Check to ensure the gas supply is sufficient for the day's activity and delivery pressures are set as described in the SOP.
- ◆ Replace trap as needed.
- ◆ Decontaminate the system after running high concentration samples or as required by blank analysis.
- ◆ Check system for leaks when problem suspected.

Archons

Regularly performed maintenance includes, but is not limited to, the following:

- ◆ Visually inspect sampler for corrosion or significant water seepage past plunger.
- ◆ Check system pressure (denotes leaks).
- ◆ Check for sufficient standard materials in standard vials.

Accelerated Solvent Extractor (ASE)

Regularly performed maintenance includes, but is not limited to, the following:

- ◆ Check for leaks at the pump solvent reservoir, valves and other components.
- ◆ Inspect needle alignment of source needle.
- ◆ Check alignment of autoseal arms.
- ◆ Change peek seals and o-rings on cell caps after about 50 extractions per cell.
- ◆ Inspect cell edges for nicks and gouges on cell body.
- ◆ Inspect stainless steel frits and sonicate in solvent if needed.

TITLE: EQUIPMENT MAINTENANCE

TABLE 1, cont'd

ROUTINE MAINTENANCE SCHEDULE FOR ORGANICS INSTRUMENTATION

Horizon SPE Automated Extractor System

Regularly performed maintenance includes, but is not limited to, the following:

- ◆ Check and clean sensors with a KIMWipe.
- ◆ Change sensors as needed.
- ◆ Purge system with solvent before use and after use.
- ◆ Clean system with hot water by running method 15 after samples are analyzed and before purging system.

HPLC

Regularly performed maintenance includes, but is not limited to, the following for HPLC instrumentation:

- ◆ Check and sonicate pump valves as needed.
- ◆ Backflush column as needed.
- ◆ Replace analytical column or guard column as needed.
- ◆ Sonicate and replace solvent with every use.
- ◆ Replace the UV lamp as needed.
- ◆ Check and replace seal-pak as needed

TITLE: EQUIPMENT MAINTENANCE

TABLE 2

ROUTINE MAINTENANCE SCHEDULE FOR INORGANICS INSTRUMENTATION

ICP/MS

Regularly performed maintenance includes, but is not limited to, the following for ICP instrumentation:

- ◆ Clean torch assembly and spray chamber when discolored.
- ◆ Clean nebulizer as needed.
- ◆ Check to ensure that the argon supply is sufficient for the day's activity, and that delivery pressures are set as described in the SOP. Change argon tanks as necessary.
- ◆ Replace peristaltic pump tubing when it becomes stretched or develops flat spots.
- ◆ Check coolant water level weekly; replenish as necessary.
- ◆ Check rinse solution level daily; replenish as necessary.
- ◆ Check waste container level daily; empty as necessary.
- ◆ Check cleanliness of instrument air filters weekly; clean or replace as necessary.
- ◆ Check instrument computer date and time at the start of each day; correct as necessary.
- ◆ Check condition of vacuum pump oil weekly, replace as necessary.
- ◆ Clean sampling and skimmer cones every 2-4 weeks.
- ◆ Clean extraction lenses monthly, or as needed.
- ◆ Clean Einzel lenses every 3-6 months.

ICP

Regularly performed maintenance includes, but is not limited to, the following for ICP instrumentation:

- ◆ Clean torch assembly and spray chamber when discolored.
- ◆ Clean nebulizer as needed.

TITLE: EQUIPMENT MAINTENANCE

TABLE 2, cont'd

ROUTINE MAINTENANCE SCHEDULE FOR INORGANICS INSTRUMENTATION

ICP, cont'd

- ◆ Check to ensure that the argon supply is sufficient for the day's activity, and that delivery pressures are set as described in the SOP. Change argon tanks as necessary.
- ◆ Replace peristaltic pump tubing when it becomes stretched or develops flat spots.
- ◆ Check coolant water level weekly; replenish as necessary.
- ◆ Check rinse solution level daily; replenish as necessary.
- ◆ Check waste container level daily; empty as necessary.

- ◆ Check instrument computer date and time at the start of each day; correct as necessary.

Mercury Analyzer

Regularly performed maintenance includes, but is not limited to, the following:

- ◆ Replace drying tube as necessary
- ◆ Replace peristaltic pump tubing when it becomes stretched or develops flat spots.
- ◆ Replace mercury lamp as necessary.
- ◆ Clean optical cell quarterly or as needed.
- ◆ Clean liquid/gas separator when it becomes cloudy. Replace as needed.
- ◆ Check waste container level before each use; empty as necessary.
- ◆ Check exhaust system integrity before each use; correct as necessary.
- ◆ Check instrument computer date and time at the start of each day; correct as necessary.

TITLE: EQUIPMENT MAINTENANCE

TABLE 2, cont'd

ROUTINE MAINTENANCE SCHEDULE FOR INORGANICS INSTRUMENTATION

Lachat Autoanalyzer

Regularly performed maintenance includes, but is not limited to, the following:

- ◆ Check pump tubing; replace as needed.
- ◆ Clean interference filter with Kimwipe.
- ◆ Check reagent levels and expiration dates; refill or replace as needed.
- ◆ Rinse manifolds with water after analysis.
- ◆ Check manifold board surfaces; clean as needed by running under tap water.
- ◆ Check supplies and reagents; order as needed
- ◆ Check for leaks
- ◆ Check autosampler and autosampler trays; clean and/or lubricate as needed.
- ◆ Check fittings and o-rings on boards; replace as needed.
- ◆ Check peristaltic pump rollers; clean and lubricate as needed.
- ◆ Inspect manifold tubing for kinks and/or stains; replace as needed.
- ◆ Inspect valve flares; clean or replace as needed.
- ◆ Inspect reagent and waste lines; replace as needed.
- ◆ Check flow cell; clean as needed with Kimwipe.

Konelab AutoAnalyzer

Regularly performed maintenance includes, but is not limited to, the following:

- ◆ Rinse and refill distilled water container weekly.

TITLE: EQUIPMENT MAINTENANCE

TABLE 2, cont'd

ROUTINE MAINTENANCE SCHEDULE FOR INORGANICS INSTRUMENTATION

Konelab AutoAnalyzer, cont'd

- ◆ Check cleanness of segments weekly.
- ◆ Wash reagent tubes monthly.
- ◆ Change lamp as needed.
- ◆ Change diluent and wash tubes as needed.
- ◆ Change mixing paddles as needed.
- ◆ Change syringes as needed.
- ◆ Change dispensing needles as needed.
- ◆ Change drain and waste tubes as needed.
- ◆ Check used cuvettes and waste daily.

TOC Combustion Analyzer

Regularly performed maintenance includes, but is not limited to, the following:

- ◆ Check level of dilution water, drain vessel water, humidifier water, autosampler rinse water, and phosphoric acid vessel and fill as needed.
- ◆ Replace oxygen cylinder as needed.

IC

Regularly performed maintenance includes, but is not limited to, the following for IC instrumentation:

- ◆ Check regenerate pump tubing and replace as needed.
- ◆ Clean or regenerate column as needed.

TITLE: EQUIPMENT MAINTENANCE

TABLE 2, cont'd

ROUTINE MAINTENANCE SCHEDULE FOR INORGANICS INSTRUMENTATION

IC, cont'd

- ◆ Replace analytical column or guard column as needed.
- ◆ Change suppressor as needed.

Miscellaneous Instrumentation

Regularly performed maintenance includes, but is not limited to, the following:

- ◆ Replace spectrophotometer lamps as needed.
- ◆ Inspect DO probe membrane for tears and check for air bubbles under the membrane.
- ◆ Replace the DO probe membrane cap and electrolyte solution as needed.
- ◆ Clean pH electrode as needed.
- ◆ Change the autotitrator filling solution as needed.
- ◆ Clean, check, calibrate to manufacturers' specifications all pH, DO, conductivity, and turbidity meters annually (minimum); clean, check, calibrate to manufacturers' specifications all spectrophotometers biannually.

TITLE: EQUIPMENT MAINTENANCE

TABLE 3

ROUTINE MAINTENANCE SCHEDULE FOR GENERAL LABORATORY EQUIPMENT

General Laboratory Areas

- ◆ Clean and calibrate balances biannually (minimum).
- ◆ Check balance calibration each day of use.
- ◆ Clean balance pan prior to each use.
- ◆ Calibrate automatic pipettes with each use.
- ◆ Calibrate thermometers yearly against an NIST traceable thermometer; calibrate heavily used digital thermometers quarterly.
- ◆ Record refrigerator, freezer, and oven temperatures each weekday.
- ◆ General housekeeping: keep counter tops, hoods, and floors clean.
- ◆ Check airflow in hoods once a week.

TITLE: EQUIPMENT MAINTENANCE

ATTACHMENT A
ANALYTICAL EQUIPMENT LIST



ANALYTICAL INSTRUMENTATION

KEY INSTRUMENTATION	DATE IN SERVICE	USED FOR ANALYSIS	Instrument Identification
Hewlett Packard 5973 GC/MS with EPC, Archon Autosampler with foam sensor option and EST ENCON Evolution Purge and Trap Concentrator	2008	5030/8260, 5035/8260, 624, Current versions of CLP SOWs (OLM, OLC, & SOM) (VOA), & 524.2	D
Hewlett Packard 5972 GC/MS with EPC, Centurion Autosampler with foam sensor option and EST ENCON Purge and Trap Concentrator	2006	5030/8260, 5035/8260, 624, Current versions of CLP SOWs (OLM & SOM) (VOA)	T
Hewlett Packard 5972 GC/MS with EPC; Tekmar LSC-3100 Purge and Trap concentrator; Archon autosampler capable of low soils per Method 5035.	1998	5030/8260, 5035/8260, 624, Current versions of CLP SOWs (OLM, OLC, & SOM) (VOA), & 524.2	S
Hewlett Packard 5972 GC/MS with EPC; Tekmar LSC - 3000 purge and trap concentrator; Archon autosampler capable of low soils per Method 5035.	1996	5030/8260, 5035/8260, 624, Current versions of CLP SOWs (OLM, OLC, & SOM) (VOA), & 524.2	Z
Hewlett Packard 5972 GC/MS with EPC; Encon Purge and Trap concentrator; Archon autosampler capable of low soils per method 5035.	1995	5030/8260, 5035/8260, 624, Current versions of CLP SOWs (OLM, OLC, & SOM) (VOA), & 524.2	M
Hewlett Packard 5972 GC/MS with EPC; Tekmar LSC-3000 Purge and Trap concentrator; Archon autosampler capable of low soils per Method 5035.	1993	5030/8260, 5035/8260, 624, Current versions of CLP SOWs (OLM, OLC, & SOM) (VOA), & 524.2	F
Hewlett Packard 5973 GC/MS with EPC and Model 6890 autosampler.	2008	8270, 625 & Current versions of CLP SOWS (OLM, OLC, & SOM) (SVOA)	G
Hewlett Packard 5973 GC/MS with EPC and Model 6890 autosampler.	2006	8270, 625 & Current versions of CLP SOWS (OLM, OLC, & SOM) (SVOA)	R

TITLE: EQUIPMENT MAINTENANCE

ATTACHMENT A

ANALYTICAL EQUIPMENT LIST, cont'd



ANALYTICAL INSTRUMENTATION

KEY INSTRUMENTATION	DATE IN SERVICE	USED FOR ANALYSIS	Instrument Identification
Hewlett Packard 5973 GC/MS with EPC and Model 6890 autosampler.	1999/ 2001	8270, 625 & Current versions of CLP SOWS (OLM, OLC, & SOM) (SVOA)	U
Hewlett Packard Model 5890 gas chromatograph with a flameionization detector; Agilent Technologies G1888 Network Headspace Analyzer.	1991/ 2005	Methane, Ethane and Ethene	GC05
Hewlett Packard Model 5890 gas chromatograph with EPC and dual electron capture detectors(ECD); Hewlett Packard Model 7673 autosampler.	1993	504, 556, 608, 8011, 8081, 8082, 8151	GC08
Hewlett Packard Model 5890 gas chromatograph with EPC and dual electron capture detectors(ECD); Hewlett Packard Model 7673 autosampler.	1993	8081, 8082, 608	GC06
Hewlett Packard Model 5890 gas chromatograph with dual electron capture detectors (ECD); Hewlett Packard Model 7673A autosampler.	1988	504, 8011, 8151	GC03
Hewlett Packard Model 5890 gas chromatograph with EPC and dual flame ionization detectors; Hewlett Packard Model 7673 autosampler.	1993/ 1996	8015 MOD., MAEPH, DRO	GC10
Hewlett Packard Model 5890 gas chromatograph with flame ionization detector; Tekmar ALS 2016 autosampler; Tekmar LSC 2000 purge and trap.	1991	8015 MOD., GRO	GC04
Hewlett Packard Model 5890 gas chromatograph with flame ionization detector and photo ionization detector; Tekmar ALS 2016 autosampler; Tekmar LSC 3000 purge and trap.	1988	8015 MOD., MAVPH, GRO	GC09

TITLE: EQUIPMENT MAINTENANCE

ATTACHMENT A

ANALYTICAL EQUIPMENT LIST, cont'd



ANALYTICAL INSTRUMENTATION

KEY INSTRUMENTATION	DATE IN SERVICE	USED FOR ANALYSIS	Instrument Identification
Hewlett Packard Model 5890 gas chromatograph with flame ionization and nitrogen-phosphorous detectors; Hewlett Packard Model 7673 autosampler.	1992/ 1996	ALCOHOLS, DMF, GLYCOLS	GC11
Hewlett Packard Model 5890 gas chromatograph with EPC and dual flame ionization detectors; Hewlett Packard Model 7673 autosampler.	1987	8015 MOD., MAEPH, DRO	GC12
Agilent Model 6890 gas chromatograph with dual EPC injection ports and micro electron capture detectors; Agilent Model 7683 autosampler	2000	8081, 8082 (including congeners), 608, current versions of CLP SOWs (OLM, OLC, & SOM) (P/P)	GC07
Hewlett Packard series 1100 HPLC with Quaternary pump, Diode Array detector and autosampler	2008	8330, 8332	HPLC03
ABC Autoprep 1000 GPC with UVD-1 ultraviolet detector and chart recorder.	1994	Current versions of CLP SOWs (OLM, OLC, \$ SOM) (GPC-3640)	GPC01
Horizon SPE-DEX 4790 Automated Extractor System equipped with 4 extractors.	2001/ 2005	3535 method development	Horizon #1
Horizon SPE-DEX 3000 Automated Extractor System equipped with 3 extractors.	2006	1664, 9070, 9071	Horizon #2
Thermo ICAP 6500 ICP Emission Spectrometer with autosampler.	2006	6010, 200.7, ILM05.4	I
Agilent 7500a ICP-MS with autosampler.	2007	6020, 200.8, ILM05.4	J
CETAC M-6100 Automated Mercury Analyzer with Autosampler	2004	7470/7471, 245.1, 245.5, ILM05.4	H

TITLE: EQUIPMENT MAINTENANCE

ATTACHMENT A

ANALYTICAL EQUIPMENT LIST, cont'd



ANALYTICAL INSTRUMENTATION

KEY INSTRUMENTATION	DATE IN SERVICE	USED FOR ANALYSIS	Instrument Identification
Tekran Series 2600 automated mercury analyzer with gold amalgam preconcentration and atomic fluorescence detector; Model 2620 autosampler.	2000	Ultra-trace level mercury (1631)	G
CPI ModBlock™ Metals Digestion Unit – Two 48 Place Units.	2000	Metals Aqueous Digestions	Digestion Unit #1 Digestion Unit #2
LACHAT Quickchem 8000 Continuum Series – Automated Ion Analyzer and autosampler.	2000	Various	WC1
Shimadzu TOC-V Combustion Analyzer, PC Controlled, High Sensitivity, Auto-Aqueous TOC Autosampler w/ 40 mL vials; Model SSM-5000A Solid Sample Module.	2002	TOC	WC2
Waters 717 Plus Autosampler, Waters 431 conductivity detector, Spectra System P4000 pump.	1991/ 2004	Ion chromatography – Various Anions	See "Key Instrumentation" column for identification
		Ion Chromatography - Perchlorate	See "Key Instrumentation" column for identification
Scanning Fluorescence Detector	1997	Out of Service	NA
10 position Lab Crest Cyanide Midi-Distillation system.	1998	Cyanide	WC3
Spectronic 401 spectrophotometer.	2000	Various	WC4
HACH Turbidimeter, Model 2100A.	1993	Turbidity	WC6

TITLE: EQUIPMENT MAINTENANCE

ATTACHMENT A

ANALYTICAL EQUIPMENT LIST, cont'd



ANALYTICAL INSTRUMENTATION

KEY INSTRUMENTATION	DATE IN SERVICE	USED FOR ANALYSIS	Instrument Identification
Accumet pH/Conductivity Meter, Model 20.	1998	Various	WC8
Mettler DL25 Autotitrator & Mettler ST20A sample changer.	1993	Alkalinity	WC9
YSI Dissolved Oxygen Meter.	1990	Dissolved Oxygen & Biochemical Oxygen Demand	WC10
Konelab 20 Multi-Wavelength Photometric Analyzer.	2003	Various	Konelab #1
Dionex Accelerated Solvent Extractor ASE 200.	2003	3545	ASE #1
Waters HPLC system with 600E multisolvent delivery system, 717 plus autosampler, Spectra System UV200 detector	2003/2004	Food Testing	HPLC01
Thermo Spectronic Genesys 10uv spectrophotometer	2005	Food Testing	Food #1
DryVap Concentrator System 5000	2005	GC and GC/MS Extractables	DryVap #1

TITLE: TRACE METALS ANALYSIS BY ICP-AES USING USEPA METHOD 6010

Prepared By: George Brewer Date: 7/98

Approved By:

Group Supervisor: George Brewer Date: 01/23/01

Operations Manager: John C. Burtis Date: 1/23/01

QA Officer: Quitoah J. Nadeau Date: 1-23-01

General Manager: Deanna F. Wujala Date: 1/23/01

Revision History:

SOP Revision	Changes	Approval Initials	Approval Date	Effective Date
01 6010B	Format changes, added pollution prevention, expanded procedure and QC sections. Added tables.	GN	1-23-01	1/23/01
02 6010B	Calibration begins with analysis of SO (cal. blank) followed by SI (Mixed Cal. Std.) Changes to section 7.5 and Table 8 to reflect this. Made changes to element concs. in Tables 3, 4, 5, 6 to reflect current practices.	GN	10-21-02	10-21-02
03 6010B	Added MN-IEC to standards run. Changed frequency of LRS. Changed concentration of HNO ₃ in calibration blank. CRI changed from three separate solutions to one. Changed CRI vendor.	MRC	04.15.04	04.15.04
04	updated ICV, CCV, ICPB, PQL Chkstd. PBW, PBS, MS & MSD acceptance criteria updated Table 1	LAD	05/06	05/06
05	Updated Tables 3, 4, 5, 6 and 7 with current standard concentrations and prep. Updated Table 1 with current practices including NAVY alert findings. Updated Sections 2, 7.2, 7.6 and Table 1 with new ICP information. Updated Table 8 with current sequence requirements.	LAD	07/07	07/07

TITLE: **TRACE METALS ANALYSIS BY ICP-AES USING USEPA METHOD 6010**

Please acknowledge receipt of this standard operating procedure by signing and dating both of the spaces provided. Return the bottom half of this sheet to the QA Department.

I acknowledge receipt of copy ___ of document **SOP CA-608-08**, titled **TRACE METALS ANALYSIS BY ICP-AES USING USEPA METHOD 6010**.

Recipient: _____ Date: _____

KATAHDIN ANALYTICAL SERVICES, INC.
STANDARD OPERATING PROCEDURE

I acknowledge receipt of copy ___ of document **SOP CA-608-08**, titled **TRACE METALS ANALYSIS BY ICP-AES USING USEPA METHOD 6010**.

Recipient: _____ Date: _____

TITLE: **TRACE METALS ANALYSIS BY ICP-AES USING USEPA METHOD 6010**

1.0 SCOPE AND APPLICATION

Inductively coupled plasma atomic-emission spectroscopy (ICP-AES) determines trace elements, including metals, in solution. The purpose of this SOP is to describe the procedures used by Katahdin Analytical Services, Inc. personnel to analyze aqueous and solid samples for trace metals by USEPA Method 6010 (Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods, USEPA SW846).

Sample types that may be analyzed using these methods include drinking waters, ground waters, aqueous samples, TCLP, SPLP and EP Toxicity extracts, industrial and organic wastes, soils, sludges, sediments, and other solid wastes. The following elements may be analyzed under this SOP: Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Si, Ag, Na, Sn, Sr, Tl, Ti, V, and Zn.

All samples, except filtered ground water samples, analyzed under USEPA Method 6010 require digestion prior to analysis. USEPA Methods 3005, 3010, and 3050 describe appropriate digestion procedures for samples to be analyzed by ICP-AES under EPA Method 6010. Refer to current revisions of Katahdin SOPs CA-604 and CA-605, current revisions, for sample digestion procedures.

1.1 Definitions

Analytical Spike - An aliquot of a sample to which a known amount of analyte has been added before analysis and after digestion, if digestion is required.

CCB - Continuing Calibration Blank - An analyte-free solution consisting of acidified reagent water used to verify calibration accuracy periodically during analysis.

CCV - Continuing Calibration Verification - A midrange standard used to verify calibration accuracy periodically during analysis.

CRI - Contract Required detection limit sample for ICP - A low concentration standard used to verify calibration accuracy near the low end of the calibration range.

Duplicate - A second aliquot of a sample that is prepared and analyzed in the same way as the original sample in order to determine the precision of the method.

ICB - Initial Calibration Blank - An analyte-free solution consisting of acidified reagent water used to verify calibration accuracy.

ICP-AES - Inductively Coupled Plasma Atomic Emission Spectroscopy.

ICS - Interference Check Sample - Two standards (ICSA and ICSAB) used to verify the effectiveness of interelement correction and background correction. Solution ICSA contains only interferences (Al, Ca, Fe, and Mg) at high concentrations (200 to

TITLE: TRACE METALS ANALYSIS BY ICP-AES USING USEPA METHOD 6010

500 mg/L); solution ICSAB contains interferences at the same concentrations as well as analytes at low (20 mg/L or less) concentrations.

ICV - Initial Calibration Verification - A standard made from a source independent from the calibration standards and with analyte concentrations different from those in the CCV; used to verify the accuracy of the instrument calibration.

IDL - Instrument Detection Limit - The lowest concentration of an analyte that can be determined with 99% confidence.

LCS - Laboratory Control Sample - A standard or solid reference material that has been brought through the sample preparation process.

LRS - Linear Range Standard - A high-concentration standard used to determine the upper reporting limit of the ICP calibration.

PB - Preparation Blank - Reagent water that has been brought through the sample preparation process.

PQL - Practical Quantitation Limit - The lowest concentration of an analyte that is routinely reported by the laboratory; nominally three to five times the IDL.

Matrix Spike - An aliquot of a sample to which a known amount of analyte has been added before digestion.

Serial Dilution - The dilution of a sample by a factor of five. When corrected by the dilution factor, the measured analyte concentrations of the diluted sample should agree with those of the original undiluted sample within specified limits. Serial dilution may reflect the influence of interferences.

Hardness - The sum of the calcium and magnesium concentrations, both expressed as calcium carbonate, in mg/L.

1.2 Responsibilities

This method is restricted to use by, or under the supervision of, analysts experienced in ICP analysis by EPA Method 6010. Each analyst must demonstrate and document their ability to generate acceptable results with this method. Refer to Katahdin SOP QA-805, current revision, "Personnel Training & Documentation of Capability".

It is the responsibility of all Katahdin technical personnel involved in ICP analysis by Method 6010 to read and understand this SOP, to adhere to the procedures outlined, and to properly document their data in the appropriate lab notebook. Any deviations from the test or irregularities with the samples should also be recorded in the lab notebook and reported to the group supervisor or designated qualified data reviewer responsible for this data.

TITLE: TRACE METALS ANALYSIS BY ICP-AES USING USEPA METHOD 6010

It is the responsibility of the Group Supervisor to oversee that members of their group follow this SOP, to ensure that their work is properly documented and to initiate periodic review of the associated logbooks.

1.3 Safety

Users of this procedure must be cognizant of inherent laboratory hazards, proper disposal procedures for contaminated materials and appropriate segregation of hazardous wastes. The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical should be treated as a potential health hazard. A reference file of material safety data sheets is available to all personnel involved in the chemical analysis. Everyone involved with the procedure must be familiar with the MSDSs for all the materials used in this procedure.

Each qualified analyst or technician must be familiar with Katahdin Analytical Environmental Health and Safety Manual including the Katahdin Hazardous Waste Plan and must follow appropriate procedures. These include the use of appropriate personal protective equipment (PPE) such as safety glasses, gloves and lab coats when working with chemicals or near an instrument and not taking food or drink into the laboratory. Each analyst should know the location of all safety equipment. Each analyst shall receive a safety orientation from their Department Manager, or designee, appropriate for the job functions they will perform.

Samples, sample digestates, standards, and other reagents used in ICP analysis may contain high concentrations of acids and toxic metals. Safety glasses should be worn when changing or adjusting argon tanks.

1.4 Pollution Prevention/Waste Disposal

Whenever possible, laboratory personnel should use pollution prevention techniques to address their waste generation. Refer to the current revision of the Katahdin Hazardous Waste Management Program for further details on pollution prevention techniques.

Wastes from ICP analysis should be disposed of in a manner appropriate to the hazards they present. Wastes generated during the preparation of samples must be disposed of in accordance with the Katahdin Analytical Environmental Health and Safety Manual I and SOP SD-903, "Sample Disposal," current revision. Expired standards are lab packed, placed in the Katahdin hazardous waste storage area, and disposed of in accordance with this SOP.

