N60200.AR.005594
NAS CECIL FIELD
5090.3a

FINAL SAMPLING AND ANALYSIS PLAN MUNITIONS AND EXPLOSIVES OF CONCERN REMEDIAL INVESTIGATION AT OPERABLE UNIT 5 (OU 5) SITE 15 BLUE 10 ORDNANCE DISPOSAL AREA WITH TRANSMITTAL LETTER NAS CECIL FIELD FL
04/16/2010
TETRA TECH NUS

TETRA TECH

PITT-04-10-042

April 16, 2010

Project 112G02267

BRAC PMO SE
Attn: Mr. Art Sanford
4130 Faber Place Drive
North Charleston, South Carolina 29405

Reference: CLEAN Contract No. N62470-08-D-1001
Contract Task Order JM09

Subject: Final Sampling and Analysis Plan
MEC RI at OU5, Site 15 [Blue 10 Ordnance Disposal Area]
Naval Air Station Cecil Field
Jacksonville, Florida

Dear Mr. Sanford:

Enclosed please find the final Sampling and Analysis Plan (SAP) for Munitions and Explosives of Concern (MEC) Remedial Investigation (RI) at Site 15 [Blue 10 Ordnance Disposal Area]. Copies have been sent to the members of the NAS Cecil Field Partnering Team as identified below. Field work will begin on April 26, 2010.

If you have any questions, please call me at 412-921-8163, Linda Klink at 412-921-8650, or Mark Jonnet at 412-921-8622.

Sincerely,

Robert F. Simcik, P.E.
Project Manager

RFS/clm

Enclosure

cc: G. Fraley, U.S. EPA (electronic copy)
D. Grabka, FDEP (1 copy)
M. Davidson, BRAC PMO SE (electronic copy)
M. Halil, CH2MHill (electronic copy)
L. Klink, Tetra Tech NUS (1 copy)
J. Trepanowski, Tetra Tech NUS (cover letter only)
S. Currie, Tetra Tech NUS File JM09 (1 copy unbound)
B. Capito, NAVFAC Mid-Atlantic (cover letter only)

Tetra Tech NUS, Inc.
661 Andersen Drive, Pittsburgh, PA 15220-2745
Tel 412.921.7090 Fax 412.921.4040 www.ttnus.com

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62470-08-D-1001

Sampling and Analysis Plan
for
Munitions Response Program
MEC Remedial Investigation
at
Operable Unit 5, Site 15, Blue 10
Ordnance Disposal Area

Naval Air Station Cecil Field
Jacksonville, Florida

Contract Task Order JM09

April 2010

BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

TETRA TECH NUS, Inc.

SAP Worksheet #1 -- Title and Approval Page

(UFP-QAPP Manual Section 2.1)

SAMPLING AND ANALYSIS PLAN FOR MUNITIONS RESPONSE PROGRAM MEC REMEDIAL INVESTIGATION AT OPERABLE UNIT 5, SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

April 2010

Prepared for:
BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

Prepared by:
Tetra Tech NUS, Inc.
234 Mall Boulevard, Suite 260
King of Prussia, Pennsylvania 19406
610.491.9688

Prepared under:
Comprehensive Long-Term Environmental Action Navy Contract
No. N62470-08-D-1001
Contract Task Order JM09

Review Signatures:

Linda Klink
Technical Lead
Tetra Tech NUS, Inc.
Linda Klink

Dr. Thomas Johnston
Quality Assurance Manager
Tetra Tech NUS, Inc.
T Johnston 4-14-10

Robert Simcik
Project Manager, Base Coordinator
Tetra Tech NUS, Inc.

Approval Signatures:

Art Sanford
Navy Remedial Project Manager
BRAC PMO SE
Arthur Sanford

Michael Green
MRP Senior Technical Advisor
NAVFAC LANT
See attached

SAP Worksheet #1 – Title and Approval Page

(UFP-QAPP Manual Section 2.1)

DRAFT
SAMPLING AND ANALYSIS PLAN
FOR
MUNITIONS RESPONSE PROGRAM
MEC REMEDIAL INVESTIGATION AT
OPERABLE UNIT 5, SITE 15, BLUE 10 ORDNANCE DISPOSAL AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

March 2010

Prepared for:
BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, South Carolina 29405

Prepared by:
Tetra Tech NUS, Inc.
234 Mall Boulevard, Suite 260
King of Prussia, Pennsylvania 19406
610.491.9688

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No. N62470-08-D-1001
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Review Signatures:

Linda Klink
Technical Lead
Tetra Tech NUS, Inc.

_____

Dr. Thomas Johnston
Quality Assurance Manager
Tetra Tech NUS, Inc.

_____

Robert Simcik
Project Manager, Base Coordinator
Tetra Tech NUS, Inc.

_____

Approval Signatures:

Art Sanford
Navy Remedial Project Manager
BRAC PMO SE

_____

Michael Green
MRP Senior Technical Advisor
NAVFAC LANT

3-22-10

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ACRONYMS

APP	Accident Prevention Plan
BEC	BRAC Environmental Coordinator
bgs	Below ground surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CLEAN	Comprehensive Long-Term Environmental Action Navy
CSM	Conceptual Site Model
CTO	Contract Task Order
CWM	Chemical Warfare Material
DDESB	Department of Defense Explosive Safety Board
DERP	Defense Environmental Restoration Program
DGM	Digital geophysical mapping
DID	Data Item Description
DMM	Discarded Military Munitions
DoD	Department of Defense
DQO	Data quality objective
EGIS	Environmental Geographic Information System
EOD	Explosive Ordnance Disposal
EP	Engineer Pamphlet
ESS	Explosives Safety Submission
FCREPA	Florida Committee on Rare and Endangered Plants and Animals
FDEP	Florida Department of Environmental Protection
FFA	Federal Facilities Agreement
FTMR	Field Task Modification Request
GIS	Geographic Information System
GPO	Geophysical prove-out
GPS	Global Positioning System
HASP	Health and Safety Plan
HDOP	Horizontal Dilution of Precision
HSM	Health and Safety Manager
HTRW	Hazardous, Toxic, and Radiological Waste
ISO	Industry Standard Object
IVS	Instrument Verification Strip
JEDC	Jacksonville Economic Development Commission

LANT	Atlantic
LUC	Land Use Control
MC	Munitions Constituents
MD	Munitions Debris
MDAS	Material Documented as Safe
MDEH	Material Documented as an Explosive Hazard
MEC	Munitions and Explosives of Concern
Mm	millimeter
MMRP	Military Munitions Response Program
MPPEH	Material Potentially Presenting an Explosive Hazard
MRP	Munitions Response Program
MRS	Munitions Response Site
NA	Not Applicable
NAD	North American Datum
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NGVD	National Geodetic Vertical Datum
NOSSA	Naval Ordnance Safety and Security Activity
NPL	National Priorities List
OU	Operable Unit
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PAH	Polynuclear aromatic hydrocarbon
PM	Project Manager
PMO	Program Management Office
POC	Point of Contact
QA	Quality Assurance
QAM	Quality Assurance Manager
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAC	Remedial Action Contractor
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SE	Southeast

SI	Site Inspection
SMP	Site Management Plan
SOP	Standard Operating Procedure
SSO	Site Safety Officer
SUXOS	Senior UXO Officer Supervisor
TBD	To Be Determined
TP	Technical Paper
TRPH	Total recoverable petroleum hydrocarbons
Tetra Tech	Tetra Tech NUS, Inc.
U.S. EPA	United States Environmental Protection Agency
UFP	Uniform Federal Policy
USACE	United States Army Corps of Engineers
UXO	Unexploded Ordnance
UXOQCS	UXO Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer
YWWA	Yellow Water Weapons Area

EXECUTIVE SUMMARY

Tetra Tech NUS, Inc. (Tetra Tech) has prepared this Munitions and Explosives of Concern (MEC) Sampling and Analysis Plan (SAP) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62470-08-D-1001, Contract Task Order (CTO) JM09. This plan has been prepared for a Remedial Investigation (RI) at Munitions Response Site (MRS) Operable Unit (OU) 5, Site 15, Blue 10 Ordnance Disposal Area, which is located at the former Naval Air Station (NAS) Cecil Field, Jacksonville, Florida.

The Navy conducted various testing, training, and disposal activities related to military munitions at NAS Cecil Field, which was established in 1941 and provided facilities, services, and material support for the operation and maintenance of Naval weapons, aircraft, and other units of operation forces as designated by the Chief of Naval Operations. As a result of these activities, MEC is present at Site 15. The term MEC includes Discarded Military Munitions (DMM), Unexploded Ordnance (UXO), and Munitions Constituents (MC) in high enough concentrations to pose an explosive hazard. MC is any material originating from UXO, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) to address MC and MEC at closed and other than operational ranges. The DoD is following the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) process for the investigation and remediation of these sites. The Navy is responsible for implementing the Munitions Response Program (MRP) at NAS Cecil Field.

Site 15 is approximately 1,000 feet by 2,400 feet in size and was used as a skeet range and a trap range from the early 1940s to the mid-1950s. Ordnance was disposed at Site 15 from the mid-1960s through 1977, and disposal consisted of burning of ordnance materials in a large metal chamber and static firing of rockets. The majority of ordnance disposed at the site was burned and included small arms munitions up to 20 millimeters in size, parachute and distress flares, Mark IV signal cartridges, rocket igniters, cartridge activated devices, and 2.75-inch and 5-inch rockets. Rocket propellant also was reportedly placed on the ground and ignited in the area of the burn chamber. Rockets were disposed by static firing of both 2.75-inch and 5-inch rockets from a firing pad located south of the burn chamber. An estimated 2.5 tons of ordnance were disposed at the site each month; overall, an estimated 350 tons of ordnance was disposed at the site while it was in operation.

Since the closure of NAS Cecil Field in September 1999, most of the facility has been transferred to the Jacksonville Port Authority (now Jacksonville Aviation Authority) and the City of Jacksonville. According

to the reuse plan, the facility will have multiple uses but will be used primarily for aviation-related activities. NAS Cecil Field is subject to the Base Realignment and Closure (BRAC) Law of 1993.

A Record of Decision (ROD) for OU 5, Site 15, was signed in June 2008 for selection of a remedy for chemical contamination at Site 15 (Tetra Tech, 2008). Remedial activities were conducted in 2008 and 2009 and included soil excavation, on-site solidification/stabilization, and off-site treatment and disposal of chemically contaminated soil to allow low-intensity recreational reuse of the site (AGVIQ-CH2MHill, 2009). A Land Use Control (LUC) Remedial Design (RD), prepared in 2009, provides specifications to limit land use to low-intensity recreational activities consistent with the property's proposed reuse as a natural resource corridor. Chemical contamination at Site 15 has been addressed through this remedy (Tetra Tech, 2009). During remedial activities, a munitions survey was conducted at Site 15 in and around the soil excavation areas, and MEC and munitions debris (MD) were found and removed from excavation areas before soil excavation. Note that the MD terminology in effect at the time of the remediation has since been replaced with Material Documented as Safe (MDAS). Based on the occurrence of MEC and MD in the surveyed areas, it is likely that MEC and MDAS [MD] are present in areas that were not surveyed as part of the remedial action for the chemically contaminated soil. Therefore, further investigation of MEC and MDAS [MD] is needed at Site 15.

The primary goal of this MEC RI is to further delineate the extent of MEC still present at the ground surface and shallow subsurface at Site 15. The RI will be conducted to determine whether surface MEC and MDAS [MD] are present in unsurveyed areas of the site that are most likely to have MEC and MDAS [MD] (within and adjacent to the former ordnance disposal area, the former and skeet and trap range areas, and along access roads to the ordnance disposal area). This will be accomplished by conducting detector-aided surface surveys of these areas.

This SAP has been prepared in accordance with the DoD requirements for developing Quality Assurance Project Plans (QAPPs) for the management of environmental data collection and the use of environmental data as described in the Uniform Federal Policy (UFP)-QAPP (aka UFP-SAP). The UFP-SAP worksheets were developed for the collection and evaluation of data on concentrations of chemical constituents in environmental media and are not designed for the collection of MEC data (detector-aided surveys). The Navy MRP Workgroup modified the UFP-SAP worksheets to be applicable to MEC investigations, and these modified worksheets have been used in the preparation of this MEC SAP.

SAP Worksheet #2 -- SAP Identifying Information

(UFP-QAPP Manual Section 2.2.4)

Site Name/Number: Site 15, Blue 10 Ordnance Disposal Area, NAS Cecil Field, Jacksonville, Florida
Operable Units: Operable Unit 5
Contractor Name: Tetra Tech NUS, Inc.
Contract Number: N62470-08-D-1001
Contract Title: Comprehensive Long-Term Environmental Action Navy
Work Assignment Number (optional): Contract Task Order JM09

1. This SAP was prepared in accordance with the requirements of the *Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP)* (U.S. EPA, 2005) and *United States Environmental Protection Agency (U.S. EPA) Guidance for Quality Assurance Project Plans, EPA QA/G-5, QAMS (U.S. EPA, 2002)*.

2. Identify regulatory program: DoD MMRP using the general CERCLA process.

3. This SAP is a project-specific SAP.

4. List dates of scoping sessions that were held:

Scoping Session	Date
Meeting No. 1 – Kick-Off Meeting and Site Visit	November 2009
Meeting No. 2 – Information Gathering and Data Quality Objective (DQO) Facilitation	February 2010

5. List dates and titles of any SAP documents written for previous site work that are relevant to the current investigation.

Title	Date
Not applicable (NA)	

6. List organizational partners (stakeholders) and connection with lead organization:
United States Environmental Protection Agency (U.S. EPA) Region 4 – Regulatory Oversight
Florida Department of Environmental Protection (FDEP) – Regulatory Oversight

7. Lead organization (see **Worksheet 7** for detailed list of data users)
BRAC Program Management Office (PMO) Southeast (SE)

8. If any required SAP elements or required information are not applicable to the project or are provided elsewhere, then note the omitted SAP elements and provide an explanation for their exclusion below: See the crosswalk table regarding SAP worksheets that are NA on MEC projects.

UFP-QAPP Worksheet #	Required Information	Crosswalk to Related Information
A. Project Management		
Documentation		
1	Title and Approval Page	NA
2	Table of Contents SAP Identifying Information	NA
3	Distribution List	NA
4	Project Personnel Sign-Off Sheet	NA
Project Organization		
5	Project Organizational Chart	NA
6	Communication Pathways	NA
7	Personnel Responsibilities and Qualifications Table	NA
8	Special Personnel Training Requirements Table	NA
Project Planning/Problem Definition		
9	Project Planning Session Documentation (including Data Needs tables) Project Scoping Session Participants Sheet	NA
10	Problem Definition, Site History, and Background. Site Maps (historical and current)	NA
11	Site-Specific Project Quality Objectives	NA
12	Measurement Performance Criteria Table	NA
13	Sources of Secondary Data and Information, Secondary Data Criteria and Limitations Table	NA
14	Summary of Project Tasks	NA
15	Reference Limits and Evaluation Table	Not used – No samples proposed for collection/analysis during MEC survey/investigation
16	Project Schedule/Timeline Table	NA
B. Measurement Data Acquisition		
Sampling Tasks		
17	Sampling Design and Rationale	NA
18	Sampling Locations and Methods/Standard Operating Procedure (SOP) Requirements Table	NA
19	Analytical Methods/SOP Requirements Table	Not used – No samples proposed for collection/analysis during MEC survey/investigation
20	Field Quality Control Sample Summary Table	NA
21	Project Sampling SOP References Table, Sampling SOPs	NA
22	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	NA
Analytical Tasks		
23	Analytical SOPs, Analytical SOP References Table	Not used – No samples proposed for collection/analysis during MEC survey/investigation
24	Analytical Instrument Calibration Table	Not used – No analytical instrument calibration data will be required to support MEC surveys/investigations

UFP-QAPP Worksheet #	Required Information	Crosswalk to Related Information
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	Not used – No analytical instrument equipment maintenance, testing, or inspections will be required to support MEC surveys/investigations
Sample Collection		
26	Sample Handling System, Documentation Collection, Tracking, Archiving, and Disposal Sample Handling Flow Diagram	Not used – No analytical sampling handling system will be required to support MEC surveys/investigations
27	Sample Custody Requirements, Procedures/SOPs Sample Container Identification Example Chain-of-Custody Form and Seal	Not used – No samples are proposed for collection/analysis during the MEC survey/investigation
Quality Control (QC) Samples		
28	Laboratory QC Samples Table, Screening/Confirmatory Analysis Decision Tree	Not used – No analytical laboratory QC sampling will be required to support MEC surveys/investigations
Data Management Tasks		
29	Project Documents and Records Table	NA
30	Analytical Services Table Analytical and Data Management SOPs	Not used – No analytical services will be required to support MEC surveys/investigations.
C. Assessment Oversight		
31	Planned Project Assessments Table	NA
32	Assessment Findings and Corrective Action Responses	NA
33	QA Management Reports Table	NA
D. Data Review		
34	Verification (Step I) Process Table - Preparatory and Initial Inspection	NA
35	Validation (Steps IIa and II b) Process Table	NA
36	Analytical Data Validation (Steps IIa and IIb) Summary Table	NA
37	Usability Assessment	NA

SAP Worksheet #3 -- Distribution List

(UFP-QAPP Manual Section 2.3.1)

Name of SAP Recipient	Title/Role	Organization	Telephone Number	E-Mail or Mailing Address	Document Control Number
Art Sanford	Navy Remedial Project Manager (RPM)/Manages Project Activities for Navy	BRAC PMO SE	843.743.2135	art.sanford@navy.mil	NA
Mark Davidson	BRAC Environmental Coordinator (BEC)/Manages BRAC Activities for the Navy	BRAC PMO SE	843.743.2124	mark.davidson@navy.mil	NA
Michael Green (electronic upload)	Naval Facilities Engineering Command (NAVFAC) MRP Senior Technical Advisor/ Reviews SAP and quality assurance (QA) Documentation for Navy	NAVFAC Atlantic (LANT)	757.322.8108	mike.green@navy.mil	NA
Bonnie Capito (copy of final cover letter only)	Librarian and Records Manager	NAVFAC LANT	757.322.4785	bonnie.capito@navy.mil	NA
Gregory Fraley (electronic copy only)	U.S. EPA RPM/Provides U.S. EPA Regulator Input	U.S. EPA Region 4	404.562.8544	fraley.gregory@epa.gov	NA
David Grabka	FDEP RPM/Provides State Regulator Input	FDEP	850.245.8997	david.grabka@dep.state.fl.us	NA

Name of SAP Recipient	Title/Role	Organization	Telephone Number	E-Mail or Mailing Address	Document Control Number
Mike Halil	CH2MHill Project Manager (PM)/Remedial Action Contactor (RAC) Manages Project Activities	CH2MHill	904.777.4812 ext. 233	michael.halil@CH2M.com	NA
Robert Simcik	Tetra Tech PM, Base Coordinator/ Manages Activities at the Base	Tetra Tech	412.921.8163	robert.simcik@tetratech.com	NA
Linda Klink	Tetra Tech Technical Lead/Manages Project Activities	Tetra Tech	412.921.8650	linda.klink@tetratech.com	NA
Ralph Brooks	UXO/MEC Manager/Manages Corporate MEC Hazards and Risks	Tetra Tech	770.413.0965 x231	ralph.brooks@tetratech.com	NA
Other Field Personnel To Be Determined (TBD)	Senior UXO Supervisor (SUXOS), UXO Quality Control Specialist (UXOQCS)	Tetra Tech	TBD	TBD	NA
Dr. Tom Johnston	Tetra Tech QA Manager (QAM)/Provides QA Oversight	Tetra Tech	412.921.8615	tom.johnston@tetratech.com	NA
Matt Soltis [Health and Safety Plan (HASP) only]	Health and Safety Manager (HSM)/Manages Corporate Health and Safety Program	Tetra Tech	412.921.8912	matt.soltis@tetratech.com	NA

Name of SAP Recipient	Title/Role	Organization	Telephone Number	E-Mail or Mailing Address	Document Control Number
John Trepanowski (copy of cover letter only)	Program Manager/Manages Program Activities	Tetra Tech	610.491.9688	john.trepanowski@tetratech.com	NA
Garth Glenn (copy of cover letter only)	Deputy Program Manager/Manages Program Activities	Tetra Tech	757.461.3926	garth.glenn@tetratech.com	NA
Glenn Wagner (copy of final cover letter only)	Administrative Record Assistant	Tetra Tech	412.220.2211	glenn.wagner@tetratech.com	NA

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

(UFP-QAPP Manual Section 2.3.2)

Certification that project personnel have read the text will be obtained by one of the following methods, as applicable:

1. In the case of regulatory agency personnel with oversight authority, approval letters or e-mails will constitute verification that applicable sections of the SAP have been reviewed. Copies of regulatory agency approval letters/e-mails will be retained in the project files and are listed in **Worksheet #29** as project records.

2. E-mails will be sent to Navy and Tetra Tech project personnel who will be requested to verify by e-mail that they have read the applicable SAP/sections and the date on which they were reviewed. Copies of the verification e-mail will be included in the project files and are identified in **Worksheet #29**.

A copy of the signed **Worksheet #4** will be retained in the project files and is identified as a project document in **Worksheet #29**.

Name	Organization/Title/Role	Telephone Number (optional)	Signature/E-Mail Receipt	SAP Section Reviewed	Date SAP Read
Navy and Regulator Project Team Personnel					
Art Sanford	Navy RPM/Manages Project Activities for Navy	843.743.2135	See **Worksheet #1** for signature	All	
Gregory Fraley	U.S. EPA RPM/Provides U.S. EPA Regulator Input	404.562.8544		All	
David Grabka	FDEP RPM/Provides State Regulator Input	850.245.8997		All	
Michael Green	NAVFAC MRP Senior Technical Advisor/ Reviews SAP and QA Documentation for Navy	757.322.8108	See **Worksheet #1** for signature	All	

Name	Organization/Title/Role	Telephone Number (optional)	Signature/E-Mail Receipt	SAP Section Reviewed	Date SAP Read
Mark Davidson	BRAC Environmental Coordinator (BEC)/Manages BRAC Activities for the Navy	843.743.2124		All	

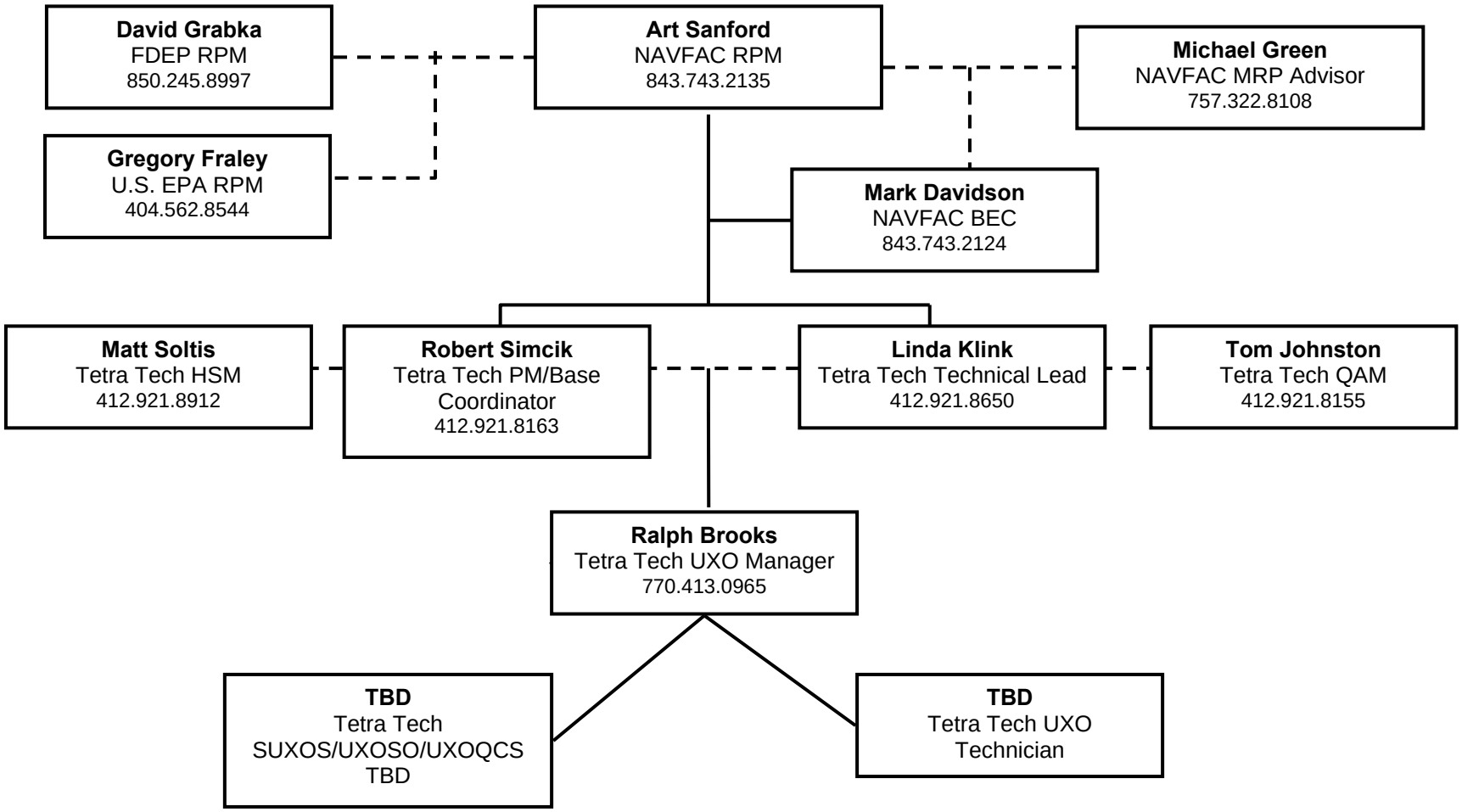
Tetra Tech Project Team Personnel

Robert Simcik	Tetra Tech PM, Base Coordinator/Manages Activities at the Base	412.921.8163	See **Worksheet #1** for signature	All	
Linda Klink	Tetra Tech Technical Lead/Manages Project Activities	412.921.8650	See **Worksheet #1** for signature	All	
Ralph Brooks	UXO/MEC Manager/Manages Project MEC Hazards and Activities	770.413.0965 x231		All	
Dr. Tom Johnston	Tetra Tech QAM/Provides QA Oversight	Tetra Tech	See **Worksheet #1** for signature	All	
Matt Soltis	HSM/Manages Corporate Health and Safety Program	412.921.8912	See signature on HASP	HASP and **Worksheet #17**	
TBD	SUXOS/Supervises UXO Field Activities	TBD		All	
TBD	UXOQCS/Provides QC during UXO Field Activities	TBD		All	
TBD	UXO Safety Officer (UXOSO)/Manages UXO Safety Operations	TBD		All	

SAP Worksheet #5 -- Project Organizational Chart

(UFP-QAPP Manual Section 2.4.1)

Lines of Authority ———— Lines of Communication - - - -



SAP Worksheet #6 -- Communication Pathways

(UFP-QAPP Manual Section 2.4.2)

Communication Driver	Responsible Affiliation	Name	Phone Number and/or E-Mail	Procedure
MEC Find	Tetra Tech Field Staff Tetra Tech UXO Staff Tetra Tech UXO Manager Tetra Tech Technical Lead Navy RPM	TBD TBD Ralph Brooks Linda Klink Art Sanford	TBD TBD 770.413.0965 x 231 412.921.8650 843.743.2135	Within 30 minutes of an MEC find, Tetra Tech UXO Technicians will notify field staff, secure area, and contact Tetra Tech UXO Manager. Tetra Tech UXO Manager will verbally inform Tetra Tech Technical Lead the same day. Tetra Tech Technical Lead will notify Navy RPM on the same day. Navy RPM will inform Naval Ordnance Safety and Security Activity (NOSSA) on the same day as informed.
Field issues that require change in field tasks or scope of field work	Tetra Tech UXO Manager Tetra Tech Technical Lead Navy RPM	Ralph Brooks Linda Klink Art Sanford	770.413.0965 x 231 412.921.8650 843.743.2135	The responsible person will inform Tetra Tech Technical Lead on the day the issue is discovered; Tetra Tech Technical Lead will inform Navy RPM within one business day; Navy RPM will issue scope change approval [verbally or via electronic mail (e-mail)] if warranted. Scope change will be implemented before work is executed. Document via a Field Task Modification Request (FTMR) form within two days.
SAP amendments	Tetra Tech Technical Lead Navy RPM	Linda Klink Art Sanford	412.921.8650 843.743.2135	Tetra Tech Technical Lead will notify NAVFAC PMO via e-mail within one business day of recognizing a need for change and will also notify the Project Team.

Communication Driver	Responsible Affiliation	Name	Phone Number and/or E-Mail	Procedure
Fieldwork schedule changes	Tetra Tech Technical Lead Navy RPM	Linda Klink Art Sanford	412.921.8650 843.743.2135	The Tetra Tech Technical Lead will verbally inform Navy RPM on the day that schedule change is known and document via schedule impact letter as soon as impact is realized.
Recommendation to stop work and initiate work upon corrective action	Tetra Tech UXO Manager Tetra Tech Technical Lead Tetra Tech PM, Base Coordinator Tetra Tech QAM Tetra Tech HSM Navy RPM	Ralph Brooks Linda Klink Robert Simcik Matt Soltis Tom Johnston Art Sanford	770.413.0965 x 231 412.921.8650 412.921.8163 412.921.8912 412.921.8615 843.743.2135	Within one hour, the UXO Manager (verbally or via e-mail) will inform subcontractors and Tetra Tech Technical Lead. Tetra Tech Technical Lead will inform (verbally or via e-mail) the listed Project Team members.
UXO survey data issues	Tetra Tech UXO Manager Tetra Tech Technical Lead Tetra Tech QAM	Ralph Brooks Linda Klink Tom Johnston	770.413.0965 x 231 412.921.8650 412.921.8615	UXO field team will notify Tetra Tech UXO Manager as soon as the impact is realized. Tetra Tech UXO Manager will notify Tetra Tech Technical Lead and QAM on the same day.
Corrective action for field program	Tetra Tech QAM Tetra Tech Technical Lead	Tom Johnston Linda Klink	412.921.8615 412.921.8650	Tetra Tech QAM will notify Tetra Tech Technical Lead within one day that the corrective action has been completed. Tetra Tech Technical Lead will then notify the Navy RPM within one day.