TITLE: **TRACE METALS ANALYSIS BY ICP-AES USING USEPA METHOD 6010**

2.0 SUMMARY OF METHOD

This method describes multielemental determinations by ICP-AES using simultaneous optical systems and radial and axial viewing of the plasma. The basis of the method is the measurement of atomic emission from sample atoms entrained in an argon plasma by optical spectroscopy. Samples are nebulized and the aerosol that is produced is transported to the plasma torch where thermal excitation of entrained atoms and ions occurs. Characteristic atomic-line and ionic-line emission spectra are produced by a radio-frequency inductively coupled plasma (ICP). The spectra are dispersed by a grating and the intensities of the emitted lines are monitored by a solid state charge injection device (CID) camera system. Photocurrents from the CID camera system are measured by a computer system. Element concentrations of unknown samples are quantitated by comparison of sample emission intensities to emission intensities of standards of known concentration. A background correction technique is used to compensate for variable background contribution to the determination of trace elements. Background is measured adjacent to the analyte lines on samples during analysis. The position selected for the background intensity measurement, on either or both sides of the analytical line, has been determined by the complexity of the spectrum adjacent to the analytical line. The position used must be relatively free of spectral interference and must reflect the same change in background intensity as occurs at the analyte wavelength. Physical interferences are corrected through the use of an internal standard (yttrium) that is automatically added to all samples and standards prior to nebulization. The possibility of additional interferences (noted in section 3) must be recognized and appropriate corrections applied.

3.0 INTERFERENCES

Several types of interference effects may contribute to inaccuracies in the determination of trace elements. They can be summarized as spectral interferences, physical interferences, and chemical interferences.

Spectral interferences can be categorized as 1) overlap of a spectral line from another element; 2) unresolved overlap of molecular band spectra; 3) background contribution from continuous or recombination phenomena; and 4) background from stray light from the line emission of high concentration elements. The first of these effects is compensated by utilizing the computer correction of raw data, requiring the monitoring and measurement of the interfering element (interelement correction). The second effect is controlled by choosing analytical wavelengths that are free from overlapping molecular emission spectra. The third and fourth effects are usually compensated by a background correction adjacent to the analyte line. Uncorrected spectral interferences may be detected through examination of serial dilution and matrix spike data.

Physical interferences are generally considered to be effects associated with sample nebulization and transport processes. Such properties as changes in viscosity and surface tension can cause significant inaccuracies, especially in samples that may contain high dissolved solids and/or acid concentrations. Matrix matching of standards and samples

TITLE: TRACE METALS ANALYSIS BY ICP-AES USING USEPA METHOD 6010

and the use of a peristaltic pump may lessen these interferences. If these types of interferences are operative, they must be reduced by dilution of the sample and/or utilization of standard addition techniques. Another problem that can occur from high dissolved solids is salt buildup at the tip of the nebulizer. This affects aerosol flow rate causing instrumental drift. Regular cleaning of nebulizer tips and dilution of samples with high dissolved solids contents are used to control this problem. Physical interferences are also corrected by this laboratory through the use of an internal standard. Uncorrected physical interferences may be detected through examination of serial dilution and matrix spike data. Instrument drift caused by the salting up of nebulizer tips may also be detected by looking for oriented drift in calibration verification standards analyzed regularly throughout the run.

Chemical interferences are characterized by molecular compound formation, ionization effects, and solute vaporization effects. Normally these effects are not pronounced with the ICP technique; however, if observed they can be minimized by careful selection of operating conditions (i.e., incident power, observation position, etc.), by matrix matching, and by standard addition procedures. These types of interferences can be highly dependent on matrix type and the specific analyte element. Uncorrected chemical interferences may be detected through examination of serial dilution data.

4.0 APPARATUS AND MATERIALS

- 4.1 Computer-controlled inductively-coupled plasma atomic emission spectrometer (plasma viewed radially or axially) equipped for internal standardization, and capable of performing automatic background correction and interelement correction. For more information refer to the current revision of Katahdin SOP CA-632, "Operation and Maintenance of the Thermo ICAP 6500 ICP Spectrophotometer".
- 4.2 Computer-controlled autosampler.
- 4.3 Argon gas supply – high purity.
- 4.4 Volumetric glassware of suitable precision and accuracy.
- 4.5 Automatic pipets of suitable precision and accuracy. Calibrated Eppendorf Reference pipets and Finn digital pipets are appropriate.

Refer to the appropriate instrument-specific SOP for additional required equipment.

5.0 REAGENTS

- 5.1 Hydrochloric acid, concentrated (HCl) – spectroscopic grade.

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- 5.2 Nitric acid, concentrated (HNO₃) – spectroscopic grade.
- 5.3 Reagent water, trace metals free.
- 5.4 Calibration blank – reagent water containing HCl (5% v/v) and HNO₃ (5% v/v). Calibration blank solution is prepared in large volumes (up to 20 liters) and stored in a carboy. Calibration blank solution is used in establishing the analytical curve, and in all initial and continuing calibration blank determinations. This solution is also used to flush the system between standards and samples. Intermediate and working standards are prepared by diluting stock standards and intermediate standards with calibration blank solution so that all standards and blanks are acid matrix-matched to sample digestates.
- 5.5 Single element and multielement stock standard solutions – purchased standards prepared from high purity salts or metals, and supplied by the vendors with certificates of purity and analysis. Refer to Tables 3 and 4 for a listing of stock standards required, and to Table 7 for element concentrations in stock standards.
- 5.6 Intermediate standard solutions – laboratory-prepared multielement standards that are used in the subsequent preparation of working standards. Refer to Table 4 for a listing of intermediate standards required and for preparation instructions. Refer to Table 6 for element concentrations in intermediate standards.
- 5.7 Working standard solutions – laboratory-prepared multielement standards that are used to calibrate the instrument and to perform all necessary QC checks. Refer to Table 3 for a listing of working standards and for preparation instructions. Refer to Table 5 for element concentrations in working standards.
- 5.8 5 mg/L yttrium internal standard solution – add 0.5 mL 10000 mg/L yttrium stock standard to a 1000 mL volumetric flask half filled with calibration blank solution. Bring to volume with calibration blank solution.

6.0 SAMPLE COLLECTION, PRESERVATION AND HANDLING

Samples to be analyzed for trace metals by ICP should be collected and preserved as described in the following table.

Matrix	Container ¹	Collection Volume/ Weight	Preservation/ Treatment	Holding Time
Aqueous (total)	P, G	250 mL	HNO ₃ to pH < 2	6 months
Aqueous (dissolved)	P, G	250 mL	Filter, HNO ₃ to pH < 2	6 months
Solid	P, G	10 g	Cool, 4°C	6 months

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¹ P = polyethylene or , G = glass

7.0 PROCEDURES

- 7.1 Begin by following the startup and calibration instructions provided in the current revision of Katahdin SOP CA-632, "Operation and Maintenance of the Thermo ICAP 6500 ICP Spectrophotometer"
- 7.2 Analysis must proceed in the sequence described in Table 8 to ensure that all necessary quality control samples are analyzed at the appropriate frequencies. A minimum of two replicate integrations is required for all standards and samples. Analysis always begins with the analysis of a calibration blank solution (S0) followed by analysis of a multielement calibration standard (S1 in Table 3) to calibrate the instrument. The system is flushed with calibration blank for two minutes between each sample and standard, and each sample and standard is aspirated for one minute prior to the beginning of emission measurements.
- 7.3 Analysis continues with analysis of the initial calibration verification standard (ICV) and the initial calibration blank (ICB) to verify the accuracy of the calibration. Refer to Section 8 and Table 1 for additional information.
- 7.4 A continuing calibration verification standard (CCV) and a continuing calibration blank (CCB) must be analyzed at the beginning of the run, after every ten samples, and at the end of the run to verify the continued accuracy of the calibration. Refer to Section 8 and Table 1 for additional information.
- 7.5 Interference check standard solutions (ICSA and ICSAB) must be analyzed at the beginning, end, and at periodic intervals (4-6 hours, 30-40 analytical samples) throughout the sample run to verify the accuracy of the IEC factors. Refer to Section 8 and Table 1 for additional information.
- 7.6 A practical quantitation limit standard (PQL) must be analyzed at the beginning of each run to determine the accuracy of the calibration at the reporting limit. Refer to Section 8 and Table 1 for additional information.
- 7.7 All sample analytical results for a particular element that are bracketed (preceded or followed) by failing results in a QC sample (ICV, ICB, CCV, CCB, ICSA, or ICSAB) for that element must not be reported. The sample must be reanalyzed for the element in question.
- 7.8 All samples that exceed the linear dynamic range must be diluted and reanalyzed. This includes samples with interfering elements that exceed the calibration ranges, because accurate quantitation of interfering elements is necessary for reliable interelement correction. For example, if a sample has been submitted to the

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laboratory for lead analysis, and the measured aluminum concentration of that sample exceeds the calibration range for aluminum, it must be diluted sufficiently to bring aluminum within the linear dynamic range and the lead result must be reported from that dilution analysis.

- 7.9 If dilutions of digested samples are performed, the measured element concentrations must be multiplied by the dilution factor prior to reporting. This is accomplished automatically by entering the dilution factor in the autosampler table prior to initiation of analysis.
- 7.10 All analyses are performed using yttrium as an internal standard to compensate for enhancement or depression of the analytical signal due to matrix effects. Yttrium solution is pumped at a constant rate through one channel of the peristaltic pump. Samples and standards are pumped through a second channel of the pump. The tubing carrying the internal standard is connected to the tubing carrying samples and standards downstream from the pump, and mixing of the two streams is accomplished in a mixing coil downstream from the connection, prior to nebulization. For each sample or standard, the computer that controls the spectrometer divides the detected emission signal for each element by the detected yttrium emission signal prior to quantitation, thus normalizing all emission signals to that of yttrium.
-

8.0 QUALITY CONTROL AND ACCEPTANCE CRITERIA

USEPA Method 6010 requires the laboratory to perform specific quality control checks to assess laboratory performance and data quality. Minimum frequencies, acceptance criteria, and corrective actions for these control checks are tabulated in Table 1 and are described below. Table 1 criteria are intended to be guidelines for analysts. The table does not cover all possible situations. If any of the QC requirements are outside the recovery ranges listed in Table 1, all associated samples must be evaluated against all the QC. In some cases data may be reported, but may be reanalyzed in other cases. Making new reagents and standards may be necessary if the standardization is suspect. The corrective actions listed in Table 1 may rely on analyst experience to make sound scientific judgments. These decisions are based on holding time considerations and client and project specific Data Quality Objectives. The supervisor, Operations Manager, and/or Quality Assurance Officer may be consulted to evaluate data. Some samples may not be able to be reanalyzed within hold time. In these cases "qualified" data with narration may be advisable after consultation with the client.

In some cases the standard QC requirements listed in this section and in Table 1 may not be sufficient to meet the Data Quality Objectives of the specific project. Much of the work performed at the lab is analyzed in accordance with specific QC requirements spelled out in a project specific Quality Assurance Project Plan (QAPP) or in a program specific Quality Systems Manual (QSM). The reporting limits, acceptance criteria and/or corrective actions may be different than those specified in this SOP. In these cases the appropriate information

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will be communicated to the Department Manager and/or senior chemists before initiation of the analyses so that specific product codes can be produced for the project. In addition, the work order notes for each project will describe the specific QAPP or QSM to be followed.

INITIAL DEMONSTRATION OF PERFORMANCE

- 8.1 Instrument detection limits (IDL) are determined quarterly for each analyte analyzed on each instrument. This determination requires seven replicate analyses of a reagent water spiked at 3-5 times the anticipated detection limit for each analyte, performed on three non-consecutive days. The standard deviation of the 21 analyses is multiplied by three to obtain the IDL. For more information on performing IDL determinations, refer to the current revision of Katahdin SOP QA-806.
- 8.2 Method detection limits (MDL) are determined annually for each analyte analyzed on each instrument. This determination requires at least seven replicate digestions and analyses of a reagent water spiked at 3-5 times the anticipated MDL for each analyte. MDLs differ from IDLs in that the seven replicates are digested prior to analysis, and they may be analyzed on a single day. The standard deviation of the 7 (or more) replicate analyses is multiplied by the Student's t-value to obtain the MDL. For more information on performing MDL determinations, refer to the current revision of Katahdin SOP QA-806.
- 8.3 A Lower Limit of Quantitation Check (LLQC) sample must be prepared and analyzed annually or on an as-needed basis to confirm the laboratory's Practical Quantitation Limits (PQLs). The LLQC sample is equivalent to the PQL standard (Section 8.10) but is carried through the entire sample preparation and analysis process. Element recoveries for the LLQC sample must fall within 70% to 130% of the expected concentrations to confirm the previously established PQLs.
- 8.4 The upper limit of the linear dynamic range (LDR) must be established for each wavelength utilized. It must be determined from a linear calibration prepared in the normal manner using the established analytical operating procedure for the instrument. The LDR should be determined by analyzing succeeding higher standard concentrations of the analyte until the observed analyte concentration differs by no more than 10% from the stated concentration of the standard. Determined LDRs must be documented and kept on file. The LDR which may be used for the analyses of samples should be judged by the analyst from the resulting data. Determined sample analyte concentrations that are greater than the determined upper LDR limit must be diluted and reanalyzed. The LDRs should be verified **every six months** or whenever, in the judgment of the analyst, a change in analytical performance caused by either a change in instrument hardware or operating conditions would dictate they be redetermined.

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- 8.5 The alkali and alkaline earth metals may have non-linear response curves due to ionization and self-absorption effects. These curves may be used for quantitation of samples if the effective range is checked and if the second order curve fit has a correlation coefficient of 0.998 or better. Third order fits are not acceptable. Non-linear response curves must be revalidated and recalculated every six months.

ANALYTICAL RUN QC SAMPLES

- 8.6 An Initial Calibration Verification (ICV) solution is analyzed after the initial calibration to check calibration accuracy. The ICV solution is prepared by combining compatible elements from a standard source different than that of the calibration standard and at concentrations within the linear working range of the instrument. The results of the ICV must fall within 90% to 110% of the expected values. If the ICV fails, result for the failing elements may not be reported from the run unless the ICV recovery is greater than 110% and the sample result is less than the PQL.
- 8.7 Continuing Calibration Verification (CCV) solutions are analyzed after the initial calibration, after every ten samples, and at the end of the analytical run. The CCV solution is prepared using the same standards used for calibration at concentrations near the mid-point of the calibration curve. Results of the CCVs must fall within 90% to 110% of the expected values. If a CCV fails, results for the failing elements may not be reported from the run unless the CCV recovery is greater than 110% and the sample result is less than the PQL. Also, for failing elements, all samples analyzed after the last passing CCV must be reanalyzed.
- 8.8 Calibration blank solution is analyzed after each ICV and CCV. A calibration blank that is analyzed after the ICV is called an Initial Calibration Blank (ICB). A calibration blank that is analyzed after a CCV is called a Continuing Calibration Blank (CCB). The absolute values of results of ICBs and CCBs must be less than the Practical Quantitation Level (PQL) for each element. If an ICB or a CCB fails, results for the failing elements may not be reported from the run until the problem is corrected and a passing ICB or CCB has been analyzed, with the following exception. If the result for a CCB a ICB is greater than the PQL, sample results that are less than the PQL or greater than or equal to ten times the measured CCB concentration may be reported. Also, for failing elements, all samples analyzed after the last passing CCB must be reanalyzed, with the exception noted above.
- 8.9 Interference check solutions ICSA and ICSAB (refer to Section 1.1) are analyzed at the beginning of each run to verify interelement correction factors and background correction. ICSA contains interferent elements (Al, Ca, Fe, and Mg) only, at concentrations of 200 mg/L to 500 mg/L. Results for interfering elements in the ICSA must fall within 80% to 120% of the expected values. Results for unspiked elements in ICSA must fall within \pm PQL if the PQL is greater than 0.01 mg/L, within \pm 2xPQL if the PQL is less than or equal to 0.01 mg/L. ICSAB contains interferent elements at concentrations of 200 mg/L to 500 mg/L, and analytes at

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concentrations of 20 mg/L or less. Results for all elements (interferents and analytes) in ICSAB must fall within 80% to 120% of the expected values. If the ICSA or ICSAB fails, results for the failing elements may not be reported from the run until the problem is corrected and a passing ICSA or ICSAB has been analyzed.

- 8.10 A Practical Quantitation Limit (PQL) Check Standard or low level continuing calibration verification (LLCCV) is analyzed at the beginning (after the ICV and ICB samples) and at the end of each run. Element concentrations in this solution are at the laboratories practical quantitation limit. Element recoveries for the PQL check Standard must fall between 70-130% of the expected values. If the PQL Check Standard fails, the results for the failing elements may not be reported from the run, unless the PQL Check Standard recovery is greater than 130% and the samples results are less than the PQL.

PREPARATION BATCH QC SAMPLES

- 8.11 Each digestion batch of twenty or fewer samples will contain a preparation blank and a laboratory control sample. Each batch will also contain one or more of the following QC samples: laboratory control sample duplicate, sample duplicate, matrix spike sample or matrix spike sample duplicate.
- 8.12 A preparation blank (PBW or PBS), consisting of reagent water carried through the same process as associated samples, is prepared with each digestion batch of twenty or fewer samples. The results of preparation blanks must be less than the Practical Quantitation Level (PQL) for each element. If a preparation blank fails, results for the failing elements may not be reported from the digestion batch, and all associated samples must be redigested, with the following exception. If the result for a preparation blank is greater than the PQL, associated sample results that are less than the PQL or greater than or equal to ten times the measured preparation blank concentration may be reported.
- 8.13 A laboratory control sample (LCS), consisting of spiked reagent water or a solid reference material carried through the same process as associated samples, is prepared with each digestion batch of twenty or fewer samples. Results for laboratory control samples must fall within 80% to 120% of the expected value, unless vendor-supplied limits (for solid reference materials) or laboratory-generated statistical limits are available. If a laboratory control sample fails, results for the failing elements may not be reported from the digestion batch, and all associated samples must be redigested with the following exception. If the LCS fails high, sample results less than the PQL may be reported.

SAMPLE MATRIX QC SAMPLES

- 8.14 Matrix spiked duplicate samples are prepared at a minimum frequency of one per digestion batch. The recovery for each element in a spiked sample or spiked

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duplicate sample must fall within 75% to 125% of the actual value if the result for the unspiked sample is less than four times the amount of spike added. If one or both spike recoveries fail, the associated sample result must be flagged on the report of analysis.

The relative percent difference between sample duplicate, matrix spiked duplicate or LCS duplicate, is calculated as follows:

$$\text{RPD (\%)} = \frac{|D_1 - D_2|}{(D_1 + D_2)/2} \times 100$$

Where: D_1 = sample result
 D_2 = duplicate sample result

A control limit of 20% RPD is applied to duplicate analysis if the original sample result is greater than 50X the IDL. If the matrix spike duplicate analysis fails, the associated sample result must be flagged on the report of analysis.

- 8.15 A serial dilution is analyzed to check for chemical or physical interferences. If the analyte concentration of a sample is sufficiently high (minimally, 50 x IDL), the measured concentration of a serial dilution (1:5 dilution) of the sample should agree within 90% to 110% of the original determination. The percent difference between the original sample and the serial dilution should be calculated as follows:

$$\text{Difference (\%)} = \frac{|L-S|}{S} * 100\%$$

where:

L = Serial dilution result (corrected for dilution)
S = Original sample result

If the serial dilution analysis fails, a matrix interference should be suspected. The associated sample result should be flagged on the report of analysis or the sample should be reanalyzed at dilution to eliminate the interference.

9.0 METHOD PERFORMANCE

The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero. The MDLs are determined annually per type of instrument and filed with the Metals Supervisor and with the QAO. Refer to the current revision of Katahdin SOP QA-806, Method Detection Limit and Instrument Detection Limit Studies, for procedures on determining the MDL.

Refer to the current revision of Method 6010 for other method performance parameters and requirements.

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10.0 APPLICABLE DOCUMENTS/REFERENCES

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, USEPA SW846, 3rd Edition, Final Updates I, II, IIA, IIB, III, IIIA, IIIB and IV, February 2007, Method 6010C.

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TABLE 1

QC REQUIREMENTS

Method	QC Sample	Minimum Frequency	Acceptance Criteria	Corrective Action
USEPA 6010	Initial Calibration, minimum 1 point plus a calibration blank.	Daily prior to sample analysis.	Correlation coefficient (r) \geq 0.998	Recalibrate
	Initial Calibration Verification (ICV), prepared from a second source.	Before beginning a sample run.	Recovery within \pm 10% of true value.	1) Do not use results for failing elements unless the ICV > 110% and the sample < the PQL. 2) Investigate and correct problem.
	Initial Calibration Blank (ICB)	Immediately after the ICV.	Absolute value of ICB < PQL.	1) Do not use results if \geq PQL and < 10x CCB level. 2) Investigate and correct problem.
	Continuing Calibration Verification (CCV)	At beginning of run, after every 10 samples, and at end of run.	Recovery within \pm 10% of true value.	1) Do not use results for failing elements unless the ICV > 110% and the sample < the PQL. 2) Investigate and correct problem.
	Continuing Calibration Blank (CCB)	After every 10 samples and at end of the run.	Absolute value of CCB < PQL.	1) Do not use results if \geq PQL and < 10x CCB level. 2) Investigate and correct problem.
	Practical Quantitation Level Check Standard (PQL) (LLCCV)	At beginning and end of run.	Recovery within \pm 30% of true value.	1) Do not use results for failing elements unless the ICV > 110% and the sample < the PQL. 2) Investigate and correct problem.
	Interference Check Solution A (ICSA)	At beginning and end of run.	For Al, Ca, Fe, and Mg, recovery within \pm 20% of true value. For analytes not spiked, \pm PQL, or, if PQL \leq 0.01 mg/L, \pm 2x PQL.	1) Do not use results for failing elements. 2) Investigate and correct problem.
	Interference Check Solution AB (ICSAB)	At beginning and end of run.	Recovery of each analyte within \pm 20% of true value.	1) Do not use results for failing elements. 2) Investigate and correct problem.

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TABLE 1, CONTINUED

QC REQUIREMENTS

Method	QC Sample	Minimum Frequency	Acceptance Criteria	Corrective Action
USEPA 6010, continued	Preparation Blank (PBW/PBS)	One per digestion batch of 20 or fewer samples.	Less than PQL.	1) Investigate source of contamination. 2) Redigest and reanalyze all associated samples if sample concentration \geq PQL and $<10x$ the blank concentration.
	Laboratory Control Sample (LCSW/LCSS)	One per digestion batch of 20 or fewer samples.	Recovery within $\pm 20\%$ of true value, unless vendor-supplied or statistical limits have been established.	1) Investigate source of problem. 2) Redigest and reanalyze all associated samples.
	Matrix Spike Sample (S)	One per digestion batch of 20 or fewer samples.	Recovery $\pm 25\%$ of true value, if sample $< 4x$ spike added.	Flag results.
	Matrix Spike Duplicate Sample (P)	One per digestion batch of 20 or fewer samples.	1) Recovery $\pm 25\%$ of true value, if sample $< 4x$ spike added. 2) RPD $\leq 20\%$ for duplicate spikes.	Flag results
	Serial Dilution (L)	One per digestion batch.	If original sample result is at least $50x$ IDL, 5-fold dilution must agree within $\pm 10\%$ of the original result.	Flag result or dilute and reanalyzed sample to eliminate interference.
	Instrument Detection Limit (IDL) Study	Quarterly.	IDL $< MDL$ PQL $> 2-3 * the IDL$	1) Repeat IDL study. 2) Raise PQL.
	Method Detection Limit (MDL) Study	Annually.	M PQL $> 2-3 * the MDL$	1) Repeat MDL study. 2) Raise PQL.
	Lower Limit of Quantitation Check (LLQC) Sample	Digest and analyze annually or as needed to confirm PQLs	70% - 130% of true value	Reevaluate PQLs
	Linear Range Study	Every six months	Run succeedingly higher stds until recovery <u>not</u> within $\pm 10\%$. Use highest passing concentration as upper limit of linear range.	Only accept data to highest passing concentration until next linear range study.

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TABLE 2
 SUMMARY OF METHOD MODIFICATIONS

TOPIC	KATAHDIN SOP CA-608-08	METHOD 6010, current revision
Apparatus/Materials		
Reagents		
Sample preservation/ handling		
Procedures		
QC - Spikes		
QC - LCS		
QC - Accuracy/Precision		
QC - MDL		
QC - Calibration Blanks	Acceptance criteria employed for 6010: \pm PQL	Acceptance criteria stated in 6010: less than 10% of PQL

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TABLE 3

PREPARATION OF CALIBRATION AND QUALITY CONTROL STANDARDS

Sample or Solution Name	Component Solution Name	Source of Component	Amount of Component Added per 100 mL Final Volume (mL)
Calibration Standard (STD1 or S1)	ICP- intermediate Standard	Lab Prepared (see Table 4)	10.0
	QCS 26	High Purity Standards	1.0
Initial Calibration Verification (ICV)	QCP-CICV-3	Inorganic Ventures	0.96
	1000 mg/L Si	Inorganic Ventures	0.98
	1000 mg/L Al	High Purity Standards	0.96
	IV-28	Inorganic Ventures	0.4
	1000 mg/L Sn	Inorganic Ventures	0.04
Interference Check Sample A (ICSA)	CLPP-ICS-A	Inorganic Ventures	10.0
Interference Check Sample AB (ICSAB)	CLPP-ICS-A	Inorganic Ventures	10.0
	CLPP-ICS-B4	Inorganic Ventures	1.0
	ICSAB-INT	Lab Prepared (see Table 4)	5.0
Continuing Calibration Verification (CCV)	ICP intermediate standard	Lab Prepared (see Table 4)	5.0
	QCS 26	High Purity Standards	0.5
Practical Quantitation Limit Sample (PQL)	PQL-INT	Lab Prepared (see Table 4)	1.0

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TABLE 4

PREPARATION OF INTERMEDIATE STANDARDS

Sample or Solution Name	Component Solution Name	Source of Component	Amount of Component Added per 100 mL Final Volume (mL)
PQL-INT	1000 mg/L B,Li,Sn,Sr, W, U	H-P or IV	1.0 each
	10000 mg/L K, Na	H-P or IV	1.0 each
	1000 mg/L Ni	High Purity Standards	0.4
	1000 mg/L Co	High Purity Standards	0.3
	1000 mg/L Cu,V,Zn	High Purity Standards	0.25 each
	1000 mg/L Si	High Purity Standards	2.0
	1000 mg/L Cr,Ti,Tl,Ag	High Purity Standards	0.15 each
	1000 mg/L Cd,Se, Mo	High Purity Standards	0.1 each
	10000 mg/L Al	High Purity Standards	0.3
	1000 mg/L As,Sb	High Purity Standards	0.08 each
	1000 mg/L Ba,Be,Mn,Pb	High Purity Standards	0.05 each
	10000 mg/L Ca,Mg	High Purity Standards	0.05 each
	10000 mg/L Fe	High Purity Standards	0.1
ICSAB-INT	10000 mg/L K,Na	H-P or IV	4.0 each
	10000 mg/L B, Li, Mo,Sr,Sn,Ti, W, U	High Purity Standards	1.0 each
	1000 mg/L Si	High Purity Standards	4.0

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TABLE 5
ELEMENT CONCENTRATIONS IN WORKING STANDARDS

Element	CONCENTRATION IN SOLUTION, mg/L								
	STD1	ICV	PQL	ICSA	ICSAB	CCV	AL_IEC	FE_IEC	MN_IEC
Aluminum	25	10	0.3	500	500	12.5	500		
Antimony	1	0.4	0.008		0.6	0.5			
Arsenic	1	0.4	0.008		0.1	0.5			
Barium	1	0.4	0.005		0.5	0.5			
Beryllium	1	0.4	0.005		0.5	0.5			
Boron	1	0.4	0.1		0.5	0.5			
Cadmium	1	0.4	0.01		1.0	0.5			
Calcium	25	10	0.05	500	500	12.5			
Chromium	1	0.4	0.015		0.5	0.5			
Cobalt	1	0.4	0.03		0.5	0.5			
Copper	1	0.4	0.025		0.5	0.5			
Iron	25	10	0.1	200	200	12.5		200	
Lead	1	0.4	0.005		0.05	0.5			
Lithium	1	0.4	0.1		0.5	0.5			
Magnesium	25	10	0.05	500	500	12.5			
Manganese	1	0.4	0.005		0.5	0.5			10
Molybdenum	1	0.4	0.01		0.5	0.5			
Nickel	1	0.4	0.04		0.5	0.5			
Potassium	25	13.6	1		20	12.5			
Selenium	1	0.4	0.01		0.05	0.5			
Silicon	1	0.4	0.2		2	0.5			
Silver	1	0.4	0.015		0.2	0.5			
Sodium	25	10	1		20	12.5			
Strontium	1	0.4	0.1		0.5	0.5			
Thallium	1	0.4	0.015		0.1	0.5			
Tin	1	0.4	0.1		0.5	0.5			
Titanium	1	0.4	0.015		0.5	0.5			
Tungsten	1	0.4	0.1		0.5	0.5			
Uranium	1	0.4	0.1		0.5	0.5			
Vanadium	1	0.4	0.025		0.5	0.5			
Zinc	1	0.4	0.025		1.0	0.5			

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TABLE 6

ELEMENT CONCENTRATIONS IN INTERMEDIATE STANDARDS

Element	CONCENTRATION IN SOLUTION, mg/L			
	ICP Intermed STD		PQL-INT	ICSAB-INT
Aluminum	240		30	
Antimony			0.8	
Arsenic			0.8	
Barium			0.5	
Beryllium			0.5	
Boron			10	10
Cadmium			1.0	
Calcium	240		5.0	
Chromium			1.5	
Cobalt			3.0	
Copper			2.5	
Iron	240		10	
Lead			0.5	
Lithium	10		10	10
Magnesium	240		5.0	
Manganese			0.5	
Molybdenum			1.0	10
Nickel			4.0	
Potassium	150		100	400
Selenium			1.0	
Silicon	250		20	40
Silver			1.5	
Sodium	240		100	400
Strontium	10		10	10
Thallium			1.5	
Tin	10		10	10
Titanium			1.5	10
Tungsten	10		10	10
Uranium	10		10	10
Vanadium			2.5	
Zinc			2.5	

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TABLE 7

ELEMENT CONCENTRATIONS IN STOCK STANDARDS

Element	CONCENTRATION IN SOLUTION, mg/L					
	IV-28	QCS-26	2007 ICS-1	CLPP- ICS-A	CLPP- ICS-B4	QCP- CICV-3
Aluminum	100	100		5000		
Antimony	100	100			60	
Arsenic	100	100			10	500
Barium	100	100			50	
Beryllium	100	100			50	
Boron	100	100	500			
Cadmium	100	100			100	250
Calcium	100	100		5000		
Chromium	100	100			50	
Cobalt	100	100			50	
Copper	100	100			50	
Iron	100	100		2000		
Lead	100	100			5	500
Lithium	100					
Magnesium	100	100		5000		
Manganese	100	100			50	
Molybdenum	100	100	300			
Nickel	100	100			100	
Potassium	1000	1000				
Selenium	100	100			5	500
Silicon	50	50	230			
Silver	100	100			20	
Sodium	100	100				
Strontium	100					
Thallium	100	100			10	500
Tin						
Titanium	100	100	1000			
Vanadium	100	100			50	
Zinc	100	100			100	

TITLE: **TRACE METALS ANALYSIS BY ICP-AES USING USEPA METHOD 6010**

TABLE 8
 REQUIRED ANALYTICAL SEQUENCE

Sequence Number	Standard/Sample	Purpose
1	Blank (Calibration Blank)	Initial calibration
2	S1 (Calibration Standard)	Initial calibration
3	ICV (Initial Calibration Verification)	Check calibration accuracy
4	ICB (Initial Calibration Blank)	Check calibration accuracy
5	PQL (Practical Quantitation Level Sample)	Check calibration accuracy near PQL, repeat before final CCV, CCB
6	ICSA (Interference Check Solution A)	Verify accuracy of IEC factors, repeat before final CCV, CCB
7	ICSAB (Interference Check Solution AB)	Verify accuracy of IEC factors, repeat before final CCV, CCB
8	CCV (Continuing Calibration Verification)	Check calibration stability
9	CCB (Continuing Calibration Blank)	Check calibration stability
10-19	Analyze up to 10 samples	
20	CCV (Continuing Calibration Verification)	Check calibration stability
25	CCB (Continuing Calibration Blank)	Check calibration stability
...	Continue analyzing sequences of up to 10 samples, followed by a CCV and a CCB	

TITLE: **TRACE METALS ANALYSIS BY ICP-AES USING USEPA METHOD 6010**

ATTACHMENT 1

HARDNESS BY CALCULATION

As referenced in "Standard Methods for the Examination of Water and Wastewater," Methods 2340 A & B, Hardness Introduction and Hardness by Calculation, American Public Health Association, 18th Edition, Revised 1992, total hardness is the sum of the calcium and magnesium concentrations, both expressed as calcium carbonate, in milligrams per liter.

Once the calcium and magnesium concentrations have been determined by EPA methods 6010, 6020, 200.7 or 200.8, the total hardness of an aqueous sample may be calculated as follows:

$$\text{Total Hardness, mg equivalent CaCO}_3/\text{L} = 2.497 (\text{Ca, mg/L}) + 4.118 (\text{Mg, mg/L})$$

The calcium hardness of an aqueous sample may also be calculated as follows:

$$\text{Calcium Hardness, mg equivalent CaCO}_3/\text{L} = 2.497 (\text{Ca, mg/L})$$

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

Please acknowledge receipt of this standard operating procedure by signing and dating both of the spaces provided. Return the bottom half of this sheet to the QA Department.

I acknowledge receipt of copy ___ of document **SD-902-08**, titled **Sample Receipt and Internal Control**.

Recipient: _____ Date: _____

KATAHDIN ANALYTICAL SERVICES, INC.
STANDARD OPERATING PROCEDURE

I acknowledge receipt of copy ___ of document **SD-902-08**, titled **Sample Receipt and Internal Control**.

Recipient: _____ Date: _____

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

1.0 SCOPE AND APPLICATION

Katahdin Analytical Services, Inc. requires the use of specific receiving, acceptance, identification, storage, and distribution procedures for samples it accepts for analyses. These procedures assure that:

- samples are uniquely identified,
- samples are protected from loss or damage,
- essential sample characteristics are preserved,
- any alteration of samples (e.g., filtration, preservation) is documented,
- the correct samples are analyzed, and
- a record of continuous sample custody and utilization is established.

The purpose of this SOP is to describe the procedures used for the receipt and tracking of samples received by Katahdin Analytical Services, Inc. (Katahdin).

1.1 Definitions

SDG: Sample Delivery Group – A group of samples to be reported as one data package.

1.2 Responsibilities

It is the responsibility of all Katahdin staff who receive samples or handle samples in the course of analysis to follow the procedures set forth in this SOP, to document their understanding of the procedures in their training files (refer to Katahdin SOP QA-805, current revision, "Personnel Training & Documentation of Capability"), and to suggest changes and revisions when appropriate. All technical staff are responsible for monitoring their immediate areas, stopping an activity when a problem is detected or suspected, initiating corrective action when needed, documenting any actions taken, and notifying the appropriate individual (e.g., Department Manager, Operations Manager, QAO). The primary responsibility for implementing real-time corrective actions and maintaining an effective QA self-inspection system resides with Katahdin staff. When problems are identified Katahdin personnel are expected to attempt to resolve situations within the scope of their technical knowledge, and to seek assistance from peers and the Department Manager as necessary.

It is the responsibility of Department Managers to oversee the adherence to Katahdin QC practices and internal documentation of laboratory activities within their area, to take corrective actions where needed and communicate problems to the Operations Manager, QAO or Vice President/President when warranted.

It is the responsibility of the Operations Manager to oversee adherence to Katahdin QA/QC practices by all laboratory groups under his/her authority, to help identify

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

problems and assure resolution, to facilitate corrective action where needed, and to communicate problems and concerns to the QAO and Vice President/President.

It is the responsibility of the Quality Assurance Officer (QAO) to oversee adherence to this SOP, to conduct periodic audits of each laboratory, to track corrective action reports, resolution, and documentation, and to communicate concerns and report findings to the Vice President/President. The QA Officer shall function independently from laboratory operations and be able to evaluate data objectively and perform assessments without outside influence. The QA Officer has the authority to independently halt production operations (including data reporting) if warranted by quality problems.

1.3 Safety

Users of this procedure must be cognizant of inherent laboratory hazards, proper disposal procedures for contaminated materials and appropriate segregation of hazardous wastes. The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical should be treated as a potential health hazard. A reference file of material safety data sheets is available to all personnel involved in the chemical analysis. Everyone involved with the procedure must be familiar with the MSDSs for all the materials used in this procedure.

Each qualified analyst or technician must be familiar with Katahdin Analytical safety procedures and the Katahdin Environmental Health & Safety Manual and must follow appropriate procedures. These include the use of appropriate personal protective equipment (PPE) such as safety glasses, gloves and lab coats when working with chemicals or near an instrument and not taking food or drink into the laboratory. Each analyst should know the location of all safety equipment. Each analyst shall receive a safety orientation from their Department Manager, or designee, appropriate for the job functions they will perform.

1.4 Pollution Prevention/Waste Disposal

Whenever possible, laboratory personnel should use pollution prevention techniques to address their waste generation. Refer to the current revision of the Katahdin Hazardous Waste Management Program for further details on pollution prevention techniques.

Wastes generated during the receipt of samples must be disposed of in accordance with the Katahdin Environmental Health & Safety Manual and SOPs SD-903, "Sample Disposal" and CA-107, "The Management of Hazardous Waste as it Relates to the Disposal of Laboratory Process Waste, Reagents, Solvents and

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Standards," current revisions. Expired standards are placed in the Katahdin hazardous waste storage area, and disposed of in accordance with these SOPs.

2.0 SUMMARY OF METHOD

Regulatory, program, and/or method requirements dictate the specifics of sample acceptance. These requirements include, but are not limited to, temperature upon receipt, chemical preservation, container type, sample amount, holding time considerations and complete and accurate documentation of all of these conditions, as well as sample identification. Katahdin's sample acceptance policy is to note any anomalies, discrepancies or non-compliances concerning the receipt of samples. The client is always notified with these issues to direct Katahdin on how and whether to proceed with analysis. All guidance from the client is recorded in the project phone logs and/or on the Sample Receipt Condition Report, which becomes part of the final report. Conditions or analyses performed which do not meet the necessary requirements are narrated or notated as described in the individual analytical SOPs.

3.0 INTERFERENCES

Not applicable.

4.0 APPARATUS AND MATERIALS

- 4.1 Thermometer – Oakton® Non-Contact Infrared Thermometer, or equivalent, capable of reading 0.1°C and digital probe style capable of reading 0.1°C (used for back-up).
 - 4.2 Capillary tubes – 75 mm Hematocrit Tubes, disposable
 - 4.3 Wide range pH test strips, pH 0 to 14 pH, EMD ColorpHast or equivalent.
 - 4.4 Narrow range pH test strips, pH 0 to 2.5 pH, EMD ColorpHast or equivalent.
 - 4.5 Narrow range pH test strips, pH 11 to 13 pH, EMD ColorpHast or equivalent.
-

5.0 REAGENTS

Preservatives - refer to Table 1, Sampling and Preservation Requirements, for specifics.

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

6.0 SAMPLE COLLECTION, PRESERVATION AND HANDLING

Refer to Table 1, Sampling and Preservation Requirements, for specifics.

7.0 PROCEDURES

PROCEDURES FOR SAMPLE CUSTODIAN

The following procedures include all steps to be completed for satisfactory receipt and acceptance of samples at Katahdin. These steps do not necessarily have to be performed in the exact order as described. Sample deliveries occur constantly throughout the day, so the sample custodian must multi-task and move back and forth between different procedures to accomplish the most critical tasks of checking receipt temperatures and checking for "RUSH" or quick hold time parameters.

- 7.1 When samples (except for non-environmental food samples) are dropped off, by either a delivery service (i.e. FEDEX or UPS) or by the client, the Chain-of-Custody (COC) should be signed immediately. The client (who is delivering or that has shipped samples with a delivery service) shall sign (at the lab upon delivery or prior to shipment of samples) that they have relinquished custody to the laboratory. The laboratory shall sign and record the date and time that custody is accepted. (Refer to Figures 1-3 for a Katahdin standard COC, a Katahdin Homeowner COC, and a Katahdin Food/Microbiology COC).
- 7.2 Cut custody seals and open all coolers. Remove the packets containing the client Chains-of-Custody (COCs).
- 7.3 Using the COCs, enter the date and time of sample receipt and the client name into the next available work order/login number in the sample receipt logbook (Figure 4). Initial each entry (line) to maintain a record of the individual who assigned each group of samples a discreet lab work order/login number. Record the assigned work order numbers in the appropriate space on the client COCs. Complete the log-in entry date and time once samples are logged in as described below.
- 7.4 Inventory the COCs for any "RUSH" or quick hold time analyses. Notify the appropriate section managers of these analyses. List any samples for analyses that have short hold times in the "Wet Chemistry Shorts and Rushes Logbook" (Figure 5) in the wet chemistry laboratory. Be sure to list the client, number of samples and date and time of the earliest sample. GC or GC/MS personnel must be informed when ENCORES are received so that they may be scheduled for extrusion. Microbiology personnel should also be informed of any microbiology samples that arrive. Parameters that routinely require short analytical hold times are:

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Coliforms	Color	pH
Nitrate/Nitrite	Dissolved Oxygen	Turbidity
Ferrous iron	Orthophosphate	Hex. Chromium
MBAS	TBOD	Free CO ₂
Sulfite	ENCORE soil samples	Settleable Solids
Odor	Residual Chlorine	CBOD

7.5 Inspect the condition of custody seals, cooler, ice condition and samples received. Note any non-intact conditions on the Sample Receipt Condition Report (SRCR - Figure 6). Notify the Katahdin project manager (PM) of any discrepancies or problems with sample receipt. The PM contacts the client as necessary. If breakage of a potentially hazardous sample is discovered, close and seal the packing container with all the samples inside and move to a hood in the organic extractions area or to the smaller hood in the login area if space permits. One of the three Katahdin Emergency Response Coordinators or the Katahdin Environmental Health & Safety Manager must be notified. Disposition of the broken and other possibly contaminated samples will be determined on a case-by-case basis in accordance with the laboratory's handling procedures for hazardous waste as outlined in the Katahdin Environmental Health & Safety Manual. Generally, when a sample has broken and has mixed with any ice in the cooler, that liquid will be poured off into 2 liter plastic containers and labeled as "do not use". These containers will be disposed of as soon as the disposition of the appropriate samples has been determined through analysis.

7.6 If there is no breakage of a potentially hazardous sample:

Check cooler temperatures using the IR thermometer assigned to the sample receipt area. If a cooler temperature blank is present, aim the IR gun at the temperature blank; otherwise aim the IR gun at any sample in the cooler if no temperature blank is present. Be sure that the IR gun is within 6 inches of the bottle and not aimed at a label on the bottle. Press the trigger on the handle and be sure the red dot is visible on the bottle surface. The IR gun has been set to read in degrees celcius. If checking the temperature of a plastic bottle, set the emissivity at 0.90. If checking the temperature of a glass bottle (either amber or clear), set the emissivity at 0.85. Refer to Figure 7 for manufacturer's instructions on changing the emissivity. Record the temperature on the Sample Receipt Condition Report. Receipt temperatures should be <6 °C, without freezing. Any temperature falling outside of this range must be noted on the SRCR and reported to the appropriate Katahdin project manager.

Note: Samples received for metals analysis only do not have to meet any temperature receipt requirements.

Note: A probe type thermometer is retained as back-up in case there is a problem with the IR thermometer.

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- 7.7 Note the condition of the ice or ice packs. If the ice has melted and the temperature is out of acceptance criteria, note this on the SRCR. For samples that are hand delivered to the laboratory immediately after collection (i.e. sample collection times are <6 hours old), the temperature blank and/or cooler temperature will most likely not meet the acceptance criteria. The samples shall be considered acceptable if there is evidence that the chilling process has begun such as arrival on ice. Note this on the SRCR. If samples (that were just collected) have not arrived on ice, note this on the SRCR, and start the cooling process as soon as possible after arrival at the laboratory.

Note: All clients must be notified when samples are received that do not meet the appropriate temperature requirements. In these cases, certain regulatory requirements may not be met and may invalidate certain data.

- 7.8 Inventory the samples against the chain of custody (COC). If the COC is incomplete, the sample custodian must inform the appropriate Katahdin project manager (PM). The PM may make changes to correct or complete the COC, but all changes must be initialed and dated. Changes must be noted on the SRCR. Any discrepancies between the samples and the COC must also be noted on the SRCR.
- 7.9 Using the Sampling and Preservation Requirements Table (Table 1) as a reference, check if samples are in proper containers and received correct pretreatment (e.g., filtration, preservation) for the analyses requested. For aqueous parameters requiring preservation, check pH by inserting a clean capillary tube into the sample and dabbing the tube on wide range pH paper. If the pH is not clearly either less than 2 or greater than 12, the appropriate narrow range pH paper must be used. NOTE: The pH of volatile organic (VOA) samples is checked and recorded by the analyst after completion of analysis and not by sample receipt personnel. The used capillary tube is discarded and a new capillary tube is used for each sample.

Additional preservative is added to samples if the pH is not in the range specified in the Sampling and Preservation Requirements Table. No more than 10% of the original sample volume should be added as preservative. If the client has noted that the sample reacts violently (i.e., foams and bubbles) upon preservation, add no more preservative to the sample. Some clients may wish to be contacted if their samples are found to be improperly preserved. Record all preservation discrepancies on the Sample Receipt Condition Report including the lot number of the preservative added. If additional preservative is added, a sticker with the type of preservative must be placed on the sample container.

Note: Preservatives are obtained from the larger containers in the bottle preparation area.

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Note: If samples are received unpreserved for 200.7 or 200.8 analysis, the samples must be preserved to pH <2 with nitric acid. Samples must be held for 16 hours after preservation before sample preparation can begin.

- 7.10 For samples requiring filtration as pretreatment (i.e. for dissolved metals), the work order/login numbers are recorded in the filtration logbook (see Figure 8). The samples are filtered by the Metals Group.
 - 7.10.1 A 500 mL filter flask and filter funnel are acid rinsed three times in a 10% nitric acid bath, then three times with Laboratory Reagent Grade Water.
 - 7.10.2 A vacuum pump is attached.
 - 7.10.3 A 0.45 micron filter is rinsed three times with 5% nitric acid and three times with Laboratory Reagent Grade Water. The rinsate is discarded.
 - 7.10.4 A sufficient sample aliquot is filtered and preserved with concentrated nitric acid to pH <2.
 - 7.10.5 The bottles are labeled with the work order/login number and other sample information and stored at <6 ° C until the time of digestion.
- 7.11 Using the Sampling and Preservation Requirements Table (Table 1) as a reference, determine if sufficient volume of sample is present for analysis. Note discrepancies on the SRCR.
- 7.12 For drinking water samples, enter the appropriate information (work order, date, etc.) into the Measured Turbidity and Preservation of Incoming Samples Logbook. Inform the appropriate analyst of the sample. The turbidity must be measured prior to sample preparation. If the turbidity is <1 NTU, the sample does not have to be digested prior to metals analysis. If the turbidity is >1 NTU, the sample must be digested prior to metals analysis. The sample must be preserved after the turbidity measurement is taken. Record the appropriate information in the logbook (Figure 9).
- 7.13 Notify the PM immediately if there are any discrepancies or problems with sample receipt. The PM will contact the client for information and resolution as necessary.
- 7.14 Review any additional paperwork that accompanies the sample(s) submitted for analysis along with laboratory-generated information. This includes shipping forms, letters, chain-of-custody forms, sample labels, Incoming Sample Information Sheets (ISIS), quotes, memos, etc. These forms may provide details on specific client requests. The ISIS will provide information on specifics for log-in. Refer to Figure 10 for an example.
- 7.15 Resolve any questions or concerns raised by steps 7.1-7.14 by consulting the correspondence files or client services personnel or communicating directly with the

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

client. Note in the notes section of the SRCR any deviations from normal sample handling or analytical procedures (e.g., client requests analysis although hold-time expired).

7.16 When non-environmental food samples are delivered to the laboratory, they are taken immediately to the food/microbiology laboratory and stored in the refrigerators there. A copy of the Chain-of-Custody is left with the analysts. The original paperwork is forwarded to sample log in where the job is logged into the KIMS system.

7.17 The following information is documented via the Katahdin Information Management System (KIMS) and a work order/login COC report (Figure 11) is generated for the samples received:

7.17.1 Log onto KIMS by entering employee ID under "Username", employee specific password under "Password" and KIMS under "Database".

7.17.2 Once logged onto KIMS select "Sample Management" and then "Login".

7.17.3 Select "New" and the next available Login ID number will automatically be entered. Select "OK" and the Sample Definition screen will open.

Note: If a Work Order number has already been opened, select "change" and type in the appropriate number to access the information.

7.17.4 In the Sample Definition Screen, enter the following information.

- | | |
|---------------|--|
| Client ID - | Enter client sample description. |
| ReceiveDate - | Enter in date that samples were received in the lab in the format YY-Month-DD. |
| CollectDate - | Enter in date that samples were collected in the format YY-Month-DDTIME. |
| TAT - | Enter TAT for hardcopy report. |
| DueDate - | Due date will automatically be calculated based on calendar days. |
| VerbalDate - | Manually type in verbal due date. |
| QuoteRef - | Enter quote number if applicable. |
| Project - | Enter project number if applicable. |
| Account - | Enter client specific account number. |

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- Account Name - Account name will automatically be entered.
- Collected By - Enter name/initials of sampler listed on COC. If unknown, enter "Client".
- Locator - May be used for client ID information when requested by the project manager.
- Site - Enter project site name.
- Description - May be used for long client Ids when requested by the project manager.
- Discount - No entry-not currently used.
- Priority - No entry-not currently used.
- Fact. - No entry-not currently used.
- Expected - No entry-not currently used.
- Comments - Enter MS/MSD, verbal due date and any sample irregularities if applicable.
- OrderDate - Current date is automatically entered.
- Matrix - Enter sample matrix code where
- AQ = Aqueous SLD = Food Solid
SL = Solid, Soil, Sludge AR = Air
FP = Free Product SWAB = Swab
WP = Wipe SAL = Saline
NOAQ = NonAqueous TIS = Tissue
DW = Drinking Water
- Product Code - Enter analysis code per test requested on COC.
- Type - Product code type will automatically be entered where
S = Stand alone
P = Parent
C = Children
- Fact. - No entry-default is 1.

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Price - This is left as is by sample log-in. During project management review of the work order, the prices are entered based on quotes or standard prices.

Cost - No entry needed.

Lev - No entry needed.

Type - Container type will automatically be entered.

Bot - Enter number of containers per test for printing of labels.

Login Info - Parameter Data Screen will open. Enter following information

KAS Proj. Manager- Initials of Katahdin person overseeing the project.

Client PO#- Client purchase order.

Project- Project name.

Cooler Temperature- Temperature blanks or cooler temps.

Delivery Services- Method of delivery to the lab.

QC Level- QC Level of report and regulatory agency (ie., IV NFESC).

SDG ID- Sample Delivery Group ID if applicable.

SDG Status- Begin, Continue or End.

Analysis Instructions- PM will enter special instructions regarding project.

Report Instructions- PM will enter special instructions regarding project.

Regulatory List- Used for federal programs.

EDD Format- Specific KAS EDD format.

Select "SAVE" and then "CANCEL".

Addresses - Select "Addresses" and the Address Links screen will open. The billing address is the default address of the account. Enter the client account code under "Project/Account" and select the report to contact under "Address Type". Select the appropriate boxes for report, report CC and invoice CC. Select "SAVE" and then "CLOSE".

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 Create Containers - Select "Create Containers". Letters will be assigned to each sample number. Select "OK" until letters have been assigned to each sample number. To manually assign letters, Select "Enter Container IDs" and "OK". Enter sample numbers including letters and select "OK", "Close", "Yes" to save changes, "Cancel" and "Cancel".

7.17.5 To print the login report, select "Reports", "Login" and "Login COC". Enter login number under "Login Number". Select "OK", "Run Report" and then "Print".