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table

(UFP-QAPP Manual Section 2.4.3)

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
Art Sanford	Navy RPM	BRAC PMO SE	Functions as primary Navy interface with the Tetra Tech PM, Tetra Tech Technical Lead, and Regulatory RPMs. • Oversees Tetra Tech management of project. • Provides Navy input through participation in technical meetings, review of SAP and project documents, and regular discussion with Tetra Tech PM, Tetra Tech Technical Lead, and Regulatory RPMs.	To be provided upon request.
Mark Davidson	Navy BEC	BRAC PMO SE	Supports issues as identified by the Navy RPM.	To be provided upon request.
David Grabka	FDEP RPM	FDEP	Functions as primary regulatory interface with the Navy RPM. • Provides regulatory input through participation in technical meetings, review of SAP and project documents, and regular discussion with Navy RPM. • Provides approval of documents in accordance with the requirements of the Federal Facility Agreement (FFA) and current Amended Site Management Plan (SMP) for NAS Cecil Field.	To be provided upon request.
Gregory Fraley	U.S. EPA RPM	U.S. EPA Region 4	Functions as primary regulatory interface with the Navy RPM. • Provides regulatory input through participation in technical meetings, review of SAP and project documents, and regular discussion with Navy RPM. • Provides approval of documents in accordance with the requirements of the FFA and current Amended SMP for NAS Cecil Field.	To be provided upon request.

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
John Trepanowski	Program Manager	Tetra Tech	Oversees NAVFAC CLEAN Program for Tetra Tech.	M.S., Mining Engineering, B.S., Mining Engineering, 27 years of engineering experience
Robert Simcik	PM, Base Coordinator	Tetra Tech	Oversees project, financial, schedule, and technical day-to-day management of the project. • Ensures timely resolution of project-related technical, quality, and safety questions associated with Tetra Tech operations. • Functions as the primary Tetra Tech interface with the Navy RPM and Tetra Tech field and office personnel. • Coordinates and oversees maintenance of all Tetra Tech project records.	B.S., Civil Engineering, A.S., Petroleum Engineering Technology, 26 years of engineering experience, Professional Engineer
Linda Klink	Technical Lead	Tetra Tech	Oversees Site 15 project, financial, schedule, and technical day-to-day management. • Ensures timely resolution of Site 15-related technical, quality, and safety questions associated with Tetra Tech operations. • Functions as the primary Tetra Tech Site 15 interface with the Navy RPM and Tetra Tech field and office personnel. • Ensures that Tetra Tech health and safety issues related to the Site 15 project are communicated effectively to all on-site personnel and off-site personnel. • Coordinates and oversees Site 15 work performed by Tetra Tech field and office technical staff (including data interpretation and report preparation). • Coordinates and oversees maintenance of all Tetra Tech Site 15 project records. • Coordinates and oversees review of Tetra Tech Site 15 deliverables. • Prepares and issues Site 15 final Tetra Tech deliverables to the Navy.	M.S., Environmental Engineering (Water Resources); B.S., Chemical Engineering, 28 years of environmental engineering experience, Professional Engineer

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
Ralph Brooks	UXO Manager	Tetra Tech	Oversees selection of qualified UXO personnel, establishes overall QC program for UXO activities, and addresses UXO-related issues as identified by field personnel.	B.S., General Studies; Graduate, Navy Explosive Ordnance Disposal (EOD) School - Indian Head, 25 years of military EOD experience, 6 years commercial UXO experience
TBD	UXO Technician III	Tetra Tech	Supervises the conduct of all on-site UXO-related operations. Prepares daily reports of field activities. Conducts daily site safety briefings. Escorts non-UXO personnel in suspect MEC areas. Determines location and identification of suspect MEC. Conducts detector-aided surface surveys.	Minimum of 8 years prior military EOD and/or commercial UXO experience in munitions response actions or range clearance activities. [Department of Defense Explosive Safety Board (DDESB) Technical Paper (TP) 18]
TBD	UXOSO	Tetra Tech	Ensures that initial site-specific training is delivered to all field personnel before field activities begin and that all safety control measures have been established. Ensures that all UXO-specific certifications are filed on site and are available for Navy inspection. Enforces personnel limits and safety exclusion zones. Conducts, documents, and reports safety inspections.	Minimum of 8 years prior military EOD and/or commercial UXO experience in munitions response actions or range clearance activities and applicable safety standards. (DDESB TP 18)
TBD	UXOQCS	Tetra Tech	Conducts QC audits. Identifies, documents, and reports corrective actions.	Minimum of 8 years prior military EOD and/or commercial UXO experience in munitions response actions or range clearance activities and the transportation, handling, and storage of munitions and commercial explosives. (DDESB TP 18)

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
Tom Johnston	QAM	Tetra Tech	Reviews SAP and conducts data quality review. Ensures quality aspects of the CLEAN program. • Develops, maintains, and monitors QA policies and procedures. • Provides training to Tetra Tech staff in QA/QC policies and procedures. • Conducts systems and performance audits to monitor compliance with environmental regulations, contractual requirements, SAP requirements, and corporate policies and procedures. • Audits project records. • Assists in the development of corrective action plans and ensuring correction of non-conformances reported in internal or external audits. • Ensures that this SAP meets Tetra Tech, Navy, FDEP, and U.S. EPA requirements. • Prepares QA reports for management.	Ph.D., Analytical Chemistry, 31 years experience
Matt Soltis	HSM	Tetra Tech	Oversees CLEAN Program Health and Safety Program • Provides technical advice to the Tetra Tech PM and Tetra Tech Technical Lead on matters of health and safety. • Oversees the development and review of the HASP. • Conducts health and safety audits. • Prepares health and safety reports for management.	B.S., Industrial Safety Sciences, 24 years environmental experience

Name	Title/Role	Organizational Affiliation	Responsibilities	Education and/or Experience Qualifications (Optional)
TBD	Site Safety Officer (SSO)/ UXOSO	Tetra Tech	• Controls specific health and safety-related field operations such as personnel decontamination, monitoring of worker heat or cold stress, and distribution of safety equipment. • Conducts and documents a daily health and safety briefing each day while on site. • Ensures that field personnel comply with all procedures established in the HASP. • Identifies assistant SSOs in his/her absence. • Terminates work if an imminent safety hazard, emergency situation, or other potentially dangerous situation is encountered. • Ensures the availability and condition of health and safety monitoring equipment. • Coordinates with the UXO Manager and Technical Lead to institute and document any necessary HASP modifications. • Ensures that facility personnel and subcontractors are adequately advised and kept clear of UXO and potentially contaminated materials.	NA

In some cases, one person may be designated responsibilities for more than one position. For example, the UXOSO may also be responsible for SSO duties. This action will be performed only as credentials, experience, and availability permits.

SAP Worksheet #8 -- Special Personnel Training Requirements Table

(UFP-QAPP Manual Section 2.4.4)

Project Function	Specialized Training by Title or Description of Course	Training Provider/ Verifier	Training Date	Personnel/ Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
Project Operations	Site Orientation, Ethics Training, and UXO Avoidance	SUXOS	Upon arrival at NAS Cecil Field	All personnel	Tetra Tech	Documentation of special training requirements will be maintained on site. After the field investigation is complete, special training documentation will be maintained in the permanent project file.
	Accident Prevention and First Aid	SSO				
	Overview of Project Plans	SUXOS				
Munitions Response	MEC Safety Training	UXOSO, SUXOS	Training will have been received prior to participation in field activities	Personnel entering exclusion zone		
Grid/Transect Layout, Surface Survey	Use of Hand-Held Global Positioning System (GPS)	SUXOS		UXO Team		
MEC Data Collection	Surface Survey and MEC Management and Accountability Standard Operating Procedures (SOPs)	SUXOS		UXO Team		

SAP Worksheet #9 -- Project Scoping Session Participants Sheet

Project Name: NAS Cecil Field, MEC RI **Projected Date(s):** 2010 **Project Manager/Base Coordinator:** Robert Simcik **Technical Lead:** Linda Klink	**Site Name:** OU 5, Site 15, Blue 10 Ordnance Disposal Area **Site Location:** NAS Cecil Field, Jacksonville, Florida

Date of Session: November 19, 2009
Scoping Session Purpose: Project Kick-Off Meeting and Site Visit

Name	Title	Affiliation	Phone Number	E-Mail Address	Project Role
Linda Klink	Technical Lead	Tetra Tech	412.921.8650	linda.klink@tetratech.com	Task Project Manager
Ralph Brooks	UXO Manager	Tetra Tech	770.413.0965 x231	ralph.brooks@tetratech.com	UXO Technical Lead
Art Sanford	Navy RPM	BRAC PMO SE	843.743.2135	art.sanford@navy.mil	Navy Project Manager
Mark Jonnet	Environmental Geographic Information System (EGIS) Specialist	Tetra Tech	(412) 921-8622	mark.jonnet@tetratech.com	EGIS Specialist
Rob Simcik	PM/ Base Coordinator	Tetra Tech	412.921.8163	robert.simcik@tetratech.com	Project Manager
Mike Halil	PM	CH2MHill	904.777.4812 ext. 233	michael.halil@CH2M.com	RAC

Discussion

CH2MHill completed previous MEC-related work at this site [Preliminary Assessment/Site Inspection (PA/SI)] in 2006 in support of the soil remediation effort (conducted a previous MEC survey remediation effort) and developed an Explosives Safety Submission (ESS). Tetra Tech has been funded to prepare this MEC SAP and implement the SAP.

During the CH2MHill investigation, most grids were cleared to the depth of equipment [minimum of 18 inches and up to 3.5 feet below ground surface (bgs)]. The grids in Area L to be excavated within the former ordnance disposal area were sifted initially to full depth of 18 inches to 3.5 feet bgs, but when the amount of soil was determined to be more than expected, only 2 feet of soil was sifted. Six grids were

identified as not fully cleared. NOSSA would call this additional clearance an After Action Report, but it can be called an Interim Action Report if work is completed in parts. NOSSA will have to agree/approve the clearing before the property can be transferred.

Action Items

1. CH2MHill identified that there are four aerial photographs in Geographic Information System (GIS); CH2MHill will determine if there are any additional aerial photographs that Tetra Tech may not have.

2. CH2MHill conducted a grid-by-grid risk evaluation that will be included in their report, which will be provided to Tetra Tech and included as an appendix to the Tetra Tech SAP.

3. There should be DoD guidance that will provide the depth of clearance needed for this site. There are four LUCs areas at NAS Cecil Field, one of which limits site use to low-intensity activities. It is not clear to what depth of clearance does that translates? Ralph Brooks will ask Doug Murray (NOSSA) to provide clearance depths.

Consensus Decisions

<u>MC</u>

1. The PA concluded that there was enough MC sampling conducted previously and that there is no issue with MC. A monitoring well was also installed at the maximum concentration of MC, and all groundwater sample concentrations were less than groundwater screening criteria; therefore, groundwater is not a concern related to MEC. Based on Tetra Tech review of historical documents, Tetra Tech is going to recommend that no additional soil and no additional groundwater sampling is required because it has already been completed. This approach will be justified by presenting historical investigations and results.

<u>MEC</u>

1. The initial MEC investigation will focus on detector-aided surface surveys that will provide data on MEC on the ground surface and in the shallow subsurface. The use of transects will allow a broad-based approach focused on determining the extent of concern.

2. No geophysical surveys will be conducted at this time. CH2MHill strongly suggested limiting geophysics because of interferences in the area.

3. If an explosive device is identified (MEC item), Mayport DoD would respond. CH2MHill stated that their contract could be used, if needed, if a device needed to be blown in place.

4. CH2MHill will stop work on the Conceptual Site Model (CSM), and Tetra Tech will complete the CSM as part of the SAP.

5. A logging company was used for clearing during the CH2MHill investigation. This investigation will not require vegetation clearance; however, if limited clearing is required, the UXO field team will do the clearing.

SAP Worksheet #9 -- Project Scoping Session Participants Sheet

Project Name: NAS Cecil Field, MEC RI **Projected Date(s):** 2010 **Project Manager/Base Coordinator:** Robert Simcik **Technical Lead:** Linda Klink	**Site Name:** OU 5, Site 15, Blue 10 Ordnance Disposal Area **Site Location:** NAS Cecil Field, Jacksonville, Florida

Date of Session: February 3, 2010
Scoping Session Purpose: Data Quality Objectives Meeting and Site Visit

Name	Title	Affiliation	Phone Number	E-Mail Address	Project Role
Gregory Fraley	U.S. EPA RPM	U.S. EPA Region 4	404.562.8544	fraley.gregory@epa.gov	U.S. EPA Regulator
David Grabka	FDEP RPM	FDEP	850.245.8997	david.grabka@dep.state.fl.us	State Regulator
Art Sanford	Navy RPM	BRAC PMO SE	843.743.2135	art.sanford@navy.mil	Navy Project Manager
Linda Klink	Technical Lead	Tetra Tech	412.921.8650	linda.klink@tetratech.com	Task Project Manager
Jeff Fournier	UXO Specialist	Tetra Tech	770.413.0965 x227	jeffrey.fournier@tetratech.com	UXO Technical Lead
Peggy Churchill	Environmental Specialist	Tetra Tech	321-636-6470 x1300	peggy.churchill@tetratech.com	Facilitator
Mark Jonnet	EGIS Specialist	Tetra Tech	(412) 921-8622	mark.jonnet@tetratech.com	EGIS Specialist
Rob Simcik	PM/Base Coordinator	Tetra Tech	412.921.8163	robert.simcik@tetratech.com	Project Manager
Mike Halil	PM	CH2MHill	904.777.4812 ext. 233	michael.halil@CH2M.com	RAC
Sid Allison	Tier II Link	CH2MHill	843.242.8018	sidney.allison@CH2M.com	Advisor

Discussion

Tetra Tech provided a presentation including general information on DQOs, general information on detector-aided survey equipment and methodology, and a preliminary plan for the investigation. Site 15 is a known MEC site with partial remediation already conducted. Therefore, the overall site-specific focus

is to cover as large an area as possible where MEC is suspect to determine the extent of possible MEC, consistent with the LUC already in place and building on the previous partial remediation.

Action Items

- Tetra Tech will include in the pending SAP an overlay of the LUC boundary on the planned investigation map to ensure that the investigation does not extend off property, if additional transect segments for investigation are added in the field.

Consensus Decisions

MC

1. There is no reason to include MC sampling at this time based on the previous extensive sampling effort. This conclusion should be supported in an appendix to the SAP.

MEC

1. The team agreed on the general broad-based approach to determine the general extent of potential MEC using detector-aided surveys.

2. This investigation will be an RI, a PA/SI and partial remediation were previously conducted. If the subject RI results are consistent with the CSM, the Project Team will proceed to remedial action. However, if the subject RI results are inconsistent with the CSM, further RI will be needed.

3. The Project Team agreed with NOSSA's advice to ultimately address the top 1 foot of soil, based on 6 inches plus a 6-inche buffer, to comply with the LUC in place for low-intensity recreational use. As a result, the previously conducted CH2MHill remediation will be considered cleared to depth, and no further investigation of these cleared grids is necessary.

4. Based on the shallow depth of concern, the Project Team agreed with the approach of using detector-aided surface surveys that can detect items on the surface, as well as provide information on the presence of anomalies in the shallow subsurface.

5. The Project Team recognizes that results generated from the detector-aided survey of the shallow subsurface will be semi-quantitative but still valuable in assessing the extent of anomalies that could

be indicative of MEC. The work will proceed outward from known MEC/MD grids to better assess the reduction in anomalies from the "source" areas.

6. No intrusive investigation is necessary because results from the previous remedial action are sufficient to characterize MEC.

7. The proposed locations of transects were accepted by the Project Team with the rationale of addressing grids near previously encountered MEC and MD grids, access roads, and former open areas of the former skeet and trap ranges.

8. Additional transect segments, either "step-outs" or more closely spaced transects, will be added in the field as necessary to meet the objectives. The Project Team agreed that this decision could be made in the field by Tetra Tech without regulatory agency involvement, provided that the decisions that are made are supported in the RI Report.

9. Concerning vegetation management, it is not necessary or efficient to cut down large pine trees at the outer boundaries of the site. Only brush cutting will be necessary to accomplish objectives. A meandering path for the detector-aided survey will be used (instead of a straight path) where pine trees interfere with the transect lane.

10. The RI needs to be expedited to be conducted in spring 2010 because Site 15 is the last parcel for transfer and because of hot weather conditions, if field work were to be conducted in the summer. U.S. EPA and FDEP agreed to expedite their review based on their concurrence with the plan presented at the subject DQO meeting.

SAP Worksheet #10 -- Problem Definition, Site History and Background

(UFP-QAPP Manual Section 2.5.2)

10.1 FACILITY BACKGROUND

NAS Cecil Field (U.S. EPA ID No. FL5 170 022 474) is located 14 miles southwest of Jacksonville, Florida. **Figure 10-1** shows the general location map of NAS Cecil Field. The majority of Cecil Field is located within Duval County, and the southernmost part of the facility is located in Clay County. NAS Cecil Field was established in 1941 and provided facilities, services, and material support for the operation and maintenance of Naval weapons, aircraft, and other units of the operation forces as designated by the Chief of Naval Operations. NAS Cecil Field was placed on the National Priorities List (NPL) by the U.S. EPA in December 1989. An FFA was signed for NAS Cecil Field by the Navy, U.S. EPA, and FDEP in 1990. Pursuant to the FFA, the Navy has conducted RIs and response actions under CERCLA authority.

NAS Cecil Field is subject to the Base Realignment and Closure Law of 1993. Since the closure of NAS Cecil Field in September 1999, most of the facility has been transferred to the Jacksonville Port Authority (now Jacksonville Aviation Authority) and the City of Jacksonville. According to the reuse plan, the facility will have multiple uses, but will be used primarily for aviation-related activities.

10.2 SITE 15 REGULATORY STATUS

OU 5, Site 15, Blue 10 Ordnance Disposal Area, covers approximately 85 acres and was historically used for ordnance disposal. Following an RI that identified polynuclear aromatic hydrocarbon (PAHs), metals (arsenic and lead), and total recoverable petroleum hydrocarbons (TRPH) soil contamination that required remediation, a ROD for OU 5, Site 15, was signed in June 2008 for selection of a remedy for these chemical contaminants (Tetra Tech, 2008). Remedial activities were conducted in 2008 and 2009 in accordance with the ROD and included soil excavation, on-site solidification/stabilization, and off-site treatment and disposal of contaminated soil to allow low-intensity recreational reuse of the site (AGVIQ-CH2MHill, 2009).

An LUC RD, prepared by Tetra Tech in 2009, provides specifications to limit land use to low-intensity recreational activities consistent with the property's proposed reuse as a natural resource corridor. Medium- and high-intensity recreational, residential, and commercial/industrial uses are not permitted. Low-intensity recreational use consists of activities such as hiking, biking, horseback riding, birding, and hunting. No man-made attractions will be provided that would entice people, particularly small children, to frequently visit the site, which is consistent with the property's proposed reuse as a natural resource

corridor. Medium-intensity recreational use includes picnicking and camping and high-intensity recreational use includes children's playgrounds and contact sports such as baseball, football, and soccer. LUCs also prohibit excavation of soil from Site 15 without prior written approval from the Navy, U.S. EPA, and FDEP (Tetra Tech, May 2009). **Figure 10-2** provides a general arrangement of Site 15 overlain by the controlled land use parcel boundaries.

10.3 SITE 15 DESCRIPTION AND HISTORY

Site 15, Blue 10 Ordnance Disposal Area, is located in the southwestern section of the Yellow Water Weapons Area (YWWA) of NAS Cecil Field. The site covers approximately 85 acres and is relatively flat. Site 15 was used for ordnance disposal from the 1960s to 1977, and disposal consisted of burning of ordnance materials in a large metal burn chamber and static firing of rockets. The skeet and trap ranges were formerly at the site from the early 1940s to the mid 1950s. The former skeet and trap ranges were approximately 1,000 feet by 2,400 feet in size, with the long axis of the range being parallel to and east of the existing access road. **Figure 10-2** shows the general arrangement of Site 15.

The ordnance disposal structures were located west of the skeet and trap ranges. The majority of ordnance disposed at the site was burned and included small arms munitions up to 20 millimeters (mm) in size, parachute and distress flares, Mark IV signal cartridges, rocket igniters, cartridge activated devices, and 2.75-inch and 5-inch rockets. Rocket propellant also was reportedly placed on the ground and ignited in the area of the burn chamber. Rocket motors were disposed by static firing of both 2.75-inch and 5-inch rockets from a firing pad located south of the burn chamber. An estimated 2.5 tons of ordnance were disposed at the site each month; overall, an estimated 350 tons of ordnance were disposed at the site while it was in operation.

In the 1980s, environmental investigations were initiated that included soil, groundwater, sediment, and surface water sampling. These investigations showed that Site 15 soil was contaminated with PAHs, metals (arsenic and lead), and TRPH. A ROD to address the chemical contamination was signed in 2008, and remedial action was conducted in 2008 and 2009 to remove contaminated soil from 17 excavation areas (A through Q as shown on **Figure 17-1**) with concentrations in excess of cleanup goals. Chemical contamination at Site 15 has been addressed through the remedy (Tetra Tech, 2009).

Because historical activities at Site 15 included munitions operations, a munitions survey was first conducted for safety purposes in and around the planned soil excavation areas to address any MEC hazards. MEC and MD were located during the munitions survey and were removed from excavation areas before soil excavation operations commenced. Note that the MD terminology in effect at the time of the remediation has since been replaced with MDAS.

10.4 SITE 15 PREVIOUS MEC INVESTIGATION/REMEDIATION

Based on the findings of an MEC PA/SI conducted in 2007 by CH2MHill, MEC removal was necessary before the 2009 soil remedial action could proceed.

Until 2008, the ordnance burn chamber and static rocket firing pad located in the north-central portion of the site were the only structures related to historical activities that remained at the site. The burn chamber was a rounded, steel, tank-like container, approximately 10 feet in length and 4 feet in height. The static rocket firing pad was an L-shaped concrete structure approximately 10 feet long by 4 feet wide by 6 feet high. The burn chamber and firing pad were removed in 2008 as part of remedial activities. Several concrete building foundations (remnants of buildings that supported skeet range and trap range activities), located in the area surrounding the burn chamber and firing pad, were also removed in 2008.

The MEC removal included subdivision of Site 15 through land survey into 100 foot by 100-foot grid cells, vegetation reduction, MEC surface clearance, digital geophysical mapping (DGM) with EM61-MK2 time-domain metal detection and identification of target anomalies, manual and mechanical-aided intrusive investigation of target anomalies identified through DGM, and demolition of MEC items. The munitions survey included 100-percent clearance (to 2 feet bgs) and removal of MEC and MD from the grids included in the survey. **Figure 10-3** depicts the grids with vegetation reduction and the results of the munitions clearance for the grids where clearance was conducted. The munitions clearance included a geophysical prove-out (GPO) for testing of equipment and personnel and other appropriate QC as discussed further in the Remedial Action Completion Report - Soil Removal Action (AGVIQ-CH2MHill, August 2009).

The table below provides MEC items identified and removed during the clearance. All of the MEC items were encountered in and around the former ordnance disposal area. MD was found in and around the ordnance disposal area, in the former skeet and trap range areas, and along access roads to the ordnance disposal area. Additional detail on the items found and removed are provided in **Appendix A-2** of this SAP.

Grid	MEC items found	Surface or Subsurface
A2J8	One 20 mmTP projectile full up	Subsurface
A3H3	One 20 mmTp projectile full up	Surface
A3H4	One M204 Practice mine Fuze	Subsurface
A3I3	Six M204 Practice mine Fuzes	Subsurface

Grid	MEC items found	Surface or Subsurface
A3J3	Two M204 Practice Mine Fuzes	Subsurface
B2A7	Two M204 Practice Mine Fuzes and one M112 Photoflash cartridge	Subsurface
B2A8	One M208 20 mm TP	Surface
B2A9	Two 20 mm Tp projectiles full up	Subsurface
B2C0	Three M204 Practice Mine Fuzes	Subsurface
B2C6	One 20 mm projectile HE	Subsurface
B3A1	One aircraft launched flare	Surface
B3B1	Two Mk4 Spotting Charges	Subsurface
B3B2	One M204 Practice Mine Fuze	Subsurface
B3B3	Two M204 Practice Mine Fuzes	Subsurface
B3C1	One BLU – 26/B Submunition Inert Bomblet	Subsurface
B3D3	One M204 Practice Mine Fuze	Subsurface

10.5 SITE 15 CSM SUMMARY FOR MEC SITE INVESTIGATION

This section provides the CSM summary based on information available to date and the November 2009 site walk conducted by Navy representatives and Tetra Tech personnel (see **Appendix B** for site photographs). As discussed in Section 10.3 and in further detail in **Appendix A-1**, chemical contamination at Site 15 has been addressed through the CERCLA remedy; therefore, this RI is focused only on MEC investigation and so the following discussion of the CSM focuses on MEC-related information.

The following subsections present the site environmental setting, potential or known sources of MEC, and MEC migration pathways, and receptors. **Figure 10-2** shows general site features, and **Figure 10-3** shows the remedial action areas and provides the CSM for MEC at Site 15.

10.5.1 Physical and Environmental Characteristics

The following section provides information that was presented in documents prepared to support previous site investigations, including climate, topography, geology, soil and vegetation types, hydrology, hydrogeology, cultural and natural resources, and threatened, endangered, and protected species.

Climate

The climate in Jacksonville, Florida, is humid subtropical. From 1971 through 2000, the mean annual rainfall was approximately 52 inches, and the mean annual temperature was 68 degrees Fahrenheit. Most of the annual rainfall occurs in the late spring/early summer, and winters are generally mild and dry.

Topography

Overall, Site 15 is flat (ABB-ES, 1997). Much of the OU5 area is swampy throughout the year, with sections of the area under water for parts of the year. Land surface elevations range from approximately 72 to 80 feet National Geodetic Vertical Datum (NGVD) at Site 15.

Geology

OU 5 is underlain by undifferentiated fine-grained sand, lenses and stringers of silty or clayey material may be encountered intermittently. The stringers are generally less than 1 inch thick and are not continuous. Lithologic descriptions recorded during monitoring well installation at OU 5 indicate that sand is present at each of the monitoring well locations from ground surface to the total depth, a maximum of 14 feet bgs (ABB-ES, 1997).

Cross sections showing Site 15 lithology were not generated during the RI and were not prepared as part of this SAP because of the homogenous lithology and shallow depth to groundwater. **Appendix A-1** of this SAP provides information on site lithology from the Site 15 monitoring well boring log provided in the RI Report, along with the location of the site monitoring well.

Soil and Vegetation Types

Three soil types cover Site 15 in nearly equal percentages, the Olustee Fine Sand, Leon Fine Sand, and Ridgeland Fine Sand. Each of the three soil types is described as a nearly level poorly drained soil found in broad flatwood areas. Natural vegetation on these soil types consists predominantly of oak, pine, and saw palmetto. Depth to groundwater is very shallow in these soil types, and permeability through the upper 6 inches is moderate to rapid (Tetra Tech, 2008). Six wetland areas are present that cover a combined area of approximately 4.6 acres (Tetra Tech, 2008).

Several forest fires have occurred in an area of stressed vegetation, referred to as the forest burn area, in the southwestern portion of the site (see **Figure 10-2**). Several slash pines are partially burned in this area. Controlled burns were commonly undertaken in this area to manage understory growth in the planted pine forest. The latest burning event took place in spring 1999 (AGVIQ-CH2MHill, 2009).

Current-day soil and vegetation types are depicted on the CSM of **Figure 10-3**. Before remedial activities to remove contaminated soil, which necessitated vegetation clearance over a large portion of the site, the entire area was heavily forested. Currently, outside of the area where vegetation was removed as part of the 2008/2009 remedial action, the site remains heavily forested, primarily with slash pine and understory vegetation. The site also includes low shrub and brushland vegetation, particularly in areas where vegetation was removed in 2008. Previously excavated areas for contaminated soil removal are now readily visible as unvegetated, sandy areas due to backfill with clean sandy soil. Some minor stands of trees were identified between the areas cleared of vegetation. Trees are also sparser in the areas where controlled forest burns were formerly conducted.

Hydrology

Drainage is limited because only two drainage pathways (ditches) intersect the general area of the site. Flow through the drainage ditches is intermittent, depending on rainfall, and ultimately drain into Yellow Water Creek located southwest of Site 15.

Hydrogeology

Three water-bearing systems are present beneath Site 15, including in descending order, the surficial aquifer system, intermediate aquifer and confining units, and Floridan Aquifer system. Only the surficial aquifer was investigated at Site 15 during the RI of chemical contamination. **Appendix A-1** of this SAP provides the Site 15 monitoring well boring log provided in the RI Report along with the location of the site monitoring well that was the basis of no further action for groundwater. The surficial aquifer at Site 15 is composed predominantly of sand from the ground surface to an approximate depth of 66 feet bgs. The water table is unconfined beneath the site and ranges between 1 and 4 feet bgs during the year, depending on rainfall events.

Cultural and Natural Resources

No existing cultural resources were identified for Site 15. As provided in the ROD, the Jacksonville Economic Development Commission (JEDC) Reuse Plan provides for future use of Site 15 as a natural and recreation corridor. The remedy for Site 15 was selected to allow for the planned future use (Tetra Tech, 2008).

Threatened, Endangered and Special Status Species

The gopher tortoise, considered as threatened by the Florida Committee on Rare and Endangered Plants and Animals (FCREPA), was identified at Site 15. As part of the Site 15 remedial action for soil contamination, gopher tortoise burrows identified in the planned soil excavation areas were relocated to an area west of the main area cleared of vegetation (AGVIQ-CH2MHill, 2009). In addition, the indigo snake is considered a special status species and a protection plan was put in place by NAS Cecil Field.