7.18 To print labels unique to each bottle, select "Reports", "Login" and "Labels". Enter login number under "Login/Prelogin", select "Background (IDX)" and select F9 on keyboard under "Select Sample Label". Select "OK" and then "Print". After labels print out select "Cancel".

7.19 Affix permanent sample number labels to sample containers, assuring that sample IDs on labels correspond to sample bottle IDs. Do not obscure client ID on the bottles.

7.20 Place samples in their designated storage locations and log them in, noting initials, date and time, work order/login and sample numbers, and storage location on the internal laboratory chain of custody form (Figure 12). Place form in the appropriate binder in the log in area. Non-environmental food samples do not get an internal COC and are taken immediately to the food/microbiology lab for storage.

Storage location of the samples is determined by type of sample and/or type of analysis, as outlined below. Most samples are stored in the walk-in cooler, which is organized by test type and work order/login number.

Specific storage locations are described below.

7.20.1 Aqueous samples for wet chemistry (except hardness, see 7.19.4 below) - left aisle, both sides, as you enter walk-in cooler. TOC vials are to be stored in the trays designated for TOC samples.

7.20.2 Aqueous samples for organic extractions – right aisle, left side, as you enter walk-in cooler.

7.20.3 Non-aqueous samples (all analyses except volatile organics) - to the right and towards the back as you enter walk-in cooler. Non-aqueous samples for volatile organics are stored in "VOA Refrigerator 2" located in the Volatiles Laboratory.

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- 7.20.4 Aqueous samples for metals and/or hardness analyses – right aisle, right side towards the front as you enter walk-in cooler.
- 7.20.5 Samples (aqueous and solid) for volatile organics analyses (VOA) – All aqueous samples and soil samples in VOA vials (preserved with methanol or sodium bisulfate) are stored in “VOA Refrigerator 1” in the Volatiles Laboratory. VOA soils in jars or ENCORE samplers are stored in “VOA Refrigerator 2” in the Volatiles Laboratory. VOA samples known or suspected to be hazardous (such that cross-contamination of other samples might occur) are placed in a “paint can” and stored in the walk-in.
- 7.20.6 Soil samples for volatile organics analyses (VOA) that are unpreserved or preserved with Laboratory Reagent Grade Water are stored in “VOA Freezer 1” in the volatiles laboratory.
- 7.21 Sample Receipt gives the Work order/login COC report and confirmation of the job, as logged-in, to the appropriate Katahdin project manager. All chain-of-custody and other receipt documentation must accompany the job. The project manager reviews the job for accuracy and completeness. Any unresolved issues should be resolved at this time. Any project or program specific forms should be included with the paperwork at this time. These forms may include CLP forms or state-specific forms. The project manager then dispatches the work order/login to the individual department worklists. The dispatched work order/login package is then filed in Data Management where the complete package will eventually be compiled.
- 7.22 The temperature of all sample storage refrigerators and freezers is recorded daily by assigned individuals. Notebooks containing a record of each refrigerator and freezer temperature history are used for this purpose and are maintained by the assigned individuals. Temperatures above or below the acceptance range are to be brought to the attention of a Department Manager, Operations Manager, or Quality Assurance Officer. Such an occurrence and the actions taken to correct it must be noted in the comments column of the temperature recording notebook next to the temperature measurement. (See Figure 13).

Additionally, temperatures of storage units are monitored continuously by wireless thermometers. A temperature is recorded electronically every 10 minutes. The QAO can generate a specified report as needed, including every reading or maximum/minimum temperatures for a given timeframe. These monitoring devices ensure continual compliance seven days per week. The data can be used to check for problems.

PROCEDURES FOR CHEMISTS

- 7.23 When removing a sample from its storage location, record on the laboratory internal chain-of-custody (from the appropriate department) the sample number, date and

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time it was removed, chemist who removed it, and the analysis to be conducted or reason for removal.

- 7.24 If the samples have not been logged in yet and they need to be pulled in order to analyze short holding time parameters, the analyst taking the sample must use the designated logbook (Immediate Internal COC – Figure 14) to sign the samples out. Many circumstances lead to analysts having to pull samples before they are logged into the KIMS system. It is everyone's responsibility to ensure that all samples can be accounted for at all times. Failure to do so can create confusion and bottle necks for others trying to access the samples. Samples that are pulled before log-in must be returned to the designated bin in the sample receipt area.
- 7.25 If a sample is not consumed by an analysis, return the remaining sample to its assigned storage location and enter the date and time returned on the laboratory internal chain-of-custody record.
- 7.26 If analysis consumes the entire sample, indicate this on the laboratory internal chain-of-custody record.

8.0 QUALITY CONTROL AND ACCEPTANCE CRITERIA

Each thermometer used to monitor sample storage or cooler temperatures must be calibrated annually against a NIST traceable thermometer. The QAO is responsible for ensuring that the thermometer(s) are scheduled for annual calibration and for maintaining the calibration records. All other procedures and documentation listed in this SOP must be followed at all times.

9.0 METHOD PERFORMANCE

Not applicable.

10.0 APPLICABLE DOCUMENTS/REFERENCES

"Handbook for Analytical Quality Control in Water and Wastewater Laboratories," U.S. EPA EMSL Office of Research and Development, March 1979.

Code of Federal Regulations 40, Parts 136 and 141.

"Test Methods for Evaluating Solid Waste: Physical/Chemical Methods," SW-846 Chapters 1 & 2, USEPA, Third Edition, including Updates I, II, IIA, and IIB, III June, 1997.

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Katahdin Analytical Services, Inc., Environmental Health & Safety Manual, current revision.

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TABLE 1
SAMPLING AND PRESERVATION REQUIREMENTS

PARAMETER – AQUEOUS MATRICES	METHOD	QUANTITY	CONTAINER	PRSV	HOLD TIME
GENERAL CHEMICAL ANALYSES					
Acidity	305.1	100 mL	P,G	1,2	14 days
Alkalinity-Manual Titrimetric	310.1	100 mL	P,G	1,2	14 days
Ammonia-Nitrogen with distill-Auto. Phenate	350.1	1 L	P,G	1,3	28 days
Ammonia-Nitrogen-Automated Phenate	350.1, 350.2	250 mL	P,G	1,3	28 days
Anions (Cl, Br, SO ₄ , NO ₂ , NO ₃)	300.0	250 mL	P, G	1	48hr/28days
Bicarbonate, Carbonate (see pH & alkalinity)	calc.				
Biochemical Oxygen Demand-Carbonaceous	405.1	1 L	P,G	1	48 hours
Biochemical Oxygen Demand-Total	405.1	1 L	P,G	1	48 hours
Bromide	320.1	500 mL	P,G	1	28 days
Chemical Oxygen Demand-Manual Colorimetric	410.4	100 mL	P,G	1,3	28 days
Chloride-Automated Ferricyanide	325.2	100 mL	P,G	1	28 days
Chlorine, Residual	SM4500-Cl G	100 mL	P,G	1,9	ASAP
Chromium, Hexavalent	SM3500Cr D / SW7196	200 mL	P,G	1,9	24 hours
Color, Apparent	110.2	100 mL	P,G	1,2	48 hours
Cyanide, Amenable-Spectrophotometric	335.1	250 mL	P,G	1,5	14 days
Cyanide, Total-Spectrophotometric	SM4500CN C 335.3, 335.4	250 mL	P,G	1,5	14 days
Dissolved Oxygen(Lab)-Membrane Electrode	360.1	500 mL	G	1	ASAP
Ferrous Iron - Colorimetric	SM3500-Fe D	250mL	P	1	24 hrs
Fluoride with distillation, Potentiometric ISE	SM4500F C/340.2	500 mL	P only	1	28 days
Fluoride, Potentiometric ISE	340.2	200 mL	P only	1	28 days
Free CO ₂	SM4500-CO ₂ C	250mL	P	1	24 hrs.
Hardness, Total-Manual Titrimetric	130.2, SM2340C	250 mL	P,G	4	6 months
MBAS, Extraction-Colorimetric	SM5540C	1 L	P,G	1	48 hours
Nitrate+Nitrite-Automated Cadmium Reduction	353.2	100 mL	P,G	1,3	28 days
Nitrate-Automated Cadmium Red./Diazotization	353.2	100 mL	P,G	1	48 hours
Nitrite-Automated Diazotization	353.2	100 mL	P,G	1	48 hours
Oil & Grease-Total Recoverable, Gravimetric N-Hexane extractable material N-Hexane extractable material w/ silica gel cleanup	1664	(2) 1 L	glass only	1,11	28 days
pH (Laboratory)	150.1	100 mL	P,G	1,2	24 hours
Phenolics, Total Recoverable-Manual 4AAP	420.1	1000 mL	glass only	1,3	28 days
Phosphate, Ortho- Ascorbic Acid	365.2	100 mL	P,G	1	48 hours
Phosphate, Total	365.4	100 mL	P,G	1,3	28 days
Solids-Filterable Residue (TDS), Gravimetric 180	160.1	250 mL	P,G	1	7 days
Solids-Nonfilterable Residue (TSS)	160.2	500 mL	P,G	1	7 days
Solids-Settleable Solids (SS)	160.5	1 L	P,G	1	48 hours

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

TABLE 1 (cont.)

SAMPLING AND PRESERVATION REQUIREMENTS

PARAMETER – AQUEOUS MATRICES	METHOD	QUANTITY	CONTAINER	PRSV	HOLD TIME
GENERAL CHEMICAL ANALYSES					
Solids-Total Solids	160.3	250 mL	P,G	1	7 days
Solids-Total Volatile (TVS)	160.4	250mL	P,G	1	7 days
Solids-Volatile Filterable Residue (VDS)	160.1/160.4	250 mL	P,G	1	7 days
Solids-Volatile Nonfilterable Residue (VSS)	SM 2540 F	500 mL	P,G	1	7 days
Specific Conductance-Wheatstone Bridge	120.1	100 mL	P,G	1,2	28 days
Sulfate-Turbidimetric	375.4	100 mL	P,G	1	28 days
Sulfide-Iodometric	376.1	500 mL	P,G	1,7	7 days
Sulfite-Titrimetric	377.1	500 mL	P,G	1,9	ASAP
Tannin/Lignin-Colorimetric	SM 5550 B	100 mL	P,G	1	7 days
TKN-Auto Block Digest, Spect.	351.2	100 mL	P,G	1,3	28 days
Total Inorganic Carbon	415.1	(2) 40 mL	VOA vial	1	28 days
Total Inorganic Carbon if with TOC	415.1	(2) 40 mL	VOA vial	1	28 days
Total Organic Carbon-Oxidation	415.1	(2) 40 mL	VOA vial	1,3	28 days
Total Organic Halogen	9020	500 mL	Amber Glass	1,3	28 days
Turbidity	180.1	100 mL	P,G	1	48 hours
ELEMENTAL ANALYSES					
Chromium, Hexavalent	7196/6010	500 mL	P,G	1,9	24 hrs
GFAA(Furnace) Elements	SM 3113/ 200 series	500 mL	P,G	4	6 months
ICP Elements	200.7/6010	500 mL	P,G	4	6 months
ICP MS Elements	200.8/6020	500 mL	P,G	4	6 months
Low Level Mercury	1631	500 mL	G	NA	90 days
Mercury	245.1/7470	500 mL	P,G	4	28 days
GC ORGANIC ANALYSES					
BTEX & MTBE	602 & 8021	(2) 40 mL	VOA vial	1,8,9	14 days(-)
EDB, DBCP & 1,2,3-TCP	504.1	(2) 40 mL	VOA vial	1,8,9	14 days(-)
Extractable Petroleum Hydrocarbons	MADEP/EPH	(2) 1000 mL	Amber Glass	12	14days/40days
Formaldehyde	556	(2) 40 mL	VOA vial	1,8,9	14 days(-)
Fuel Oil in Water	8015Modified	(2) 1000 mL	Amber Glass	1,8	7days/40days
Fuel Oil in Water	ME HETL 4.1.25	(2) 1000 mL	Amber Glass	1,8	7days/40days
Gasoline in Water	8015Modified	(2) 40 mL	VOA vial	1,8	14 days
Gasoline in Water	ME HETL 4.2.17	(2) 40 mL	VOA vial	1,8	14 days
Glycols	8015Modified	(2) 40 mL	VOA vial	1,8,9	14 days(-)
Herbicides	8151	(2) 1000 mL	Amber Glass	1	7days/ 40days
Methane, Ethane & ethene	RSK 175	(2) 40 mL	VOA vial	1,8,9	14 days(-)
PCB's (& Congeners)	608 & 8082	(2) 1000 mL	Amber Glass	1	7days/40days

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

TABLE 1 (cont.)
SAMPLING AND PRESERVATION REQUIREMENTS

PARAMETER – AQUEOUS MATRICES	METHOD	QUANTITY	CONTAINER	PRSV	HOLD TIME
GC ORGANIC ANALYSES					
Pesticides	608 & 8081	(2) 1000 mL	Amber Glass	1	7days/40days
Pesticides and PCB's	608 & 8081/8082	(2) 1000 mL	Amber Glass	1	7days/40days
Purgeable Aromatics	602 & 8021	(2) 40 mL	VOA vial	1,8,9	14 days(~)
Purgeable Halocarbons	601 & 8021	(2) 40 mL	VOA vial	1,8,9	14 days(~)
Purgeables, Total	601 & 602	(2) 40 mL	VOA vial	1,8,9	14 days(~)
Purgeables, Total	8021	(2) 40 mL	VOA vial	1,8,9	14 days(~)
Solvents (Direct Injection)	8015M	(2) 40 mL	VOA vial	1	14 days
Volatile Petroleum Hydrocarbons	MADEP/VPH	(2) 40 mL	VOA vial	11	14days
GC/MS ORGANIC ANALYSES					
Acid Extractables-Priority Pollutants	625	(2) 1000 mL	Amber Glass	1	7days/40days
Acid Extractables-TCL	8270	(2) 1000 mL	Amber Glass	1	7days/40days
Base Neutral Extract.-Priority Pollutants	625	(2) 1000 mL	Amber Glass	1	7days/40days
Base Neutral Extractables-TCL	8270	(2) 1000 mL	Amber Glass	1	7days/40days
Drinking Water Volatiles - Low Level	524.2	(3) 40 mL	VOA vial	1,8,9,10	14 days(~)
PCB Homologues	680	(2) 1000 mL	Amber Glass	1	7days/40days
Polyaromatic Hydrocarbons	8270/8270 SIM	(2) 1000 mL	Amber Glass	1	7days/40days
Semivolatile Extractables-Priority Pollutants	625	(2) 1000 mL	Amber Glass	1	7days/40days
Semivolatile Extractables-TCL	8270	(2) 1000 mL	Amber Glass	1	7days/40days
Volatile Organics	8260	(2) 40 mL	VOA vial	1,8,9	14 days(~)
Volatile Organics-Priority Pollutants	624	(2) 40 mL	VOA vial	1,8,9	14 days(~)
HPLC ANALYSES					
HPLC-Explosives	8330, 8332	(2) 1000 mL	Amber Glass	1	7days/40days
MICROBIOLOGICAL ANALYSES					
Coliform, Fecal	SM 9222D, SM 9213D Mod.	100 mL	P,G	1,6	6 hours
Coliform, Total	SM 9222B	100 mL	P,G	1,6	30 hours
Coliform and E-coli, Total	SM9223B/Colitag	100 mL	P,G	1,6	30 hours
E-coli	SM9213D, Colilert/Quantitray	100 mL	P,G	1,6	6 hours
Heterotrophic Plate Count	SM9215B SIMPLATE	100 mL	P,G	1,6	30 hours

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

TABLE 1 (cont.)
SAMPLING AND PRESERVATION REQUIREMENTS

PARAMETER – SOLID MATRICES	METHOD	QUANTITY	CONTAINER	PRSV	HOLD TIME
GENERAL CHEMICAL ANALYSES		4 oz=100 g			
% Carbon	9060 mod.	4 oz	Soil Jar	1	28 days
Ammonia-Nitrogen-Automated Phenate	350.1 mod.	4 oz	Soil Jar	1	28 days (^)
Anions	9056	4 oz	Soil Jar	1	48hrs to 28 days from slurry (^)
Cation Exchange Capacity	9081	4 oz	Soil Jar	1	14days/7days (^)
Chloride-Automated Ferricyanide	9251/300.0	4 oz	Soil Jar	1	28days from slurry (^)
Cyanide, Amenable-Spectrophotometric	9012	4 oz	Soil Jar	1	14 days
Cyanide, Total-Spectrophotometric	9012	4 oz	Soil Jar	1	14 days
Fluoride, Potentiometric ISE	300.0 mod./340.2	4 oz	Soil Jar	1	28 days (^)
Lime Equivalency	310.1 mod.	4 oz	Soil Jar	1	28 days (^)
Nitrate+Nitrite-Automated Cadmium Reduction	300.0 mod./353.2	4 oz	Soil Jar	1	28 days (^)
Nitrate-Automated Cadmium Red./Diazotization	300.0 mod./353.2	4 oz	Soil Jar	1	48 hrs from slurry (^)
Nitrite-Automated Diazotization	300.0 mod./353.2	4 oz	Soil Jar	1	48 hrs from slurry (^)
Oil & Grease-Total Recoverable, Gravimetric N-Hexane extractable material N-Hexane extractable material w/ silica gel cleanup	9071	4 oz	Soil Jar	1	28 days (^)
Organic Nitrogen-Auto. Block Digest.,Spectro.	350.1/351.2 mod.	4 oz	Soil Jar	1	28 days (^)
pH (Laboratory)	9045	4 oz	Soil Jar	1	24 hours (^)
Phenolics, Total Recoverable-Manual 4AAP	Mod. 9065	4 oz	Soil Jar	1	28 days (^)
Phosphate, Ortho- Ascorbic Acid	300.0 mod./365.2	4 oz	Soil Jar	1	48 hrs from slurry (^)
Phosphate,Tot.-Auto Ascorbic Acid/Block Dig.	Mod. 365.4	4 oz	Soil Jar	1	28 days (^)
Solids-Ash	SM 2540 F	4 oz	Soil Jar	1	28 days (^)
Solids-Total Solids	CLP-CIP	4 oz	Soil Jar	1	28 days (^)
Solids-Volatile Solids	SM 2540 F	4 oz	Soil Jar	1	28 days (^)
Specific Conductance-Wheatstone Bridge	Mod. 9050	4 oz	Soil Jar	1	28 days (^)
Sulfate-Turbidimetric	9036/9038	4 oz	Soil Jar	1	28 days from slurry (^)
Sulfide-Iodometric	9030	4 oz	Soil Jar	1	7days from slurry (^)
Sulfide-Monier-Williams	40CFR-425	4 oz	Soil Jar	1	28 days (^)
Sulfite-Titrimetric	ASTM D3987/377.1 mod.	4 oz	Soil Jar	1	24 hrs from slurry (^)
TKN-Auto Block Digest,Spectro.	351.2 mod.	4 oz	Soil Jar	1	28 days (^)
Total Organic Halogen	9020/9021	4 oz	Soil Jar	1	28 days (^)
Total Petroleum Hydrocarbons-Extraction, IR	9071	4 oz	Soil Jar	1	28 days (^)
ELEMENTAL ANALYSES					
ICP Elements	6010	4 oz	Soil Jar	1	6 months
ICP MS ELements	6020	4 oz	Soil Jar	1	6 months
GFAA(Furnace) Elements	7000series	4 oz	Soil Jar	1	6 months
Mercury	7471	4 oz	Soil Jar	1	28 days

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

TABLE 1 (cont.)
SAMPLING AND PRESERVATION REQUIREMENTS

PARAMETER – SOLID MATRICES	METHOD	QUANTITY	CONTAINER	PRSV	HOLD TIME
ELEMENTAL ANALYSES (cont.)		4 oz=100 g			
Chromium, Hexavalent	3060/7196	4 oz	Soil Jar	1	30dys/24hrs
GC ORGANIC ANALYSES					
BTEX & MTBE	8021	(2) 40 mL	VOA Vial	1	14 days
Explosives - HPLC	8330, 8332	4 oz	Soil Jar	1	14days/40days
Extractable Petroleum Hydrocarbons	MADEP/EPH	4 oz	Soil Jar	1	7days/40days
Fuel Oil	ME HETL 4.1.25	4 oz	Soil Jar	1	14days/40days
Fule Oil	8015 mod.	4 oz	Soil Jar	1	14days/40days
Gasoline	ME HETL 4.2.17	(2) 40 mL	VOA Vial	1	14 days
Gasoline	8015 mod.	(2) 40 mL	VOA Vial	1	14 days
Herbicides	8151	4 oz	Soil Jar	1	14days/40days
PCB's (& Congeners)	8082	4 oz	Soil Jar	1	14days/40days
PCB's in Oil	8082	4 oz	VOA Vial	1	40 days
Pesticides	8081	4 oz	Soil Jar	1	14days/40days
Pesticides and PCB's	8081/8082	4 oz	Soil Jar	1	14days/40days
Purgeable Aromatics	8021	(2) 40 mL	VOA Vial	1	14 days
Purgeable Halocarbons	8021	(2) 40 mL	VOA Vial	1	14 days
Purgeables, Total	8021	(2) 40 mL	VOA Vial	1	14 days
Solvents (Direct Injection)	8015M	(2) 40 mL	VOA Vial	1	14 days
Volatile Petroleum Hydrocarbons	MADEP/VPH	(2)40 mL	VOA vial	13	28days
HPLC ANALYSES					
HPLC-Explosives	8330, 8332	4 oz	Soil Jar	1	7days/40days
GC/MS ANALYSES					
Acid Extractables-Priority Pollutants	8270	4 oz	Soil Jar	1	14 days/40 days
Acid Extractables-TCL	8270	4 oz	Soil Jar	1	14 days/40 days
Base Neutral Extractables-Priority Pollutants	8270	4 oz	Soil Jar	1	14 days/40 days
Base Neutral Extractables-TCL	8270	4 oz	Soil Jar	1	14 days/40 days
Polyaromatic Hydrocarbons	8270/8270SIM	4 oz	Soil Jar	1	14 days/40 days
Semivolatile Extractables-Priority Pollutants	8270	4 oz	Soil Jar	1	14 days/40 days
Semivolatile Extractables-TCL	8270	4 oz	Soil Jar	1	14 days/40 days
Volatile Organics – High Soil (>200 ug/kg)	5035/8260	Please refer to Table 6-2	Encore or similar sampler or VOA Vial or soil jar	14	Extruded w/in 48 hrs. Analyzed w/in 14 days
Volatile Organics – Low Soil (<200 ug/kg)	5035/8260	Please refer to Table 6-2	Encore or similar sampler or VOA Vial	14 or 15	Extruded w/in 48 hrs. Analyzed w/in 14 days
Volatile Organics-Priority Pollutants	8260	(2) 40 mL	VOA Vial	1	14 days
Volatile Organics-TCL	8260	(2) 40 mL	VOA Vial	1	14 days

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

TABLE 1 (cont.)
SAMPLING AND PRESERVATION REQUIREMENTS

PARAMETER – SOLID MATRICES	METHOD	QUANTITY	CONTAINER	PRSV	HOLD TIME
RCRA - HAZARDOUS WASTE CHARAC.					
Corrosivity-pH	9045	4 oz	Soil Jar	1	24 hours (^)
Ignitability-Flash Point (closed cup)	1010	4 oz	Soil Jar	1	14 days (^)
Reactivity-Reactive Cyanide	7.3.3.2	4 oz	Soil Jar	1	14 days
Reactivity-Reactive Sulfide	7.3.4.1	4 oz	Soil Jar	1	7 days
TCLP					
TCLP Extraction-Volatile Organics	1311	100 g	Soil Jar	1	14 days
TCLP Extraction-Semivolatiles	1311	200 g	Soil Jar	1	14 days
TCLP Extraction-Pesticides & Herbicides	1311	400 g	Soil Jar	1	14 days
TCLP Extraction-Metals	1311	200 g	Soil Jar	1	28 days
TCLP Analysis-Volatile Organics	8260	see above	Soil Jar	1	14 days
TCLP Analysis-Metals	6010/6020	see above	Soil Jar	1	180 days
TCLP Analysis-Mercury	7470	see above	Soil Jar	1	28 days
TCLP Analysis-Semivolatiles	8270	see above	Soil Jar	1	7 days/40 days
TCLP Analysis-Pesticides	8081	see above	Soil Jar	1	7 days/40 days
TCLP Analysis-Herbicides	8151	see above	Soil Jar	1	7 days/40 days

METHODS OF PRESERVATION
1 = Cool at 4 Degrees Celsius
2 = Settled
3 = H2SO4 to pH<2
4 = HNO3 to pH<2
5 = NaOH to pH>12
6 = 1 mL 0.1M Na2S2O3 or 1 10 mg pellet
7 = 1 mL 2NZnAc/L & NaOH
8 = 2 drops 1:1 HCl
9 = No headspace
10 = Na2S2O3, if chlorinated
11 = HCl to pH < 2
12 = 5 mL of HCL
13 = 15 mL of methanol
14 = methanol
15 = sodium bisulfate

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

FIGURE 2

EXAMPLE OF HOMEOWNER KATAHDIN CHAIN-OF-CUSTODY FORM



Katahdin
ANALYTICAL SERVICES

600 Technology Way
P.O. Box 540
Scarborough, ME 04070
Tel: (207) 874-2400 Fax: (207) 775-4029

Homeowner Chain of Custody

Client:		Contact:		Phone:		Fax:							
Address:			City:		State:		Zip:						
Purchase Order #:		Project Name/No.:			E-mail:								
Billing Address (if different):													
Sampler (Print/Sign):				Copies To:									
*** Test results are for compliance and will be reported to the state (see statement below).				yes		no							
				Compliance samples must be received on ice.									
Lab Use Only	Work Order #:		KAS Project Manager:			Requested Services							
Shipping:	UPS	Fed-Ex	Mail	Drop-Off									
Sample(s) Received on Ice?	Yes	No	Temperature if Iced:										
Sample Description (Sample Identification and/or Lot #)		Date Collected	Time Collected	No. of Cntrs.	Standard Homeowner	Arsenic	Total Coliforms	Lead	Safety Test - coliform & NHN	FHA/MSH	Fluoride	Uranium	What's Included in the Standard Test and the FHA/MSH Test.
													Standard Homeowner Total Coliform/e-coli Nitrate, Nitrite Chloride, pH Hardness Copper, Iron Manganese Sodium
													FHA/MSH Standard plus Lead Turbidity Color Odor
Relinquished By:		Date/Time:	Received By:		Relinquished By:		Date/Time:	Received By:					

Per the National Environmental Laboratory Accreditation Program (NELAP) Standards, Katahdin is required to accept samples that have been properly preserved. All sample containers provided to you have been properly preserved, but the proper preservation also requires samples to be received at <6 degrees celcius. The Safe Drinking Water Act regulations only require this for compliance samples (i.e., results that are submitted to the state). By circling no for compliance (above), you acknowledge that the samples described above are not for compliance purposes, and thus may not meet the temperature receipt requirements.

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

FIGURE 4

EXAMPLE OF KATAHDIN SAMPLE RECEIPT LOGBOOK

KATAHDIN ANALYTICAL SERVICES, INC.

SAMPLE LOG IN

Date Received	Time Received	Date Logged In	Time Logged In	Work Order	Client	Initials
				SA 0094		
				SA 0095		
				SA 0096		
				SA 0097		
				SA 0098		
				SA 0099		
				SA 0100		
				SA 0101		
				SA 0102		
				SA 0103		
				SA 0104		
				SA 0105		
				SA 0106		
				SA 0107		
				SA 0108		
				SA 0109		
				SA 0110		
				SA 0111		
				SA 0112		
				SA 0113		
				SA 0114		
				SA 0115		
				SA 0116		
				SA 0117		
				SA 0118		
				SA 0119		
				SA 0120		
				SA 0121		
				SA 0122		
				SA 0123		
				SA 0124		

Signed By: _____

Date: _____

Reviewed By: _____

Date: _____

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

FIGURE 5

EXAMPLE OF WET CHEMISTRY SHORTS AND RUSHES LOGBOOK

WET CHEMISTRY SHORTS & RUSHES											Receipt Date:					Comments (Quick TAT, MS/MSD, etc.)		
HOLDING TIME				Immediate			24 Hr		48 Hr									
Work Order Client	Matrix	Earliest Sampling Date	Earliest Sampling Time	Rush Parameters	pH	DO	Sulfide	Fe+2	Cr+6	Total BOD	Carbon BOD	Color	Nitrate	Nitrite	PO4		Set Solids	Turbidity

0000004

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

FIGURE 6

EXAMPLE OF SAMPLE RECEIPT CONDITION REPORT FORM

Katahdin Analytical Services, Inc. Sample Receipt Condition Report

Client:	KAS PM:	Sampled By:
Project:	KIMS Entry By:	Delivered By:
KAS Work Order#:	KIMS Review By:	Received By:
SDG #:	Cooler: _____ of _____	Date/Time Rec.:

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?					
2. Chain of Custody present in cooler?					
3. Chain of Custody signed by client?					
4. Chain of Custody matches samples?					
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.					Temp (°C):
Samples received at <6 °C w/o freezing?					Note: Not required for metals analysis.
Ice packs or ice present?					The lack of ice or ice packs (i.e. no attempt to begin cooling process) may not meet certain regulatory requirements and may invalidate certain data.
If not, has the cooling process begun (i.e. ice or packs present) and sample collection times <2hrs., but samples are not yet cool?					Note: No cooling process required for metals analysis.
6. Volatiles free of headspace: Aqueous: No bubble larger than a pea Soil/Sediment: Received in airtight container?					
Received in methanol?					
Methanol covering soil?					
7. Trip Blank present in cooler?					
8. Proper sample containers and volume?					
9. Samples within hold time upon receipt?					
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2 Sulfide - >9 Cyanide – pH >12					

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

FIGURE 7

IR THERMOMETER MANUFACTURER'S INSTRUCTIONS FOR CHANGING EMISSIVITY

MODE Button Functions

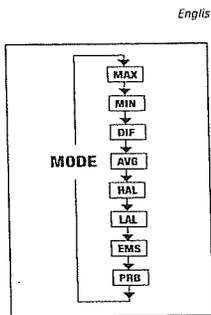
Your infrared thermometer measures Maximum (MAX), Minimum (MIN), Differential (DIF)*, and Average (AVG)** temperatures each time you take a reading. This data is stored and can be recalled with the MODE button (3) until a new measurement is taken. (See "Hold and Recall" for information on how to recall stored data.) When the trigger is pulled again, the unit will begin measuring in the last mode selected. Pressing the MODE button also allows you to access the High Alarm (HAL), Low Alarm (LAL), Emissivity (EMS), Probe temperature (PRB—only available when the probe is connected), and Data logger (LOG). Each time you press MODE, you advance through the mode cycle. The diagram shows the sequence of functions in the Mode cycle.

Note: PRB (probe) is only available in the MODE loop when the contact probe is connected to the unit.

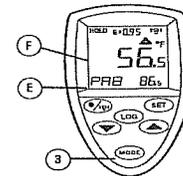
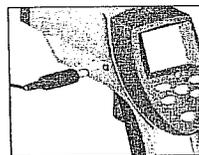
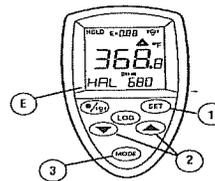
*DIF shows the difference between the maximum and minimum temperatures measured.
**AVG shows the average temperature reading for each time the trigger is pulled or the unit is locked on.

Selecting a Function

To Select the MAX, MIN, DIF, or AVG mode, pull the trigger. While holding the trigger, press the MODE button (3) until the appropriate code appears in the lower left corner of the display (E). Each time you press MODE, you advance through the MODE cycle. The MODE cycle is shown above.



English



Setting the High Alarm, Low Alarm, and Emissivity

To set values for the High Alarm (HAL), Low Alarm (LAL), and Emissivity, pull the trigger or press the MODE button (3) to activate the display. Press the MODE button until the appropriate code appears in the lower left corner of the display (E). Use the up and down keys (2) to adjust the desired values. To activate the alarms, press SET (1). To deactivate the alarms, press SET again.

Using a Probe (PRB)

Connect the probe to the input on the side of the unit (as shown). PRB automatically appears in the lower left corner of the display (E, below). The probe temperature is shown in the lower right part of the display. The current infrared temperature continues to show in the center of the display (F). While the probe is connected, you may still cycle through the mode functions by pressing MODE (3).

Note: PRB is only available in the MODE loop when a probe is connected to the unit; the probe temperature will not activate the high alarm or low alarm.

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

FIGURE 11

EXAMPLE OF KATAHDIN WORK ORDER/LOGIN COC REPORT



Account: KATAHD001
Katahdin Analytical Services

Project:

Primary Report Address:
Leslie Dimond
Katahdin Analytical Services
600 Technology Way
P.O. Box 540
Scarborough, ME 04070

Primary Invoice Address:
Accounts Payable
Katahdin Analytical Services
600 Technology Way
P.O. Box 540
Scarborough, ME 04070

Report CC Addresses:

Invoice CC Addresses:

Katahdin Analytical Services
Login Chain of Custody Report (Ino1)
Jan. 26, 2007
03:51 PM

Page: 1 of 1

Login Information:

ANALYSIS INSTRUCTIONS :
CHECK NO. :
CLIENT PO# :
COOLER TEMPERATURE : n/a
DELIVERY SERVICES : In House.
EDD FORMAT :
MAIL DATE :
PM : LAD
PROJECT NAME : QC Holding Blanks
QC LEVEL : 1
REGULATORY LIST :
REPORT INSTRUCTIONS :
SDG ID :
SDG STATUS :

Web

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Comments
SA0395-1	WHITE FRIDGE	26-JAN-07 15:50	26-JAN-07			08-FEB-07	
<i>Matrix</i>	<i>Product</i>	<i>Hold Date (shortest)</i>	<i>Bottle Type</i>			<i>Bottle Count</i>	
Aqueous	S SW6260FULLSML	09-FEB-07				2	
SA0395-2	BLUE FRIDGE	26-JAN-07 15:50	26-JAN-07			08-FEB-07	
<i>Matrix</i>	<i>Product</i>	<i>Hold Date (shortest)</i>	<i>Bottle Type</i>			<i>Bottle Count</i>	
Aqueous	S SW6260FULLSML	09-FEB-07				2	
Total Samples: 2		Total Analyses: 2					

TITLE: SAMPLE RECEIPT AND INTERNAL CONTROL

FIGURE 14

EXAMPLE OF IMMEDIATE INTERNAL COC LOGBOOK

KATAHDIN ANALYTICAL SERVICES, INC.
INTERNAL CUSTODY RECORD FOR IMMEDIATES

CLIENT	PROJECT	CLIENT ID &/or WORK ORDER #	ANALYSIS	OUT date/time	IN date/time	INIT	Consumed?
Jacobs		WW4813-1A, -2A	ICP	9/13/06 0930	→ 0935	DJJ	yes <u>no</u>
Jacobs		WW4883-1A	ICP	9/16/06 0100	→ 1000	DJJ	yes <u>no</u>
CES		WW4965	BOD	9/20/06 0900	9/20/06 1000	CP	yes no
CCAB		WW4969	BOD	9/20/06 1000	↓	CP	yes no
GENF		WW4970	BOD	↓	↓	CP	yes no
Jacobs		WW4962-1A, -2A	ICP	9/20/06 0900	→ 1000	DJJ	yes <u>no</u>
Irving		WW4994	BOD	9/21/06 1000	9/21/06 1005	CP	yes <u>no</u>
Highmer		WW4992	BOD	9/21/06 1015		CP	yes no
National		WW5000	TS, PEROXIDE PK, SP, BATH	9/21/06 1100	9/21/06 1257	JF	yes <u>no</u>
WTC		WW5001	BOD	9/21/06 1300		CP	yes no
Ariens		WW5016	NO ₃	9/22/06 1100	9/22/06 1100	WR	yes <u>no</u>
RASSM		WW5010	↓	↓	↓	↓	yes <u>no</u>
EcoMaine		WW5029	BOD	9/22/06 1100		CP	yes no

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TITLE: SAMPLE DISPOSAL

Please acknowledge receipt of this standard operating procedure by signing and dating both of the spaces provided. Return the bottom half of this sheet to the QA Department.

I acknowledge receipt of copy ___ of document **SD-903-04**, titled **SAMPLE DISPOSAL**.

Recipient: _____ Date: _____

KATAHDIN ANALYTICAL SERVICES, INC.
STANDARD OPERATING PROCEDURE

I acknowledge receipt of copy ___ of document **SD-903-04**, titled **SAMPLE DISPOSAL**.

Recipient: _____ Date: _____

TITLE: SAMPLE DISPOSAL

1.0 SCOPE AND APPLICATION

Katahdin Analytical Services, Inc. requires strict adherence to specific procedures for the disposal of samples. The procedures are designed to categorize waste materials, provide for their safe and timely disposal and to ensure compliance with local and federal regulations pertaining to disposal of chemicals and environmental samples. Any other means of disposal not described in this SOP is prohibited without consent from the Katahdin Environmental Health & Safety Officer and/or the Katahdin Environmental Compliance Officer.

The purpose of this SOP is to describe the procedures utilized by Katahdin Analytical personnel for the disposal of samples. These procedures apply to the disposal of all samples received or processed by Katahdin. Refer to the current revision of Katahdin SOP CA-107 regarding the disposal of spent preparation and analysis reagents, standards, sample extracts, distillates, or digestates.

1.1 Definitions

Hazardous Waste – A “Solid Waste” which displays a hazardous characteristic or is specifically listed as hazardous waste.

Solid Waste – Any discarded material that is not excluded from the definition of hazardous waste.

Discarded Material – Material that is abandoned, recycled or inherently waste-like.

Waste (State of Maine) –

- Any useless, unwanted, or discarded substance or material, whether or not such substance or material has any other future use.
- Any substance or material that is spilled, leaked, pumped, poured, emptied or dumped onto the land or into the water or ambient air.
- Materials which are used in a matter constituting disposal, burned for energy recovery, reclaimed, or accumulated speculatively.

Ignitable Hazardous Waste – EPA Waste Code D001

- Liquids with a flash point less than 140°F or 60°C.
- Solids capable of spontaneous combustion under normal temperature and pressure.
- Ignitable compressed gas.
- Oxidizers.

Corrosive Hazardous Waste - Liquids with a pH less than or equal to 2.0 or greater than or equal to 12.5. EPA waste code D002.

TITLE: SAMPLE DISPOSAL

Reactive Hazardous Waste – EPA waste code D003.

- A material that reacts violently with water.
- A material that generates toxic gases or fumes.
- Explosives.

Toxic Hazardous Waste – A material that exceeds certain concentration levels based on the toxicity characteristic leaching procedure (TCLP). See Figure 3 for the chemicals and concentration levels covered under this definition.

Listed Wastes – Lists of chemicals that are considered hazardous based on the following criteria

- Virgin chemical or unused product.
- Sole active ingredient.
- Single substance spill debris.

Listed wastes are divided into 5 subcategories

- F-wastes – Describe hazardous waste from non-specific sources usually containing halogenated and non-halogenated solvents.
- K-wastes – Describe hazardous wastes created by specific processes.
- U-wastes – Describe toxic or non-acute hazardous wastes.
- P-wastes – Describe acute hazardous wastes. (Note: Maine considers a material to be a P-listed waste if it contains 10% or more of any P-listed chemical.
- State listed wastes – Maine lists any material with a concentration of greater than 50 ppm Polychlorinated Biphenyls (PCB) as a hazardous waste.

Organics hit – A liquid sample containing greater than 1 mg/L of organic contaminants or a soil sample containing greater than 20 mg/kg of organic contaminants.

1.2 Responsibilities

Only designated analysts/technicians trained in these procedures may dispose of samples or analytical by-products. Each analyst or technician must be familiar with Katahdin Analytical safety procedures. Gloves, safety glasses, lab coats and/or other protective clothing must be worn at all times.

It is the responsibility of the designated Katahdin personnel involved in the disposal of samples to read and understand this SOP, to adhere to the procedures outlined, to properly document their activities in the appropriate lab notebook and file the necessary manifests and reports to outside agencies in the required manner. Refer to

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Katahdin SOP QA-805, "Personnel Training & Documentation of Capability," current revision.

It is the responsibility of the Department Managers to oversee that members of their group follow this SOP, to ensure that their work is properly documented and to initiate periodic review of the associated logbooks.

It is the responsibility of the Katahdin Environmental Health & Safety Officer (EHSO) to manage the proper classification and disposal of samples. Katahdin is responsible for regulatory compliance of Katahdin's waste storage areas (less than 90 day storage). The EHSO ensures compliance of the waste storage areas with applicable state and federal regulations. The EHSO is responsible for providing the appropriate training to all individuals involved in the proper classification and/or disposal of samples. The EHSO is responsible for working with the Laboratory Operations Manager/Environmental Compliance Officer to help identify problems and assure resolution, to facilitate corrective action where needed, and to communicate unresolved problems and concerns to the Laboratory Vice President.

It is the responsibility of the Operations Manager/Environmental Compliance Officer to oversee adherence to Katahdin sample disposal and hazardous waste practices by all laboratory groups under his/her authority, to help identify problems and assure resolution, to facilitate corrective action where needed, and to communicate problems and concerns to the EHSO and/or the Laboratory Vice President.

It is the responsibility of the Laboratory Vice President to provide the necessary resources to meet the regulatory requirements of proper classification and disposal of samples.

2.0 SUMMARY OF METHOD

Not applicable.

3.0 INTERFERENCES

Not applicable.

4.0 APPARATUS AND MATERIALS

Not applicable.

TITLE: SAMPLE DISPOSAL

5.0 REAGENTS

Not applicable.

6.0 SAMPLE COLLECTION, PRESERVATION AND HANDLING

Not applicable.

7.0 PROCEDURES

- 7.1 Sample purging is the removal of samples from laboratory refrigerated storage. Sample storage areas where samples are removed (purged) from include wet chemistry, organic extractables, metals, volatiles, total organic carbon and soils. Wet chemistry, aqueous metals, organic extractables, total organic carbon, and soils can all be found in the walk-in refrigerator. Aqueous and soil volatiles can be found in the volatiles laboratory refrigerators/freezer.
- 7.2 Samples are purged from storage, after analysis and reporting, on a routine basis to make room for incoming samples. Samples are to be kept in storage for a duration of 30 days past the report mailed date. Some samples must be kept for 60 or 90 days beyond the report mailed date, depending on specific client requests and contracts.
- 7.3 The first step in disposing of samples is to generate a disposal list. The disposal list contains sample analysis information stored in the Katahdin Information Management System (KIMS). The analytical data for the samples is compared to the hazardous waste criteria specified in 40CFR Part 261 and to local wastewater discharge criteria. Refer to Figure 4 for 40 CFR Part 261 Characteristic Hazardous Waste Criteria. Based on this comparison, the report displays information on the classification/category for disposal of each sample. The disposal report should be reviewed against the data reports for accuracy. Refer to Figure 2 for an example of a KIMS generated disposal list. The primary disposal categories listed in the report are: non-hazardous, high organics, high metals, flashpoint, high mercury, high PCBs, and high cyanide. Katahdin has established 14 waste stream profiles with a 3rd party waste transporter/waste disposal firm for sample disposal based on these categories. As required, new or special temporary waste profiles are established based on the characteristics of samples.
- 7.4 Sorting through samples and preparing them for disposal is a crucial quality checkpoint. Samples put into the incorrect waste stream could not only produce adverse environmental effects, but, could also interrupt the 3rd party's waste treatment efficiency, or endanger an individual handling the waste stream. Therefore, when sorting through samples pay close attention to which waste stream each sample falls into.

TITLE: SAMPLE DISPOSAL

- 7.5 Once you are ready to dispose of the samples of interest (the oldest samples that have been purged), these samples must be sorted, logged, and the classification/category (sample knowledge) information recorded.

Sample storage times (as listed in section 7.2) and space should be taken into consideration when purging samples. It is important to make room for future samples, but to make sure that samples are not purged too early. Samples should be pulled from the walk-in or the volatiles refrigerators to make room for new samples. When purging, chose a section that needs extra space the most and remove the oldest samples.

Safety glasses, nitrile gloves, lab coat, and a splash apron must be worn when handing samples during disposal

- 7.6 Remove the designated purge samples from the shelf one by one and line them up on the countertop in the log-in area. Generally, removing two cartloads at a time is a good amount to purge at one time. For volatile samples in 40mL vials, 5 or 6 vial trays should be purged at a time. Samples should be lined up across the counter with the earliest sample to the left and building up to the right, organizing the samples according to work order and sample number. After the samples are lined up, they should be recorded in the Sample Disposal Logbook (SDL). Refer to Figure 1 for an example SDL page. The location the samples were removed from should also be recorded. Sample storage areas are recorded with the following designations:

VOA (Aq)	Aqueous Volatiles(VOA)
VOA (SL)	Solid Volatiles(VOA)
M	Metals
EXT	Extractables (Organic)
TOC	Total Organic Carbon
WC	Wet Chemistry
S	Soils

- 7.7 The next step is to use the sample disposal list to determine the earliest release date of the reports and to determine each samples appropriate waste classification/characterization. As stated in section 7.3, the primary disposal categories listed in the report are: non-hazardous, high organics, high metals, flashpoint, high mercury, high PCBs, and high cyanide.

Using the information from the KIMS disposal list, record the appropriate classification for each sample in the SDL. If multiple categories are identified as being present then a single category is selected as controlling. The order of precedence is PCB's, metals and then organics. If another scenario is found, the individual should bring it to the EHSO for a determination of the acceptable waste stream designation or a determination that it should be lab packed separately.

TITLE: SAMPLE DISPOSAL

If samples have been sorted that have not been in storage for the 30 days beyond the release date (60 or 90 for certain clients), then these samples need to be placed back in storage and it should be noted in the SDL.

7.8 As stated above, a sample may be categorized into a waste stream based upon the analytes it contains as determined by laboratory testing. In addition, many samples are also categorized as hazardous waste based upon the preservative that they contain. Since many samples contain preservatives, caution must be used when dumping samples. It is also important to ensure that the sample container is empty. This can be accomplished by holding the container upside down and shaking gently until liquid is no longer observed coming out of the container.

7.9 Once waste categories have been determined and entered into the SDL, The following waste categories are disposed of as follows:

7.9.1 Dumping non-hazardous samples (as determined by laboratory testing)

Non-hazardous samples (non-preserved) are poured directly into the sink in the warehouse.

Non-hazardous solid samples are disposed of with the general trash, which is picked up by commercial trash collectors and ultimately disposed of in a waste-to-energy incinerator.

Sample containers from non-hazardous samples are disposed of with the general trash.

7.9.2 Dumping Samples with high Organics (as determined by laboratory testing)

Aqueous samples get dumped into waste stream "K". Containers are disposed of with general trash. Solid samples are placed into waste stream "I" with their containers. The disposal date is recorded in the SDL.

7.9.3 Dumping samples high in metals, including mercury (as determined by the by laboratory testing)

Aqueous samples get disposed of in waste stream "A". Containers are disposed of with general trash. Solid samples are placed in waste stream "L" with their containers. The disposal date is recorded in the SDL.

7.9.4 Dumping Acidic Samples that do not contain any other hazardous waste constituents (as determined by the acidic preservative or by laboratory testing)

Refer to section 7.10 below.

TITLE: SAMPLE DISPOSAL

7.9.5 Dumping Basic samples (as determined by the basic preservative or by laboratory testing)

Aqueous samples get disposed of in waste stream "NH_i". Containers are disposed of with general trash. The disposal date is recorded in the SDL.

7.9.6 Dumping samples with high PCBs (as determined by laboratory testing)

Aqueous samples are disposed of in waste stream "Q". Containers are disposed of with general trash. Solid samples get disposed of in waste stream "F" with their containers. The disposal date is recorded in the SDL.

7.9.7 Dumping samples with low flashpoints (as determined by laboratory testing)

Aqueous samples are disposed of in waste stream "O". Containers are disposed of with general trash. Solid samples get disposed of in waste stream "I" with their containers. The disposal date is recorded in the SDL.

7.9.8 Dumping samples with high cyanide (as determined by laboratory testing)

Aqueous samples are disposed of in waste stream "NH_i". Containers are disposed of with general trash. Solid samples should be set aside for labpack. The disposal date is recorded in the SDL.

7.9.9 Miscellaneous Disposal (as determined by the preservative)

Sodium Bisulfate: Sodium Bisulfate often comes in vials, but may also come in the 2-4oz glass jars. Dump the Sodium Bisulfate out of the container into waste stream "A". There may be remaining soil left in the sample container. The soil's waste stream and dump date will be dictated by the SDL. The disposal date is recorded in the SDL.

Methanol / Free Products: This often comes in vials, but may also come in the 2-4oz glass jars. Dump the methanol out of the container into the mix-flammables accumulation. When this satellite accumulation container gets full it can be dumped into the "O" waste stream. There may be remaining soil left in the sample container. The soil's waste stream and dump date will be dictated by the SDL. Lastly, samples marked "free product" on the Katahdin sample ID label can be dumped into the mixed flammables stream. The disposal date is recorded in the SDL.

7.10 Pursuant to Maine DEP regulations, Katahdin has the necessary agreements, processes and documentation in place to neutralize samples without a license. Refer to the current revision of the Katahdin Environmental Health & Safety Manual for additional information. Generally, the following procedures are followed.

TITLE: SAMPLE DISPOSAL

- 7.10.1 Samples that have been determined to be hazardous due **solely** to the corrosivity characteristic are neutralized using sodium hydroxide pellets. In the warehouse, samples are emptied into a five gallon heavy duty carboy to about 60% capacity. The carboy is kept in a secondary container. Sodium hydroxide pellets are added slowly to the carboy (about 5 grams at a time) and stirred with a long glass stirring rod. The pH is checked with pH paper.
- 7.10.2 This process is continued until the pH is between 7 and 8. This normally takes about 30-40 grams of sodium hydroxide pellets, but may vary depending on the buffering capacity of the individual samples.
- 7.10.3 The carboy is emptied into the sink in the warehouse. The tap water is run at the same time as the neutralized material is disposed of. An eyewash station and spill material is located at this sink.
- 7.10.4 All neutralization activities are documented, including the date and time of neutralization, the name of the person doing the neutralizing, the amount of neutralized liquid discharged, details on the inspection of the drain area and the date and nature of any significant repairs or corrective actions. This documentation is maintained by the EHSO. Refer to Figure 5 for an example logbook page of neutralization documentation.
- 7.11 Every 3 to 5 weeks a pickup of hazardous waste is scheduled with the 3rd party waste transporter/waste disposal firm. An inventory is faxed to the transporter summarizing the number of drums and waste streams/profiles. As required, a "lab pack" of expired chemicals or orphan samples is organized as necessary. A designated individual, with applicable Hazardous Waste (RCRA) and Department of Transportation (DOT) training, oversees the waste pickup and signs the hazardous manifests and land ban documentation. Within 7 days a copy is forwarded to the Maine Department of Environmental Protection (MEDEP) and the environmental agency in the designation state (if required by that state). Once the report is received at the disposal facility a copy is returned to KATAHDIN and the MEDEP.
- 7.12 Prior to March 31 of each year, the laboratory prepares the Annual Hazardous Waste Report (i.e., MEDEP modified EPA Form 8700-13A) as required by MEDEP Hazardous Waste Management Rules. The complete report is reviewed by the Katahdin Environmental Compliance Officer and then forwarded to the following address:
- Maine Department of Environmental Protection
Bureau of Remediation & Waste Management
State House Station #17
Augusta, ME. 04333
Attn: Annual Hazardous Waste Report
-

TITLE: SAMPLE DISPOSAL

8.0 QUALITY CONTROL AND ACCEPTANCE CRITERIA

On a daily basis, a designated individual performs quality checks in all hazardous waste storage areas. The daily check documentation is located in login. Any discrepancy is copied to the Operations Manager and the Katahdin Vice President for corrective action. Refer to the current revision of Katahdin SOP CA-107, *The Management of Hazardous Waste as it Relates to the Disposal of Laboratory Process Waste, Reagents, Solvents & Standards*, for more information. Refer to Figure 3 for a copy of the daily check documentation.