Access/Controls/Restrictions

Site 15 is currently not used and is a controlled area accessible only through access gates. The JEDC Reuse Plan provides for future use of the site as a natural and recreational corridor. In accordance with the ROD, the LUC RD allows for low-intensity recreational uses including activities such as hiking, biking, horseback riding, birding, and hunting. No man-made attractions can be provided that would entice people, particularly small children, to frequently visit the site, which is consistent with the property's proposed reuse as a natural resource corridor. Medium- (picnicking and camping) and high-intensity (children's playgrounds and contact sports) recreational uses are not permitted. Residential and industrial/commercial uses are also prohibited.

10.5.2 Potential or Known Sources of MEC

It appears that the areas containing MEC and MDAS [MD] at Site 15 are associated with the ordnance disposal area and cleared or accessible areas (e.g., former skeet and trap ranges and access roadways) where disposal associated with ordnance operations occurred. **Table 10-1** below provides a summary of the areas of concern for MEC based on the current-day CSM, and discussion of each area is provided herein. Additional details on MEC encountered during the soil excavations are provided in **Appendix A-2**.

Table 10-1 – Site 15 MEC Summary of Concerns

MEC Areas of Concern	Munitions Items			Estimated Dates of Operation and Notes
	Type	Observed[(1)]	Potential	
Skeet and Trap Range Areas	MDAS [MD][(2)]	√	√	- 1940s to 1950s. - Area 1,000 feet by 2,400 feet. - MDAS [MD] likely associated with ordnance disposal operations and present because the area was formerly open when used as a range.

MEC Areas of Concern	Munitions Items			Estimated Dates of Operation and Notes
	Type	Observed[1]	Potential	
Ordnance Disposal Area - Burn Chamber - Static Firing Pad - Historical operational area outline	MEC items/MDAS[MD] [2]	√	√	- Mid-1960s to 1977. - MEC and MDAS [MD] were found in and adjacent to the area identified as the Ordnance Disposal Area.
Miscellaneous Disposal along Access Roads	MDAS [MD][2]	√	√	- Unknown dates; assumed to be mid-1960s to 1977 as for Ordnance Disposal Area. - MDAS [MD] likely present due to easy accessibility.

1 MEC and MD were observed and removed as a safety measure from those areas that were included in the 2008 munitions survey, prior to contaminated soil excavation: **Figure 17-1** indicates the results of the munitions survey and areas where MEC and/or MD were found and removed or where no MEC or MD were found.
2 MEC found included practice mine fuzes, TP projectiles, and photoflash cartridges. MD found included cartridge and flare cases, banding pieces, flare canisters, small arms, and shot gun primer (see table in **Appendix A-2**).

10.5.3 MEC Migration Pathways and Receptors

MEC and MDAS [MD] from ordnance disposal activities were found in portions of Site 15 where munitions clearance was conducted as part of remedial activities in 2008/2009. MEC and MDAS [MD] were found in surface and subsurface soil. Migration of MEC is expected to be negligible as MEC would not be expected to move within soil. Human exposure to MEC would only occur at a given location where MEC is present (e.g., picking up an item, inadvertently kicking an item). MEC is anticipated to be in areas used for munitions disposal and adjacent areas. MDAS [MD] is anticipated in surface soil in the formerly open skeet and trap range areas, munitions disposal area and adjacent areas, and along access roads to the disposal area.

Based on the LUC RD, the only potential human receptors at this site are low-intensity recreational users (e.g., bikers, hikers, and bird watchers). The site is currently not used and access is restricted; therefore, these recreational users are considered future potential users who could be exposed to MEC and MDAS [MD], if present, at the ground surface and in shallow subsurface soil (generally the top 1 foot of soil which includes a 6-inche buffer zone), particularly in the MEC suspect areas of concern.

The area is considered a natural resource corridor, and birds, mammals, and reptiles are present at the site. In particular, gopher tortoises are known to be present at the site. As part of remedial action in 2008, gopher tortoises in the vegetation removal area were relocated to the west of the vegetation removal area (north of excavation area C and west of excavation areas J and G) (see **Figure 10-3**).

10.6 PROBLEM STATEMENT

Based on historical site activities and the occurrence of MEC and MDAS [MD] in portions of Site 15 where a munitions survey was previously conducted to support the remedial action to remove PAH-lead-arsenic- and TRPH-contaminated soil, the likelihood exists that MEC are present in areas of Site 15 that were not surveyed as part of the remedial action. MEC was found in remedial areas within and adjacent to the ordnance disposal area, and MDAS [MD] was found in the ordnance disposal area, former skeet and trap range areas, and along access roads to the ordnance disposal area.

The munitions survey in 2008 only included areas where soil remedial activities were being conducted; therefore, MEC and MDAS [MD] are likely present in unsurveyed areas that may be a concern for recreational users at the site (future) at the ground surface and shallow subsurface (0 to 1 foot bgs that includes a 6-inch buffer zone). MDAS [MD] may be present that, although not a safety hazard concern, may provide information as to where historical operations occurred that may additionally include MEC. Site investigation is needed to determine whether MEC and MDAS [MD] are present in unsurveyed areas adjacent to where MEC and MDAS [MD] were previously found and removed and to determine the general extent of these items.

An evaluation of the chemical contamination at Site 15 investigation is provided in **Appendix A-1** and concludes that chemical contamination has been adequately investigated and remediated; further investigation of chemical contamination as part of the subject RI is not required at this time. Based on the extensive investigation of chemical contamination that was previously conducted, MEC and MDAS [MD] are not expected to be present beyond the area of chemical contamination investigation at Site 15. Further investigation of chemical contamination is not required unless MEC are found outside of the area previously investigated for chemical contamination.

SAP Worksheet #11 - Data Quality Objectives for MEC Investigation at Site 15

11.1 IDENTIFY THE GOAL OF THE STUDY

The primary goal of the MEC RI is to determine whether MEC (ferrous and non-ferrous)/material potentially presenting an explosive hazard (MPPEH) are present on the ground surface or suspected to be present in the shallow subsurface in areas of Site 15 that have not undergone investigation to date and, if present, to delineate the general extent of MEC/MPPEH. The RI will focus on whether MEC/MPPEH are present in previously unsurveyed areas of the site that are most likely to have MEC/MPPEH based on the CSM, such as within and adjacent to the former ordnance disposal area, former skeet and trap range areas, and along access roads to the ordnance disposal area. If MEC/MPPEH or related MDAS [MD] is found at the outer boundaries of the planned survey area, the Project Team will extend the given transect segment as part of the RI. If MEC/MPPEH are not found at the perimeter of the investigation areas, then transects will not be extended beyond the initially planned survey areas.

[Note: Anomaly avoidance will be followed during the RI; therefore, if found to be present, MPPEH cannot be moved and will not be segregated into MDAS and material documented as an explosive hazard (MDEH) until future continued RI activities or future remedial actions.]

11.2 IDENTIFY INFORMATION INPUTS

Data and information that will be gathered from portions of the site that are likely to contain MEC/MPPEH on the ground surface and within the shallow subsurface and used for decision making include:

- Results of the UXO detector-aided survey in the established RI survey areas over transects in both the north-south and east-west directions at 100-foot intervals to determine the presence and general extent of MEC/MPPEH.

- Results of the UXO detector-aided survey from additional transects, if determined necessary in the field after completion of the initially planned survey transects to determine the presence and general extent of MEC/MPPEH.

- A GPS or compass/tape will be used to establish transect lines and to flag locations with potential ground surface MEC/MPPEH or MDAS [MD].

11.3 DEFINE BOUNDARIES OF THE STUDY

The 100-foot grids developed as part of the remedial action (see **Appendix A-1**) provide the spacing for the RI survey transects at 100-foot intervals. Up to 30 additional transects may be added as step-outs or to address closer spacing. Previously unsurveyed grids within and immediately adjacent to the ordnance disposal area have the greatest potential to contain MEC/MPPEH based on the results of the 2008 survey; therefore, additional transects at 50-foot intervals parallel to and between initial transects may be added in these grids following evaluation of the initially collected transect survey data to provide more closely spaced information. Similarly, additional transects may be added as step-outs from the initially collected transect survey data. The addition of these transects to the initial RI survey transects will be determined based on the results of the initial survey and at the discretion of the Tetra Tech UXO Manager, Technical Lead, and SUXOS.

The planned survey areas that are the initial focus of the RI include:

- Portions of the areas cleared of vegetation in 2008 that were not previously surveyed for munitions in the portions of the site used for ordnance disposal.
- The associated previously open land area formerly used as skeet and trap ranges.
- Areas along the access roads to this area.

Areas previously investigated/cleared of munitions during the 2008/2009 soils remediation effort do not require further investigation and are not included in the planned survey area. As shown on **Figure 10-3**, these areas include areas cleared of vegetation where no MEC or MDAS [MD] was found and areas where MEC and/or MDAS [MD] were found and cleared.

To generally delineate the extent of potential MEC/MPPEH, data will be collected from areas that are 100 to 200 feet (200 feet where proximity to roads, operational areas, and previous MEC/MDAS [MD] findings support a greater distance) beyond where MEC and MDAS [MD] were previously found or operations occurred that may have resulted in MEC. Some of these areas may be outside of the cleared vegetation area and may be heavily vegetated with trees. Survey transects of 100-foot spacing established along generally straight lines, avoiding trees or other obstructions, will provide information on the potential presence of MEC/MPPEH hazards. Surface soil to a depth of 6 inches bgs is the expected vertical depth for exposure based on permitted land use (low-intensity recreational activities; however, because of potential erosion, or other changes to the ground surface, a buffer of an additional 6 inches is warranted, resulting in a total vertical depth of 1.0 foot bgs. The objective of the instrument selection is to identify ferrous and non-ferrous MEC to a depth of 1 foot as confirmed by an instrument verification system.

Depth requirements in areas where the RI shows potential MEC/MPPEH hazards would be determined as part of continued RI or remedial action.

Groundwater is shallow at the site, generally ranging from 1 to 4 feet bgs depending on rainfall events. Although the majority of the site is dry most of the year, portions of the site may have 2 to 4 inches of standing water during portions of the year. The rainy season in the area is from June to September and is the most likely time that standing water would be present in portions of the site. Temporal boundaries include limitations of implementing the survey as a result of a rainfall event.

11.4 DEVELOP THE ANALYTIC APPROACH

The decision rule for this investigation is as follows:

The site is a known MEC site, and remedial action for MEC will be required in the future. The CSM is based on the PA/SI results, previous MEC investigation, and assumption that MEC/MPPEH will be found on the surface or in the shallow subsurface within the former operational areas during this investigation. If the RI results support this assumption, then enough data will have been collected such that the Project Team can proceed with remedial action. However, it is possible that MEC may be found on the surface or indicated in the subsurface along transects that extend well beyond the former operational areas. These results would not support the current CSM or assumptions about where MEC/MPPEH is currently located at the site. Therefore, the decision rules are based on gaining information during the RI surface survey that either supports or disputes the current CSM, as follows:

- If the results of the detector-aided UXO survey indicate that MEC/MPPEH are potentially present in previously unsurveyed areas adjacent to or within the former operational areas and findings are consistent with the CSM, then proceed to remedial action.

- If the results of the detector-aided UXO survey indicate that MEC/MPPEH are potentially present in previously unsurveyed areas beyond the former operational areas, then the findings are NOT consistent with the CSM, and a continued RI to address data gaps is necessary as a next step.

11.5 SPECIFY PERFORMANCE OR ACCEPTANCE CRITERIA

The areas most likely to have MEC/MPPEH based on historical site activities and previous munitions survey results will be investigated for the presence of suspect MEC/MPPEH. The survey will focus on areas of the site that, based on the CSM, may contain suspect MEC/MPPEH. The Project Team will use the results of the investigation to verify that all proposed data were collected, that the data meets

quality specifications of this SAP, especially adherence to method-specific quality specifications identified in **Worksheets #35** and **#36**. The Project Team will review the survey results and ensure that all stakeholder viewpoints are included in decision making. **Worksheet #37** describes the data usability assessment process, which goes beyond an evaluation of method-specific quality evaluations to include evaluations of planning assumptions and other factors. This will involve a review of survey coverage and anomaly patterns by the Project Team to determine if they are representative of suspect MEC/MPPEH.

11.1.6 DEVELOP THE PLAN FOR OBTAINING DATA

The proposed RI field data collection program for Site 15 is described in detail in **Worksheet #17**.

SAP Worksheet #12 -- Measurement Performance Criteria Table

(UFP-QAPP Manual Section 2.6.2)

Definable Feature of Work Data Type	Geophysical Anomaly Measurement Data Quality Indicator	QC Sample and/or Activity to Assess Measurement Performance	Measurement Performance Criteria	Frequency
Site Preparation (including mobilization)	Completeness	Verify that approved project plans are reviewed and signed Verify that equipment needed is on site Verify that communications needed are on site and working Verify emergency services Verify site-specific training	Approved project plans reviewed and signed All equipment needed is on site Communications checked Emergency services checked Site-specific training completed	Once
Site Survey	Accuracy	Verify that site boundaries have been established Verify that survey transects have been established	Site boundaries have been established Survey transects have been established in accordance with the MRP **SOP 05**	Once
Vegetation Management	Completeness	Verify that vegetation has been removed in accordance with MRP SOP 06	Vegetation cut to > 6 inches and < 12 inches	As needed

Definable Feature of Work Data Type	Geophysical Anomaly Measurement Data Quality Indicator	QC Sample and/or Activity to Assess Measurement Performance	Measurement Performance Criteria	Frequency
UXO Detector-Aided Surface Survey – Transect	Precision	Resurvey transect to perform a direct comparison to field data collected during detector-aided surface survey	Detect all metallic (both ferrous and nonferrous) objects 20 mm or larger on surface	Resurvey 25% of first four transects and after any failure, then 10% of remaining transects after four transects in a row pass QC. If any transect does not pass QC, UXO team will resurvey entire transect and another QC check will be performed.
		Blind seeds items	Discover and record all blind seeds placed in transect.	Blind seed items will be placed on the surface into the duff, or if duff is not present, covered with duff from another location, at locations within each transect prior to surface survey operations. At least one blind seed item, and no more than six, will be placed in each transect (daily lot of work). If any transect does not pass QC, UXO team will resurvey entire transect and another QC check will be performed.

Definable Feature of Work Data Type	Geophysical Anomaly Measurement Data Quality Indicator	QC Sample and/or Activity to Assess Measurement Performance	Measurement Performance Criteria	Frequency
GPS Positional Data	Real-Time Accuracy	Horizontal Dilution of Precision (HDOP) and number of satellites	HDOP < 3, number of satellites at least four	Ongoing
	Accuracy	GPS positioning - comparison with two known locations	Sub-meter	At the beginning and end of each day
Demobilization	Completeness	Verify that sites have been restored and all equipment is inspected, packaged, and shipped to appropriate location	Temporary markers removed and Instrument Verification Strip (IVS) seed holes are filled. All equipment is off site and has arrived at the appropriate location	Once at the end of field operations
Site-Specific Final Report Preparation and Approval	Completeness	QC of MEC Tracking Log and Daily Field Reports	Ground Surface: Quantitative tabulation of MEC items discovered during the RI is included in the MEC Tracking Log Shallow Subsurface: Semi-quantitative tabulation of anomalies for each transect segment Daily Field Reports are complete and accurate MEC Hazard Assessment complete	Once at the end of field operations prior to demobilization

Explanations for the criteria listed above area contained in **Worksheet #22**.

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

(UFP-QAPP Manual Section 2.7)

Secondary Data	Data Source (originating organization, report title and date)	Data Generator(s) (originating organization, data types, data generation / collection dates)	How Data Will Be Used	Limitations on Data Use
None	NA	NA	NA	NA

SAP Worksheet #14 -- Summary of Project Tasks

(UFP-QAPP Manual Section 2.8.1)

Implementation of the MEC investigation has been divided into definable features of work, and the tasks required to complete each definable feature of work have been identified. Procedures for these tasks, including recording data, forms and checklists, data generation, QC checks, data management, and information management, are defined in the SOPs for the project indexed in **Worksheet #21**.

Definable Feature of Work	Tasks
Site Preparation (including mobilization)	• Prepare Project Plan (SAP review, GIS setup, review documentation and data management procedures, approve SAP and subcontractors, and schedule confirmed) • Verify personnel qualifications • Coordinate with local authorities and establish communication logistics • Set up administrative offices • Equipment setup and checkout • Remove surface non-munitions related debris, as applicable • Initial orientation and training (including Safety and Emergency Response)
Site Survey	• Survey site boundaries with GPS or conventional means • Survey transect corners with GPS or conventional means As necessary, survey transect endpoints with GPS or conventional means
Vegetation Management	• Check equipment for proper height • Complete UXO Escort and MEC avoidance • As necessary, cut vegetation to proper height
Detector-Aided Survey	• Detector-aided survey to locate MEC/MPPEH on ground surface and characterize the extent of anomalies (none, low, medium, or high) that could be shallow subsurface MEC/MPPEH • Record location (GPS and photograph) of MEC/MPPEH on the ground surface • UXO Escort duties
GPS Positional Data	• Twice daily (once at the beginning and end of each day) comparison with two known locations • Continually monitor HDOP parameters
Demobilization	• Remove temporary survey markers • Verify site restoration • Complete all field forms • Close out field logbooks • Return equipment • Provide all field documentation (verify requirements established in the SAP)

Definable Feature of Work	Tasks
Site-Specific Final Report Preparation and Approval	• Close out MEC tracking log • Collect all documentation from field activities • Prepare site-specific final report • Receive approval of site-specific final report

SAP Worksheet #15 – Reference Limits and Evaluation Table

(UFP-QAPP Manual Section 2.8.1)

☑ **Worksheet Not Applicable**

This worksheet applies to chemical analysis and reporting, and is not applicable to this UFP-SAP for MEC surveys/investigations.

SAP Worksheet #16 -- Project Schedule/Timeline Table

(UFP-QAPP Manual Section 2.8.2)

Activity	Organization	Dates (MM/YYYY)	
		Anticipated Date(s) of Initiation	Anticipated Date of Completion
Prepare Draft RI MEC SAP	Tetra Tech	----	03/01/2010
Submit Draft RI MEC SAP	Tetra Tech	03/01/2010	03/01/2010
Review	Navy	03/01/2010	03/17/2010
Receive Comments/Comment Resolution	Tetra Tech	03/17/2010	03/24/2010
Prepare Draft Final RI MEC SAP	Tetra Tech	03/24/2010	03/30/2010
Submit Draft Final RI MEC SAP	Tetra Tech	03/31/2010	03/31/2010
Review	Navy, FDEP, U.S. EPA	03/31/2010	04/19/2010
Receive Comments/Comment Resolution	Tetra Tech	04/19/2010	04/26/2010
Prepare Final RI MEC SAP	Tetra Tech	04/26/2010	04/29/2010
Submit Final RI MEC SAP	Tetra Tech	04/30/2010	04/30/2010
Field Investigation	Tetra Tech	05/09/2010	05/28/2010
Prepare Draft RI Report	Tetra Tech	06/01/2010	07/15/2010
Submit Draft RI Report	Tetra Tech	07/16/2010	07/16/2010
Review	Navy	07/16/2010	07/29/2010
Receive Comments/Comment Resolution	Tetra Tech	07/29/2010	08/06/2010
Prepare Draft Final RI Report	Tetra Tech	08/06/2010	08/13/2010
Submit Draft Final RI Report	Tetra Tech	08/16/2010	08/16/2010
Review	Navy, FDEP, U.S. EPA	08/16/2010	09/17/2010
Receive Comments/Comment Resolution	Tetra Tech	09/17/2010	09/30/2010
Prepare Final RI Report	Tetra Tech	09/30/2010	10/08/2010
Submit Final RI Report	Tetra Tech	10/09/2010	10/09/2010

SAP Worksheet #17 -- Project Design and Rationale

(UFP-QAPP Manual Section 3.1.1)

SAMPLING DESIGN AND RATIONALE

This section describes in detail the approach, methods, and operational procedures Tetra Tech will use to conduct UXO detector-aided surface surveys to identify surface and shallow subsurface anomalies potentially related to MEC. The data collected will be used to evaluate suspected anomalies in the approximately 5-foot-wide lanes associated with each transect in the survey area. Specifically, this SAP worksheet documents the site-specific application of geophysical sensors, navigation equipment, data analysis, data management, and associated equipment and personnel in a manner capable of meeting the site-specific project performance goals as presented in **Worksheet #11**.

Definable Feature of Work	SOP	Supporting Document(s)
Site Preparation (including mobilization)	**MRP SOP 01, MRP SOP 03**	UFP-SAP
Site Survey	**MRP SOP 05**	UFP-SAP
Vegetation Management	**MRP SOP 06**	UFP-SAP
UXO Detector-Aided Surface Survey – Transects	**MRP SOP 01, MRP SOP 02, MRP SOP 05**	UFP-SAP
GPS Positional Data	**MRP SOP 05**	UFP-SAP
Demobilization	NA	UFP-SAP
Site-Specific Final Report Preparation and Approval	NA	UFP-SAP

SITE PREPARATION (Including Mobilization)

Mobilization, Set-up, and Preliminary Activities

Tetra Tech will schedule the arrival of its workforce in a manner that is most effective and designed to allow immediate productivity. All personnel mobilized to the site will meet the Occupational Safety and Health Administration (OSHA) training and medical surveillance requirements specified in the HASP. The UXO Technicians will have the appropriate level of training and experience as stated in DDESB TP-18. As part of the mobilization process, site-specific training for all on-site personnel will be performed, and each person will sign **Worksheet #4**. The purpose of this training is to ensure that personnel fully understand the operational procedures and methods to be used at NAS Cecil Field, to include individual duties and responsibilities, and all safety and environmental concerns associated with these MEC operations. The training will include, but is not limited to, a review of this MEC UFP-SAP and the HASP/Accident Prevention Plan (APP). Any personnel arriving at the site after this initial training session will be trained when they arrive and will sign **Worksheet #4**. Training will be conducted by a UXO Technician III.

Project equipment for the UXO survey will come from Tetra Tech sources and local leases/purchases. All equipment, regardless of source, will be checked to ensure its completeness and operational readiness. Any equipment found damaged or defective will be returned to the point of origin, and a replacement will be secured. All instruments and equipment that require routine maintenance and/or calibration will be checked initially upon arrival and then prior to use each day. This system of checks ensures that the equipment is functioning properly. If an equipment check indicates that any piece of equipment is not operating correctly and field repair cannot be made, the equipment will be tagged and removed from service, and a request for replacement equipment will be placed immediately. Replacement equipment will meet the same specifications for accuracy and precision as the equipment removed from service.

Site Accessibility and Traffic Control

OU 5, Site 15 is a controlled area accessible only through access gates. For Site 15 access, the following two entities must be contacted:

- Florida Forestry: 904-573-4902
- Florida State College at Jacksonville, Cecil Center North: 904-779-4177

Safety requires that an active exclusion zone be established at the site and maintained before any MEC activities occur due to the potential of encountering explosively configured/fuzed munitions. For this project, the exclusion zone will be established at a minimum of 200 feet from the edge of the MEC investigation area. If non-site personnel or non-essential non-UXO personnel enter an exclusion zone, all MEC operations will cease until the exclusion zone is re-established.

Both routine and emergency response actions dictate the need for prevention of unauthorized site access and for the protection of vital records and equipment. All equipment will be brought to a designated secure location each day.

Site Security

Site security will be maintained to ensure that non-essential personnel do not access the exclusion zone during the UXO detector-aided surface surveys or other UXO avoidance operations at the site. Barricades will be positioned on access routes a minimum of 200 feet from the edge of the investigation site. Notification procedures will be posted on the barricades to ensure that non-essential personnel notify the team working in the area prior to entering the area during active operations. Barricades will be removed when operations stop for the day.

Out-of-Box Tests

The following out-of-box tests will be conducted prior to the commencement of RI field work and at the start of each day of surveying:

- Inventory and inspection of all equipment to confirm that all components are present and in good condition.
- Assembling and powering up the equipment.

Governing Regulations/Guidance and ESS Determination

The work planned for this RI does not require an ESS because MEC avoidance measures will be practiced during the investigation. No MEC or MPPEH will be moved or disturbed during this phase of the project. An ESS Determination Request was prepared describing the general operations planned at the site. NOSSA reviewed the request and issued an ESS Determination for the planned operations allowing the activities using UXO avoidance procedures (see **Appendix C**).

MEC activities will be performed in accordance with all local, state, and federal regulations and will include all applicable DoD requirements, including those in Engineer Pamphlet (EP)-75-1-2 [United States Army Corps of Engineers (USACE), 2004] and MMRP Data Item Description (DID) 09-005 USACE, 2009). Activities involving work in areas potentially containing MEC hazards will be conducted in full compliance with the Department of the Navy, NOSSA, and DoD requirements regarding personnel, equipment, and procedures. Navy requirements include OP-5 and NOSSAINST.8020.15B

This RI is being conducted as part of the Defense Environmental Restoration Program (DERP) MMRP. The RI will be performed in accordance with CERCLA Sections 104 and 121.

The site where surveys will be conducted may contain live munitions, and caution should always be exercised while working on the site.

SITE SURVEY

Survey transect locations described in the UFP-SAP will be established in the field and are predetermined as per **Figure 17-1**. Additional transect segments may be employed at the discretion of the Tetra Tech UXO Manager, Technical Lead, and SUXOS to step out from the initial transect segments and/or to collect more closely spaced (50-foot) information within the former ordnance disposal area; no more than 30 additional transect segments will be surveyed.

The UXO team will establish the transects using hand-held GPS units or, if GPS signal reception is inadequate, using a compass, tape measure, or survey wheel from a known location. Survey equipment (such as transit or total station), or GPS will be used to establish the known transect locations. Highly visible temporary markings (e.g., plastic flagging, pin flags, etc.) will be used to mark locations of transects for vegetation management and surveying.

VEGETATION MANAGEMENT

It is anticipated that some vegetation management will be required prior to performing detector-aided surface surveys. Brush and grass can present impediments to positioning the metal detectors in close proximity to the ground surface. The degree of brush/vegetation management will be determined by site conditions at the time of fieldwork and will be accomplished in accordance with Tetra Tech MRP **SOP 06** (Vegetation Management at MEC Sites). The following are the types of equipment/techniques that may be used:

- Hand-held brush cutters (string or blade) will be used to cut light vegetation and small grassy areas.
- Chain saws will be used in heavier brush areas and to cut small trees up to 2 inches in diameter.
- Mechanized equipment will be used to remove brush and grasses.
- Brush/vegetation debris will be left on site at the edge of the area cleared.

Brush cutting/vegetation management operations will be conducted by the UXO team.

UXO DETECTOR-AIDED SURFACE SURVEY - TRANSECT

During the initial setup of the site and prior to bringing non-UXO personnel or mechanized equipment on site, the UXO team will survey the surface in the area of interest, removing non-munitions debris from the transect lanes and flagging all MDAS [munitions-related debris] and suspect MEC/MPPEH. After all surface non-munitions debris has been removed, and all MDAS [munitions-related debris] and suspect MEC/MPPEH have been flagged for UXO avoidance, the SUXOS will allow non-UXO personnel and mechanized equipment on site in cleared areas.

UXO DETECTOR-AIDED SURFACE SURVEYS AND POSITIONING

Data will be collected along survey transects primarily using 100-foot spacing. Transects will run both north-south and east-west throughout designated areas of the site (see **Figure 17-1**). The UXO team will establish a coordinate system for the detector-aided surface surveys by creating a labeled system of survey stakes. Detector-aided surface surveys will be performed along the proposed survey lines to establish approximately 5-foot-wide transect lanes. The transects will be aligned with the grid system

developed during the soil removal effort. Detector-aided survey operations will be conducted in accordance with Tetra Tech MRP **SOP 01** (UXO Detector-Aided Surface Surveys). MEC/MPPEH will be managed in accordance with Tetra Tech MRP **SOP 02** (MEC Management and Accountability).

Detector-aided surveys will be used to locate surface items of concern (MEC/MPPEH or MDAS [MD]) and to provide semi-quantitative information on anomalies in the shallow subsurface that could be indicative of MEC/MPPEH or MD.

Surface MEC/MPPEH/MDAS [MD] Items: Locations of surface items will be recorded using a GPS and/or compass/tape measure from a known location. The location information will be stored in the GPS or entered into the field log. If poor satellite reception in an area prohibits GPS use, data will not be collected until more satellites are available and the accuracy criteria are met or an alternative positioning technique will be employed (e.g., tape-measured grid or total stationing).

Data will be provided in the RI Report and will consist of tables reporting the UXO survey results in North American Datum (NAD) 83 Florida State Plane coordinates in US survey feet and plots of the results on plans or aerial maps for the MRP area. A summary of methods used and discussion of the survey results will also be included in the RI Report. Descriptive data will be recorded in the UXO team logbook, and a copy of these data will be provided in the report.

Subsurface Anomalies: For each 100-foot long-transect segment, the field team will evaluate and record the number of subsurface anomalies as none, low (1 to 5), medium (5 to 20), or high (greater than 20). Data will be recorded in the UXO team logbook along with the instrument sensitivity setting. A copy of this data will be provided in the RI Report and will also be mapped.

UXO Escort Operations

All activities involving work in areas potentially containing MEC hazards will be conducted in full compliance with this UFP-SAP regarding personnel, equipment, and procedures as follows:

1. If any MEC, MPPEH, or MDAS [MD] is encountered, the item will be avoided. The UXO Escort will not attempt to identify the type or condition of the ordnance. MEC avoidance procedures will be practiced at all times.

2. The UXO Escort will clearly mark any area with visible ordnance or MEC/MPPEH, and the area will be avoided. The visible MEC/MPPEH will be noted on the field log sheets or in the field logbook. The UXO Escort will report the MEC/MPPEH to the UXO Team Leader.

3. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed during UXO Escort duties.

4. The UXO Escort will conduct UXO avoidance surveys for all proposed survey stake locations using a White's all metals-detector or equivalent to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO Technician suspects the presence of MEC/MPPEH, the proposed stake location will be relocated to an area free of concerns/anomalies.

UXO Detector-Aided Surface Survey Instrumentation, Methods, and Standards

The Schonstedt GA-52Cx or equivalent will be used as the primary survey instrument to conduct the surveys. In addition to the Schonstedt, a White's Spectrum XLT all-metals detector or equivalent will be used in surface survey areas to assist in the location of metal targets with little or no ferrous content. Because ferrous and nonferrous ordnance may be present at the site, this is the best combination of technology for the operation based on industry standards.

The detection capabilities of the instruments to be used by the UXO Team during detector-aided surface surveys are limited by the size and orientation of the target and soil characteristics of the work area. These instruments provide an audio signal for response, but do not store data. The Schonstedt GA-52Cx magnetic locator (magnetic gradiometer) does not need to be calibrated. The White's all-metals detector requires setup to establish the sensitivity setting for UXO detection. To ensure that each detector is operating properly, the operator turns on the instrument and slowly moves the locator towards metal. As the probe advances toward the target, the audio signal will increase. Failure to detect the object is reason to reject the instrument.

To ensure that detection instruments are operating properly, the UXOQCS will place three metallic objects on the ground surface in an area free of surface and subsurface anomalies. Two of the items will be ferrous metal objects and one nonferrous. The UXOQCS will observe the UXO Technicians as they pass each instrument over the metallic objects to verify proper instrument operation and response. The detector will be checked twice daily at a minimum, before starting MEC activities and at the end of each shift, and after any battery change. UXO Technicians will also conduct random checks during daily operations. The objects used to conduct instrument operational checks will be photographed and logged in the QC logbook and in the appropriate QC site documentation.

Similarly, to ensure that detection instruments are operating properly to assess the shallow subsurface, the following seed items will be buried 10 feet apart in a horizontal orientation at the following depths:

Item and Burial Depth	Burial Depth
Small (1-inch D 4-inch long pipe) (1)	6 inches
Small (1-inch D 4-inch long aluminum pipe) (2)	6 inches
Small (1-inch D 4-inch long pipe) (1)	12 inches
Small (1-inch D 4-inch long aluminum pipe) (2)	12 inches

1 Used to test ability to detect ferrous items
2 Used to test ability to detect nonferrous items

The standard setting for the Schonstedt magnetic locator instrument is 2; setting the instrument to 3 or 4 will make it more sensitive, and setting the instrument to 1 will make it less sensitive. The Schonstedt instrument will not detect nonferrous munitions such as those made of copper, brass, or aluminum. Standard settings for the White's Spectrum XLT when used during MEC surveying operations are included in Tetra Tech MRP **SOP 01** (UXO Detector-Aided Surface Surveys).

Discovery of Chemical Warfare Materiel

Potential exposure to Chemical Warfare Material (CWM) on this site is not anticipated. In the event that CWM is located or suspected, Tetra Tech personnel will evacuate the area immediately in an upwind direction from the CWM, secure the site, and request assistance from the Navy RPM or designated Point of Contact (POC).

Upon discovery of suspect CWM, the responsible UXO Technician III will:

- Ensure that all personnel are clear of the area
- Maintain security of the area until relieved

After the area is clear and secured, the responsible UXO Technician III will:

- Notify the Tetra Tech UXO Manager
- Notify the Navy POC
- Stop all field operations
- Assemble the crew at a designated assembly point
- Stand by to provide assistance as required

If directed, UXO personnel will take emergency non-invasive actions such as covering the item with plastic sheeting or placing sandbags around the item. In the event that Hazardous, Toxic, or Radiological Waste

(HTRW) is encountered on site, the work site will be evacuated until the Project Health and Safety Manager, with concurrence of the Navy POC, identifies and implements appropriate protective measures.

Suspect MEC/MPPEH

If suspect MEC, MPPEH, or MDAS [MD] is encountered, the location of each will be recorded and/or marked using a GPS, tape measure, or other grid coordinate location system. The UXO team will attempt to determine its condition without moving or disturbing the item. Each item will be marked with flagging tape and assigned a unique number starting with the transect ID label followed by the item number. All available information about the item will be recorded in the logbook, including location, identification, item number, and whether the item is suspect MEC, MPPEH, or MDAS [MD]. A digital photograph will be taken of each item. The UXO team will not move or otherwise disturb the item in an attempt to collect information. After all available information is recorded and the item is determined not to be MEC, the UXO team will resume the detector-aided surface survey.

Every effort will be made to identify each suspect MEC/MPPEH item encountered; however, under no circumstances will any suspect MEC/MPPEH be moved in an attempt to make a definitive identification. Munitions will be visually examined for markings and other external features such as shape, size, and external fittings. If MEC/MPPEH are encountered, the Navy POC and Tetra Tech UXO Manager will be notified immediately, and work within the exclusion zone for the identified MEC/MPPEH will temporarily stop. Proper notifications and the request for response to the MEC/MPPEH item will be coordinated through the Navy POC and Tetra Tech UXO Manager. Work within the exclusion zone for the MEC item will resume after the removal/disposal of the item has occurred or upon notification by the Tetra Tech UXO Manager.

Only UXO-qualified personnel will perform MEC identification procedures. As an exception, a UXO Technician I may assist in the performance of MEC identification procedures when under the supervision of a UXO Technician III or higher. All personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel will be under the direct supervision of a UXO Technician III or higher. All suspect MEC items will be recorded following the requirements of this UFP-SAP, the site-specific HASP, applicable ordnance operations procedural safety guidelines, and industry-accepted safe work practices and procedures.

MEC Disposal

In the event that MEC is discovered that pose an immediate threat to operations, UXO personnel will mark the item and avoidance procedures will be followed. The Navy POC will be notified and Military EOD will

be contacted for treatment. All site operations will stop, and the area will be under the control of the UXO Technician until relieved by the Navy POC or Military EOD.

Anomaly Avoidance

Anomaly avoidance will be performed by UXO Technicians for site workers by locating potentially hazardous anomalies (whether identified by visual means or through detector-aided surface surveys).

Global Positioning System Positional Data

A sub-meter-accuracy GPS (e.g., Trimble GeoXM or GeoXH) unit will be used to collect positional data during this RI. The GPS survey will utilize third order monumentation. Select monuments or markers (such as the survey monitoring well shown on Figure 4 of **Appendix A-1**, note also that Figure 4 shows the northings and eastings of the corners of the land use control parcel) will be visited at the start of each day and toward the end of each day. The GPS data will be used to accurately record the positions of surface suspect MEC, MPPEH, and munitions-related debris. Additionally, the GPS will be used to establish UXO detector-aided surface survey transect end points. Tetra Tech will load site boundaries, transect end point locations, known cultural/terrain features that may affect surveys, and background maps into the GPS prior to deployment. GPS data collected during the RI will be stored in the GPS and downloaded to a personal computer daily or as soon as possible. Data will also be manually entered into a field log as it is collected. Once downloaded from the GPS unit, the data will then be uploaded to the MRP Data Repository website located at http://www.ttnus.com/MrpRepository/Login.aspx for processing by Tetra Tech GIS personnel.

If GPS accuracy is not sub-meter for detector-aided surveys, data will not be collected until more satellites are available and the accuracy criteria specified in **Worksheet #12** are met or an alternative positioning technique will be employed (e.g., compass and tape measure, fiducials, or total stationing).

GPS positional data will be collected in accordance with Tetra Tech MRP **SOP 05** (Global Positioning System).

DEMOBILIZATION

When fieldwork is complete, the site will be restored and temporary survey markers will be removed. All field forms and field logbooks will be completed, field documentation will be provided to recipients, and equipment will be returned to providers. Personnel will demobilize with approval of the Tetra Tech UXO Manager and Technical Lead.

SITE-SPECIFIC FINAL REPORT PREPARATION AND APPROVAL

Team Decision Points

No MC sampling is currently planned for the site. The results of the detector-aided surface survey will be evaluated to provide guidance in decisions regarding the necessity and scope and extent of continued RI of the site or a recommendation to move forward with remedial action (see **Worksheet #11**).

- Any MEC, suspect MEC, or MPPEH discovered on site will be brought to the attention of the Navy POC, and Tetra Tech (UXO Manager, and Technical Lead).

- Any unanticipated findings that warrant modification of the UFP-SAP will be brought to the attention of those individuals stated above and the stakeholders listed in **Worksheets #3** and **#4**.

An RI Report will be prepared summarizing the investigation and will contain summaries of the site background, personnel utilized, objectives and scope, equipment, description of survey activities, results and discussion of the project data. The report will contain noted munitions-related discoveries, site photographs, field notes, checklists, and QC data.

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

(UFP-QAPP Manual Section 3.1.1)

Sampling Location/ID Number	Exclusion Areas	Matrix	Approximate Depth (bgs)	Survey Methodology	Degree of Investigation	SOP Name[1]
Site 15	Investigated areas/areas cleared of munitions during the 2008/2009 soil remediation effort (see **Figure 17-1**)	Ground surface and shallow subsurface soil	0 to 2.5 feet bgs, depending on target MEC size	Magnetic locator All-metals detector	100-Foot spaced transects running both north-south and east-west throughout designated survey area (see **Figure 17-1**). Surface surveys transects will be at approximately 5 feet wide. Transects will be aligned with the grid system developed during the soil removal effort.	**MRP SOP 01** **MRP SOP 02** **MRP SOP 03** **MRP SOP 05** **MRP SOP 06**

1 SOPs can be found in **Appendix D**.

SAP Worksheet #19 -- Analytical SOP Requirements Table

(UFP-QAPP Manual Section 3.1.1)

☑ **Worksheet Not Applicable**

No laboratory samples are proposed for collection/analysis during this MEC survey/investigation.

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

(UFP-QAPP Manual Section 3.1.1)

Matrix	Analytical Group	QC Survey Requirements	Field Duplicates/Repeat Data Collection	Sample	Quality Control
Ground Surface	Detector-aided surface survey	Resurvey 25% of first four transects and after any failure, then 10% of remaining transects after four transects in a row pass QC. If any transect does not pass QC, UXO team will resurvey entire transect and another QC check will be performed.	Not applicable	Detect all metallic debris 20mm or larger on surface; non-detection of metallic objects would result in failure of QC.	Resurvey transects to perform a direct comparison to field data collected during detector-aided surface survey.
Ground Surface	Detector-aided surface survey	Blind seed items will be used during the detector-aided surface survey process as an additional QC check. Blind seed items will be placed at the surface, into the duff or if duff is not present, covered with duff from another location, at locations along the transects prior to the start of the detector-aided surface survey. At least one blind seed item, and no more than six, will be placed in each estimated daily lot of work. If a blind seed item is missed, that lot of work will be rejected and reworked.	Not applicable	Detect and recover and record all blind seed items; non-detection of a blind seed item would result in failure of QC.	Check UXO team logbooks for data showing ID number and location of recovered blind seed item and perform a direct comparison to the QC as seeded log.

Matrix	Analytical Group	QC Survey Requirements	Field Duplicates/Repeat Data Collection	Sample	Quality Control
Shallow Subsurface Soil	Detector-aided surface survey	IVS survey at the beginning and end of each day or after extended breaks.	Not applicable	Survey over Industry Standard Objects (ISOs) buried in the IVS plot	IVS survey will be conducted at the beginning and end of each day or after extended breaks to verify that the survey technique is operating properly by comparison of the instrument's anomalous response to standardized buried items that have related empirically established instrument response curves.

SAP Worksheet #21 – Project SOP References Table

(UFP-QAPP Manual Section 3.1.2)

Reference Number	Title	Originating Organization of SOP	Equipment Type	Modified for Project Work? (Y/N)	Comments
MRP SOP 01	UXO Detector-Aided Surface Surveys	Tetra Tech	Magnetic detector All-metals detector	N	Describes detector-aided surface surveys
MRP SOP 02	MEC Management and Accountability	Tetra Tech	GPS Digital camera	Y (addition of site-specific contact information)	Describes actions to be taken if suspect MEC are encountered
MRP SOP 03	Geophysical Survey	Tetra Tech	Magnetic detectors All-metals detectors	N	Describes IVS requirements
MRP SOP 05	Global Positioning System	Tetra Tech	GPS	N	Describes usage of hand-held GPS units and MRP data repository website
MRP SOP 06	Vegetation Management at MEC Sites	Tetra Tech	Hand-held brush cutters, mowers, chain saws, brush hog, wood chipper	N	Describes brush cutting and vegetation clearance activities to take place at MEC sites

SOPs are contained in **Appendix D**.

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

(UFP-QAPP Manual Section 3.1.2.4)

Field Equipment	Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference	Comments
GPS	Positioning	Daily	Accuracy: sub-meter HDOP < 3, number of satellites at least four	Wait for better signal, replace unit, or choose alternate location technique	UXO Technician	**MRP SOP 05**	None
Magnetic Locator	Operational	Beginning and end of day and after battery change	Operating properly	Replace battery, replace instrument	UXO Technician	**MRP SOP 01** **MRP SOP 03**	None
All-Metal Detector	Calibration	Beginning and end of day	Detect aluminum ISO	Recalibrate, replace instrument	UXO Technician	**MRP SOP 01** **MRP SOP 03**	None

22.1 REGULAR TESTS FOR GEOPHYSICAL SURVEYING EQUIPMENT

Equipment/Electronics Warm-Up. This test minimizes sensor drift caused by thermal stabilization. Most instruments need a few minutes to warm up before data collection begins. All manufacturer instructions will be followed, or if none are given, data readings will be observed until they stabilize. Acceptance Criterion: Equipment Specific (typically 5 minutes). This test will be conducted each time the unit is started.

Record Instrument Settings. The purpose of recording instrument settings is to document the sensitivity setting for qualitative subsurface expected performance. This information will be used to interpret high subsurface anomaly areas as opposed to low subsurface anomaly areas. Acceptance Criterion: In accordance with MRP **SOP 01** (UXO Detector-Aided Surface Surveys). This test will be conducted at the beginning and end of each day and after a battery change is made.

Personnel Test. This test ensures that survey personnel have removed all potential interference sources (metal) from their bodies. Common interference sources are ballpoint pens, steel-toed boots, or large metallic belt buckles, which can produce anomalies signatures similar to investigation targets. This test will be conducted at the beginning of each day if the operator is wearing metallic items that could interfere with equipment operation.

Static Spike (or Standard Response) Test. This test determines response and repeatability of the instrument to a standard test item (typically an ISO). Improper instrument function and faulty equipment are potential causes of inconsistent non-repeatable readings. This test will be conducted at the beginning and end of each day and after battery changes.

GPS Positioning. The GPS will be tested at the start of the project and daily, once at the beginning and once towards the end of each day, by surveying two survey control points and comparing the GPS coordinates to the documented coordinates for the control points. Acceptance Criterion: Sub-meter. GPS survey instruments should also be closely monitored during field acquisition by using HDOP criteria, or as a minimum, the number of satellite signals being received. HDOP should normally be less than three to obtain high-quality results, and at least four satellites should also indicate high-quality results.

Interferences Test. This test is to determine if the sensors are interfered with by other survey support equipment such as the vehicle, boat, motor, etc. This test will result in no or minimal interference to the instrumentation towards detecting targets. The test will be performed before the geophysical survey begins and after an equipment configuration change is made.

22.2 DATA COLLECTION VARIABLES FOR GEOPHYSICAL SURVEYING EQUIPMENT

The same equipment and procedures will be used for the IVS (**Worksheet #12**) and geophysical survey. In addition, only personnel who have been tested on the IVS will perform the geophysical surveys. Multiple surveys using the planned geophysical instruments will be performed. Some elements of data collection are subject to modification and evaluation. Data collection variables subject to modification and optimization may include, but not necessarily be limited to, instrument setting selections, measurement interval along survey lines, and transect line spacing.

22.3 GEOPHYSICAL AND POSITIONING INSTRUMENTS

The detection depth of the metal detectors to be used by the UXO team during detector-aided surveys is limited by the size and orientation of the target and the characteristics of the soil in the work area. These instruments provide an audio signal for response but do not store data. The magnetic locator (magnetic gradiometer) does not need to be calibrated, but the all-metals detector requires field calibration. The operator turns on the instrument and slowly moves the locator toward metal to ensure that the detector is operating properly. The audio signal will increase as the probe advances toward the target. Failure to detect the object is reason to reject the instrument. The detector will be checked at the beginning and end of each day and after any battery change. UXO Technicians will also conduct a minimum of two checks during daily operations.

The normal setting for the Schonstedt magnetic locator instrument is 2; setting the instrument to 3 or 4 will make it more sensitive, and setting the instrument to 1 will make it less sensitive. The Schonstedt instrument will not detect non-ferrous munitions such as ones made of copper, brass, or aluminum. The normal settings for the White's all-metals detector are presented in MRP **SOP 01** (UXO Detector-Aided Surface Surveys).

During the surface surveys, all-metals detectors such as the White's Spectrum XLT or equivalent will be used if visual observations show that non-ferrous metal suspect MEC is present. The all-metals detector will either be used in place of, or in conjunction with, the magnetic locator.

Tetra Tech will use a sub-meter-accuracy GPS unit where possible during data collection to provide precise location coordinates for the data collected. The anticipated tree cover at some of the survey areas may dictate that only certain transects in open locations (no or limited tree cover) are located using a GPS, and the remainder of the transect will be tied to these locations. If the GPS accuracy is not sub-meter, data will not be collected until more satellites are available and the accuracy criteria are met, or surveying with alternate positioning techniques will be employed.

22.4 QUALITY ASSURANCE/QUALITY CONTROL

Operational and test procedures will conform to the manufacturers' standard instructions. QC of the instruments' data will be achieved daily by field testing, consisting of checking the detectors and navigation system against a known target to ensure that they are operating properly. All instruments and equipment used to gather and generate field data will be operated in such a manner that accuracy and reproducibility of the results are consistent with the manufacturers' specifications. Repair or replacement records will be filed and maintained by the UXOQCS and may be subject to audit by the Tetra Tech QAM.

SAP Worksheet #23 -- Analytical SOP References Table

(UFP-QAPP Manual Section 3.2.1)

☑ **Worksheet Not Applicable**

No project sampling is proposed for this RI to support MEC surveys/investigations (See Worksheet #21 for project SOPs).

SAP Worksheet #24 -- Analytical Instrument Calibration Table

(UFP-QAPP Manual Section 3.2.2)

☑ **Worksheet Not Applicable**

No analytical instrument calibration data will be required for this RI to support MEC surveys/investigations (See Worksheet #22 for equipment calibrations).

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

(UFP-QAPP Manual Section 3.2.3)

✓ **Worksheet Not Applicable**

No analytical instrument equipment maintenance, testing, or inspections will be required for this RI to support MEC surveys/investigations. Field instrumentation maintenance, testing, and inspection for equipment are presented in Worksheet #22.

SAP Worksheet #26 -- Sample Handling System

(UFP-QAPP Manual Appendix A)

☑ **Worksheet Not Applicable**

This worksheet is not applicable because no samples will be handled.

SAP Worksheet #27 – Sample Custody Requirements Table

(UFP-QAPP Manual Section 3.3.3)

☑ **Worksheet Not Applicable**

No samples are proposed for collection/analysis and no MPPEH will be handled during this RI.

SAP Worksheet #28 -- Laboratory QC Samples Table

(UFP-QAPP Manual Section 3.4)

☑ **Worksheet Not Applicable**

No analytical laboratory QC sampling will be required for this RI to support MEC surveys/investigations.

SAP Worksheet #29 -- Project Documents and Records Table

(UFP-QAPP Manual Section 3.5.1)

Document/Record	Generator	Definable Feature of Work	Frequency of Completion	Location/Where Maintained
Project Personnel Sign-off Record	Technical Lead	Mobilization/Site Preparation	One time	UFP-SAP/RI Report, Project File
ESS Determination	UXO Manager	Mobilization/Site Preparation	One time	UFP-SAP/RI Report, Project File
Field Checklists	Field UXO Personnel	UXO Detector-Aided Surface Survey	Field collection days	UFP-SAP/RI Report, Project File
MEC Accountability Log	SUXOS	UXO Detector-Aided Surface Survey	As needed	**MRP SOP 01, MRP SOP 02**/RI Report, Project File
Daily Reports	SUXOS	UXO Detector-Aided Surface Survey	Field collection days	UFP-SAP/Project File
Medical and OSHA Clearance Letter	HSM and Technical Lead	Mobilization/Site Preparation	As needed	HASP/Project File
Daily Safety Meeting Sign-In	SSO	UXO Detector-Aided Surface Survey	Daily	HASP/Project File
Medical Data Sheet	SUXOS	Mobilization/Site Preparation	As needed	HASP/Project File
Surface Survey Grid Map	SUXOS	UXO Detector-Aided Surface Survey Site Survey	Field collection days	UFP-SAP/RI Report, Project File

Document/Record	Generator	Definable Feature of Work	Frequency of Completion	Location/Where Maintained
Detector-Aided Surface Survey Data	UXO Personnel	UXO Detector-Aided Surface Survey Site Survey	Field collection days	**MRP SOP 01**/Field Logbooks, RI Report, Project File
Field Notes (detailing equipment and procedure)	Field UXO	UXO Detector-Aided Surface Survey	Field collection days	**MRP SOP 01**/RI Report, Project File
Assessment Findings and Corrective Actions	Various (see **Worksheet #31**)	All	As needed	UFP-SAP/RI Report
Quality Control Surveillance Report	UXOQCS	UXO Detector-Aided Surface Survey	UXOQCS - Minimum of once per phase for each definable feature of work	UFP-SAP/ QC Logbook, Project File
Daily Quality Control Report	UXOQCS	UXO Detector-Aided Surface Survey	Daily	UFP-SAP/QC Logbook, RI Report, Project File
Photographs (may be included in report)	UXO Field Personnel	UXO Detector-Aided Surface Survey	As needed	**MRP SOP 01, MRP SOP 02**/RI Report, Project File
FTMR Forms	SUXOS	UXO Detector-Aided Surface Survey	As needed	UFP-SAP/ RI Report, Project File
Field Audit Checklist (if an audit is conducted)	Technical Lead	UXO Detector-Aided Surface Survey	As needed	UFP-SAP/Project File

Document/Record	Generator	Definable Feature of Work	Frequency of Completion	Location/Where Maintained
RI Report	Tetra Tech Personnel	All	One time	UFP-SAP/Project File, Long-term third party professional document storage firm utilized

SAP Worksheet #30 -- Analytical Services Table

(UFP-QAPP Manual Section 3.5.2.3)

☑ **Worksheet Not Applicable**

No analytical services will be required for this RI to support MEC surveys/investigations.

SAP Worksheet #31 -- Planned Project Assessments Table

(UFP-QAPP Manual Section 4.1.1)

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment(1) (title and organizational affiliation)	Person(s) Responsible for Responding to Assessment Findings(1) (title and organizational affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions(1) (title and organizational affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions(1) (title and organizational affiliation)
Personnel Qualifications	One time for all field personnel	Internal	Tetra Tech	UXOQCS	SUXOS	UXO Manager	QAM Technical Lead
Accident/Incident Reporting	Per event	Internal	Tetra Tech	SSO	Project Health and Safety Officer	HSM Technical Lead	HSM
Preventive Maintenance	Daily	Internal	Tetra Tech	UXOQCS	SUXOS	UXO Manager	Technical Lead
Communications Equipment Inspection	Daily	Internal	Tetra Tech	UXO Team Leader	SUXOS	SUXOS	UXO Manager Technical Lead
Safety Inspections	Daily (inspection); Weekly (formal surveillance)	Internal	Tetra Tech	SSO	SUXOS	SUXOS	UXO Manager Technical Lead
Brush Cutting and Vegetation Management	As needed to support operations	Internal	Tetra Tech	SUXOS	UXO Team Leader	UXO Team Leader	Technical Lead
IVS - Assessment	Twice Daily	Internal	Tetra Tech	SUXOS	UXO Team Leader	UXO Team Leader	Technical Lead
Detector-Aided Surface Survey	25% of First four transects or after any failure; 10% thereafter	Internal	Tetra Tech	UXOQCS	SUXOS	SUXOS	UXO Manager Technical Lead
Surveying and Mapping Operations	Initial, then weekly	Internal	Tetra Tech	UXOQCS	SUXOS	SUXOS	UXO Manager

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment[1] (title and organizational affiliation)	Person(s) Responsible for Responding to Assessment Findings[1] (title and organizational affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions[1] (title and organizational affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions[1] (title and organizational affiliation)
UXO/MEC Accountability	Weekly	Internal	Tetra Tech	UXOQCS	SUXOS	SUXOS	UXO Manager Technical Lead
Visitor Briefing	Initial, then as needed to support operations	Internal	Tetra Tech	Project Health and Safety Officer	SSO	SSO	HSM
Site-Specific Training	Once at start of fieldwork and at start of each definable feature of work	Internal	Tetra Tech	SUXOS UXO Manager Technical Lead	As designated by Technical Lead	As designated by Technical Lead	Technical Lead
Hazard Assessment – Risk Analysis	At start of each definable feature of work, then as needed to support operations	Internal	Tetra Tech	Project Health and Safety Officer UXOSO	UXOSO SUXOS	UXOSO SUXOS	HSM
Field Work Systems Audit	one per contract year	Internal	Tetra Tech	QAM	UXO Manager Technical Lead	QAM UXO Manager	QAM Technical Lead

1 Tetra Tech personnel unless otherwise noted.

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

(UFP-QAPP Manual Section 4.1.2)

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (name, title, organization)	Time Frame of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (name, title, organization)	Time Frame for Response
Personnel Qualifications	E-mail	Linda Klink – Technical Lead, Tetra Tech	Immediately upon discovery	E-mail	Linda Klink – Technical Lead, Tetra Tech	Prior to initiation of task
Accident/Incident Reporting	Accident/Incident Report Form	Linda Klink – Technical Lead, Tetra Tech Matt Soltis – HSM, Tetra Tech	Immediately	Dependent on accident/incident	Linda Klink – Technical Lead, Tetra Tech Ralph Brooks - UXO Manager, Tetra Tech Matt Soltis – HSM, Tetra Tech	Within 24 hours
Preventive Maintenance	Field forms	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours	Field forms	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours
Communications Equipment Inspection	Field forms	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours	Field forms	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (name, title, organization)	Time Frame of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (name, title, organization)	Time Frame for Response
Safety Inspections	Field forms	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours	Field forms	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours
Brush Cutting and Vegetation Management	Field forms	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours	E-mail	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours
IVS - Assessment	Oral	SUXOS – TBD Linda Klink – Technical Lead, Tetra Tech	Within 24 hours	E-mail	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours
Detector-Aided Surface Survey	QC Checklist	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 1 business day of assessment	Updated QC Checklist	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (name, title, organization)	Time Frame of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (name, title, organization)	Time Frame for Response
Surveying and Mapping Operations	E-mail	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours	Updated E-mail	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours
UXO/MEC Accountability	Field forms	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours	Updated field forms	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours
Visitor Briefing	E-mail	SUXOS – TBD Linda Klink – Technical Lead, Tetra Tech	Within 24 hours	Updated e-mail	SUXOS – TBD Linda Klink – Technical Lead, Tetra Tech	Within 24 hours
Site-Specific Training	E-mail	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Upon completion of training	Updated e-mail	Ralph Brooks - UXO Manager, Tetra Tech Linda Klink – Technical Lead, Tetra Tech	Within 24 hours

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (name, title, organization)	Time Frame of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (name, title, organization)	Time Frame for Response
Hazard Assessment – Risk Analysis	E-mail	Linda Klink – Technical Lead, Tetra Tech Matt Soltis – HSM, Tetra Tech	Within 24 hours	Updated e-mail	Linda Klink – Technical Lead, Tetra Tech Matt Soltis – HSM, Tetra Tech	Within 24 hours
Field Work Systems Audit	Letter Report	Linda Klink – Technical Lead, Tetra Tech Tom Johnston – QAM, Tetra Tech	Within 5 business days of assessment	Letter Report	Linda Klink – Technical Lead, Tetra Tech Tom Johnston – QAM, Tetra Tech	Within 10 business days of receipt

SAP Worksheet #33 -- QA Management Reports Table

(UFP QAPP Manual Section 4.2)

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)
Project monthly progress report	Monthly (written) for duration of the project	Monthly	Technical Lead/PM Tetra Tech	Navy RPM NAVFAC
Daily QC Report (Detector-Aided Survey)	Daily (e-mail)	TBD	UXOQCS Tetra Tech	Technical Lead Tetra Tech UXO Manager Tetra Tech
QC Meeting Minutes	Twice per month during project performance	TBD	UXO Manager Tetra Tech	Technical Lead Tetra Tech
Rework Items List	Twice per month during project performance Daily for UXO work	TBD	UXOQCS Tetra Tech	Technical Lead Tetra Tech
Project QC Report	Internal draft, draft, and final (Appendix to MEC RI Report)	TBD	Technical Lead Tetra Tech	Navy RPM Navy BRAC PMO SE

This worksheet will be modified to include the project delivery dates after fieldwork is scheduled.

SAP Worksheet #34 -- Verification (Step I) Process Table - Preparatory and Initial Inspection

(UFP-QAPP Manual Section 5.2.1)

A preparatory-phase inspection will be performed prior to beginning each definable feature of work. The purpose of this inspection is to review applicable specifications and verify that the necessary resources, conditions, and controls are in place and compliant before the start of work activities. An initial-phase inspection will be performed at the beginning of each definable feature of work. The purpose of this inspection is to observe/review the application of procedures to ensure their adequacy, to ensure that adequate resources are applied to the activity, and that a clear understanding exists as to the QC requirements of the definable feature of work. The responsible person will inspect the relevant items from the checklist in the appropriate SOP.