9.0 METHOD PERFORMANCE

Not applicable.

10.0 APPLICABLE DOCUMENTS/REFERENCES

USEPA Code of Federal Regulations, 40 CFR Part 261.

Maine Department of Environmental Protection (ME DEP) Hazardous Waste Management Rules

ME DEP modified EPA Form 8700-13A

LIST OF TABLES AND FIGURES

Figure 1	Example of Sample Disposal Logbook
Figure 2	Example of KIMS Generated Waste Disposal Report
Figure 3	Example Of Hazardous Waste Area Daily Check Documentation
Figure 4	Characteristic Toxic Hazardous Waste and TCLP concentrations
Figure 5	Example of Elementary Neutralization Logbook

TITLE: SAMPLE DISPOSAL

FIGURE 1

EXAMPLE OF SAMPLE DISPOSAL LOGBOOK (SDL)

KATAHDIN ANALYTICAL SERVICES, INC. -SAMPLE STORAGE/DISPOSAL LOGBOOK

WORK ORDER/ SAMPLE NUMBERS	DEPARTMENT	EARLIEST RELEASE DATE	CRITERIA	SAMPLE KNOWLEDGE								DATE DISPOSED	INITIALS	
				CLEAN	WL	ORG	METS	CN	FP	HG	PCBS			
SAS 783-1	W/C	10-17-07	✓										1-22-08	GN
SAS 786-1		10-17-07	✓											
SAS 787-1,2,4		10-17-07	✓											
SAS 790-1		10-19-07		✓										
SAS 793-1		10-17-07	✓											
SAS 795-1-9		10-23-07	✓											
SAS 797-1		10-23-07	✓											
SAS 798-1,2		10-25-07			✓									
SAS 799-1-5		10-31-07	✓											
SAS 804-1,2		10-25-07	✓											
SAS 804-1,2		10-25-07	✓				2				2			
SAS 810-4		10-23-07	✓											

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TITLE: SAMPLE DISPOSAL

FIGURE 2

EXAMPLE OF KIMS GENERATED WASTE DISPOSAL REPORT

SAMPLE DISPOSAL REPORT

Query by: Login SA6501 to SA7000
 Date : 15-JAN-08

Sample	SDG	Status	Mail Date	Parameter	Value
SA6605-1		NEED	12/02/07		
SA6606-1		NEED	12/02/07		
SA6607-1		NEED	11/15/07		
SA6608-1		NEED	12/06/07	ORG	1.17 MG/L (HIGH)
SA6608-1		NEED	12/06/07		
SA6608-2		NEED	12/06/07	AA	13 MG/KG (HIGH)
SA6609-1		NEED	11/26/07		
SA6609-1		NEED	11/26/07		
SA6610-1		NEED	11/30/07		
SA6611-1	FCS-020	NEED	12/07/07		
SA6611-2	FCS-020	NEED	12/07/07		
SA6611-3	FCS-020	NEED	12/07/07		
SA6611-4	FCS-020	NEED	12/07/07		
SA6611-5	FCS-020	NEED	12/07/07		
SA6611-6	FCS-020	NEED	12/07/07		
SA6611-7	FCS-020	NEED	12/07/07		
SA6611-8	FCS-020	NEED	12/07/07		
SA6612-1	NSA-030	NEED	12/07/07		
SA6612-2	NSA-030	NEED	12/07/07		
SA6612-3	NSA-030	NEED	12/07/07		
SA6612-4	NSA-030	NEED	12/07/07	ORG	1.70735 MG/L (HIGH)
SA6612-5	NSA-030	NEED	12/07/07	ORG	1.0481 MG/L (HIGH)

TITLE: SAMPLE DISPOSAL

FIGURE 3

EXAMPLE OF HAZARDOUS WASTE STORAGE AREA DAILY CHECK

Daily Checklist for
 HAZARDOUS WASTE STORAGE AREA

Week of: 1-28, 2008

Item/Day:	Monday	Tuesday	Wednesday	Thursday	Friday
1. Are containers closed? (Except when waste is being added)	<input checked="" type="radio"/> Yes / No				
2. Are containers properly labeled with a hazardous waste label?	<input checked="" type="radio"/> Yes / No				
3. Do you have access to each container and can you read the label? (3" size?)	<input checked="" type="radio"/> Yes / No				
4. Is each container marked with the date storage begins?	<input checked="" type="radio"/> Yes / No				
5. Are the dates on the containers less than 90 days old?	<input checked="" type="radio"/> Yes / No				
6. Is container free of dents, bulges, rust, spills or leaks?	<input checked="" type="radio"/> Yes / No				
7. Are all containers on a firm working surface?	<input checked="" type="radio"/> Yes / No				
8. Inspection by: Name (No initials)	<i>Dale Platin</i>				
9. Time of inspection	16:35	15:00	14:45	14:15	16:25
10. Verification of inspection (Name/Date)	<i>DL 1-28-08</i>				
Deficiency noted:					
Corrective action:					
By (Name/Date):					

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TITLE: SAMPLE DISPOSAL

FIGURE 4

CHARACTERISTIC TOXIC HAZARDOUS WASTE AND TCLP CONCENTRATIONS

Chemical Name	CAS Number	Waste Code	TCLP conc. liquid	Equivalent conc. In Soil
Arsenic	7440-38-2	D004	5.0 mg/L	100 mg/kg
Barium	7440-39-3	D005	100 mg/L	2000 mg/kg
Cadmium	7440-43-9	D006	1.0 mg/L	20 mg/kg
Chromium	7440-47-3	D007	5.0 mg/L	100 mg/kg
Lead	7439-92-1	D008	5.0 mg/L	100 mg/kg
Mercury	7439-97-6	D009	0.2 mg/L	4 mg/kg
Selenium	7782-49-2	D010	1.0 mg/L	100 mg/kg
Silver	7440-22-4	D011	5.0 mg/L	20 mg/kg
Endrin	72-20-8	D012	0.02 mg/L	0.4 mg/kg
Lindane	58-89-9	D013	0.4 mg/L	8 mg/kg
Methoxychlor	72-43-5	D014	10 mg/L	200 mg/kg
Toxaphene	8001-35-2	D015	0.5 mg/L	10 mg/kg
2,4-D	94-75-7	D016	10 mg/L	200 mg/kg
2,4,5-TP (Silvex)	93-72-1	D017	1.0 mg/L	20 mg/kg
Benzene	71-43-2	D018	0.5 mg/L	10 mg/kg
Carbon Tetrachloride	56-23-5	D019	0.5 mg/L	10 mg/kg
Chlordane	57-74-9	D020	0.03 mg/L	0.6 mg/kg
Chlorobenzene	108-90-7	D021	100 mg/L	2000 mg/kg
Chloroform	67-66-3	D022	6.0 mg/L	120 mg/kg
o-Cresol	95-48-7	D023	200 mg/L	4000 mg/kg
m-Cresol	108-39-4	D024	200 mg/L	4000 mg/kg
p-Cresol	106-44-5	D025	200 mg/L	4000 mg/kg
Cresol	1319-77-3	D026	200 mg/L	4000 mg/kg
1,4-Dichlorobenzene	106-46-7	D027	7.5 mg/L	150 mg/kg
1,2-Dichloroethane	107-06-2	D028	0.5 mg/L	10 mg/kg
1,1-Dichloroethylene	75-35-4	D029	0.7 mg/L	14 mg/kg
2,4-Dinitrotoluene	121-14-2	D030	0.13 mg/L	2.6 mg/kg
Heptachlor	76-44-8	D031	0.008 mg/L	0.16 mg/kg
Hexachlorobenzene	118-74-1	D032	0.13 mg/L	2.6 mg/kg
Hexachlorobutadiene	87-68-3	D033	0.5 mg/L	10 mg/kg
Hexachloroethane	67-72-1	D034	3.0 mg/L	60 mg/kg
Methyl Ethyl Ketone	78-93-3	D035	200 mg/L	4000 mg/kg
Nitrobenzene	98-95-3	D036	2.0 mg/L	40 mg/kg
Pentachlorophenol	87-86-5	D037	100 mg/L	2000 mg/kg
Pyridine	110-86-1	D038	5.0 mg/L	100 mg/kg
Tetrachloroethylene	127-18-4	D039	0.7 mg/L	14 mg/kg
Trichloroethylene	79-01-6	D040	0.5 mg/L	10 mg/kg

TITLE: SAMPLE DISPOSAL

FIGURE 4, cont'd

CHARACTERISTIC TOXIC HAZARDOUS WASTE AND TCLP CONCENTRATIONS

Chemical Name	CAS Number	Waste Code	TCLP conc. liquid	Equivalent conc. In Soil
2,4,5-Trichlorophenol	95-95-4	D041	400 mg/L	8000 mg/kg
2,4,6-Trichlorophenol	88-06-2	D042	2.0 mg/L	40 mg/kg
Vinyl Chloride	75-01-4	D043	0.2 mg/L	4.0 mg/kg

TITLE: SAMPLE DISPOSAL

FIGURE 5

EXAMPLE OF ELEMENTARY NEUTRALIZATION LOGBOOK

Katahdin Analytical Services, Inc. – Elementary Neutralization Logbook

Date: 3-4-09		Time: 12:00	Analyst: GN
# of gallons neutralized	Final pH	Condition of drain and sink area before and after neutralization.	Significant Repairs or Corrective Actions
5	5	good	
6	7	good	
6	5	good	
6	6	good	
2	8	good	

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 240

Date: 3-10-09		Time: 13:45	Analyst: GN
# of gallons neutralized	Final pH	Condition of drain and sink area before and after neutralization.	Significant Repairs or Corrective Actions
6	7	good	
6	6	good	
5	6	good	
6	8	good	
6	5	good	
6	8	good	
5	5	good	
6	7	good	
3	5	good	

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APPENDIX D

HEALTH AND SAFETY PLAN (HASP)

HEALTH AND SAFETY PLAN

NON-TIME-CRITICAL REMOVAL ACTION
FOR
ARSENIC CONTAMINATED SOIL

SITE 95 MAGNOLIA ROAD

MARINE CORPS BASE CAMP LEJEUNE
CAMP LEJEUNE, NORTH CAROLINA

Contract N40085-08-D-1409
Task Order 0003

FEBRUARY 2010

Rhēa Project No. 390

Prepared for:

MCB CamLej
Camp Lejeune, North Carolina

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LIST OF ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
CORs	Conditions of Readiness
EC	Emergency Coordinator
EZ	Exclusion Zone
HPP	Hurricane Preparation Plan
LEPC	Local Emergency Planning Committee
MCB	Marine Corps Base
mph	Miles Per Hour
MSDS	Material Safety Data Sheets
NRC	National Response Center
NOSC	Navy On-Scene Coordinator
OSHA	Office of Safety and Health Administration
OT	Oral Temperatures
PPE	Personal Protective Equipment
PM	Project Manager
Rhēa	Rhēa Engineers & Consultants, Inc.
ROICC	Resident Officer in Charge of Construction
SHSO	Site Health and Safety Officer
SHSP	Site Health and Safety Plan
Site 95	Site 95 – Magnolia Road
SOW	Scope of Work
USEPA	United States Environmental Protection Agency
USMC	United States Marine Corps
USN	United States Navy

1.0 HEALTH AND SAFETY PLAN

1.1 INTRODUCTION

This Site Health and Safety Plan (SHSP) contains procedures and protocols pertaining to personnel and public health and safety issues at Site 95 (Site 95 Magnolia Road). It is through the implementation of this plan, along with Rhēa Engineers & Consultants, Inc. (Rhēa) Health and Safety Policies Manual, that site hazards and risks with regard to removal activities will be controlled and minimized.

All Rhēa personnel and subcontractors engaged in site activities involving contact with or handling of potentially contaminated materials will be required to review this plan prior to the commencement of work. These individuals will be required to sign their name, indicating that they have read this plan and will comply with the rules, practices, and procedures contained herein.

2.0 SITE HEALTH AND SAFETY PERSONNEL

Site-safety is accomplished through an integrated team effort. The health and safety personnel, supervisors, site workers and administrative team all perform essential safety roles. The following sections outline the work team's respective responsibilities and training requirements and identify key personnel.

2.1 SITE HEALTH AND SAFETY OFFICER

Implementation of the SHSP is the responsibility of the Site Health and Safety Officer (SHSO). Mr. R. Scott Powell of Rhēa will be the acting Field Team Leader/SHSO. He has completed the required 40-hour health and safety training in accordance with 29 Code of Federal Regulations (CFR) 1910.120 and the 8-hour supervisory training along with yearly 8-hour refresher training. All training certificates and certifications will be retained at the Site 95 during the project. The SHSO will be on Site 95 when work is in progress.

The Field Team Leader/SHSO will be in direct communication with Rhēa's Project Manager (PM) Ms. Marcella G. Johnson and other Site 95 workers. It will be his responsibility to coordinate with these individuals regarding the health and safety aspects of the investigation activities.

2.2 OSHA 1910.120 TRAINING

Rhēa and subcontractors working on the Site 95 who may potentially be exposed to hazardous substances and/or potential health and safety hazards will have completed the 40-hour health and safety training and 8-hour refresher training as required by the Office of

Safety and Health Administration (OSHA) regulations, 29 CFR 1910.120. The SHSO will have completed the additional 8-hour supervisory training.

Visitors to Site 95 who will not enter the Exclusion Zone (EZ) will not be required to complete the health and safety training; however, their activities will be monitored by an individual with health and safety training. All other visitors to Site 95 must present current 40-hour or 8-hour refresher training certificates to the SHSO prior to entering the EZ.

Rhēa will maintain a record of training and refresher courses for all on-Site 95 Rhēa and subcontractor personnel. Also, a log of visitors to Site 95, including name, company name/organization, date, and activities conducted will be maintained at the site. Everyone entering Site 95 will be required to sign the log.

2.3 DAILY SAFETY MEETING

Project personnel will be given briefings by the SHSO on a daily or as needed basis as determined by the SHSO. These daily meetings will further assist Site 95 personnel in conducting their activities in a safe manner and will provide workers with information on new operations, changes in work practices, or changes in environmental conditions at the work site. Briefings will also be given to facilitate conformance to prescribed safety practices when performance deficiencies are identified during routine, daily activities or as a result of safety audits.

3.0 MEDICAL SURVEILLANCE PROGRAM

In accordance with 29 CFR 1910.120(f), Rhēa is responsible for instituting a medical surveillance program for the following personnel:

- All employees who are or may be exposed to hazardous substances or health hazards at or above permissible exposure limits or, if there is no permissible limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year;
- All employees who will wear a respirator for 30 days or more a year as required by 29 CFR 1910.134; and
- All employees who are injured, become ill, or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation.

For this project, employees participating in intrusive activities or entering the EZ will be considered as potentially exposed to hazardous substances or health hazards.

In addition, any Site 95 worker (i.e., Rhēa employee or subcontractor employee) exhibiting symptoms relating to heat/cold stress or other work related physical disorder will be examined by a licensed occupational physician as soon as practicable upon exhibiting these symptoms.

The Rhēa medical surveillance program is designed and is implemented by a licensed occupational physician in accordance with 29 CFR 1910.120(f). Medical surveillance procedures are identified in Rhēa's Health and Safety Policies Manual.

When Personal Protective Equipment (PPE) more stringent than Level D is required at the site, workers that will be performing intrusive activities or entering the EZ will have completed medical surveillance through their employer. The medical surveillance program should categorize personnel as fit-for-duty and able to wear respiratory protection. Confirmation from licensed occupational physicians identifying personnel as able to wear respiratory protection will be required on Site 95 prior to personnel using a respirator.

4.0 POTENTIAL HEALTH HAZARDS

4.1 PHYSICAL HAZARDS

During site activities, workers will obey the rules and regulations developed by the United States Navy (USN) and United States Marine Corps (USMC), as well as those presented in this SHSP. Of special concern, with respect to site safety, are preventative measures and safe working practices that can minimize the risk of injury to Site 95 personnel. The following is a list of preventive measures that can be taken to complete site activities in a safe manner:

- Back strain can be prevented by employing proper lifting techniques when moving supplies, equipment, and tools. Site 95 personnel will be instructed in proper lifting procedures;
- Slipping on wet surfaces can be minimized by using an absorbent material in a wet area, as well as wearing boots with a deep tread;
- Heavy equipment hazards can be minimized by exercising caution while working in the vicinity of heavy equipment and wearing reflective or highly visible clothing. Equipment operators should know their surroundings and be aware of workers in their respective areas;
- Live electrical lines and/or bare wires will be avoided at all times;
- Eye protection will be worn at all times and hearing protection will be worn at all times that loud equipment is being used nearby; and

- Site 95 personnel will be familiar with the proper use of small tools.

Additionally, the following sections describe procedures to be followed by Site 95 workers for: slip, trip and fall hazards; head and back injuries; equipment and hand tools; and noise.

Slip/Trip/Fall Hazards: Some areas may have wet surfaces, which will greatly increase the possibility of inadvertent slips. Good housekeeping practices are essential to minimize trip hazards.

The work area shall be kept clean and orderly. Tools and debris must be picked up and placed in the proper place to prevent a tripping hazard. Spills will be cleaned up immediately. Personnel shall not walk or climb on any other equipment not designed as walking surfaces.

Personnel should be constantly aware of the possibility of slips, trips, and falls due to poor and possibly slippery footing in the work areas before crossing either in front of or behind a piece of heavy equipment. Personnel will signal the operator and receive confirmation before moving.

Head and Back Injuries: As minimum requirements, hard hats and safety glasses will be donned prior to performing work activities. This requirement will minimize minor injuries caused by a worker's head being impacted by hard objects while working. At the daily safety meeting, personnel are instructed in proper lifting techniques and reminded not to lift heavy items without assistance.

Equipment and Hand Tools: Hand tools and power tools will be in good repair and will be used only for the task for which they were designed. Damaged tools will be tagged "out of service." Tools will be kept clean. Sharp tools will not be carried in pockets.

Hearing Conservation: Working with and around the operation of heavy equipment may result in employee noise exposure equal to or in excess of an 8-hour time weighted average of 85 decibels. The SHSO is responsible for providing employees working with or near heavy equipment or aircraft with appropriate hearing protection and verifying that the protection is properly worn.

4.2 ENVIRONMENTAL HAZARDS

Environmental factors such as weather, wild animals, insects, and irritant plants pose a hazard when performing outdoor work. The SHSO will take all necessary measures to alleviate these hazards should they arise.

Heat Stress Disorders: The following is a summary of signs and symptoms of heat stress disorders.

- Heat rash – characteristic rash that may develop on the skin in areas that may be chapped by clothing. Frequent clothing changes help to prevent chapping from contact with wet clothes.
- Heat cramps – caused by heavy sweating and inadequate electrolyte replacement. Provide frequent breaks with fluid replacement. Cramps are usually relieved when victim is moved to a cool resting place and provided fluids every 15 minutes for approximately 1 hour.
- Symptoms include:
 - Muscle spasms; and
 - Pain in hands, feet, or abdomen.
- **Heat exhaustion** – caused by increased stress of various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Immediately remove the victim from the hot environment and provide rest while lying the victim down with feet elevated, and care for shock. Attempt to cool the victim by fanning or applying wet towels. Provide fluid replacement every 15 minutes and refer for medical evaluation if not improved within 30 minutes. Symptoms include:
 - Pale, cool, moist skin;
 - Heavy sweating;
 - Dizziness;
 - Nausea; and
 - Fainting.

- **Heat stroke** – temperature regulation fails and the body core temperature rises to critical levels. Immediate action must be taken to cool the body. Competent medical care must be obtained immediately because this is a life threatening disorder. Symptoms include:
 - Hot, dry skin, usually red and mottled;
 - 104° F temperature;
 - Confusion and/or dizziness;
 - Loss of consciousness;
 - Convulsions; and
 - Strong rapid pulse.

It is recommended that workers break at least every two hours for 10 to 15 minute rest periods when temperatures rise above 72.5 degrees F and protective clothing is worn (i.e., Level D PPE). Ambient temperatures will be determined from a thermometer shielded from radiant heat. In addition, workers are encouraged to take rests whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased upon worker recommendation. Heat stress can be prevented by assuring an adequate work/rest schedule; guidelines are printed below.

Ambient Temperature	Level D Personal Protective Clothing and Equipment
90 °F or above	After 45 minutes of work
87.5 – 90 °F	After 60 minutes of work
82.5 – 87.5 °F	After 90 minutes of work
77.5 – 82.5 °F	After 120 minutes of work
72.5 – 77.5 °F	After 150 minutes of work

The work/rest schedule can be calculated based on heat stress monitoring results. Monitoring consists of taking the radial pulse of a worker for 30 seconds immediately after exiting the work area. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, decrease the work period by one-third. The initial rest period should be at least 10 minutes.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 80 °F. Monitoring will include pulse rate, weight loss, oral temperature and signs and symptoms of heat stress. The employee’s radial pulse will be monitored for 30 seconds to determine heart rate. When monitored, oral temperatures (OT) will be obtained using a clinical thermometer or equivalent. If the employee OT exceeds 99.6 F, the work period will be reduced by one-third. If after this work period, the oral temperature still exceeds 99.6 °F, the work period will again be shortened by one-third. If the employee OT exceeds 100.6 °F, the employee will not be permitted to work at the site during hot weather.

Exposure to Cold: With outdoor work in the winter months, the potential exists for hypothermia and frostbite. Protective clothing greatly reduces the possibility of hypothermia. However, personnel will be instructed to wear warm clothing and to stop work should conditions become excessively cold. Employees will also be advised to change into dry clothes if their clothing becomes wet from perspiration or from exposure to precipitation. Because wind chill temperatures take into account the potential for loss of body heat through convection, the wind-chill adjusted temperature will be used to evaluate for potential cold stress occurrence.

In cold weather, the potential for frostbite exists, especially in body extremities. Personnel will be instructed to pay particular attention to hands, feet, and any exposed skin when dressing. Personnel will be advised to obtain additional clothing if they begin to experience loss of sensation due to cold exposure.

Employees will be encouraged to move into the heated areas such as a vehicle or adjacent building on site at regular intervals depending upon the severity of ambient temperatures. When temperatures are less than 20 degrees F (actual or wind chill) workers should break regularly (every 45 minutes at a minimum). Since cold weather does cause significant water loss as a result of the dryness of the air, fluid intake will be encouraged to prevent dehydration, which directly affects blood volumes and flow to the extremities. Warm, sweet, caffeine-free, nonalcoholic drinks and soup offer the best fluid replacement and provide calorie energy. Symptoms of cold stress, including heavy shivering, excessive fatigue, drowsiness, irritability, or euphoria, necessitate immediate medical attention.

Dust Hazard: Excavation of soils, especially during periods of extended dry periods and/or droughts, can create an air-born dust hazard. Recognition of this hazard will be the responsibility of the SHSO and appropriate actions will be taken to abate this measure. Acute symptoms of dust inhalation may include fever, pulmonary inflammation, chest tightness, and/or airway obstruction. Appropriate actions including immediate first aid and/or hospital aid should be taken by the SHSO if any on-site worker exhibits the above conditions. In addition, immediate response to any of the above symptoms is necessary in order to prevent chronic disease including hypersensitivity pneumonitis. Planned mitigation of dust hazards during excavation and work activities are the use of an approximately 1000-gallon water tank which will be used to spray water over dry areas to minimize airborne dust. Additional abatement measures may include, but are not limited to, the use of dust monitoring equipment, particulate filtered respirators, large industrial fans to facilitate movement of dust away from work zones, and/or suspension of on-site activities. If the SHSO determines that use of a dust monitoring device is necessary, United States Environmental Protection Agency (USEPA) standards for particle pollution will be applied (USEPA Particulate Matter standards are detailed in Attachment B). If on-site respirators are necessary, each on-site worker will need to be fit tested, or provide proof of recent past fit testing, to ensure the proper operation of such PPE.

Biological Hazards: Biological hazards on site include, but are not limited to, ticks, mosquitoes, snakes, poisonous plants, and other stinging/biting insects or animals. Mitigation of these hazards may be through the use of insect repellents and appropriate Level D PPE.

4.3 CHEMICAL HAZARDS

The contaminant of concern in the soil being excavated at Site 95 is arsenic.

A Material Safety Data Sheet (MSDS) for this contaminant is included in Attachment C and will be made available at the site.

5.0 PERSONAL PROTECTIVE EQUIPMENT

Individuals entering work areas will be advised of and protected from potential hazards. The purpose of PPE is to shield or isolate individuals from the potential health and safety hazards that may be encountered at the site. PPE for this project was selected based on the potential health hazards expected, the work tasks to be performed, and previous project experience. It is understood that Site 95 workers will be able to perform the proper donning and doffing, maintenance, and inspection of PPE.

5.1 LEVEL D CRITERIA

The following criteria determine Level D protection:

- Potential exists for physical contact with arsenic contaminated soil during work operations.

5.2 LEVEL D PPE

- Appropriate work clothing;
- Gloves (discretionary);
- Safety glasses;
- Leather or chemical resistant boots or shoes with steel toe and shank;
- Hard hat; and
- Ear protection (if working around heavy equipment).

5.3 LEVEL C CRITERIA

The following criteria determine Level C protection:

- Potential exists for physical contact with arsenic contaminated soils or sustained inhalation of arsenic contaminated dust during work operations.

- The SHSO will visually monitor the excavation operations area for dust. If dust becomes airborne from the exclusion zone, the SHSO will halt operations. Water will be used to control the dust prior to resuming operations. In the event that dust continues despite the application of water, the SHSO will upgrade to Level C.

5.4 LEVEL C PPE

The following Level C PPE may be used at the discretion of the SHSO:

- Tyvek clothing;
- Gloves;
- Full-face or half-face air-purifying canister equipped with dust particulate filters (Mine Safety Health Administration/ National Institute for Occupational Safety and Health approved) available at work area;
- Safety glasses;
- Leather or chemical resistant boots or shoes with steel toe and shank;
- Hard hat; and
- Ear protection (if working around heavy equipment).

5.5 LEVELS OF PROTECTION FOR WORK ACTIVITIES

Level D attire will be worn during the majority of the Site 95 work and where the potential exists for workers to contact contaminated soil at the site.