Definable Feature of Work	Description	Responsible for Verification (name, organization)
Site Preparation (including mobilization)	Project readiness review to be performed by Tetra Tech Technical Lead and Navy RPM, including UFP-SAP review.	Linda Klink – Technical Lead, Tetra Tech Art Sanford - Navy RPM Navy BRAC PMO
	Prior to field crew(s) mobilizing to the field for on-site data collection, the Tetra Tech Technical Lead will review resumes and training records, including those for UXO field personnel, to ensure that all required training and experience requirements identified in **Worksheet #7** have been completed for each crew member.	Ralph Brooks – UXO Manager, Tetra Tech
	Review of mobilization and site preparation activities such as equipment setup and checkout, installation of IVS, and grid survey and layout.	Linda Klink – Technical Lead, Tetra Tech Ralph Brooks – UXO Manager, Tetra Tech
	Review of **MRP SOP 01** (UXO Detector-Aided Surface Surveys) and **MRP SOP 02** (MEC Management and Accountability), which document methodology to be utilized during surveys and QC procedures.	Ralph Brooks, - UXO Manager, Tetra Tech TBD – SUXOS TBD – UXOQCS

Definable Feature of Work	Description	Responsible for Verification (name, organization)
Site Preparation (including mobilization)	Prior to surface survey crews initiating on-site investigations, the UXO Manager will review the results of the IVS to verify that performance criteria have been satisfactorily attained per **Worksheet #12**. The Tetra Tech Technical Lead will review the recommendations of the UXO Manager and provide final approval.	Linda Klink – Technical Lead, Tetra Tech Ralph Brooks – UXO Manager, Tetra Tech
Site Survey	Prior to the start of field work, the site boundaries will be established. Prior to the start of the detector-aided surveys, the transects will be established.	TBD – SUXOS TBD – SUXOS
Vegetation Management	Brush clearing and vegetation management will be conducted in accordance with **MRP SOP 06** (Vegetation Management at MEC Sites).	Preparatory: Ralph Brooks – UXO Manager, Tetra Tech Initial Inspection: TBD - UXOQCS
UXO Detector-Aided Surface Survey	Review of **MRP SOP 01** (UXO Detector-Aided Surface Surveys) and **MRP SOP 02** (MEC Management and Accountability), which include procedures for data collection and transcription. The SUXOS will verify that the data collected during the first lot of field work contain all the elements required by the scope of work and do not contain questionable data or error points.	Ralph Brooks - UXO Manager, Tetra Tech TBD – SUXOS
	Review of **MRP SOP 05** (Global Positioning System), which documents procedures to be utilized in the collection of GPS positional data. The SUXOS will verify that the UXO detector-aided data collected during the first lot of field work contain all the elements required by the scope of work and do not contain questionable data or error points.	Ralph Brooks – UXO Manager, Tetra Tech
IVS	Prior to collection of data at IVS, review **MRP SOP 03** (Geophysical Survey).	Ralph Brooks – UXO Manager, Tetra Tech

Definable Feature of Work	Description	Responsible for Verification (name, organization)
GPS Positional Data	Prior to start of data collection, comparison with two known locations.	TBD – SUXOS
Demobilization	Review of demobilization activities such as completion of field forms, return of equipment, and, forwarding of all field documentation to the Technical Lead.	Linda Klink – Technical Lead, Tetra Tech Ralph Brooks – UXO Manager, Tetra Tech
Site-Specific Final Report Preparation and Approval	Verify that all data and documentation have been acquired for report preparation.	Tetra Tech

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

(UFP-QAPP Manual Section 5.2.2) (Figure 37 UFP-QAPP Manual) (Table 9 UFP-QAPP Manual)

Follow-up QC inspections are conducted to ensure that procedures are being correctly performed, that no changed conditions exist that may affect the quality of work, and that lessons learned are being applied as identified. The responsible individual will inspect the relevant follow-up items from the checklist in the appropriate SOP at least as often as specified in this worksheet. **Worksheet #32** describes actions to be taken in the event that nonconforming conditions are observed during the QC inspections.

Definable Feature of Work	Frequency of Inspection	Supporting QC Document(s)	Responsible for Validation (name, organization)
Site Preparation (including mobilization)	NA/Upon completion of RI field work	No follow-up required. Verify that the UFP-SAP was implemented and carried out as written and that any deviations are documented.	Linda Klink – Technical Lead, Tetra Tech Art Sanford - Navy RPM, Navy BRAC PMO SE
Site Survey	Daily	Checklist and field logbooks that document equipment utilization and progress.	TBD – SUXOS, Tetra Tech
Vegetation Management	Daily	Checklists and field logbooks that document equipment utilized and progress.	TBD – SUXOS, Tetra Tech Ralph Brooks - UXO Manager, Tetra Tech
UXO Detector-Aided Surface Survey	Once per week activity is conducted	Checklists and field logbooks that document equipment utilized and progress.	Linda Klink – Technical Lead, Tetra Tech
	Minimum of once per day surveys are conducted or more frequently as necessary	Checklists and field forms that document equipment utilized, grids/transects surveyed, and grids/transects checked for QC purposes.	Ralph Brooks - UXO Manager, Tetra Tech TBD – SUXOS, Tetra Tech TBD – UXOQCS, Tetra Tech

Definable Feature of Work	Frequency of Inspection	Supporting QC Document(s)	Responsible for Validation (name, organization)
	As needed, prior to data entry	Prior to entering data (field forms and electronic data) from the detector-aided surface surveys into the permanent project database, the UXO Manager or designated representative will review the field forms to ensure that all required information is provided as required by **MRP SOP 01** (Detector-Aided Surface Survey) and **MRP SOP 02** (MEC Management and Accountability). Verify that all data have been transferred correctly and completely during collection. Ensure that data are downloaded and backed up at least once per day to prevent accidental loss of data/field efforts.	Ralph Brooks - UXO Manager, Tetra Tech TBD – SUXOS, Tetra Tech
IVS	Once for each team	Review data results of IVS.	Ralph Brooks - UXO Manager, Tetra Tech
GPS Positional Data	Daily	See **MRP SOP 05** (Global Positioning System) and Follow-Up Report.	Ralph Brooks - UXO Manager, Tetra Tech TBD – SUXOS, Tetra Tech
Demobilization	Once upon completion of each phase of project/site activities	Verify that all demobilization activities, as applicable to the phase of work, have been completed.	Linda Klink – Technical Lead, Tetra Tech Ralph Brooks - UXO Manager, Tetra Tech
Site-Specific Final Report Preparation and Approval	Once upon completion of the project/site activities	Verify that all activities have been documented and reported, as applicable to each phase of work, have been included in the report.	Linda Klink – Technical Lead, Tetra Tech Art Sanford - Navy RPM, Navy BRAC PMO SE

SAP Worksheet #36 –Analytical Data Validation (Steps IIa and IIb) Summary Table

(UFP-QAPP Manual Section 5.2.2.1)

Step IIa/IIb[1]	Matrix	Analytical Group	Validation Criteria	Data Validator (Title and organization)
IIa	Surface Soil	Detector-Aided Surface Survey	a) Satisfactory rechecks of 25% of first four transects by the UXOQCS, or SUXOS if no UXOQCS. b) Satisfactory rechecks of 10% of the transects by the UXOQCS, or SUXOS if no UXOQCS, after achievement of satisfactory rechecks on four transects in a row. c) Satisfactory location and recording of blind seed items placed on surface along transects.	TBD UXOQCS Tetra Tech TBD UXOQCS Tetra Tech TBD UXOQCS Tetra Tech
IIa	Subsurface Soil	Detector-Aided Subsurface Survey	a) Satisfactory rechecks of 25% of first four transects by the UXOQCS, or SUXOS if no UXOQCS. b) Satisfactory rechecks of 10% of the transects by the UXOQCS, or SUXOS if no UXOQCS, after achievement of satisfactory rechecks on four grids/transects in a row c) Achievement of goals established for the IVS.	TBD UXOQCS Tetra Tech TBD UXOQCS Tetra Tech TBD UXOQCS Tetra Tech

1 IIa = compliance with methods, procedures, and contracts (see Table 10, page 117, UFP-QAPP manual, V.1 March 2005).
IIb not applicable for MEC investigations.

SAP Worksheet #37 -- Usability Assessment

(UFP-QAPP Manual Section 5.2.3)

Data Usability Assessment

The usability of the data directly affects whether project objectives can be achieved. The characteristics described below will be evaluated at a minimum. The results of these evaluations will be included in the project report. To the extent required by the type of data being reviewed, the assessors will consult with other technically competent individuals to render sound technical assessments of these data characteristics.

Certification of Proper Operation of Detection and Positioning Systems

The Tetra Tech UXO Manager, or designee, acting on behalf of the Project Team, will prepare a table listing planned calibration and QC checks, their occurrence, and results (acceptable or not acceptable) for each type of metal detector and positioning system equipment used on the project. Data collected by any improperly operating equipment will be identified. A determination will be made as to whether the affected data adversely impacted the ability to meet project objectives. If the project objectives have been adversely impacted, the Tetra Tech Technical Lead will consult with the Navy RPM and other Project Team members, as necessary (determined by the Navy RPM), to develop appropriate corrective actions.

Qualification/Certification of Survey Team

The Tetra Tech UXO Manager, acting on behalf of the Project Team, will prepare a table listing each member of the detector-aided surface survey team, required certifications and training, and required demonstrations of competency. Any deviations will be identified. Data collected by team members not meeting the required training and demonstrations of competency will be identified. A determination will be made as to whether affected data impacted the ability to meet project objectives. If the project objectives have been adversely impacted, the Tetra Tech Technical Lead will consult with the Navy RPM and other Project Team members, as necessary (determined by the Navy RPM), to develop appropriate corrective actions.

Coverage of Areas to be Investigated

The UXO Manager, or designee, acting on behalf of the Tetra Tech Technical Lead and Project Team, will determine whether data were collected in all areas planned to be investigated. Data gaps will be

identified. The Tetra Tech Technical Lead will consult with the Project Team to determine the extent to which it is necessary to fill these data gaps during future investigations.

Identify the personnel responsible for performing the usability assessment:

The Tetra Tech Technical Lead and project scientist will be responsible for conducting the listed data usability assessments. The data usability assessment will be reviewed with the Navy RPM, FDEP, and U.S. EPA. The review will take place either in a face-to-face meeting or a teleconference, depending on the extent of identified deficiencies. If no significant deficiencies are identified, the data usability assessment will simply be documented in the project report and reviewed during the normal document review cycle.

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented:

Written documentation will support the non-compliance, estimated, or rejected data results. The project report will identify and describe the data usability limitations and suggest resurveying or other corrective actions, if necessary.

Usability Checklist Table			
Phase of Work	**Item to be Checked/Verified**	**Verified (Yes or No)**	**Comments or Deviations**
Pre-Survey	Qualification of survey team evaluated		
	Personnel reviewed and signed-off on relevant SAP section(s)		
Survey	QC evaluation of survey equipment (tests and checklists satisfactorily completed)		
	Conformance to SAP requirements and procedures for all survey work and rework (including documentation requirements), and all deficiencies documented		
	Coverage of areas to be investigated fulfilled and located within accuracy levels required for the RI		
	Interpretation and summary of data satisfies SAP requirements and conformance with data processing flowchart (**Worksheet #17**)		

REFERENCES

ABB-ES (ABB Environmental Services, Inc.), October 1997. Remedial Investigation, Operable Unit 5, Sites 14 and 15, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command, Southern Division, North Charleston, South Carolina.

AGVIQ-CH2MHill (AGVIQ-CH2MHill Constructors, Inc. Joint Venture III), August 2009. Remedial Action Completion Report – Soil Removal Action for Operable Unit 5, Site 15, Blue 10 Ordnance Disposal Area, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command, Southern Division, North Charleston, South Carolina.

CH2MHill, February 2007. Preliminary Assessment/Site Inspection Report for Past Use of Munitions and Explosives of Concern for Blue Ordnance Disposal Area (Site 15), Former Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command Southeast.

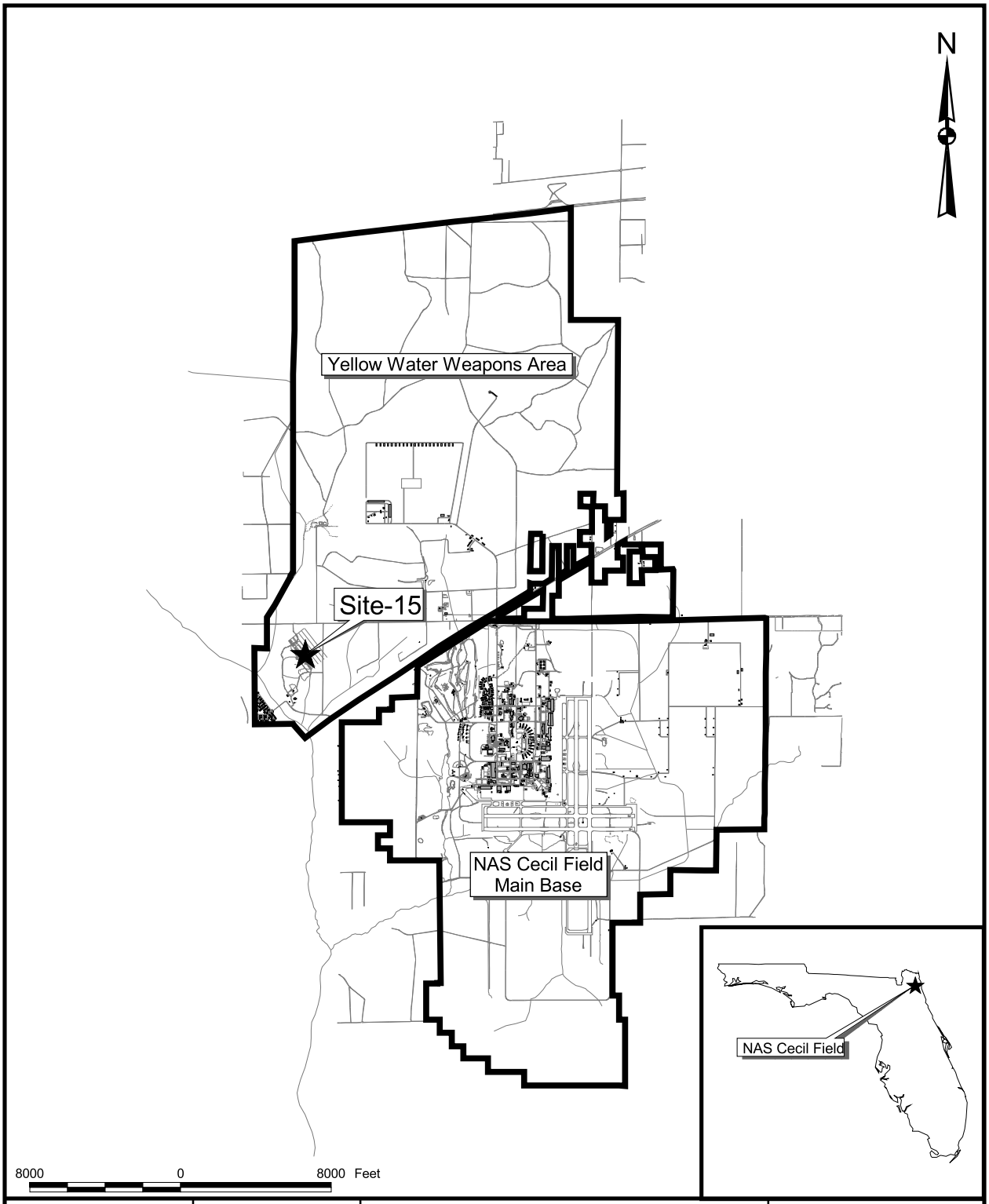
Tetra Tech, June 2008. Record of Decision for Operable Unit 5, Site 15, Blue 10 Ordnance Disposal Area, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command, Southern Division, North Charleston, South Carolina.

Tetra Tech, May 2009. Land Use Control Remedial Design, Operable Unit 5, Site 15, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command, Southern Division, North Charleston, South Carolina.

Tetra Tech, August 2009. Remedial Action Completion Report for OU5, Site 15, Naval Air Station Cecil Field, Jacksonville, Florida. Draft. Prepared for Naval Facilities Engineering Command, Southern Division, North Charleston, South Carolina.

USACE, August, 2004. EP-75-1-2, Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities.

USACE, August, 2009. MMRP-09-005, Accident Prevention Plan.



DRAWN BY MJJ	DATE 20Jan10	GENERAL LOCATION MAP OPERABLE UNIT 5, SITE 15 MEC REMEDIAL INVESTIGATION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 10-1 / REV 0

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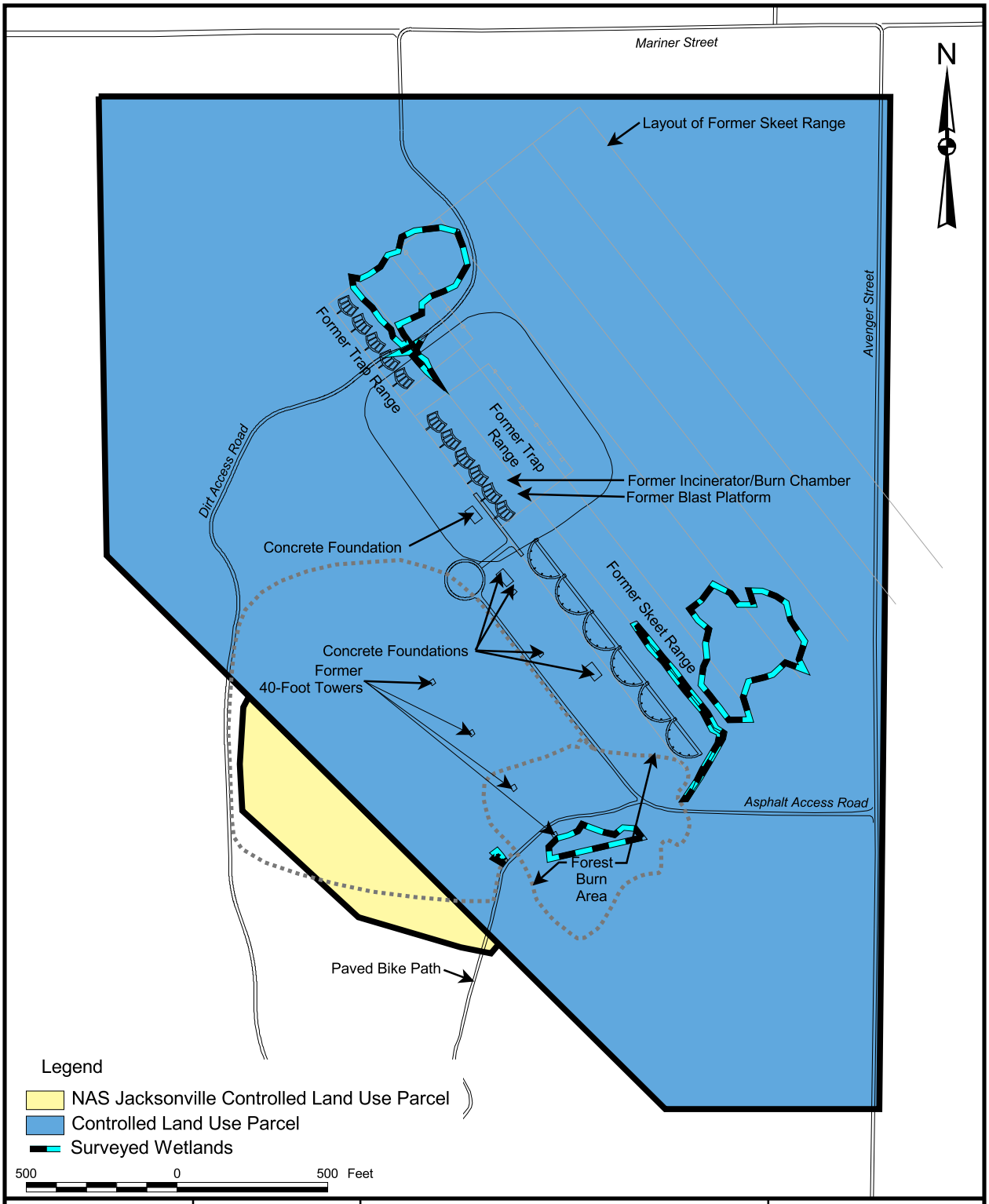

DRAWN BY MJJ DATE 20Jan10			CONTRACT NUMBER 2267
CHECKED BY DATE			APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED	NAVFAC	GENERAL ARRANGEMENT OPERABLE UNIT 5, SITE 15 MEC REMEDIAL INVESTIGATION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	DRAWING NO. FIGURE 10-2 REV 0

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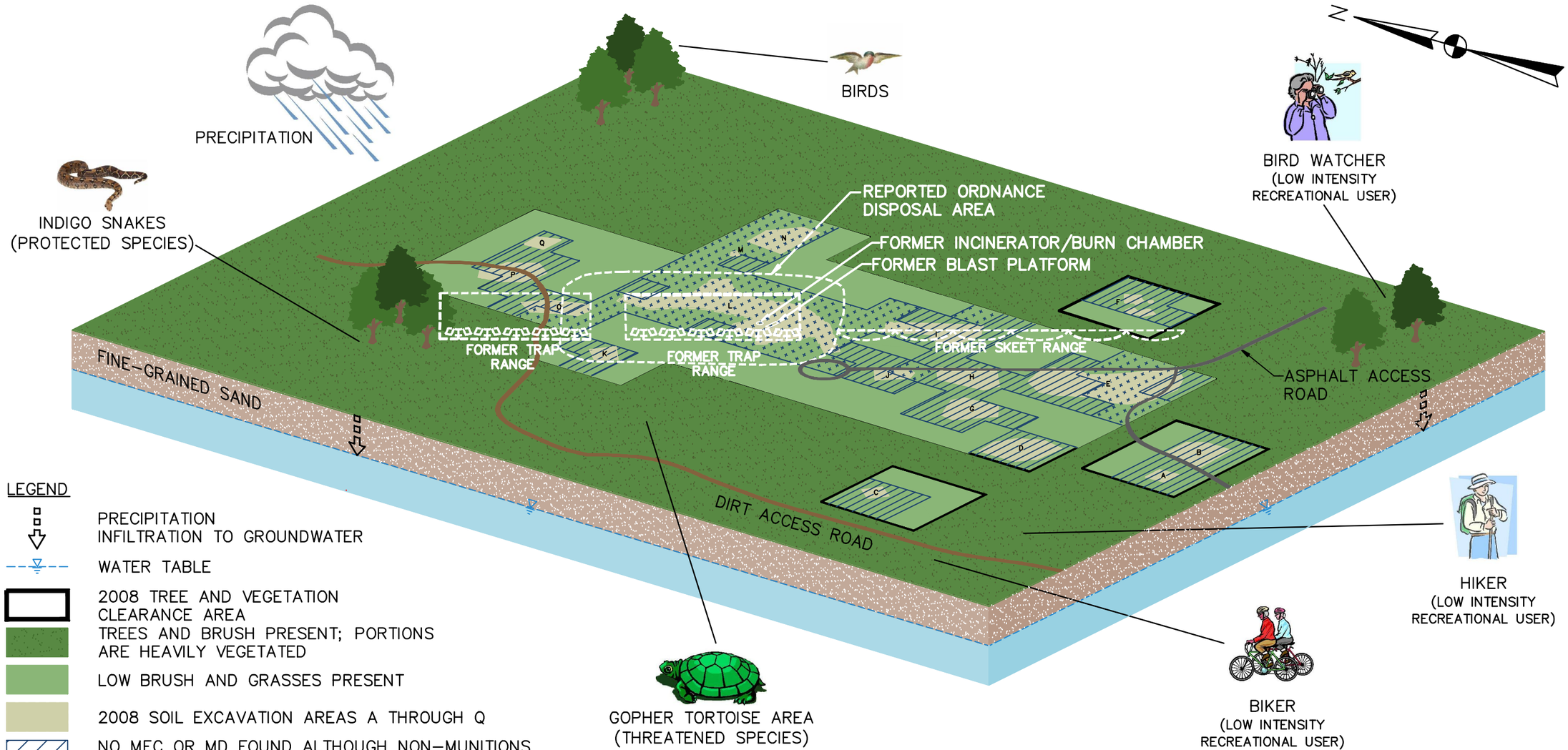

LEGEND

- PRECIPITATION INFILTRATION TO GROUNDWATER
- WATER TABLE
- 2008 TREE AND VEGETATION CLEARANCE AREA
- TREES AND BRUSH PRESENT; PORTIONS ARE HEAVILY VEGETATED
- LOW BRUSH AND GRASSES PRESENT
- 2008 SOIL EXCAVATION AREAS A THROUGH Q
- NO MEC OR MD FOUND ALTHOUGH NON-MUNITIONS DEBRIS MAY HAVE BEEN PRESENT
- MEC AND/OR MD FOUND

NOTES:

1.) MEC OR MD ARE MOST LIKELY STILL PRESENT IN AREAS NOT INCLUDED IN THE 2008 MUNITIONS CLEARANCE WITHIN AND ADJACENT TO THE ORDNANCE DISPOSAL AREA, ALONG ACCESS ROADS TO THE ORDNANCE DISPOSAL AREA, AND IN THE AREA USED AS FORMER SKEET AND TRAP RANGES.

2.) CURRENT ALLOWED LAND USE IS FOR LOW-INTENSITY RECREATIONAL USE.

DRAWN BY CK DATE 02/16/10	NAVFAC	CONCEPTUAL SITE MODEL MEC REMEDIAL INVESTIGATION OPERABLE UNIT 5, SITE 15 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 2267
CHECKED BY DATE			OWNER NO.
REVISED BY DATE			APPROVED BY DATE
SCALE NOT TO SCALE			DRAWING NO. FIGURE 10-3 REV. 0

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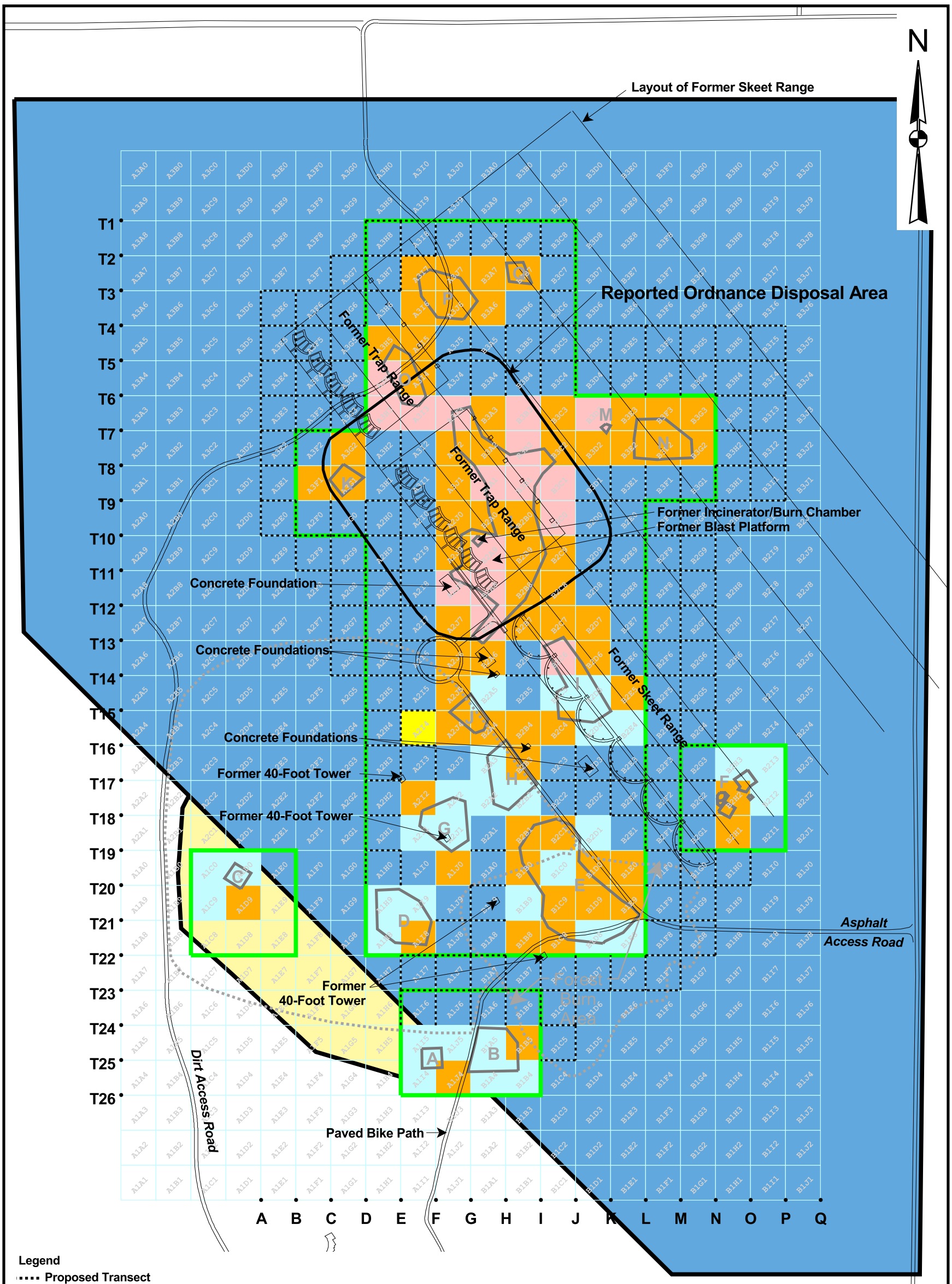

Legend

- Proposed Transect
- 2008 Soil Excavated Areas (A through Q)
- 2008 Tree and Vegetation Clearance Area
- UXO Grid Number
- NAS Jacksonville Controlled Land Use Parcel
- Controlled Land Use Parcel

2008 Munitions Surface and Subsurface Clearance Areas:

- GPO (Reuse area for equipment QA testing)
- MEC or MEC/MD found and removed
- MD only found and removed
- No MEC or MD found although non MD related debris may have been present

Notes: 1) Transect number system shown
2) Additional contingency transect segments to be added as necessary determined by Tetra Tech UXO Manager, Technical Lead, and SUXOS.

300 0 300 Feet

DRAWN BY MJJ	DATE 20Jan10	TRANSECT LOCATIONS FOR DETECTOR-AIDED SURVEY OPERABLE UNIT 5, SITE 15 MEC REMEDIAL INVESTIGATION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 17-1 / REV 0

APPENDIX A

PROJECT SUPPORT INFORMATION

APPENDIX A-1

SUPPLEMENTAL HISTORICAL DATA
CHEMICAL CONTAMINATION

SUPPLEMENTAL HISTORICAL DATA – CHEMICAL CONTAMINATION

The following provides information used to develop the conceptual site model and support the data quality objectives for munitions and explosives of concern (MEC) Remedial Investigation (RI) at Site 15. The evaluation is used to support that only MEC investigation is necessary for the remedial investigation; investigation of MC is not required at this time because sufficient investigation and remediation of chemical contaminants at Site 15 have been conducted. (However, if MEC or MD items are found outside of the area investigated for chemical contaminants, further evaluation of the need for MC investigation may need to be conducted in the future).

The remedial action was conducted in 2008 and 2009 and included removal of soil contaminated with polycyclic aromatic hydrocarbons (PAHs), metals, and total recoverable petroleum hydrocarbons (TRPH) from 17 excavation areas (A to Q). Based on the findings of a MEC Preliminary Assessment/Site Inspection (PA/SI) conducted in 2007 (CH2MHill, 2007) MEC removal was necessary before soil excavation activities for the remedial action could proceed. As part of the remedial action, tree and vegetation clearance and clearance for MEC were conducted in portions of the site prior to soil excavation.

Various investigations of chemical contamination were conducted and the results were presented in the RI Report (ABB-ES, October 1997). The areas of contamination at Site 15 are associated with the ordnance disposal area and old skeet and trap ranges. Chemical contamination was found associated with these sources as well as forest burn activities. Contaminants of Concern (COCs) were identified and the extent of contamination determined. The Record of Decision (ROD) (Tetra Tech, 2008) specified removal of contamination soil to meet current land use and to prevent unacceptable ecological exposure.

Soil sampling location figures supporting this evaluation are attached (Figures 1, 2, and 3) and show the extent of the comprehensive chemical investigation at Site 15. PAHs and lead contamination, respectively, are likely the result of clay pigeons/forest burn and lead shot from the skeet and trap operations. The extent of lead and PAH contaminated soil was delineated and contaminated soil excavated to meet current land use requirements. Similarly, the extent of TRPH contaminated soil has been delineated and excavated to meet current land use. Environmental investigations show that other organic compounds, dioxins, perchlorate, nitroaromatics, and other Target Analyte List (TAL) metals are not COCs. Although nitroglycerin (propellant) has not been investigated, soil in the area where propellant would be expected (reportedly rocket propellant was reportedly placed on the ground, ignited, and presumed to be consumed) in the area of the burn chamber was removed during the 2008/2009 soil removal effort. Groundwater concentrations were not at levels of concern, although note that one monitoring well remains on site (see Figure 4) to further assess arsenic.

REFERENCES

ABB-ES (ABB Environmental Services, Inc.), October 1997. Remedial Investigation, Operable Unit 5, Sites 14 and 15, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command, Southern Division, North Charleston, South Carolina.

AGVIQ-CH2MHill (AGVIQ-CH2MHill Constructors, Inc. Joint Venture III), August 2009. Remedial Action Completion Report – Soil Removal Action for Operable Unit 5, Site 15, Blue 10 Ordnance Disposal Area, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command, Southern Division, North Charleston, South Carolina. [DRAFT]

CH2MHILL, February 2007. Preliminary Assessment/Site Inspection Report for Past Use of Munitions and Explosives of Concern for Blue Ordnance Disposal Area (Site 15), Former Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command, Southeast.

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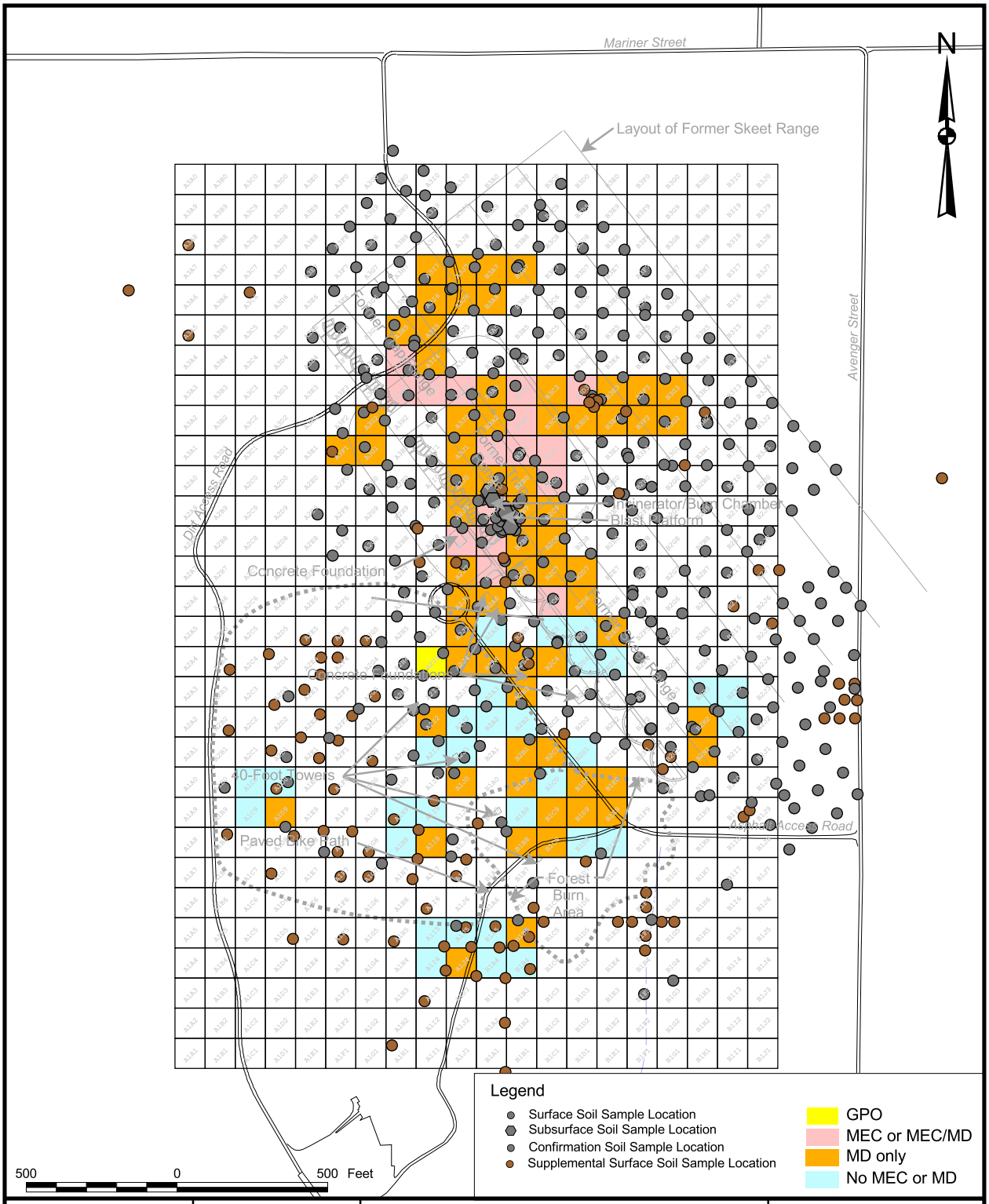
Tetra Tech, August 2009. Remedial Action Completion Report for OU5, Site 15, Naval Air Station Cecil Field, Jacksonville, Florida. [DRAFT].



DRAWN BY MJJ	DATE 31Oct09	SUPPLEMENTAL SURFACE SOIL/SEDIMENT SAMPLING LOCATIONS SELECTED FOR LEAD ANALYSIS OU 5, SITE 15 NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1 / REV 0

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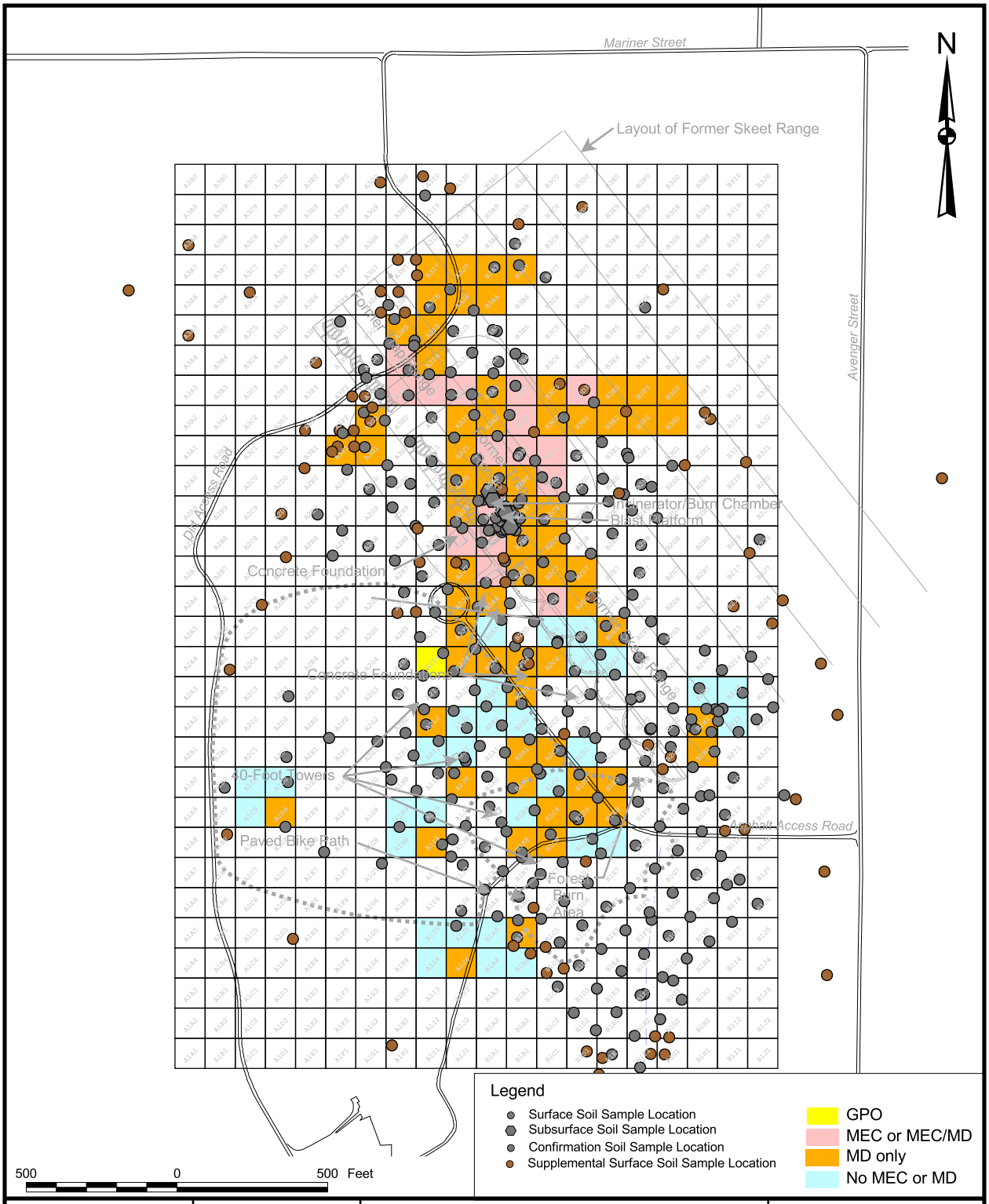
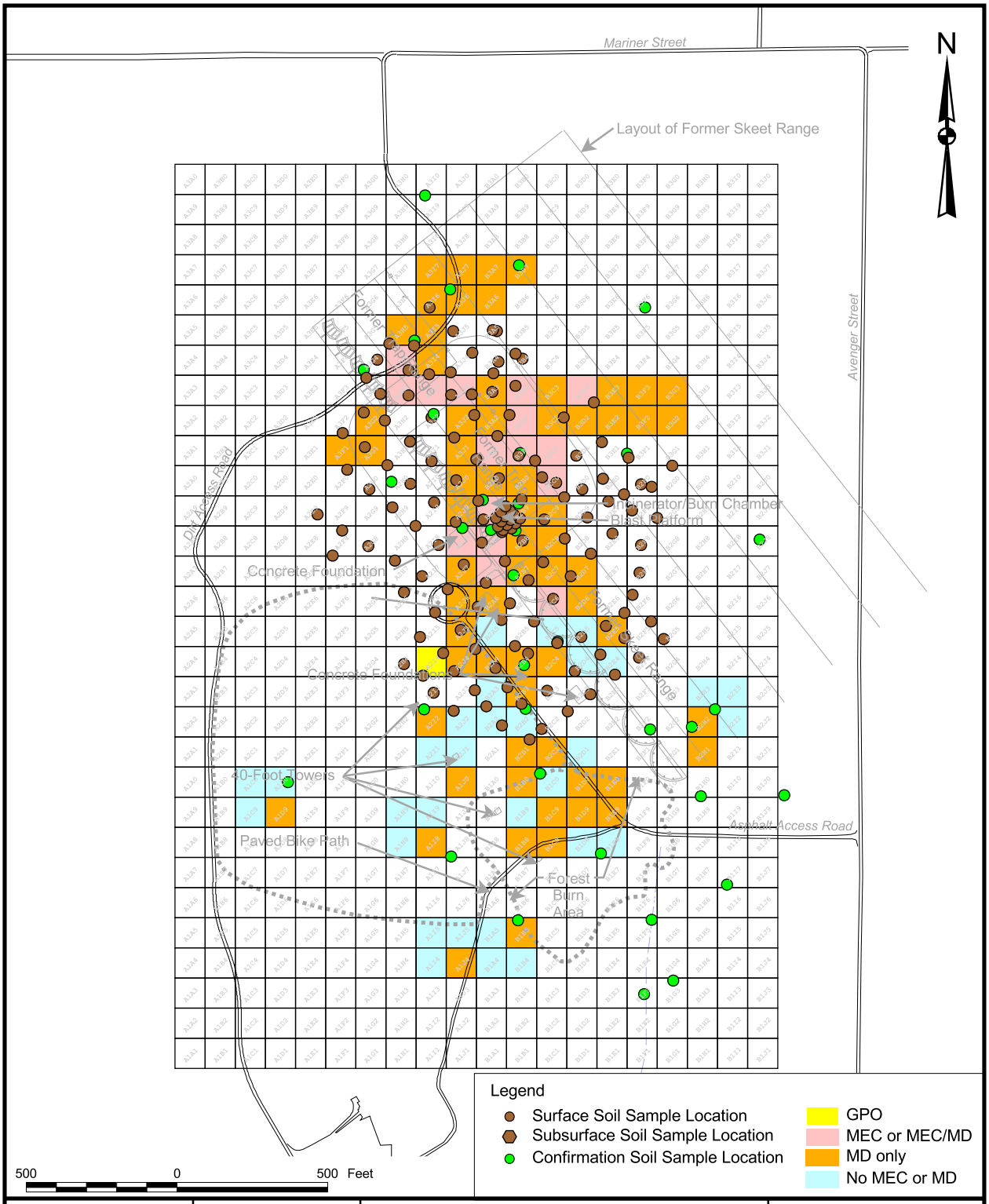


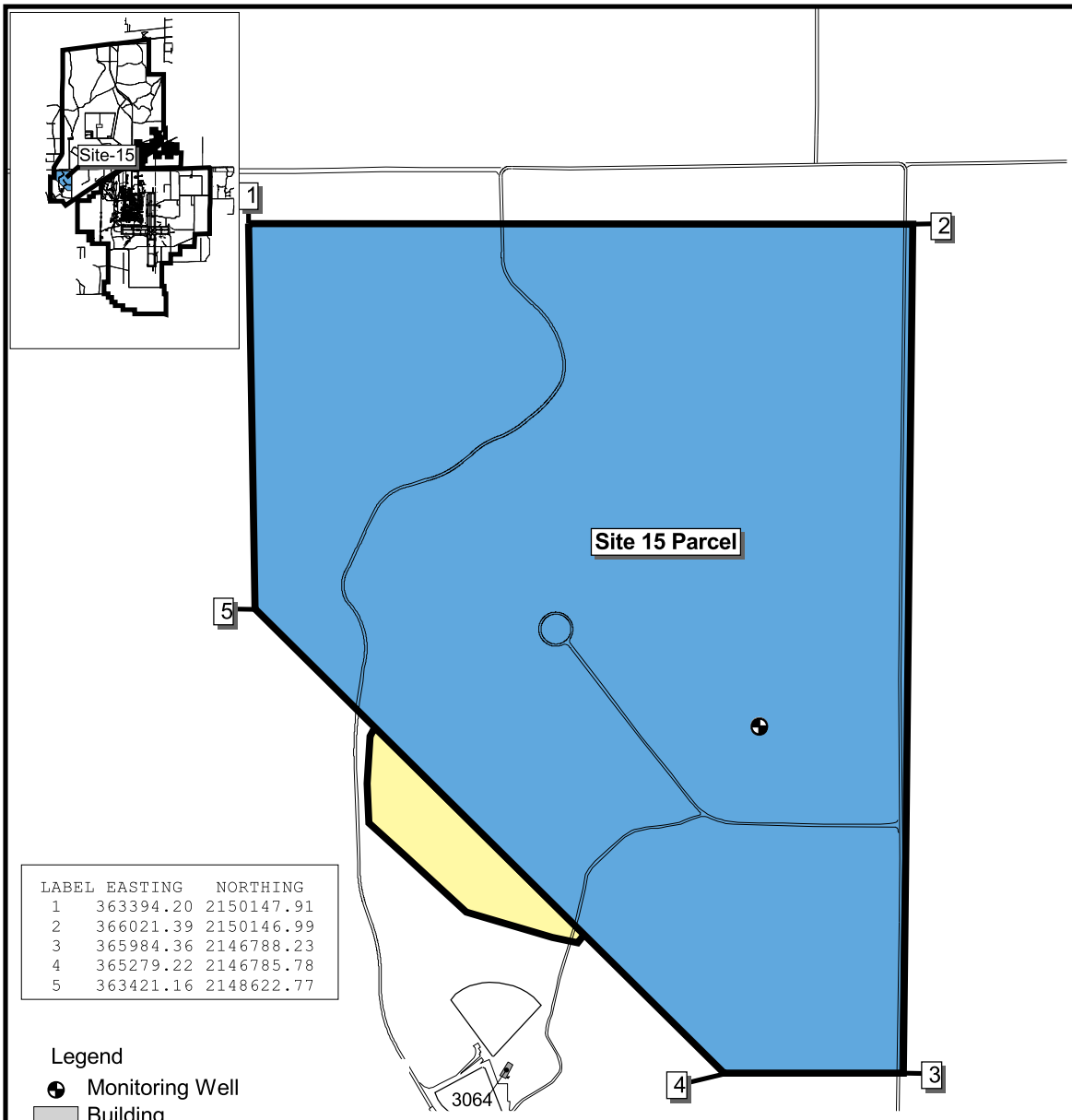
DRAWN BY MJJ	DATE 31Oct09	SUPPLEMENTAL SURFACE SOIL/SEDIMENT SAMPLING LOCATIONS SELECTED FOR PAH ANALYSIS OU 5, SITE 15 NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2 / REV 0

P:\GIS\NAS_CecilField\Site-15_20100120.apr 16Mar10 MJJ 09-Layout-PostPAH_Samples



DRAWN BY MJJ	DATE 31Oct09	RI SAMPLING LOCATIONS SELECTED FOR TNT SCREENING & CONFIRMATORY SAMPLING OU 5, SITE 15 NAS CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 3 / REV 0

P:\GIS\NAS_CecilField\Site-15_20100120.apr 16Mar10 MJJ 06-Layout-TNT_Samples



LABEL	EASTING	NORTHING
1	363394.20	2150147.91
2	366021.39	2150146.99
3	365984.36	2146788.23
4	365279.22	2146785.78
5	363421.16	2148622.77

Legend

- Monitoring Well
- Building
- NAS Jacksonville Controlled Land Use Parcel
- Controlled land use parcel:

a) Residential (including but not limited to any form of housing, child-care facilities, pre-schools, elementary schools, secondry schools, playgrounds, convalescent, or nursing care facilities), industrial, commercial, agricultural, and medium- and high-intensity recreational (including but not limited to playgrounds and contact sports such as baseball, football, and soccer and picnic grounds and campling, respectively) reuse is prohibited*;

b) Excavation of soils is prohibited*;

c) Disturbance of any existing or future monitoring or remediation system(s) is prohibited*.

(* unless prior written approval is obtained from the Navy, EPA and FDEP)

700 0 700 Feet

DRAWN BY MJJ	DATE 20Jan10	LAND USE CONTROL PARCEL OPERABLE UNIT 5, SITE 15 MEC REMEDIAL INVESTIGATION NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 2267
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4 / REV 0

P:\GIS\NAS_CecilField\Site-15_20100120.apr 16Mar10 MJJ 10-04

APPENDIX A-2

SUPPLEMENTAL HISTORICAL DATA
MEC

SUPPLEMENTAL HISTORICAL DATA – MEC

The following provides information on munitions surveys conducted in support of the 2008/2009 contaminated soil removal effort. This information summarizes the munitions survey results and, in doing so, supports the presumption that no further munitions and explosives of concern (MEC) investigation is needed in those grids previously addressed and aids in planning the Remedial Investigation (RI).

The remedial action was conducted in 2008 and 2009 and included removal of soil contaminated with polycyclic aromatic hydrocarbons (PAHs), metals, and total recoverable petroleum hydrocarbons (TRPH) from 17 excavation areas (A to Q). Based on the findings of a MEC Preliminary Assessment/Site Inspection (PA/SI) conducted in 2007 (CH2MHill, 2007) MEC removal was necessary before soil excavation activities for the remedial action could proceed. As part of the remedial action, tree and vegetation clearance and clearance for MEC were conducted in portions of the site prior to soil excavation. The MEC-related remedial action activities related to soil removal are discussed in the Remedial Action Completion Report for Soil Remedial Activities (AGVIQ-Ch2MHill, August 2009 [Draft]).

The MEC removal included subdivision of Site 15 through land survey (100 feet by 100 feet grid cells), vegetation reduction, MEC surface clearance, digital geophysical mapping (DGM) with EM61-MK2 Time-domain Metal Detection and identification of target anomalies, manual and mechanical-aided intrusive investigation of target anomalies identified through DGM, and demolition of MEC items. The munitions survey included 100 percent clearance to 2 feet below ground surface (bgs) and removal of MEC and munitions debris (MD) from the grids included in the survey. The munitions clearance included geophysical prove-out (GPO) and appropriate QC as discussed further in the Remedial Action Completion Report for Soil Removal Action (AGVIQ-Ch2MHill, August 2009). Additional detail on the items found and removed are in the attached grid tracking table.

Munitions clearance activities as part of the remedial activities included the following:

- MEC avoidance as part of activities included unexploded ordnance (UXO) Technician III conducting a reconnaissance of the associated areas. Work locations and access routes were visually checked for anomalies using a magnetometer. Access routes were twice the width of the widest vehicle and clearly marked to prevent personnel from straying into non-cleared areas.
    - No anomalies were reported during pre-excavation sampling
    - No anomalies were reported (gopher tortoise survey and trapping and relocation activities)
    - No anomalies were reported for collection of soil samples for soil treatability study
    - MEC avoidance was conducted during tree and vegetation removal

- Subdivision of Site 15 through land survey into 600 100-foot by 100-foot grids for use for survey and clearance.
- Vegetation reduction.
- MEC surface clearance of 22 acres consisting of an instrument-assisted surface clearance. Surface clearance for MD was performed that included visual search of the surface, augmented with addition of handheld magnetometers to locate and remove MEC (including small arms) and ferrous items 2-inch by 2-inch and larger from the soil surface. Surface/near-surface search efforts were completed to identify MEC for assessment and disposition options; MPPEH was recovered for consolidated storage and processing, surface solid waste was collected, and MEC determined unsafe to move was flagged-in-place. Surface clearance included 114 grids.
- DGM with EM61-MK2 Time-domain Metal Detection and identification of target anomalies (included GPO grid for testing of equipment and personnel). DGM sweeps covering the 114 grids were conducted. Following selection of potential subsurface anomalies, a Nomad GPS RTK system was used to reacquire the anomalies for investigation.
- Manual and mechanical-aided intrusive investigation of target anomalies identified through DGM except for several grids in excavation area L, 100 percent of DGM-identified anomalies were excavated. Anomaly investigation included soil removal to identify the source of the anomaly. Focused investigations were also applied where anomaly investigations did not provide sufficient information to identify the source of the anomaly. Grids in excavation area L where intrusive investigation was only conducted in the excavation region are A2J0, A2J8, A2J9, A3J2, B2A0, B2A8, B2A9, B2B0, B2B8, B2B9, B3A1, B3A2, and B3B1
- Demolition of MEC items.

The table below provides the MEC items identified and removed during the clearance. All of the MEC items were found in the areas surveyed within or nearby the former ordnance disposal area. MD was found in and around the ordnance disposal area, in the former skeet range, and along access roads to the ordnance disposal area.

Grid	**MEC items found**	**Surface or Subsurface**
A2J8	One 20 mm TP projectile full up	Subsurface
A3H3	One 20 mm Tp projectile full up	Surface
A3H4	One M204 Practice mine Fuze	Subsurface
A3I3	Six M204 Practice mine Fuzes	Subsurface
A3J3	Two M204 Practice Mine Fuzes	Subsurface

Grid	MEC items found	Surface or Subsurface
B2A7	Two M204 Practice Mine Fuzes and one M112 Photoflash cartridge	Subsurface
B2A8	One M208 20 mm TP	Surface
B2A9	Two 20 mm Tp projectiles full up	Subsurface
B2C0	Three M204 Practice Mine Fuzes	Subsurface
B2C6	One 20 mm projectile HE	Subsurface
B3A1	One aircraft launched flare	Surface
B3B1	Two Mk4 Spotting Charges	Subsurface
B3B2	One M204 Practice Mine Fuze	Subsurface
B3B3	Two M204 Practice Mine Fuzes	Subsurface
B3C1	One BLU – 26/B Submunition Inert Bomblet	Subsurface
B3D3	One M204 Practice Mine Fuze	Subsurface

REFERENCES

AGVIQ-CH2MHill (AGVIQ-CH2MHill Constructors, Inc. Joint Venture III), August 2009. Remedial Action Completion Report – Soil Removal Action for Operable Unit 5, Site 15, Blue 10 Ordnance Disposal Area, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command, Southern Division, North Charleston, South Carolina. [DRAFT]

CH2MHILL, February 2007. Preliminary Assessment/Site Inspection Report for Past Use of Munitions and Explosives of Concern for Blue Ordnance Disposal Area (Site 15), Former Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Naval Facilities Engineering Command, Southeast.