Upgrading and downgrading of PPE will be at the discretion of the SHSO. The SHSO will monitor the use and effectiveness of PPE during site work, as well as require that site workers inspect their PPE for proper fit and performance. Level D attire is the highest level of worker protection expected during these particular work activities.

6.0 WORK ZONES

Exposure to arsenic contaminated soil will be a potential hazard during the excavation phase of the removal work. The following steps will be taken to minimize the risk of exposure.

Before excavation begins, an exclusion zone will be established around the excavation area and the soil storage area. Workers entering the EZ will be required to wear Level D PPE at a minimum. Workers exiting the EZ will be required to exit through the decontamination area and perform the decontamination procedures described below.

7.0 PERSONNEL DECONTAMINATION

Personnel in Level D attire will be required to dispose of any gloves (cloth or chemical resistant) and thoroughly wash their hands and face before leaving the site. Gloves will be disposed of by the SHSO. Workers exiting the EZ will use the following decontamination procedures.

7.1 LEVEL D DECONTAMINATION STEPS

- | | |
|--------|--------------------------------|
| Step 1 | Remove Gloves (if applicable) |
| Step 2 | Thoroughly Wash Hands and Face |

7.2 LEVEL C DECONTAMINATION STEPS

- Step 1 Tape Removal
- Step 2 Outer Glove Removal
- Step 3 Inner Glove Removal*
- Step 4 Remove the Respirator
- Step 5 Tyvek Removal
- Step 6 Safety Boot Wash
- Step 7 Safety Boot Rinse
- Step 8 Thoroughly Wash Hands and Face
-

***Note:** Inner gloves will be included as a part of these respective PPE ensembles if the SHSO so warrants.

7.3 PERSONNEL DECONTAMINATION DISPOSAL

Wastewater and disposable PPE generated during personnel decontamination will be collected and stored on site in drums or other appropriate containers labeled with the site name, media (e.g., PPE or wastewater), date, and contractor name. The wastewater and PPE, after being triple-rinsed, will be collected by Rhēa for proper disposal with any other waste soil, water, or debris collected during the excavation.

8.0 EQUIPMENT DECONTAMINATION

The part of the earthmoving equipment used to handle soil will be brushed with a detergent solution, then flushed with a pressure washer containing potable water. A temporary decontamination pad constructed of a wooden frame overlain by heavy-duty plastic will be used for this purpose.

Soil sampling equipment will be decontaminated by hand by the following method, unless alternate recommendations are provided by the equipment manufacturer:

- Wash with a solution of detergent;
- Rinse with tap water;
- Rinse twice with isopropanol or acetone; and
- Rinse twice with distilled water.

The wastewater collected will be placed into appropriate containers with other waste soil and debris for proper disposal.

9.0 EMERGENCY RESPONSE

The following section provides information on personnel roles, lines of authority and communications; and procedures for containing/collecting spills. A list of emergency phone numbers will be posted and updated as necessary in the Site 95 trailer.

9.1 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATION

The primary Emergency Coordinator (EC) for Site 95 is the Field Team Leader/SHSO. In the event an emergency occurs, the Field Team Leader/SHSO or the highest-ranking employee on site will serve as the EC. The EC will determine the nature of the emergency and take appropriate action.

9.2 RESPONSIBILITIES AND DUTIES

It is recognized that the structure of the “Incident Command System” will change as additional response organizations are added. Rhēa will follow procedures as directed by the fire department, Local Emergency Planning Committee (LEPC), and state and federal agencies, as required. Rhēa will defer to the first on-scene local Fire Department individual with responsibility of taking command of the incident scene. Additional Site 95 personnel may be added to the Site Emergency Response Team as required to respond effectively.

9.3 ON-SITE EMERGENCY COORDINATOR DUTIES

The on-site EC is responsible for implementing and directing the emergency procedures. The EC will immediately contact outside authorities for assistance in the event of a spill or release.

Initially all emergency personnel and their communications will be coordinated through the EC. Specific duties of the EC are as follows:

- Identify the source and character of the incident, type, and quantity of release. Assess possible hazards to human health or the environment that may result directly from the problem or its control;
- Discontinue operations in the vicinity of the incident if necessary to minimize the potential that fires, explosions, or spills recurring

or spreading to other parts of the site. While operations are dormant, monitor as appropriate;

- Notify the Navy On-Scene Coordinator (NOSC) if outside emergency response help is necessary to control the incident;
- Direct on-site personnel to control the incident until, if necessary, outside help arrives;
- Verify that the area where the incident occurred and the surrounding area are evacuated, and remove possible ignition sources as is safe and appropriate;
- If fire or explosion is involved, notify Local Fire Department, (911);
- Notify Rhēa PM.

If the incident may threaten human health or the environment outside of the Site 95, the EC should immediately determine whether evacuation of the area outside of Site 95 might be necessary and, if so, notify the Police Department and the Camp Lejeune fire, safety and rescue offices.

When required (as determined by the NOSC), notify the National Response Center (NRC). The following information should be provided to NRC:

- Name and telephone number;
- Name and address of facility;
- Time and type of incident;
- Name and type of materials involved, if known;
- Extent of injuries; and
- Possible hazards to human health or the environment outside of the facility.

The emergency number for the NRC is **800-424-8802**.

If hazardous waste has been released or produced through control of the incident, the following steps shall occur:

- Waste is collected and contained;
- Containers of waste are removed or isolated from the immediate site of the emergency;

- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided;
- Check that no waste that is incompatible with released material is treated or stored at Site 95 until cleanup procedures are completed;
- Check that all equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed;
- Notify USEPA Regional Administrator that cleanup procedures have been completed and that all emergency equipment is fit for its intended use before resuming operations in the affected area of the facility;
- Record time, date, and details of the incident, and submit a written report to the USEPA Regional Administrator. Report is due to USEPA within 15 days of the incident; and
- Perform the post-incident evaluation and response critique and submit a written report to the USEPA Regional Health and Safety Director within 30 days of the incident conclusion.

9.4 EMERGENCY RESPONSE EQUIPMENT

Before work activities begin, the following emergency equipment will be stored at the Site 95 trailer and tested to verify working order:

- First aid kit;
- Additional Tyvek and other PPE, safety glasses, hard hats, hearing protection, and respirators; and
- Water for washing hands and face.

Other equipment used for the routine implementation of the worker health and safety protection and monitoring programs will be made available as needed to support emergency response activities.

9.5 SAFE DISTANCES AND PLACES OF REFUGE

No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies that could occur. Safe distances will be determined at the time of the emergency based on a combination of site and incident-specific criteria. The following measures are established to serve as general guidelines.

In the event of minor hazardous materials releases (small spills of low toxicity), workers in the affected area will initially evacuate at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the EC or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

In the event of a major hazardous materials release (large spills of high toxicity/greater than 55 gallons), workers will be evacuated from the site. If there are individuals in the area other than Rhēa employees or subcontractors, Site 95 personnel will meet at the site entrance for a head count and to wait further instructions.

If the incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The EC, or his designee, will inform the proper agencies in the event that an evacuation is necessary. Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical Release;
- Fire/explosion;
- Power loss;
- Medical emergency; and
- Hazardous weather.

9.6 EVACUATION ROUTES AND PROCEDURES

Emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. In specific emergency situations, the EC may deviate from the procedures to provide a more effective plan for bringing the situation under control. The EC is responsible for determining which situation requires site evacuation.

9.7 EVACUATION PROCEDURES

In the event evacuation is necessary, the following actions will be taken:

- The emergency signal will be activated;
- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment;
- Shut off machinery and equipment if safe to do so;

- Rhēa on-site personnel, visitors, and subcontractors on site will assemble at the entrance to the site for a head count and await further instruction from the EC;
- Contract personnel and visitors will be accounted. The EC or designee will make a final tally of persons. No attempt to find persons not accounted will involve endangering lives of Rhēa or other subcontractor employees by reentry into emergency areas;
- The EC or a designee will be assigned to be available at the entrance to direct and brief emergency responders; and
- Reentry into the site will be made only after clearance is given by the EC. At his direction, a signal or other notification will be given for reentry into the site.

9.8 PROCEDURE FOR CONTAINING / COLLECTING SPILLS

The initial response to a spill or discharge will be to protect human health and safety, and the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If a chemical spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or a pipeline rupture, an initial isolation of at least 100 feet in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 feet in all directions to allow cleanup and repair and to prevent exposure. When any spill occurs, only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible, the area will be roped or otherwise blocked off.

If the spill results in the formation of a toxic vapor cloud (by reaction with the surrounding materials or by outbreak of fire), further evacuation will be enforced. In general an area at least 500 feet wide and 1,000 feet long will be evacuated downwind if volatile materials are spilled.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and possibly evacuated from the area. The Site 95 EC will inform the proper agencies in the event this response is necessary.

9.9 FIRES

Rhēa personnel and subcontractors are not trained as professional firefighters. Therefore, if there is any doubt a fire can be quickly contained and extinguished, personnel will vacate the

area and immediately contact the local Fire Department. No flammable materials are anticipated to be exposed during the excavation.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be kept away from the excavation area;
- Fire extinguishers will be placed in all areas where a fire hazard may exist; and
- Before workers begin operations in an area, the EC will give instructions on egress procedures and assembly points.

The following procedures will be used in the event of a fire:

- Workers who see a fire will notify the EC who will contact the local Fire Department; and
- When a small fire has been extinguished by a worker, the EC will be notified.

Small Fires: In the event of a small fire at the site, the EC will, at a minimum, take the following actions:

- Immediately notify the local Fire Department;
- Evacuate all unnecessary personnel from the area to an upwind location, if possible;
- Attempt, using properly protected personnel, to extinguish fire using portable fire extinguishers or by smothering; and
- Request emergency response assistance (ambulance, fire, hospital, poison control center) as needed for any injuries or exposures to hazardous chemicals.

Large Fires: In the event of a large or small fire that cannot be extinguished, the EC will undertake the following actions:

- Immediately notify the local Fire Department;
- Evacuate all personnel from the area of the fire, preferably to an upwind location;
- Order the appropriate level of protective clothing; and
- Notify other emergency response agencies.

Evacuation Procedures: In the event the EC should declare an evacuation, all personnel would be required to exit the defined work area to an upwind location near the site perimeter or beyond. Moreover, the evacuation procedures will be reviewed during daily site meetings.

9.10 INCLEMENT WEATHER CONDITIONS

Inclement weather conditions may occur without warning. It will be the responsibility of the EC to halt work due to eminent dangers. The EC will also be responsible for ordering the commencement of work once the danger has passed.

Work activities will not be started or continued when the following hazardous weather conditions are present:

- Lightning;
- Heavy rains; and
- High winds.

Personnel working in hazardous weather conditions will move to safe refuge. The EC will determine when it is necessary to evacuate the area and will coordinate these efforts with fire, police, and other agencies.

The EC will be responsible for assessing hazardous weather conditions and notifying personnel of specific contingency measures. Notifications will include:

- Rhēa PM;
- Camp Lejeune Environmental Department; and
- Local Civil Defense Organization (if necessary).

In the event of the potential for a hurricane to impact the work activities, the EC will implement the requirements of the Hurricane Preparation Plan (HPP) provided in Section 10.0.

9.11 HAZARD COMMUNICATION PROGRAM

The Hazard Communication Program complies with 29 CFR 1926.59/1910.1200. The MSDS sheet pertaining to materials known or suspected to be encountered at the project site can be obtained from the SHSO. A MSDS station will be located at the Site 95 trailer. MSDS for arsenic contaminated soil will be available to Site 95 workers and is included in Attachment C. Site 95 personnel will review MSDS with the SHSO prior to working with hazardous materials.

Chemical and hazardous material containers will be properly labeled or tagged. Chemicals and hazardous materials transferred to other containers will be properly labeled to indicate the product stored within.

Each subcontractor will be responsible for maintaining its Hazard Communications Program, list of chemicals and hazardous products, MSDS, and training.

10.0 HURRICANE PREPARATION PLAN

Rhēa has prepared this HPP to establish the standard operating procedures to follow in the event that impending hurricane weather conditions may affect site activities. Our goal is to provide for the safety of personnel and minimize financial loss caused by severe weather conditions.

Hurricanes are most likely to occur along the North Carolina coastline between June 1 and November 30 of each year. Because meteorologists are unable to accurately forecast hurricane storm speed, direction, or intensity, it is important to develop a plan of action to prepare for such events. The emergency procedures described herein apply to all Rhēa personnel, subcontractors, and visitors associated with this project.

10.1 DEFINITIONS

Tropical Disturbances:

Powerful cyclones characterized by destructive sustained winds, water spouts, heavy rain, and flooding are caused by depressions over tropical waters. Tropical disturbances are typically categorized by maximum surface wind velocity. The following describes the various degrees of tropical disturbances:

- Tropical Depression - Maximum surface winds of 38 miles per hour (mph);
- Tropical Storm - Maximum surface winds of 39 to 73 mph; and
- Hurricane - Maximum surface winds 74 mph or greater.

Conditions of Readiness:

Commander, Naval Base Norfolk, has established five Conditions of Readiness (CORs) for hurricanes and other potentially dangerous tropical storms. The following describes each COR:

- **Condition V** - Destructive winds are possible at the Marine Corps Base Camp Lejeune (MCB CamLej) within 96 hours;
- **Condition IV** - Destructive winds are possible at the MCB CamLej within 72 hours;
- **Condition III** - Destructive winds are possible at the MCB CamLej within 48 hours;
- **Condition II** - Destructive winds are possible at the MCB CamLej within 24 hours; and

- **Condition I** - Destructive winds are possible at the MCB CamLej within 12 hours.

10.2 HURRICANE NOTIFICATION

The National Weather Service will issue either a “watch” or a “warning” depending on the potential time of impact of the storm. These terms are described below:

- **Hurricane Watch** - A hurricane watch means that there is a threat of hurricane or tropical storm conditions in the coastal North Carolina area in the next 36 hours.
- **Hurricane Warning** - A hurricane warning is issued when a hurricane or tropical storm is expected to affect coastal North Carolina within 24 hours.

The National Weather Service classifications are described here only for reference. Official notification of upgrade or downgrade of condition of readiness will be provided by the Resident Officer In Charge of Construction (ROICC) to Rhēa’s EC, who will inform the Rhēa PM. Rhēa will be prepared to commence site security response action for condition upgrade within two hours of notification from the Rhēa PM, regardless of time of day. A listing of emergency telephone numbers will be posted at the Site 95 trailer.

10.3 RESPONSIBILITIES

Worker safety during a hurricane requires the dedicated team effort from all personnel. The proper organization and coordination of personnel will result in a smooth transition from execution of routine activities to completion of securing operations. Rhēa’s PM, SHSO, and site labor forces each have specific responsibilities critical to the execution of this plan.

Project Manager

The PM is responsible for overall management of site activities. The PM’s role in hurricane preparation is to verify that the field crews are adequately trained in the procedures outlined in this plan. The PM will verify the field staff has adequate funding for resources (i.e., personnel, materials, and equipment) required to perform the response preparation actions. The PM will be supplied with or have record of inventory deemed irreplaceable and will make arrangements for its proper protection.

Site Health and Safety Officer

As described in the SHSP for this Project, the SHSO is the Field Team Leader, and he will serve as the EC. In this role, the EC will be responsible for assuring the proper execution of this HPP in the field. The EC will be responsible for the coordination of personnel, supplies, and equipment necessary to begin securing operations within two hours of notification of

condition upgrade from the PM. The EC will be the primary liaison between the PM and the site labor forces.

The EC will continue to monitor safety activities during execution of this plan and will retain authority to stop work due to impending weather conditions if, in his opinion, worker safety may be jeopardized.

Site Labor Forces

Site 95 laborers will be responsible for the actual performance of the site preparation at the direction of the EC. Laborers should also offer suggestions and alert the EC of any changing conditions.

10.4 RESPONSE ACTIONS

The following sections describe the requirements expected during each of the five COR. The action items described in this plan should be used for guidance only since it is impossible to develop contingency plans for each activity associated with a field project. The handling of specific field situations that are not described in the following action lists will be at the discretion of the EC.

Condition V (destructive winds within 96 hours)

The following activities will be performed at a minimum when Condition V response is required by the ROICC:

- Continue routine work activities;
- Perform normal daily job-site cleanup and maintain good housekeeping practices, including containerizing waste materials and maintaining clear walkways to prevent tripping hazards;
- Notify site labor about impending dangers and train Site 95 workers on the content of this plan. Refresh work crews on general emergency response procedures (i.e., evacuation routes) as outlined in the SHSP;
- Take inventory of emergency supplies such as first aid kits, sorbent material, polyethylene sheeting, security fencing, sand bags, and drums. Replenish supplies as necessary;
- Inspect the integrity of existing erosion and sedimentation controls (e.g., silt fence) and existing drainage receptor facilities. Make arrangements to repair deficient items;

- Inspect the Site 95 trailer tiedowns (if applicable) for wear, pullout, or other damage. Make arrangements to repair deficient workmanship;
- Arrange to either transport contaminated materials off site or temporarily stage materials in competent containers (i.e., drums, roll-off boxes);
- Review requirements for Condition IV; and
- Contact ROICC for COR updates and completion of required actions.

Condition IV (destructive winds within 72 hours)

The following activities will be performed at a minimum when Condition IV response is required by the ROICC:

- Continue Condition V preparations, if necessary;
- Continue routine work activities that do not affect preparation requirements described in this plan;
- Perform normal job-site cleanup and maintain good housekeeping practices;
- Place job materials in neat piles (less than four feet high) in a designated laydown area;
- Remove and store debris that may become “missile” hazards (i.e., any object that may become airborne in high winds);
- Review requirements for Condition III; and
- Contact ROICC for COR updates and completion of required actions.

Condition III (destructive winds within 48 hours)

The following activities will be performed at a minimum when Condition III response is required by the ROICC:

- Maintain Condition IV requirements;

- Cease work activities that cannot be completed within 18 hours. Schedule work to minimize open excavations and other low-lying depressions that may collect water;
- Cease other work activities that interfere with securing operations;
- Begin stowing and securing portable equipment. Gasoline-powered portable equipment should be placed in a storage trailer when possible to prevent overturning;
- Secure portable sanitary facilities;
- Consolidate drums in drum storage area. Where possible, affix content label to the inside lid of the drum before tightening lid brackets. Arrange drums against permanent structure if possible. If this arrangement is not practical, arrange heavier drums around the perimeter of the drum staging area;
- Dismantle decontamination area and secure supplies;
- Review requirements for Condition II; and
- Contact ROICC for weather and COR updates and completion of required actions.

Condition II (destructive winds within 24 hours)

The following activities will be performed at a minimum when Condition II response is required by the ROICC.

- Cease routine work activities until securing operations are completed. Do not begin new Scope of Work (SOW) tasks;
- Consolidate material piles and secure to ground using soil/concrete anchors and cables. As an alternative, excess materials may be stored in an empty roll-off box or other suitable enclosed container sufficiently anchored to the ground surface;
- If off-site transportation of waste material is not practical, cover contaminated waste stockpiles with 10-mil minimum plastic sheeting. Anchor sheeting using sandbags at a rate of one bag per 20 square feet of liner and one bag per five lineal feet of stockpile perimeter. Do not use scrap lumber, piping or jagged rocks for this

purpose. If practical, park heavy equipment in the anticipated upwind position in front of the waste material stockpile;

- Band drums together to form a single unit using steel banding equipment or heavy-duty ropes;
- Refuel heavy equipment. Fuel may be in short supply in the days following a hurricane. Secure temporary fuel storage tank, if applicable;
- Pack all monitoring equipment, fax machine, computers, printers for transport to safe storage;
- Record storage inventory of all supplies, materials, drums, equipment remaining at the site; and
- Contact ROICC for weather updates and completion of required actions.

Condition I (destructive winds within 12 hours)

The following activities will be performed at a minimum when Condition I response is required by the ROICC:

- Perform all remaining actions associated with the previous CORs;
- Secure tarps on roll-off containers;
- Arrange heavy equipment in a manner to protect other supplies, equipment, and/or stockpiles;
- Collect site files, plans, records, and drawings and transport to safe storage location;
- Personnel lodging in a hotel shall be provided with non-perishable food and drinking water for three days; also provide flashlight, batteries, transistor radio, personal hygiene supplies, and first aid supplies including bandages, pain relievers and special medications;
- Unplug all electrical components and switch external power supply to the OFF position;
- Document the secured site with photographs;

- Notify ROICC of date and time of departure and anticipated date of return; and
- Lock all doors, account for all personnel, and leave site.

10.5 RESUMPTION OF WORK

The ROICC will retain the authority to commence work activities. Before work begins, the ROICC and EC shall visit the site and assess damages. Inventory of supplies, materials, drums, and equipment will be verified at this time. Scope of Work activities will commence as soon as practical after notice to proceed is directed by the ROICC.

A written damage assessment will be prepared by the EC, reviewed and approved by the ROICC, and forwarded to the PM.

TABLES

**TABLE 1
SITE HEALTH AND SAFETY LOG**

**RHĒA ENGINEERS AND CONSULTANTS, INC.
NON-TIME-CRITICAL REMOVAL ACTION FOR ARSENIC CONTAMINATED SOIL
SITE 95 MAGNOLIA ROAD
MCB CAMLEJ, NORTH CAROLINA**

SITE: _____ **DATE:** _____ **PROJECT:** _____

Name	Company	Job Title	H&S Training Dates		Medical Surveillance	I have read the HASP and am familiar with the HASP requirements (Signature)
			HAZWOPER 8 Hour Refresher	HAZWOPER 8 Hour Site Supervisor		

TABLE 2
SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

RHEA ENGINEERS AND CONSULTANTS, INC.
NON-TIME-CRITICAL REMOVAL ACTION FOR ARSENIC CONTAMINATED SOIL
SITE 95 MAGNOLIA ROAD
MCB CAMLEJ, NORTH CAROLINA

Check all that apply: Injury/Illness Fatality Complaint
 Not Work Related Auto Liability Auto Physical Damage
 General Liability Property Damage Environmental

Exact Date, Day, and Time of Incident: _____ am pm

Shift: 1st 2nd 3rd

TMS: _____
(Employee's Home Division/Regional Office/Subsidiary)

Address: _____
City State Zip

PROJECT IDENTIFICATION (Project Related Incidents Only)

Regular Full Time Regular Part Time Temporary Non-Employee

Address: _____
City State Zip

Birth Date: _____ Age: _____ Social Security No.: _____ Sex: _____

Job Title: _____ Department: _____ Date Hired: _____

Length of Employment: In Training Months Years

Time in Job Class: In Training Months Years

Name of Employee's Direct Supervisor: _____

Supervision at time of accident: Directly Supervised Indirectly Supervised Not Supervised

Specific location where accident occurred: _____

_____ TMS Facility Project Site Not Supervised Other _____

TABLE 2 (continued)

SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

To whom was incident reported?: _____ When?: _____

Witness Name/Address: _____

Witness Job Title/Reason in Area: _____

Describe Employee's job duties being performed when injured: _____

Describe fully the events which resulted in the accident/injury/illness: _____

Describe the injury/illness in detail; indicate part of body affected: _____

Name of object/substance which directly injured employee: _____

Has/will employee seek treatment?: Yes No Did Employee Die? Yes No

Name/Address of Hospital/Doctor: _____

Describe treatment given: _____

Was employee able to return to work?: Yes No

If YES: Regular Work Work with restricted activities

Restriction: _____

If NO: Date lost time began: _____ Date/Est. Date to Return: _____

TABLE 2 (continued)

SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

Specify personal protective equipment used by injured employee: _____

What training or instruction had been given?: _____

How could this accident have been prevented? _____

Corrective Action: _____

Signature _____ (Supvr/Manager) Date _____

Signature _____ (Safety Officer) Date _____

Signature _____ (Project Manager) Date _____

DISTRIBUTION

Original to: Division Secretary at Employee's Home Office

Copy to: Corporate Health & Safety Regional Health & Safety Manager
 Project Manager Site Safety File

**TABLE 3
HEALTH AND SAFETY PLAN
ACCEPTANCE/SIGNATURE PAGE**

**RHĒA ENGINEERS AND CONSULTANTS, INC.
NON-TIME-CRITICAL REMOVAL ACTION FOR ARSENIC CONTAMINATED SOIL
SITE 95 MAGNOLIA ROAD
MCB CAMLEJ, NORTH CAROLINA**

By signing below, I acknowledge that I have reviewed and am in concurrence with the tenets of this Health and Safety Plan for the Camp Lejeune, Site 95 Magnolia Road Arsenic Removal.