Grid	Vegetation Clearance Complete	Surface Clearance Comments	lbs of MD removed During Surface Sweep	Surface Clearance Completion Date	Digital Geophysical Mapping Comments	Digital Geophysical Completion Date	Number of Point Intrusive Anomalies	Intrusive Investigation Comments	Intrusive Investigation Completion Date	Lbs of MD removed during Subsurface Sweep
A1C0	Yes	Swept North to South 37 lbs Non-MD Related Scrap 0 MEC	0	4/8/2008		5/15/2008	51		6/9/2008	0
A1C9	Yes	Swept North to South 17 lbs Non-MD Related Scrap 0 MEC	0	4/8/2008		5/15/2008	54		6/3/2008	0
A1D0	Yes	Swept North to South 0 MEC 7 lbs Non-MD Related Scrap	0	4/8/2008		5/7/2008	31		6/2/2008	0
A1D9	Yes	Swept North to South 6 lbs Non-MD Related Scrap 0 MEC	0	4/8/2008		5/7/2008	31		5/30/2008	2
A1H8	Yes	Swept East to West 1 lbs Non-MD Related Scrap 0 MEC	0	4/1/2008		5/7/2008	2	polygon is a Monitoring Well	5/28/2008	0
A1H9	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC	0	4/1/2008		5/7/2008	9		5/28/2008	0
A1I4	Yes	Swept East to West 1 lbs Non-MD Related Scrap 0 MEC	0	4/7/2008		5/13/2008	16		5/19/2008	0
A1I5	Yes	Swept East to West 1 lbs Non-MD Related Scrap Gopher Tortes Hole 0 MEC	0	4/7/2008		5/5/2008	9		5/19/2008	0
A1I8	Yes	1/2 Swept North to South 1/2 Swept East to West 1 lbs Non-MD Related Scrap 0 MEC	0	4/1/2008		5/7/2008	10		5/28/2008	1
A1I9	Yes	Swept East to West 3 lbs Non-MD Related Scrap 0 MEC	0	4/1/2008		5/7/2008	2		5/28/2008	0
A1J0	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC	0	4/1/2008		5/1/2008	17		5/21/2008	12
A1J4	Yes	Swept East to West 1 lbs Non-MD Related Scrap 0 MEC	0	4/7/2008		5/6/2008	18	**polygon is forestry sign**	5/14/2008	1
A1J5	Yes	Swept East to West 1 lbs Non-MD Related Scrap 0 MEC	0	4/7/2008		5/5/2008	7		5/14/2008	0
A2I1	Yes	Swept North to South 3 lbs Non-MD Related Scrap 0 MEC	0	3/31/2008		5/8/2008	22		5/16/2008	0
A2I2	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC	0	3/31/2008		5/8/2008	24		5/16/2008	1

Grid	Vegetation Clearance Complete	Surface Clearance Comments	lbs of MD removed During Surface Sweep	Surface Clearance Completion Date	Digital Geophysical Mapping Comments	Digital Geophysical Completion Date	Number of Point Intrusive Anomalies	Intrusive Investigation Comments	Intrusive Investigation Completion Date	Lbs of MD removed during Subsurface Sweep
A2I4	Yes	GPO	0	4/12/2008		5/6/2008	N/A		N/A	0
A2J0	Yes	Swept North to South 29 lbs Non-MD Related Scrap 0 MEC	32	4/30/2008		5/20/2008	132	**Mag And Dig in Excavation regions only**	8/6/2008	4600
A2J1	Yes	Swept North to South 8 lbs Non-MD Related Scrap 0 MEC	0	3/31/2008		5/1/2008	15		5/20/2008	0
A2J2	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	0	3/31/2008		5/1/2008	5		5/22/2008	0
A2J4	Yes	Swept North to South 26 lbs Non-MD Related Scrap 0 MEC	0	4/11/2008		5/13/2008	47		6/17/2008	1
A2J5	Yes	Swept North to South 49 lbs Non-MD Related Scrap 0 MEC	0	4/11/2008		5/15/2008	105	**grid was reswept. failed info pro QC process**	6/23/2008	5
A2J6	Yes	Swept East to West 150 lbs Non-MD Related Scrap 0 MEC	3	4/24/2008		5/14/2008	109		6/23/2008	4
A2J7	Yes	Swept East to West 300 lbs Non-MD Related Scrap 0 MEC (1) Mk 7 Marine Marker	8	4/24/2008		5/14/2008	63		7/3/2008	8
A2J8	Yes	Swept East to West 0 lbs of Non-MD Related Scrap 0 MEC	100	4/25/2008		5/14/2008	83	**Mag And Dig in Excavation regions only** 20mm TP Projectile Full Up	7/18/2008	4600
A2J9	Yes	Swept East to West 600 lbs Non-MD Related Scrap 0 MEC	12	4/25/2008		5/20/2008	173	**Mag And Dig in Excavation regions only**	7/25/2008	4600
A3F1	Yes	Swept East to West 12 lbs Non-MD Related Scrap 0 MEC	0	5/1/2008		5/29/2008	82		7/7/2008	54
A3G1	Yes	Swept East to West 39 lbs Non-MD Related Scrap 0 MEC	0	5/1/2008		5/29/2008	116		7/7/2008	16
A3G2	Yes	Swept East to West 57 lbs Non-MD Related Scrap 0 MEC	0	5/1/2008		5/29/2008	95		7/9/2008	26
A3H3	Yes	Swept East to West 140 lbs Non-MD Related Scrap 1 MEC Item - 20mm TP Full Up Round	7	5/6/2008		5/28/2008	116		7/16/2008	51

Grid	Vegetation Clearance Complete	Surface Clearance Comments	lbs of MD removed During Surface Sweep	Surface Clearance Completion Date	Digital Geophysical Mapping Comments	Digital Geophysical Completion Date	Number of Point Intrusive Anomalies	Intrusive Investigation Comments	Intrusive Investigation Completion Date	Lbs of MD removed during Subsurface Sweep
A3H4	Yes	Swept North to South 24 lbs Non-MD Related Scrap 0 MEC	0	5/6/2008		5/28/2008	101	(1) M204 Practice Mine Fuze	7/9/2008	67
A3H5	Yes	Swept North to South 2 lbs Non-MD Related Scrap 0 MEC	0	8/7/2008		5/28/2008	56		7/9/2008	31
A3I3	Yes	Swept East to West 120 lbs Non-MD Related Scrap 0 MEC	2	5/5/2008		5/28/2008	178	(6) M204 Practice Mine Fuze	7/14/2008	99
A3I4	Yes	Swept North to South 300 lbs Non-MD Related Scrap 0 MEC	0	5/6/2008		5/28/2008	119		7/11/2008	38
A3I5	Yes	Swept North to South 2 lbs Non-MD Related Scrap 0 MEC	0	5/7/2008		5/28/2008	52		7/9/2008	31
A3I6	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	0	5/7/2008		5/27/2008	42		7/14/2009	27
A3I7	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	0	5/7/2008		5/28/2008	26		7/17/2009	14
A3J1	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	22	4/29/2008		5/20/2008	178			0
A3J2	Yes	Swept East to West 400 lbs Non-MD Related Scrap 0 MEC	17	5/5/2008		5/20/2008	220	**Mag And Dig in Excavation regions only**	9/10/2008	4600
A3J3	Yes	Swept East to West 8 lbs Non-MD Related Scrap 0 MEC	0	5/5/2008		5/20/2008	188	(2) M204 Practice Mine Fuze	8/4/2009	59
A3J6	Yes	Swept North to South 50 lbs Non-MD Related Scrap 0 MEC	0	5/8/2008		5/27/2008	39		7/17/2009	12
A3J7	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	0	5/7/2008		5/28/2008	26		7/17/2009	11
B1A4	Yes	Swept East to West 0 Non-MD Related Scrap 0 MEC	0	4/4/2008		5/6/2008	28		5/13/2008	0
B1A5	Yes	Swept East to West 1 lbs Non-MD Related Scrap 0 MEC	0	4/4/2008		5/5/2008	9	**polygon is fence post left from soil samples**	5/13/2008	0
B1B0	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC	0	4/10/2008		5/12/2008	16		6/10/2008	1

Grid	Vegetation Clearance Complete	Surface Clearance Comments	lbs of MD removed During Surface Sweep	Surface Clearance Completion Date	Digital Geophysical Mapping Comments	Digital Geophysical Completion Date	Number of Point Intrusive Anomalies	Intrusive Investigation Comments	Intrusive Investigation Completion Date	Lbs of MD removed during Subsurface Sweep
B1B4	Yes	Swept East to West 1 lbs Non-MD Related Scrap 0 MEC	0	4/4/2008		5/6/2008	15		5/13/2008	0
B1B5	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC	0	4/4/2008		5/5/2008	10		5/13/2008	5
B1B8	Yes	Swept East to West 0 lbs Non-MD Related Scrap 0 MEC	3	4/8/2008		5/2/2008	17	**polygon is an antenna foundation**	5/14/2008	2
B1B9	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC	0	4/4/2008		5/1/2008	23		5/14/2008	0
B1C0	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC	0	4/10/2008		5/12/2008	26		5/19/2008	0
B1C8	Yes	Swept East to West 0 lbs Non-MD Related Scrap 0 lbs MEC	47	4/9/2008		5/2/2008	44		5/16/2008	0
B1C9	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	8	4/4/2008		5/6/2008	10		5/15/2008	0
B1D0	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	27	4/9/2008		5/12/2008	28		5/29/2008	0
B1D8	Yes	Swept East to West 12 lbs Non-MD Related Scrap 0 MEC	0	4/21/2008		5/6/2008	20		5/30/2008	0
B1D9	Yes	Swept East to West 0 lbs Non-MD Related Scrap 0 MEC	39	4/9/2008		5/6/2008	28		6/10/2008	0
B1E0	Yes	Swept North to South 0 lbs Non-MD Related Scrap Failed Info Pro QC. Reswept on 4/14/2008	17	4/14/2008		5/12/2008	14		5/30/2008	1
B1E8	Yes	Swept East to West 12 lbs Non-MD Related Scrap 0 MEC galvanized wire fence cutting in grid, used magnetic pick-up devise.	0	4/22/2008		5/6/2008	15		5/29/2008	0
B1E9	Yes	Swept East to West 0 lbs Non-MD Related Scrap 0 MEC	33	4/9/2008		5/15/2008	45		6/12/2008	1
B2A0	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	43	4/30/2008		5/15/2008	0	**Mag And Dig in Excavation regions only**	10/29/2008	4600

Grid	Vegetation Clearance Complete	Surface Clearance Comments	lbs of MD removed During Surface Sweep	Surface Clearance Completion Date	Digital Geophysical Mapping Comments	Digital Geophysical Completion Date	Number of Point Intrusive Anomalies	Intrusive Investigation Comments	Intrusive Investigation Completion Date	Lbs of MD removed during Subsurface Sweep
B2A2	Yes	Swept North to South 2 lbs Non-MD Related Scrap 0 MEC	0	4/10/2008		5/12/2008	36		6/13/2008	0
B2A3	Yes	Swept North to South 9lbs Non-MD Related Scrap 0 MEC found .3030 rifle in grid @ N30 14 22.4 W081 55 22.4	0	4/11/2008		5/12/2008	23		6/13/2008	0
B2A4	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	33	4/17/2008		5/13/2008	66		6/16/2008	0
B2A5	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	0	4/22/2008		5/14/2008	122		6/20/2008	0
B2A6	Yes	Swept North to South 975 lbs Non-MD Related Scrap 0 MEC	0	4/23/2008		5/14/2008	111		6/20/2008	3
B2A7	Yes	Swept East to West 750 lbs Non-MD Related Scrap 0 MEC	0	4/23/2008		5/14/2008	118	(2) M204 Practice Mine Fuze (1) M112 Photoflash Cartridge	7/3/2008	9
B2A8	Yes	Swept East to West 0 lbs Non-MD Related Scrap 1 MEC item - 1 each M208 20mm TP	121	4/24/2008		5/14/2008	101	**Mag And Dig in Excavation regions only**	8/12/2008	4600
B2A9	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	4039	5/2/2008		5/2/2008	106	**Mag And Dig in Excavation regions only** (2) 20mm TP Projectiles Full Up	12/15/2008	4600
B2B0	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	38	4/30/2008		5/15/2008	71	**Mag And Dig in Excavation regions only**	9/23/2008	4600
B2B1	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC	0	4/10/2008		5/9/2008	25		6/11/2008	1
B2B2	Yes	Swept North to South 17 lbs Non-MD Related Scrap 0 MEC	0	4/11/2008		5/12/2008	34		6/13/2008	0
B2B3	Yes	Swept North to South 4 lbs Non-MD Related Scrap 0 MEC Grid contains significant amount of roadway.	0	4/16/2008		5/12/2008	36		6/13/2008	2

Grid	Vegetation Clearance Complete	Surface Clearance Comments	lbs of MD removed During Surface Sweep	Surface Clearance Completion Date	Digital Geophysical Mapping Comments	Digital Geophysical Completion Date	Number of Point Intrusive Anomalies	Intrusive Investigation Comments	Intrusive Investigation Completion Date	Lbs of MD removed during Subsurface Sweep
B2B4	Yes	Swept East to West 17 lbs Non-MD Related Scrap 0 MEC	0	4/22/2008		5/13/2008	55		6/16/2008	2
B2B7	Yes	Swept East to West 0 lbs Non-MD Related Scrap 0 MEC	36	4/23/2008		5/2/2008	99		7/3/2008	3
B2B8	Yes	Swept East to West 600 lbs Non-MD Related Scrap 0 MEC	12	4/25/2008		5/2/2008	234	**Mag And Dig in Excavation regions only**	7/28/2008	4600
B2B9	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	3	5/1/2008		5/2/2008	42	**Mag And Dig in Excavation regions only**	9/26/2008	4600
B2C0	Yes	Swept North to South 29 lbs Non-MD Related Scrap 0 MEC	3	4/28/2008		5/19/2008	182	(3) M204 Practice Mine Fuze	9/5/2008	3143
B2C1	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC	1	4/10/2008		5/9/2008	46		6/11/2008	3
B2C4	Yes	Swept North to South 1.75 lbs Non-MD Related Scrap 0 MEC This grid contains significant amount of asphalt roadway.	0	4/16/2008		5/16/2008	18		6/24/2008	2
B2C5	Yes	Swept North to South 1.5 lbs Non-MD Related Scrap 0 MEC	0	4/16/2008		5/16/2008	49		6/26/2008	0
B2C6	Yes	Swept North to South 27 lbs Non-MD Related Scrap 0 MEC Western portion of grid contains abandoned burn kettle remains requiring removal .	1.25	4/16/2008		5/16/2008	58	(1) 20mm Projectile HE	6/27/2008	5
B2C7	Yes	Swept North to South 17 lbs Non-MD Related Scrap 0 MEC	0	4/15/2008		5/16/2008	64		6/30/2008	12
B2C8	Yes	Swept North to South 87 lbs Non-MD Related Scrap 0 MEC	5	4/28/2008		5/19/2008	121		9/5/2008	80
B2C9	Yes	Swept North to South 37 lbs Non-MD Related Scrap 0 MEC	8	4/28/2008		5/19/2008	165		10/1/2009	110
B2D1	Yes	Swept North to South 0 lbs Non MD Related Scrap 0 lbs MEC	0	4/10/2008		5/9/2008	19		6/12/2008	0

Grid	Vegetation Clearance Complete	Surface Clearance Comments	lbs of MD removed During Surface Sweep	Surface Clearance Completion Date	Digital Geophysical Mapping Comments	Digital Geophysical Completion Date	Number of Point Intrusive Anomalies	Intrusive Investigation Comments	Intrusive Investigation Completion Date	Lbs of MD removed during Subsurface Sweep
B2D4	Yes	Swept North to South 107 lbs Non-MD Related Scrap 0 MEC several foundations, walks (cement & asphalt) in grid.	0	4/14/2008		5/13/2008	52	**Lots of Concrete and pipe running from boarders of grid**	6/26/2008	0
B2D5	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC	0	4/15/2008		5/13/2008	39		6/26/2008	0
B2D6	Yes	Swept North to South 2000 lbs Non-MD Related Scrap 0 MEC J57 ENGINE CASKET	0	4/15/2008		5/27/2008	38		6/27/2008	1
B2D7	Yes	Swept North to South 9 lbs Non-MD Related Scrap 0 MEC	1.25	4/15/2008		5/27/2008	40		6/17/2008	11
B2E4	Yes	Swept North to South 27 lbs Non-MD Related Scrap 0 MEC significant cement foundations to be removed prior to DGM visitation.	0	4/14/2008		5/13/2008	21		6/26/2008	0
B2E5	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	1	4/14/2008		5/13/2008	22		6/25/2008	2
B2H1	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC ugly grid needs grubbing prior to dam	0	4/3/2008		5/9/2008	4		5/28/2008	1
B2H2	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC extremely ugly grid needs grubbing	0	4/2/2008		5/9/2008	4		5/28/2008	2
B2H3	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC ugly grid needs grubbing prior to dam	0	4/2/2008		5/9/2008	5		5/28/2008	0
B2I2	Yes	Swept North to South 1 lbs Non-MD Related Scrap 0 MEC extremely ugly grid needs grubbing	0	4/3/2008		5/9/2008	4		5/28/2008	0
B2I3	Yes	Swept East to West 1 lbs Non-MD Related Scrap 0 MEC	0	4/3/2008		5/9/2008	6		5/28/2008	0

Grid	Vegetation Clearance Complete	Surface Clearance Comments	lbs of MD removed During Surface Sweep	Surface Clearance Completion Date	Digital Geophysical Mapping Comments	Digital Geophysical Completion Date	Number of Point Intrusive Anomalies	Intrusive Investigation Comments	Intrusive Investigation Completion Date	Lbs of MD removed during Subsurface Sweep
B3A1	Yes	Swept North to South 0 lbs Non-MD Related Scrap aircraft launched flair	12	4/29/2008		5/20/2008	115	**Mag And Dig in Excavation regions only**	10/15/2008	4600
B3A2	Yes	Swept East to West 17 lbs Non-MD Related Scrap 0 MEC	3	5/2/2008		5/27/2008	134	**Mag And Dig in Excavation regions only**		4600
B3A3	Yes	Swept East to West 15 lbs Non-MD Related Scrap 0 MEC	15	5/5/2008		5/27/2008	222		8/6/2008	97
B3A6	Yes	Swept North to South 17 lbs Non-MD Related Scrap 0 MEC	17	8/8/2008		5/27/2008	43		7/17/2008	29
B3A7	Yes	Swept North to South 7 lbs Non-MD Related Scrap 0 MEC	10	8/8/2008		5/28/2008	46		8/7/2008	29
B3B1	Yes	Swept North to South 0 lbs Non-MD Related Scrap 0 MEC	10	4/29/2008		5/20/2008	167	**Mag And Dig in Excavation regions only** (2) MK4 Spotting Charge	9/11/2008	4600
B3B2	Yes	Swept East to West 40 lbs Non-MD Related Scrap 0 MEC	0.5	5/2/2008		5/20/2008	195	(1) M204 Practice Mine Fuze	8/1/2008	53
B3B3	Yes	Swept East to West 49 lbs Non-MD Related Scrap 0 MEC	17	5/5/2008		5/20/2008	149	(2) M204 Practice Mine Fuze	7/31/2008	53
B3B7	Yes	Swept North to South 6 lbs Non-MD Related Scrap 0 MEC	0	8/8/2008		5/28/2008	37		6/18/2008	24
B3C1	Yes	Swept North to South 424 lbs Non-MD Related Scrap 0 MEC	12	4/28/2008		5/20/2008	144	BLU - 26/B Submunition Inert Bomblet (BIP)	7/24/2008	52
B3C2	Yes	Swept East to West 276 lbs Non-MD Related Scrap 0 MEC	43	5/5/2008		5/20/2008	118		7/22/2008	58
B3C3	Yes	Swept East to West 276 lbs Non-MD Related Scrap 0 MEC	43	5/5/2008		5/20/2008	134		9/8/2008	75
B3D2	Yes	Swept East to West 150 Non-MD Related Scrap 0 MEC	0	4/21/2008		5/27/2008	111		7/23/2008	52
B3D3	Yes	Swept East to West 25 lbs Non-MD Related Scrap 0 MEC	14	4/18/2008		5/22/2008	113	(1) M204 Practice Mine Fuze	7/21/2008	57
B3E2	Yes	Swept East to West 37 lbs Non-MD Related Scrap 0 MEC	30	4/21/2008		5/27/2008	59		8/26/2008	9

Grid	Vegetation Clearance Complete	Surface Clearance Comments	lbs of MD removed During Surface Sweep	Surface Clearance Completion Date	Digital Geophysical Mapping Comments	Digital Geophysical Completion Date	Number of Point Intrusive Anomalies	Intrusive Investigation Comments	Intrusive Investigation Completion Date	Lbs of MD removed during Subsurface Sweep
B3E3	Yes	Swept East to West 25 lbs Non-MD Related Scrap 0 MEC	14	4/18/2008		5/22/2008	46		7/18/2008	30
B3F2	Yes	Swept East to West 12 lbs Non-MD Related Scrap 0 MEC	6	4/18/2008		5/27/2008	38		7/23/2008	19
B3F3	Yes	Swept East to West 17 lbs Non-MD Related Scrap 0 MEC	4	4/18/2008		5/22/2008	35		7/18/2009	19
B3G2	Yes	Swept East to West 5 lbs Non-MD Related Scrap 0 MEC	8	4/18/2008		5/27/2008	19		7/18/2009	13
B3G3	Yes	Swept East to West 17 lbs Non-MD Related Scrap 0 MEC	13	4/18/2008		5/22/2008	22		7/21/2008	15

APPENDIX B

SITE VISIT PHOTOGRAPHS
NOVEMBER 2009

Appendix B – Site Visit Photographs (November 2009)

Photograph 1: Facing northwest at fork on asphalt access road to former Ordnance Disposal Area.

Photograph 2: Facing northwest on dirt portion of road that leads away from the former Ordnance Disposal Area.

Photograph 3: Facing northeast on the asphalt access road toward the southern end of the former skeet range.

Photograph 4: Facing northwest toward circle southwest of the former Ordnance Disposal Area.

Photograph 5: On circle facing east-northeast toward southwestern portion of the former Ordnance Disposal Area.

Photograph 6: On circle facing west-northwest showing drums.

Photograph 7: On circle facing northeast into the former Ordnance Disposal Area.

Photograph 8: On circle facing west-southwest showing drums.

Photograph 9: In southwestern portion of former Ordnance Disposal Area showing excavation area L (sandy fill).

Photograph 10: In southwestern portion of former Ordnance Disposal Area facing south towards circle.

Photograph 11: In southwestern portion of former Ordnance Disposal Area facing southeast.

Photograph 12: In former Ordnance Disposal Area showing 50 caliber bullet.

Photograph 13: North of former Ordnance Disposal Area facing northwest showing discarded old burn chamber.

Photograph 14: On dirt access road north-northwest of the former Ordnance Disposal Area facing southeast.

Photograph 15: On dirt access road north-northwest of the former Ordnance Disposal Area facing east-northeast.

APPENDIX C

EXPLOSIVES SAFETY SUBMISSION DETERMINATION

DEPARTMENT OF THE NAVY
NAVAL ORDNANCE SAFETY AND SECURITY ACTIVITY
FARRAGUT HALL
3817 STRAUSS AVENUE, SUITE 108
INDIAN HEAD, MD 20640-5151

8020
Ser N539/255
25 Feb 10

From: Commanding Officer, Naval Ordnance Safety and Security Activity
To: Director, Base Realignment and Closure Program Management Office, Southeast (BRAC PMO SE)

Subj: EXPLOSIVES SAFETY SUBMISSION DETERMINATION REQUEST FOR A REMEDIAL INVESTIGATION OF SITE 15, CECIL FIELD, FLORIDA

Ref: (a) E-mail BRAC PMO Southeast Mr. A. Sanford/NOSSA (N539) Mr. D. Murray of 12 Feb 10 (w/encl)
(b) NOSSAINST 8020.15B, Explosives Safety Review, Oversight, and Verification of Munitions Responses, of 26 Jan 09
(c) NAVSEA OP 5, Volume 1, Seventh Revision, Change 8

1. As requested by reference (a), the Naval Ordnance Safety and Security Activity (NOSSA) reviewed the subject Explosives Safety Submission (ESS) Determination Request in accordance with references (b) and (c). Based on the information provided, NOSSA has determined that an ESS is not required to conduct a Remedial Investigation (RI) of Site 15 (Operable Unit 5, Blue 10 Ordnance Disposal Area), Cecil Field, Florida.

2. As outlined in your request, we understand that the likelihood of encountering Munitions and Explosives of Concern (MEC) and/or Material Potentially Presenting an Explosive Hazard (MPPEH) during the proposed project has been determined to be low and that the following conditions apply:

a. The RI will consist of a visual and detector-aided survey of MEC/MPPEH, as well as munitions and non-munitions debris, that may be present. The information shall be used to delineate boundaries, fill site information data gaps, and assess the hazard/risk posed by any surface MEC that may be present at the site.

b. Anomaly avoidance techniques described in reference (b) shall be employed by Unexploded Ordnance (UXO)-qualified

technicians. Limited vegetation clearance may also take place in order to provide adequate site access. This will also be conducted by UXO-qualified technicians.

c. The site is outside of all existing explosives safety quantity distance arcs.

3. If surface MEC or MPPEH is discovered on the site while employing anomaly avoidance techniques, the item will be avoided and its location and description will be reported to the cognizant Explosive Safety Officer and the Navy Project Manager. An emergency response from the cognizant Explosive Ordnance Disposal detachment will be requested, if appropriate.

4. The NOSSA point of contact for this ESS determination is Mr. Douglas Murray, who can be contacted at DSN 354-5630 or commercial at 301-744-5630.

TAMMY K. SCHIRF
By direction

Copy to:
CNO (A. Malson; W. Holmes and E. Newbaker)
NAVFAC HQ (R. Sadorra)
COMNAVREG SE JACKSONVILLE ESO (P. Driver)
NOSSA ESSOLANT (B. Sizemore and D. Moore)

APPENDIX D

MEC FIELD STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE
MRP SOP 01
UXO DETECTOR-AIDED SURFACE SURVEYS

1.0 SCOPE AND APPLICABILITY

This document is designed to set a standard operating procedure (SOP) for the detector-aided surface Survey field operations during activities performed under the Munitions Response Program (MRP). This SOP is not site-specific, but rather is intended as a general guidance document for a variety of sites and conditions.

2.0 BACKGROUND

Detector-aided surface Survey activities will be performed in accordance with all local, State, and federal regulations and will include all applicable DoD requirements. The scope of the detector-aided surface Survey activities for a specific site will be defined in the project-specific work plans. Generally, all areas identified as suspect for munitions and explosives of concern (MEC) will receive an Unexploded Ordnance (UXO) detector-aided surface Survey UXO detector-aided surface Survey operations may be used as a stand-alone method for site survey and assessment or in preparation for geophysical survey operations. UXO escort operations will be required during site visits (initial site assessments, planning, and stakeholders meetings), geophysical operations, and MC sampling operations and any other time where non-UXO trained personnel are conducting work in an MEC site. This SOP does not address UXO escort operations. UXO escort operations are addressed in the Munitions and Explosives of Concern and Chemical Warfare Agents Activities SOP which will be attached to the site-specific health and safety plans (HASPs) for those activities.

3.0 PERSONNEL QUALIFICATIONS

UXO personnel conducting detector-aided surface Surveys shall be graduates of a military Explosive Ordnance Disposal (EOD) School of the United States, Canada, Great Britain, Germany, or Australia or a graduate of a formal training course of instruction or EOD assistant course as stated in DDESB TP-18.

UXO Senior UXO Supervisor (SUXOS)

The SUXOS will have a minimum of ten years experience in all aspects of munitions response actions or range clearance activities. A minimum of five years of the experience shall be in supervisory positions.

UXO Team Leader (UXO Technician III)

The UXO Team Leader will have a minimum of 8 years of EOD/UXO experience including prior military EOD and/or commercial UXO experience in munitions response actions, and/or range clearance activities. The UXO Team Leader may supervise up to six UXO technicians.

The UXO Team Leader will conduct detector-aided surface Survey activities as directed by the project manager (PM) and UXO Manager. The UXO Team Leader will be under the direct supervision of the UXO Manager.

UXO Quality Control Specialist (UXOQCS)

The UXOQCS specialist shall have a minimum of 8 years experience in all phases of munitions response actions and/or range clearance activities.

UXO Safety Officer (UXOSO)

The UXOSO shall have a minimum of 8 years experience in all phases of munitions response actions and/or range clearance activities.

UXO Technicians II

The UXO Technicians II will have prior military EOD experience or a minimum of 3 years of experience in munitions response actions and/or range clearance activities. The UXO technician will conduct detector-aided surface Survey activities as directed by the UXO Team Leader.

UXO Technician I

The UXO Technician I will have training as specified in DDESB TP-18. The UXO technician I will be directly supervised by a UXO Technician III or higher when conducting UXO activities.

4.0 DETECTOR-AIDED SURFACE SURVEY OPERATIONS

Equipment

A magnetic locator such as the Schonstedt, GA-52Cx instrument or equivalent and/or an all-metal detector such as the White's XLT or equivalent will be used for detector-aided surface Survey operations. The detection depth of the instrument is limited by size and orientation of a target and soil characteristics of the work area. The locators provide an audio signal for response, but do not store data. The magnetic locator does not need to be calibrated. The all-metal detector has field calibration. Calibration settings are specific to the make and model of the all metals detector. Table 1 lists the calibration settings for the White's spectrum XLT.

To ensure each detector is operating properly, the operator turns on the instrument and slowly moves the locator towards metal. As the probe advances toward the target, the audio signal will increase. Failure to detect the object is reason to reject the instrument.

The detector will be checked daily before starting detector-aided surface Survey activities and after any battery change. The normal daily check for detector-aided surface Survey operations is the blanket test. To conduct the blanket test, an area near the work site and free of anomalies will be identified. The senior UXO Technician or UXOQCS will position several inert munitions, or surrogate munitions items on the surface and cover the items with a tarpaulin or similar cover so the items are not visible the UXO technician. Each UXO technician will conduct a detector aided surface Survey of the blanket test area and locate the test items. The senior UXO technician or UXOQCS will compare the results of the test to the actual placement

of the items and make corrections as necessary. UXO Technicians will also conduct random checks during daily operations.

The normal setting for the Schonstedt instrument is 2; setting the instrument to 3 or 4 will make it more sensitive and setting the instrument to 1 will make it less sensitive. The instrument will not detect copper, brass, or aluminum munitions. The normal setting for the White's all-metal detector will vary according to site conditions.

UXO Detector-Aided Surface Survey

The objective of the UXO detector-aided surface Survey is to locate suspect MEC. Materials potentially presenting an explosive hazard (MPPEH) and munitions debris (MD) on the ground surface in a munitions response site, (MRS). Early in the planning for the field activities, usually during the DQO process with the regulators and the client, the level of effort is determined for each MRS within a munitions response area, MRA). The level of effort can vary from a 100% UXO investigation where the entire foot print of the MRS receives a UXO detector-aided surface Survey, to transects where five foot wide lanes receive a UXO detector-aided surface Survey and each lane is separated by a set number of feet depending on the budget and size of the MRS, or even a meandering path where a UXO detector-aided surface Survey is conducted as the UXO technician meanders across the MRS. Each of these will be discussed in some detail below:

100% UXO Detector-aided Surface Survey

The first step in conducting a 100% UXO detector-aided surface Survey is to identify the boundaries of the MRS. This can be done with a GPS with preloaded grid coordinates, or surveyed by a land surveyor.

The next step is to remove brush and small trees within the MRS to allow access to the locations where the surface Survey is to be conducted. The degree of removal will depend on site-specific conditions. This can be accomplished with a bush cutting crew and a UXO escort, or the UXO team can conduct the brush cutting themselves depending on the size of the area and the amount of brush removal needed. Care must be taken to ensure that personnel do not disturb suspect MEC, MPPEH or munitions debris on the surface that may be obscured by vegetation

The next step is to establish a grid system across the MRS. The normal grid is 100ft X 100ft but may be larger or smaller if the MRS would be better covered with a different size. The grid is established using a GPS with preloaded grid corners, or surveyed by a land surveyor to establish the grid corners.

The next step in the set-up process is to divide each grid into search lanes. This is normally done by running a tape measure between the bottom and top east/west corner stakes. Then the UXO team will run rope lines from the 0 point on one tape to the 0 point on the other tape, from the 5ft point on one tape to the 5ft point on the next tape, and so on until the entire 100 ft grid has been divided in to lanes.

The UXO team members will now start the UXO detector-aided surface Survey of each lane. Each UXO team member will start at one of the tapes and using the metal detector, proceed toward the other tape and locate any surface MEC within their lane. If suspect MEC is

encountered, its location will be recorded and/or marked using a GPS, tape measure, or other grid coordinate location system. The UXO Team will attempt to determine its condition without moving or disturbing the item prior to proceeding with the surface Survey. Each item will be marked with engineer flagging and given a unique ID number (See MEC Management and Accountability SOP). All available information about the item will be recorded in the logbook/MEC Accountability Log, including suspect MEC location, identification, and ID number. A digital photograph will be taken of each item. The UXO Team will not move or otherwise disturb the item in an attempt to collect information. After all available information is recorded; the UXO Team will resume the detector-aided surface Survey.

When the UXO detector-aided surface Survey of a grid is complete and all items have been located with coordinates and digitally photographed, the tape measures, ropes and other equipment will be moved to the next grid and reestablished as stated above. This process will continue until the entire MRS has been investigated with as close as possible to 100% UXO detector-aided surface Survey.