Signature: _____ Date: _____

Name: _____

Title: _____

Company: _____

Telephone: _____

Fax: _____

TABLE 5

DAILY ON-SITE MEETING

Non-Time-Critical Removal Action for Arsenic Contaminated Soil Site 95 Magnolia Road, MCB CamLej, North Carolina

Date _____ Time (Start) _____ Time End _____

Presenters: _____

Presenters: _____

Topic(s): Categories	<input type="checkbox"/> Flora	<input type="checkbox"/> Weather	<input type="checkbox"/> Site Safety
	<input type="checkbox"/> Fauna	<input type="checkbox"/> PPE	<input type="checkbox"/> Heat Stress/Stroke
	<input type="checkbox"/> Chemicals (COCs)	<input type="checkbox"/> UXO	<input type="checkbox"/> Fatigue/Exhaustion
	<input type="checkbox"/> Excavations	<input type="checkbox"/> Utilities	<input type="checkbox"/> Elevated Work Zones
	<input type="checkbox"/> Equipment	<input type="checkbox"/> Regulations	<input type="checkbox"/> Vehicle Traffic
	<input type="checkbox"/> Visitors/Spectator Safety	<input type="checkbox"/> Emergency Protocol	<input type="checkbox"/> Military Ranges
	<input type="checkbox"/> Chain of Command	<input type="checkbox"/> Electricity/Electrical	<input type="checkbox"/> Confined Space

Brief Description of Discussion

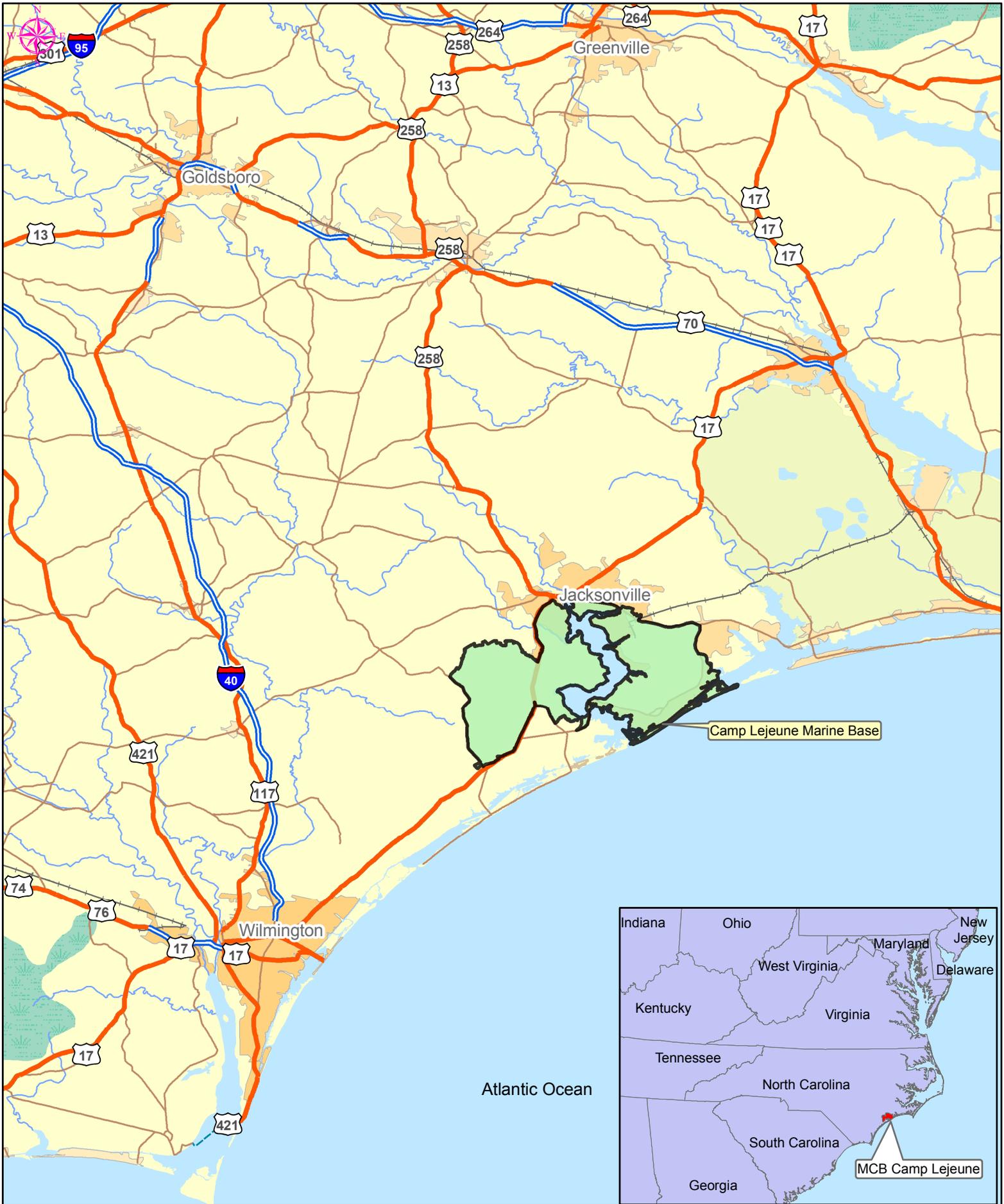
Questions/Answers:

Participants
Name

Company

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

FIGURES



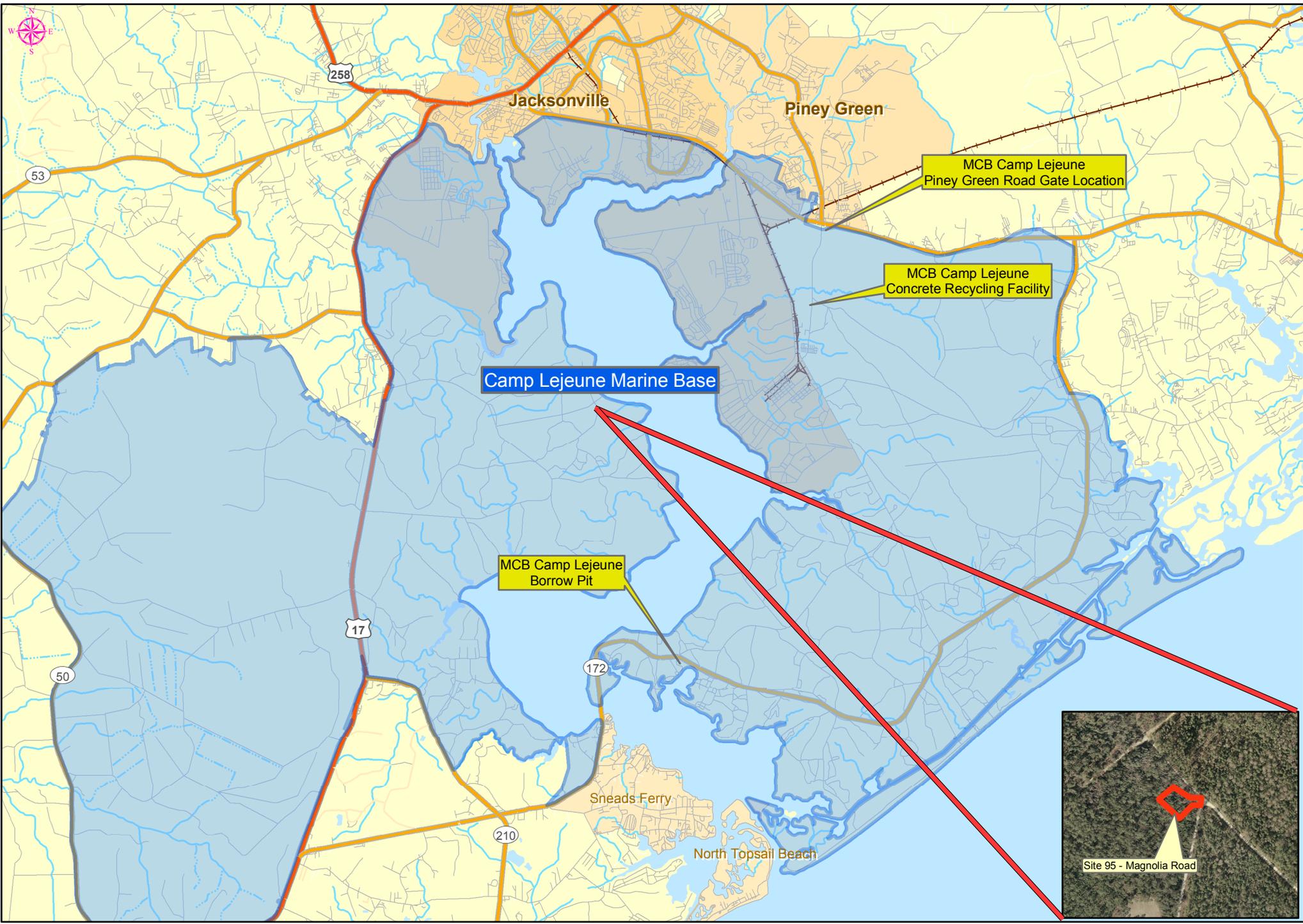
Camp Lejeune Marine Base



140 70 0 140 Miles



Figure 1
General Location Map
MCB Camp Lejeune, North Carolina



300 150 0 300 Feet



Figure 2
Site Location Map
Site 95
MCB Camp Lejeune, North Carolina



Directions to "Onslow Memorial Hospital"

Memorial Ct
16.1 mi – about 31 mins

Save trees. Go green!
 Download Google Maps on your phone at google.com/gmm

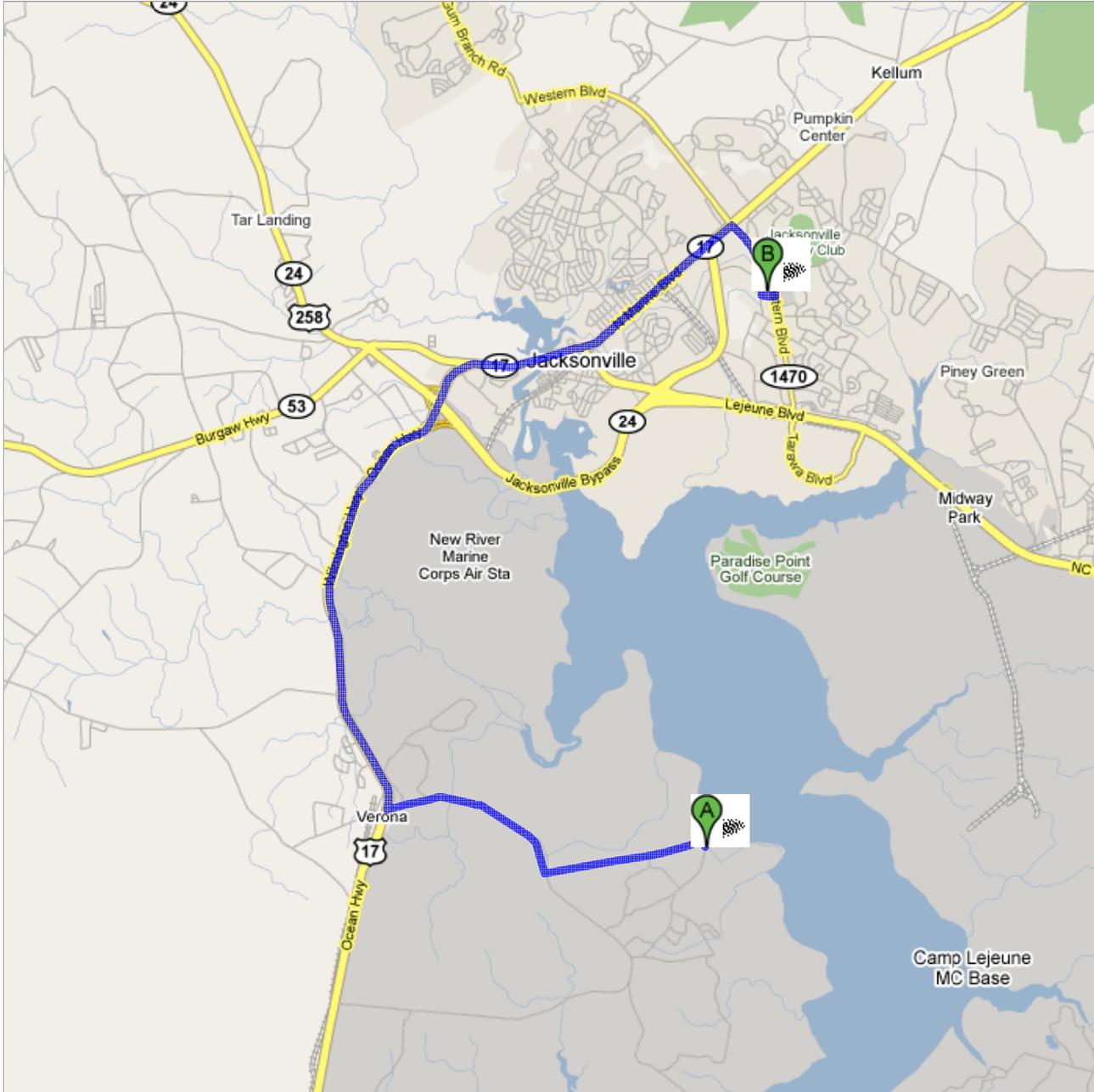



Figure 3
 Hospital Location Map
 Site 95 Magnolia Road
 MCB Camp Lejeune, North Carolina

 "Site 95"
Camp Lejeune

-
1. Head **north** on **Camp Lejeune** toward **Town Point Rd**
go 0.1 mi
total 0.1 mi
 -  2. Turn **left** at **Town Point Rd**
About 5 mins

go 2.0 mi
total 2.1 mi
 -  3. Turn **right** at **Verona Loop Rd**
About 6 mins

go 2.4 mi
total 4.5 mi
 -  4. Turn **right** at **US-17**
About 7 mins

go 5.3 mi
total 9.8 mi
 -  5. Continue on **17**
About 8 mins

go 4.6 mi
total 14.4 mi
 -  6. Continue on **N Marine Blvd/US-17**
About 1 min

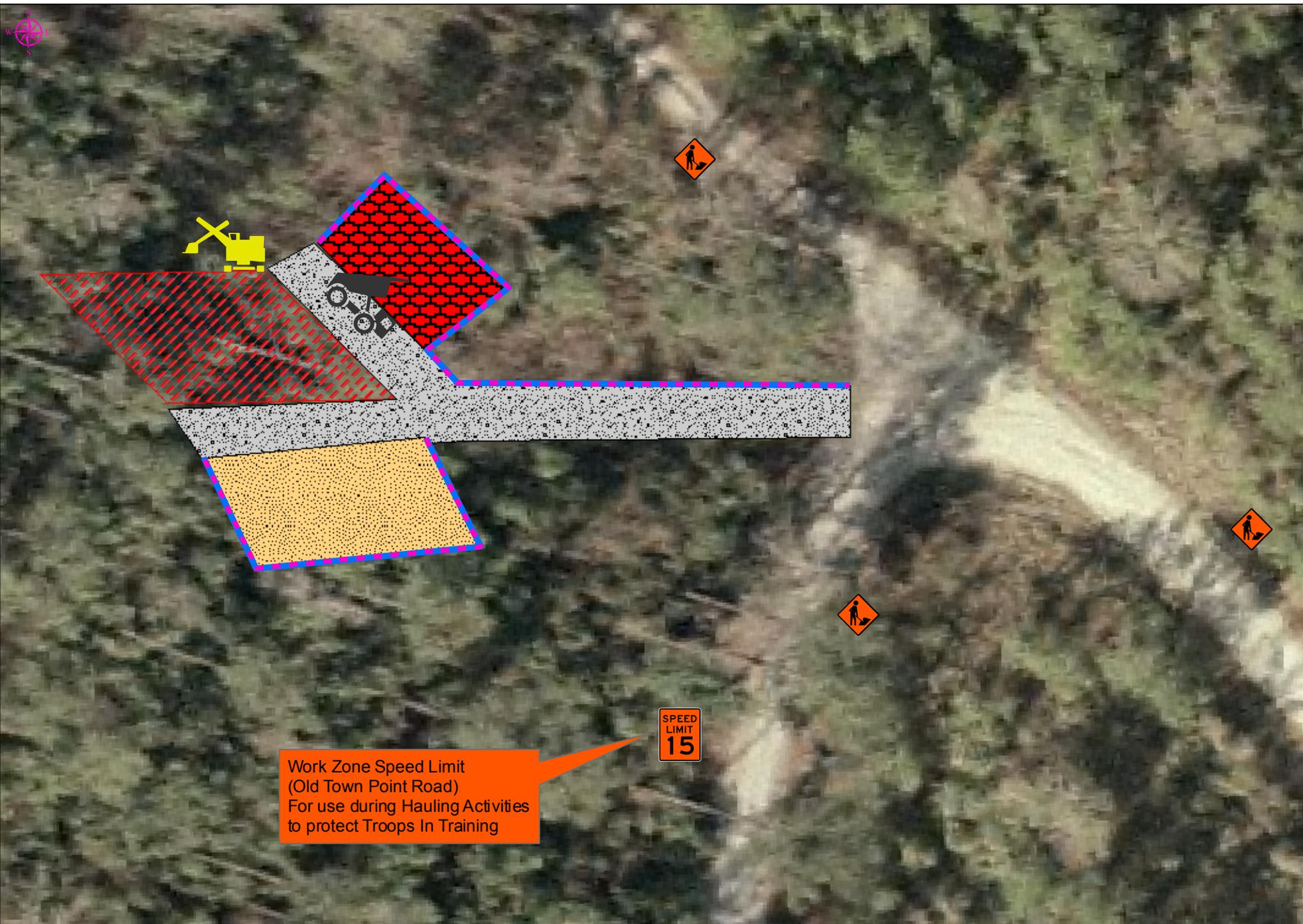
go 0.4 mi
total 14.8 mi
 -  7. Turn **right** at **NC-1470/Western Blvd**
About 2 mins

go 1.1 mi
total 15.9 mi
 -  8. Turn **right** at **Memorial Dr**
go 0.2 mi
total 16.1 mi
 -  9. Turn **right** at **Memorial Ct**
go 446 ft
total 16.1 mi
-
-  "Onslow Memorial Hospital"
Memorial Ct

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2009 , Maponics, Tele Atlas

Figure 3(Cont.)
Hospital Location Map
Site 95 Magnolia Road
MCB Camp Lejeune, North Carolina



Work Zone Speed Limit
 (Old Town Point Road)
 For use during Hauling Activities
 to protect Troops In Training

- Legend**
-  E&S Controls (Silt Fence)
 -  Excavated Soil Storage Area (if needed)
 -  Clean Soil Staging Area
 -  New Construction Road
 -  Excavation Area

NAVFA/1409/090/Repts/R1/ECA

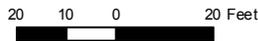
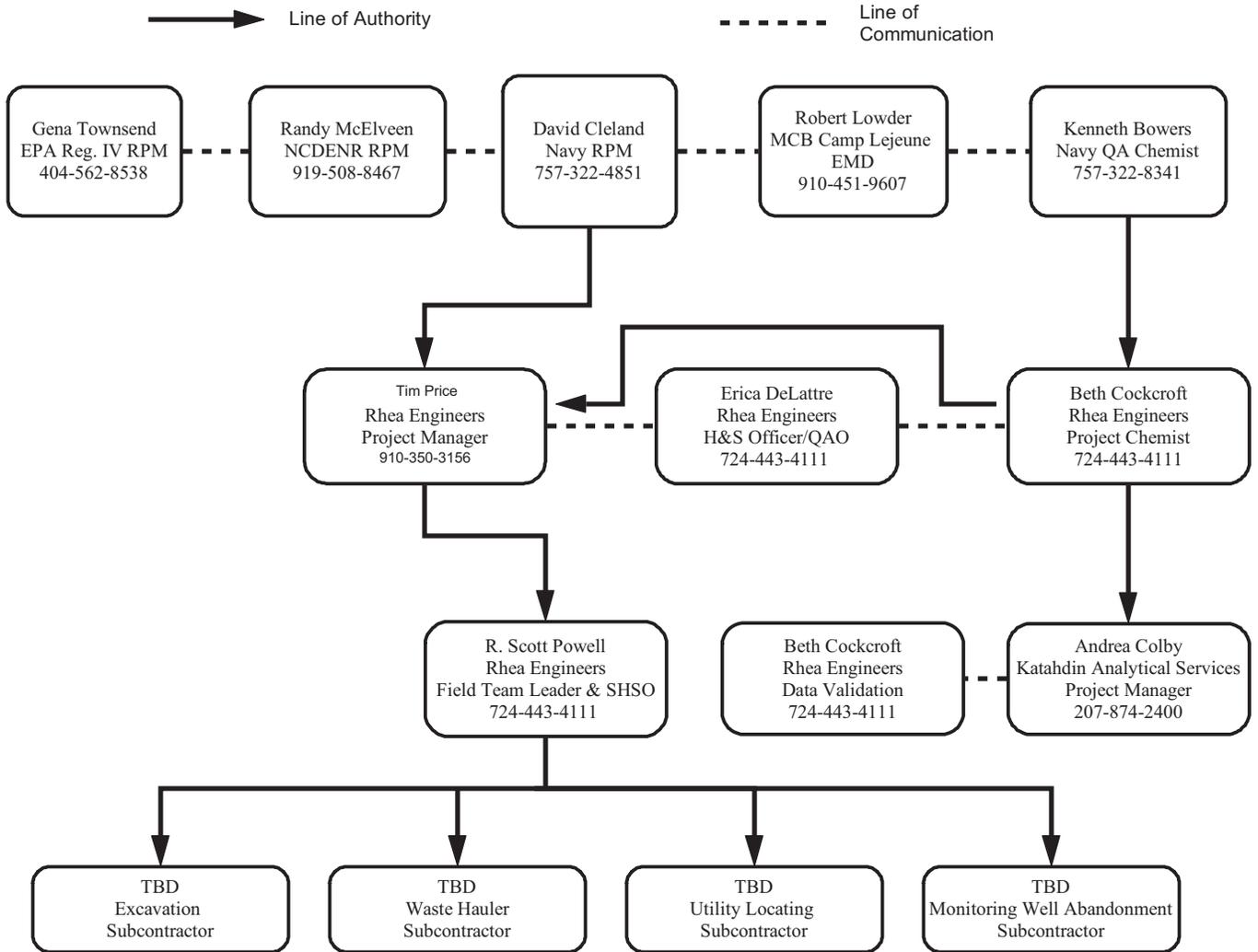


Figure 4
 Excavation Site Layout
 Site 95, Magnolia Road
 MCB Camp Lejeune, North Carolina

Figure 5
Project Organization

Site 95 Magnolia Road NTCRA
MCB Camp Lejeune, North Carolina



ATTACHMENT A

Refer to UFP-SAP APPENDIX B

ATTACHMENT B

**ENVIRONMENTAL PROTECTION AGENCY – PARTICULATE
MATTER STANDARDS**



Particulate Matter

<http://www.epa.gov/air/particlepollution/standards.html>
Last updated on Tuesday, October 14th, 2008.

You are here: [EPA Home](#) | [Air & Radiation](#) | [Particulate Matter](#) | [PM Standards](#)

PM Standards

Announcements

The Clean Air Act requires EPA to set National Ambient Air Quality Standards (NAAQS) for six criteria pollutants, particle pollution (also known as particulate matter) is one of these. The Clean Air Act established two types of national air quality standards for particle pollution. **Primary standards** set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. **Secondary standards** set limits to protect public welfare, including protection against visibility impairment, damage to animals, crops, vegetation, and buildings.

September 21, 2006 - EPA strengthens National Ambient Air Quality Standards for Particle Pollution.

- Learn more about today's action
- Final Rule
- Fact Sheet (PDF, 8 pp, 63 KB)

The nation's air quality standards for particulate matter were first established in 1971 and were not significantly revised until 1987, when EPA changed the indicator of the standards to regulate inhalable particles smaller than, or equal to, 10 micrometers in diameter (that's about 1/4 the size of a single grain of table salt).

Ten years later, after a lengthy review, EPA revised the PM standards, setting separate standards for fine particles (PM_{2.5}) based on their link to serious health problems ranging from increased symptoms, hospital admissions and emergency room visits for people with heart and lung disease, to premature death in people with heart or lung disease.

The 1997 standards also retained but slightly revised standards for PM₁₀ which were intended to regulate "inhalable coarse particles" that ranged from 2.5 to 10 micrometers in diameter. PM₁₀ measurements, however, contain both fine and coarse particles.

EPA revised the air quality standards for particle pollution in 2006. The 2006 standards tighten the 24-hour fine particle standard from the current level of 65 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) to 35 $\mu\text{g}/\text{m}^3$, and retain the current annual fine particle standard at 15 $\mu\text{g}/\text{m}^3$. The Agency decided to retain the existing 24-hour PM₁₀ standard of 150 $\mu\text{g}/\text{m}^3$. The Agency revoked the annual PM₁₀ standard, because available evidence does not suggest a link between long-term exposure to PM₁₀ and health problems.

The Clean Air Act requires EPA to review the latest scientific information and standards every five years. Before new standards are established, policy decisions undergo rigorous review by the scientific community, industry, public interest groups, the general public and the Clean Air Scientific Advisory Committee (CASAC). More about the process of [reviewing the standards](#).

National Ambient Air Quality Standards for Particle Pollution			
Pollutant	Primary Stds.	Averaging Times	Secondary Stds.
Particulate Matter (PM ₁₀)	Revoked ⁽¹⁾	Annual ⁽¹⁾ (Arithmetic Mean)	
	150 $\mu\text{g}/\text{m}^3$	24-hour ⁽²⁾	
Particulate Matter (PM _{2.5})	15.0 $\mu\text{g}/\text{m}^3$	Annual ⁽³⁾ (Arithmetic Mean)	Same as Primary
	35 $\mu\text{g}/\text{m}^3$	24-hour ⁽⁴⁾	

(see the complete table of National Ambient Air Quality Standards at <http://www.epa.gov/air/criteria.html>)

Units of measure for the standards are micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$).

Footnotes:

(1) - Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual

PM₁₀ standard in 2006 (effective December 17, 2006).

(2) - Not to be exceeded more than once per year on average over 3 years.

(3) - To attain this standard, the 3-year average of the weighted annual mean PM_{2.5} concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m³.

(4) - To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³ (effective December 17, 2006).

Related Documents

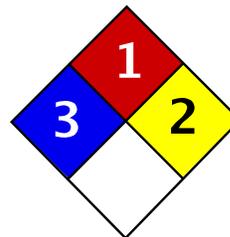
- [Documents from the Current Review of the PM Standards](#)
- [Documents from Review Completed in 2006](#)
- [Documents from Review Completed in 1997](#)

For more information

- [PM Standards Revision - 2006](#)
- [Process of Reviewing the Standards](#)
- [History of PM Standards](#)
- [Technical Information](#)
- [Greenbook](#)
- [PM Designations](#)
- [PM₁₀ Implementation](#)
- [PM_{2.5} Implementation](#)

ATTACHMENT C

MSDS



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance is toxic to kidneys, lungs, the nervous system, mucous membranes.

Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:

Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not

present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 0.01 from ACGIH (TLV) [United States] [1995]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH.

Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:

Very hazardous in case of ingestion, of inhalation.

Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic

Pennsylvania RTK: Arsenic

Massachusetts RTK: Arsenic

TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).

CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R22- Harmful if swallowed.

R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:

Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information**References:**

-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.
-Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec.
-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec.
-SAX, N.I. Dangerous Properties of Industrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984.
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Guide de la loi et du règlement sur le transport des marchandises dangereuses au Canada. Centre de conformité international Ltée. 1986.

Other Special Considerations: Not available.

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