Transect UXO Detector-aided Surface Survey

The first step in conducting a transect UXO detector-aided surface Survey is to identify the boundaries of the MRS. This can be done with a GPS with preloaded grid coordinates, or surveyed by a land surveyor.

The next step is to establish the end stakes of each transect across the MRS. The transect end stakes are established using a GPS with preloaded end stake locations, or surveyed by a land surveyor. The distance between transects will be established in the site-specific work plan. The direction should be either north/south, or east west although other directions may be appropriate in specific circumstances.

If necessary, each transect may require some brush cutting to aide in the surface Survey. If brush cutting is determined to be necessary, the transect should be at least 5 ft. wide. This can be accomplished with a bush cutting crew and a UXO escort, or the UXO team can conduct the brush cutting themselves depending on the size of the area and the amount of brush removal needed. Care must be taken to ensure that personnel do not disturb suspect MEC items on the surface that may be obscured by brush and tall grass.

The UXO team members will now start the UXO detector-aided surface Survey of each transect. Each UXO team member will start at one of the end stakes and using the metal detector proceed in a deliberate pattern to locate any surface MEC within their 5ft wide transect, toward the other corresponding end stake. The UXO team member will use a GPS or compass to maintain a generally straight transects during the investigation. If suspect MEC is encountered, its location will be recorded and/or marked using a GPS, tape measure, or other grid coordinate location system. The UXO Team will attempt to determine its condition without moving or disturbing the item prior to proceeding with the surface Survey. Each item will be marked with engineer flagging and given a unique ID number (See MEC Management and Accountability SOP). All available information about the item will be recorded in the logbook/MEC Accountability Log, including suspect MEC location, identification, and ID number. A digital photograph will be taken of each item. The UXO Team will not move or otherwise disturb the item in an attempt to

collect information. After all available information is recorded; the UXO Team will resume the detector-aided surface Survey.

When the UXO detector-aided surface Survey of a transect is complete and all items have been located with coordinates and digitally photographed, the UXO team member may proceed to the next transect. This process will continue until the transects have been completed over the entire MRS as planned in the WP.

Meandering Path UXO Detector-aided Surface Survey

Generally the meandering path UXO detector-aided surface Survey is very similar to the transect UXO detector-aided surface Survey. The main difference is there is very little need to cut brush as the UXO team members will meander around heavy brush and other obstacles.

The GPS will have information about the MRS preloaded so as to ensure that the path stays within the MRS. Again the meandering path will be approximately 5ft wide and proceed across the MRS until the objective, (a set amount of time, distance, or suspect MEC items) have been investigated with the UXO detector-aided surface Survey. The site-specific work plans will establish the area within the MRS to be covered with the meandering transects.

If suspect MEC is encountered, its location will be recorded and/or marked using a GPS, compass, and/or tape measure, or other grid coordinate location system. The UXO Team will attempt to determine its condition without moving or disturbing the item prior to proceeding with the surface Survey. Each item will be marked with engineer flagging and given a unique ID number (See MEC Management and Accountability SOP). All available information about the item will be recorded in the logbook/MEC Accountability Log, including suspect MEC location, identification, and ID number. A digital photograph will be taken of each item. The UXO Team will not move or otherwise disturb the item in an attempt to collect information. After all available information is recorded; the UXO Team will resume the detector-aided surface Survey.

Every effort will be made to identify each suspect MEC or MPPEH item located. Under no circumstances will any suspect MEC be moved in an attempt to make a definitive identification. The MEC item will be visually examined for markings and other external features such as shape, size, and external fittings. If unknown military munitions are encountered, the facility point of contact (POC) and Chadux Tt UXO Manager will be notified.

Only UXO-qualified personnel will perform MEC identification procedures. As an exception, a UXO Technician I may assist in the performance of MEC identification procedures when under the supervision of a UXO Technician III or higher. All personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel will be under the direct supervision of a UXO Technician III or higher. All suspect MEC items will be recorded following the requirements of this SOP, the site-specific Work Plan/QAPP, the project site-specific HASP, applicable ordnance operations procedural safety guidelines, and industry-accepted safe work practices and procedures.

All items discovered during the detector-aided surface Survey of the transects/grid will be left in place. No MEC will be moved during this part of the project. The facility POC will be notified

of the presence of MEC so that arrangements may be made through the facility for proper disposition of the item(s). If the facility initiates an emergency response or disposal action, follow-up documentation must be obtained to detail the date and method of disposition. This is also needed to ascertain the actual type and condition of the item (live or inert filled) to aid in future classification of the site.

Quality Control

During the detector aided surface Survey the UXOQCS, or Senior UXO technician if there is no UXOQCS, will recheck 25% of the first four units of work (grids or transects). If quality requirements are not met on any unit, that unit will be rejected and the UXO team will rework the entire unit. Once quality requirements are met for four units in a row, the UXOQCS, or Senior UXO technician if there is no UXOQCS may reduce the level of rechecks to 10% of each unit (grids or transects). If at any time a unit fails the quality control check, that complete unit will be reworked and the rechecks will be increased to 25% until four units in a row pass the recheck. Blind seeds should also be considered as part of the quality control for the detector aided surface survey. When blind seeds are used, 1-6 blind seeds will be placed in the daily lot of work. Failure to detect a blind seed will result in rejection of the lot of work and that lot will be reworked by the UXO Team. After rework, the UXOQCS will recheck that lot using the procedures above, with or without blind seeds.

Detector-Aided Surface Survey for Geophysical Survey

The UXO Technician will conduct a detector-aided surface Survey of the grid or area to be surveyed and record the location of any MEC items discovered. Each item will be marked and recorded as described above. UXO avoidance will be practiced during the geophysical survey.

When allowed by the conditions of the Explosive Safety Submission (ESS) determination, any non-munitions debris may be moved to facilitate a more effective geophysical survey. Non-munitions debris may be collected and stockpiled in a designated area within the boundaries of the site. The facility must agree to take possession of this non-munitions debris and arrange the proper disposition of the material before any items may be moved or disturbed.

TABLE 1

White's Spectrum XLT Settings		
Basic Adjustments:	**UXO 1**	
Target Volume	58	
Audio threshold	23	
Tone (audio frequency)	226	
Audio Disc.	on	
Silent Search	off	
Mixed-Mode	on	
A.C. Sensitivity	60	Adjust at a test Grid. Compare with another White's
D.C. Sensitivity	30	Adjust at a test Grid. Compare with another White's
Backlight	0	
Viewing Angle	25	
Pro Options:		
"Audio"		
Ratchet Pinpointing	on	
S.A.T. Speed	7	
Tone I.D.	on	
V.C.O.	on	
Absolute Value	off	
Modulation	on	
"G.E.B/Trac"		
Autotrac	on	
Trac View	off	
Autotrac Speed	14	
Autotrac Offset	+1	
Trac Inhibit	on	
Coarse B.E.B.	54	These numbers are variable and will change automatically.
Fine G.E.B.	160	These numbers are variable and will change automatically.
"Discrimination"		
Disc. Edit	+95 Accept	
Block Edit	+95 Accept	
Learn Accept	off	
Learn Reject	off	
Recovery Speed	20	

White's Spectrum XLT Settings		
Basic Adjustments:	**UXO 1**	
Bottlecap Reject	20	
"Display"		
Visual Disc.	off	
Icons	on or off	
V.D.I. Sensitivity	55	
D.C. Phase	9on	
Graph Averaging	on	
Graph Accumulating	on	
Fade Rate	u	
"Signal"		
Transmit Boost	off	
Transmit Frequency	1 to 7	
Preamp Gain	4	

STANDARD OPERATING PROCEDURE
MRP SOP 02
MEC MANAGEMENT AND ACCOUNTABILITY

A. SCOPE AND APPLICABILITY

This document is designed to set a standard operating procedure (SOP) for the management and accountability of Munitions and Explosives of Concern (MEC) encountered during activities performed under the Munitions Response Program (MRP).

B. BACKGROUND

MEC activities will be performed in accordance with all local, State, and federal regulations and will include all applicable DoD requirements. Generally, MEC will be encountered during the performance of Unexploded Ordnance (UXO) detector-aided surface Survey operations, subsurface geophysics investigations and UXO Escort operations. UXO detector-aided surface Survey operations may be used as a stand-alone method for site survey and assessment or in preparation for geophysical survey and other operations. UXO escort operations may be required during site visits (initial site assessments, planning, and stakeholders meetings), geophysical operations, construction support during subsurface activities, and MC sampling operations.

C. PERSONNEL QUALIFICATIONS

UXO personnel shall be graduates of a military Explosive Ordnance Disposal (EOD) School of the United States, Canada, Great Britain, Germany, or Australia or a graduate of a formal training course of instruction or EOD assistant course as stated in DDESB TP-18.

D. MEC MANAGEMENT AND ACCOUNTABILITY OPERATIONS

UXO Detector-Aided Surface Survey

If suspect MEC is encountered, its location will be recorded and/or marked using a GPS, tape measure, or other grid coordinate location system. The UXO Team will attempt to determine its condition without moving or disturbing the item prior to proceeding with the surface Survey. Each item will be marked with engineer flagging and given a unique ID number. ID numbers will start with a letter(s) corresponding to the site or grid in which the item is located. This will be followed by the transect number of the site or grid specific to the location of the item. Lastly, a number will be assigned to the individual items within the transect. These numbers will start at 01 and run consecutively. For example:

*The site name is **O**pen **B**urn **P**it. The first transect within the Open Burn Pit is **A1**. The first item encountered in transect A1 is item **01**. The ID number assigned to the item is **OBP-A1-01.***

All available information about the item will be recorded in the logbook/MEC Tracking Log as presented in Attachment 1 to this SOP, including suspect MEC location, identification, and ID number. A digital photograph will be taken of each item. The UXO Team will not move or otherwise disturb the item in an attempt to collect information. After all available information is recorded; the UXO Team will resume the detector-aided surface Survey.

Every effort will be made to identify each suspect MEC item located. Under no circumstances will any suspect MEC be moved in an attempt to make a definitive identification. The MEC item will be visually examined for markings and other external features such as shape, size, and external fittings. Prior to any documentation being developed on an MEC item, all fusing will be definitively identified if it is possible to safely do so visually without disturbing the ordnance item. This identification will consist of fuse type by function and condition (armed or unarmed) and the physical state/condition of the fuse, i.e., burned, broken, parts exposed/sheared, etc.

Only UXO-qualified personnel will perform MEC identification procedures. As an exception, a UXO Technician I may assist in the performance of MEC identification procedures when under the supervision of a UXO Technician III or higher. All personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel will be under the direct supervision of a UXO Technician III or higher. All suspect MEC items will be recorded following the requirements of this SOP, the site-specific Work Plan/QAPP, the project site-specific HASP, applicable ordnance operations procedural safety guidelines, and industry-accepted safe work practices and procedures.

Detector-Aided Surface Survey for Geophysical Survey

The UXO Technician will conduct a detector-aided surface Survey of the grid or transect to be surveyed and record the location of each MEC item discovered, if any. Each item will be marked and recorded as described above. UXO avoidance will be practiced during the geophysical survey.

When allowed by the conditions of the Explosive Safety Submission (ESS) determination, any non-munitions debris may be moved to facilitate a more effective geophysical survey. Non-munitions debris may be collected and stockpiled in a designated area within the boundaries of the site. The facility must agree to take possession of this non-munitions debris and arrange the proper disposition of the material before any items may be moved or disturbed.

UXO Escort Operations

One UXO Technician, qualified as a UXO Technician II or higher, will be required to support each field team engaged in operations in areas that might contain MEC. If any MEC is encountered, the item will be avoided during this phase of the project.

The UXO Technician will not attempt to identify the type or condition of the ordnance during escort operations. Any area with visible ordnance or MEC will be clearly marked, and the area will be avoided. The location of visible ordnance or MEC will be recorded and noted in the field logs. If more senior level personnel are present on site, MEC findings will be reported to the UXO Team Leader. No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO Escort duties.

E. NOTIFICATOINS IF MEC IS ENCOUNTERED

Any MEC item discovered during a detector-aided surface Survey, geophysical survey, or UXO escort operation will be left in place and will not be moved. Should MEC be encountered, the following scenarios should be addressed as follows:

(1) <u>If a complete MEC item or ordnance related material is encountered that is believed to pose a hazard, is unexpectedly encountered at a given site, is encountered outside of the current established site boundaries, or is unknown</u>, the UXO Team Leader, with support by UXO Technicians on site as necessary, will document the following information, as provided on Attachment 1, for notification purposes:

- Site Name
- Date/Time Encountered
- Name and UXO Category of Person Providing Notification
- Location of Item (provide coordinates)
- Type of Item (provide digital photograph)

- Apparent Fuze Condition (armed or unarmed)
- Physical Condition (burned, broken, parts exposed/sheared, etc)
- Physical Appearance (buried, staged, etc.)
- Activity in Progress

The UXO Team Leader will attempt to identify the type and/or condition of the ordnance and its location, as described above, and will immediately report this information to the client point of contact at the facility and the Tetra Tech UXO Manager. Prior to any documentation being performed on a suspect MEC item, all fuzing will be definitively identified only if it is possible to safely do so visually without disturbing the item. If directed by the point of contact at the facility, UXO personnel may take emergency non-invasive action such as securing the area until the appropriate exclusion and safety zones have been determined.

The Navy point of contact at the facility will be responsible for notifying appropriate EOD personnel or for designating this notification task to the Tetra Tech UXO Team Leader. The notification to EOD personnel should be immediate if a live MEC item is encountered which could be a hazard to personnel, or if the item is unknown so that arrangements may be made through the facility for proper disposition of the item(s). If the facility initiates an emergency response or disposal action, follow-up documentation should be obtained to detail the date and method of disposition. This information is also needed to ascertain the actual type and condition of the item (live or inert filled) to aid in future classification of the site.

(2) If the MEC item cannot be identified by type as a conventional munition, and/or if in the unlikely event that the MEC is suspected to be potential Chemical Warfare Material (CWM), personnel will withdraw upwind from the area, assemble at a pre-designated rally point, secure the site, and immediately request assistance from the point of contact at the facility and notify the Tetra Tech UXO Manager. If so directed, UXO personnel will take emergency non-invasive actions such as covering the item with plastic sheeting and securing the area until the appropriate exclusion and safety zones have been determined.

(3) If Hazardous, Toxic, or Radiological Waste (HTRW) is encountered on-site, the work site will be evacuated until the Tetra Tech Project Health and Safety Officer, with concurrence of the client point of contact at the facility, identifies and implements appropriate protective measures.

For any of the scenarios, upon receiving notification from the Tetra Tech UXO Team Leader, the Tetra Tech UXO Manager will then immediately inform the Tetra Tech Technical Lead, who will then immediately inform the client Project Manager. Tetra Tech Program Management personnel will then be notified. The client Project Manager will then make all other necessary notifications within the client's organization.

The following table lists contacts information.

Position	Name	Organization	Direct Dial Phone	Cell Phone
Technical Lead	Linda Klink	Tetra Tech	412.921.8650	
UXO Manager	Ralph Brooks	Tetra Tech	770.413.0965 - 231	404.661.4916
Navy BRAC Project Manager	Art Sanford	Navy BRAC PMO SE	843.743.2135	

ATTACHMENT 1

MEC TRACKING LOG
CECIL FIELD, JACKSONVILLE, FL
SITE:_____

ID #	ITEM IDENTIFICATION	UXO TECH NAME	ITEM COORDINATES	DATE/TIME FOUND	DIGITAL PHOTGRAPH NUMBER	ARMED / UNARMED	PHYSICAL CONDITION / APPEARANCE	DATE DESTROYED

STANDARD OPERATING PROCEDURE
MRP SOP 03
GEOPHYSICAL SURVEY

1.0 SCOPE AND APPLICABILITY

This operating procedure is designed to provide a regular set of guidelines for conducting geophysical surveys for Munitions Response Programs (MRPs). The general procedure is intended to apply to a wide variety of investigations (targets).

2.0 SUMMARY OF METHOD

Various military operations (transport, training, practice and experimental) over time have resulted in the deposition of a wide assortment of munitions of explosive concern (MEC), and a large effort is underway to search and remove such items from many of the active and inactive military sites across the country. MEC range from small objects (20mm) to large objects (bombs), and their potential abundance on a site can vary considerably as well. Geophysics is a non-intrusive approach often used to locate buried objects that could be MEC. Numerous steps are involved in selecting a geophysical approach, and they are described below.

All UXO Survey and avoidance activities and geophysical surveys will be carried out in accordance with all local, state, and federal regulations, and will include general guidance from applicable USACE Data Item Description requirements, including Engineer Pamphlet EP-75-1-2 dated 01 August 2004 (USACE 2004), Data Item Descriptions; MMRP-09-001 (USACE 2009), MMRP-09-005-05 (USACE 2009), and MMRP-09-007 (USACE 2009). Additional guidance is provided in Ordnance and Explosives Digital Geophysical Mapping Guidance – Operational Procedures and Quality Control Manual (DGM QC Guidance) (USACE 2003f).

3.0 PERSONNEL QUALIFICATIONS

Personnel responsible for designing or conducting geophysical processes should possess education and training in geophysics to insure proper procedures are followed. Sub-contractors should possess similar personnel requirements when implementing a geophysical plan. Personnel will meet the requirements of USACE Data Item Description OE – 025.01 (USACE 2004) described below. For this Cecil Field project where geophysics consists only of detector-aided surveys, UXO technicians will conduct the surveys as per MRP SOP 01and geophysical personnel qualifications below are not applicable.

Project Geophysicist - ~~This individual shall have a degree in geophysics, geology, geological engineering, or a closely related field, and shall have a minimum of 5 years of directly related geophysical experience.~~ This individual has overall responsibility for design, implementation, and management of all geophysical investigations required for the work effort, but may not necessarily be on-site full time. ~~This individual shall be the project geophysicist of record.~~

Site Geophysicist - ~~This individual shall have the same education requirements as the Project Geophysicist, except the 5 years minimum experience requirement is waived, if working under~~

~~the general supervision of a Project Geophysicist.~~ This individual is responsible for day-to-day operations of the site geophysical investigations. ~~This individual may also be the Project Geophysicist if he/she meets the qualifications of "Project Geophysicist" above.~~

4.0 SURVEY DESIGN

Several considerations must be taken into account when designing a geophysical survey:

Site Preparation: Sites suspected to contain MEC must be inspected by a properly qualified UXO technician. The inspection will include, as a minimum, a visual inspection as well as possibly assisted by a hand-held magnetic or all-metals locator. This is to ensure safety for setting monuments or survey stakes, and in collecting the survey data. All movable aboveground metal should be removed from the site prior to commencement of the geophysical survey in order to obtain subsurface information (not be interfered with by the aboveground metal that could mask subsurface metal).

Vegetation can also create limitations for survey coverage. Brush cutting and vegetation clearing may be necessary to acquire geophysical data.

Equipment Selection: An understanding of the nature of the suspect MEC must be established first in order to select the proper equipment for the survey site.

Magnetometer surveys are selected when the potential MEC targets are comprised of a substantial ferrous (iron) component, and the site is expected to have low levels of cultural 'noise' (ex. power lines, scrap mixed in with the soil, numerous aboveground metallic objects that cannot be removed from the survey area). Maximum prospecting depth is limited by the strength of the magnetic field for the potential MEC (controlled by the mass, diameter and orientation of the buried metallic object). Sensor height will be determined by the Geophysicist based on the nature of site conditions and expected target sizes and depths.

EM induction surveys are selected when the potential MEC targets are comprised of a significant component of any type of metal. Normally maximum prospecting depths are limited to about 12 to 18 feet below ground surface for the largest potential targets, but will range to very shallow depths for small metallic objects.

Certain geologic conditions may be prohibitive to the success of a geophysical survey, and in such cases a pilot test or Geophysical Prove Out may be required to determine whether the survey equipment can detect the buried targets. Examples of such conditions include ultra-mafic soils or shallow bedrock, high electrically conductive soils (perhaps fill containing scrap metal) or salt water conditions which can interfere with the detection capabilities of the survey equipment.

Survey Coverage: Expected target sizes, anticipated burial depths and the target metal mass must be evaluated by the Geophysicist in order for proper selection of survey line spacing given the selection of geophysical equipment in order to possess a high level of confidence that the project goals can be accomplished. Surveys conducted using 2.5 ft line spacing with an EM61 or G-858 magnetometer will provide 100% effective survey coverage for most MEC targets. Conversely,

in cases where a reconnaissance survey is needed, meandering path or non-traditional survey geometries may be substituted to accomplish the project goals. In all cases, consideration must be given to past, current and future land uses to assure that the survey approach meets the client objectives.

Survey Location: Locating survey lines (data) can be accomplished in a few ways. The level of accuracy needed and the surrounding site features will help determine the acceptable location technique. Small survey areas may be located with a high level of accuracy using tape measures to create survey lines (grids). The grids may then be referenced directly to permanent and semi-permanent site features.

Larger survey areas or survey areas in remote areas may need a different location method to maintain a high level of accuracy. Professional surveying or integrating DGPS measurements with the geophysical data can be used in large areas to maintain high location accuracy. Numerous GPS units (DGPS) are readily available to achieve sub-meter accuracy. Specialized GPS units (Real Time Kinematic or RTK) should be employed when sub-foot accuracies are needed. GPS units do not normally operate effectively in wooded areas, and professional surveying or total stationing methods may be required for high level accuracy in those areas. Alternatively, wooded survey areas may be established by tape measure, followed by GPS (where a clear GPS signal can be received), total stationing or professional surveying of several survey grid points or corners.

Data Sampling: Data must be collected at intervals to satisfactorily sample the anticipated targets. Expected target sizes, anticipated burial depths and the target metal mass must be evaluated by the Geophysicist in order for proper selection of data sampling intervals. Data station intervals will normally be determined from the movement speed along the survey lines with respect to the data initiation interval (normally automatic or sometimes manual as a function of time). Measurements may be triggered by a survey wheel attached to the survey instrument when sufficient data density can be achieved. Calibration of the survey wheel may be needed depending on the instrument setup.

5.0 EQUIPMENT

Instrument Checks:

Equipment Standardization. Geophysical sensors and support equipment, navigation equipment, and operator performance will be checked and tested at specific intervals and must meet the appropriate acceptance criteria. Table 1 lists the tests, and their required frequencies and acceptance criteria modified from USACE Engineering Pamphlet (EP) 75-1-2 (2004). These tests plus the initial out-of-box tests are detailed below.

Out-of-Box-Tests. The following out-of-box procedures will be conducted before the pre-seed geophysical survey of the test plot area begins:

- Inventory and inspect all equipment to confirm all components are present and in good condition.
- Assemble the equipment and power up.

Regular Tests.

1. **Equipment/Electronics Warm-Up.** This test minimizes sensor drift caused by thermal stabilization. Most instruments need a few minutes to warm up before data collection begins. All manufacturer instructions will be followed or, if none are given, data readings will be observed until they stabilize. Acceptance Criterion: Equipment Specific (typically 5 minutes). This test will be conducted each time the unit is started.

2. **Equipment Null.** The EM61 and EM31 equipment should be nulled before data collection at each site. The units should be nulled in areas determined to represent background levels (non-anomalous areas 'quiet areas').

3. **Record Sensor Positions.** The purpose is to document relative navigation and sensor offsets, detector separation, and detector heights above the ground surface. This information will ensure that the detector offset corrections and gradient calculations can be done correctly and that the surveys are repeatable. Acceptance Criterion: ±2 inches for EM61 and 858 standard units and ±6 inches for EM31. This test will be conducted at the beginning of the 1st day and when an equipment configuration change is made.

4. **Personnel Test.** This test ensures that survey personnel have removed all potential interference (metal) sources from their bodies. Common interference sources are ballpoint pens, steel-toe boots, or large metallic belt buckles, which can produce data anomalies similar to OE targets. All personnel who will be coming near the sensor during survey operations should remove metallic items from themselves, and if not possible then readings should be monitored and recorded to judge the effect of the metallic items in order to meet the following acceptance criteria. Acceptance Criterion: EM61 2 mV, magnetometer 2 nT, EM31 1mS/m or ppt. This test will be conducted at the beginning of each day if the operator is wearing metallic items that could interfere with equipment operation..

5. **Static Background and Static Spike (or Standard Response) Test.** These tests quantify instrument background readings and electronic drift, locate potential interference spikes in the time domain, and determine impulse response and repeatability of the instrument to a standard test item (typically a 2-inch-diameter steel trailer hitch ball). Improper instrument function, the essence of local sources of ambient noise (such as EM transmissions from high-voltage electric lines), and faulty equipment are all potential causes of inconsistent, non-repeatable readings. A minimum of 3 minutes static background test after instrument warm-up, followed by a 1-minute standard response test, in turn followed by an additional 1 minute static background test, will be performed. The field geophysicist must review the readings to confirm they are stable before the geophysical survey continues. Guidance Criteria: Static Background test EM 61 ± 3 mV, magnetometer ± 5 nT, EM31 ± 1 mS/m or ppt ; Static Response Test ±20% of standard item response after background correction. This test will be conducted at the beginning of each day.

6. **Base-Line Test.** This test is conducted in an area that has low background noise and no sources of anomalous response. The test line will be well marked to facilitate data collection over exactly the same line each time the test is performed. The test may need to be conducted at the beginning, middle and end of each day to check for instrument drift

(baseline shift in data values) or in the situation where a magnetic base station is not used during a magnetometer survey in order to make any necessary data value adjustments.

7. **Pull-Away Test.** This test demonstrates the effects of the navigational equipment. All equipment will be powered up and operating as it would be during the survey. Acceptance Criterion: document the effects of the navigational equipment on the geophysical readings. Effects should be small. Test should be performed before the geophysical survey begins, and if the equipment configuration changes during the survey.

8. **GPS Positioning.** The GPS positioning system will be tested by surveying two survey control points. The GPS coordinates are compared with the documented coordinates for the control points. Acceptance Criterion: sub-meter or better (based on project requirements). Test should be performed as a minimum at the beginning of the project and daily, once at the beginning and once towards the end of each day, and if an equipment change is made. GPS survey instruments should also be closely monitored during field acquisition by using Dilution of Precision (DOP) criteria, or as a minimum # of satellite signals received criteria. DOP should normally be less than 3 to obtain high quality results, and at least 4 satellites should also indicate high quality results.

   Latency is an issue when a separate GPS controller (from the geophysical controller) is used to acquire the GPS data. If separate controllers are used, care should be taken to synchronize the clocks in both the GPS and geophysical units, and a test must be set up to measure the latency inherent in using two different accuracy clocks. The test should consist of positioning oneself overtop of a linear metallic object (ex. pipe) at several points and recording data with the all of the survey equipment, and again using only the GPS equipment to compare the results and determine the necessary adjustment.

9. **Azimuth Test.** The purpose of this test is to optimize the sensor orientation to avoid optically pumped magnetometer sensor "dead zones", and obtain a strong signal strength.

6.0 QUALITY ASSURANCE / QUALITY CONTROL

All documentation will be available to base personnel. Operational and test procedures will conform to the manufacturer's standard instructions. QC of the instruments' data will be achieved daily by field testing, checking the sensor and navigation system against a known target to ensure that they are operating properly. All geophysical instruments and equipment used to gather and generate field data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of the results are consistent with the manufacturer's specifications. Calibration, repair, or replacement records will be filed and maintained by the field geophysicist and may be subject to audit by the quality assurance (QA) manager. Potential data problems include source data errors, data entry errors, data editing errors, and user errors. All data will be reviewed to identify and correct any of these errors should they occur.

7.0 FIELD REPORTING AND RECORDS MANAGEMENT

Field data sheets/notes will be maintained for all geophysical activities. This SOP contains copies of the field forms and checklists. Project documentation will be collected and managed on-site during the life of all field activities. Geophysical data will be recorded digitally and downloaded to a field computer for review in the field. In addition to the copy of data saved on the field computers hard drive, a copy of the data will be saved on a compact disk (CD) for backup before the data are erased from the equipment. The project geophysicist will review the downloaded data to verify that the download system is functioning properly. This review will also check the field data for QC review. The review will verify that the data are valid and useable for the intended purpose.

8.0 INSTRUMENT VERIFICATION STRIP

An Instrument Verification Strip (IVS) may be performed to evaluate geophysical surveying techniques and personnel that will apply to MEC sites. IVSs are important in testing the survey technique to determine whether it is capable of detecting the target items.

Instrument Verification Strip -

The specific objectives for the Instrument Verification Strip (IVS) will be:

- Determine whether the proposed geophysical technique is appropriate for this type of investigation.
- Provide a safe area with a known set of isolated objects (for example, single inert UXO). The sensor signatures from these items may be used to evaluate the equipment limitations in the site geologic setting and to optimize equipment, procedures, and data analysis. Response curves to industry standard objects (ISOs) and standard munition items will be compared to IVS survey data to assess whether or not the technique appears to have typical detection capabilities for survey work.
- Assess the operators' performance and update related procedures to assist in the development of operator measurement techniques.
- Establish a baseline of performance capabilities for the selected instruments.
- Evaluate average speed and minimum along-track sampling required to detect target items.
- Evaluate all data processing (see MRP SOP 04 named Geophysical Data Processing and Analysis), including distance corrections, map production, and target selection, to produce final datasets.
- Detect items within the USACE's 11x rule, which states that generally munitions can typically be detected within a depth equal to 11 times their diameter.

- Identify horizontal positions of detected seed items to be within project specified accuracy or better (depending on investigation goals).

Test Plot/Test Strip Design. The proposed test plot/test strip layout shall be included in the work plan, and the following recommendations from USACE Data Item Description MR-005-05.01 (2007) should be used as guidelines for establishing the IVS:

a. Plot Size and Location. Selection of the plot area should be based upon the technical and site-specific considerations developed and finalized during the TPP process and/or project team meetings, and follow anticipated layout for project data collection. It may be advantageous to plan the IVS location outside of areas where digging is restricted to UXO technicians and/or oversight by UXO technicians.

b. Seed Items. Describe the planned seeding methodology for known items. In addition to the known seed items. Once placed, all seeded items and corner markers should be surveyed and photographed. The planned IVS target layout plan shall be updated to reflect the "as built" configuration. The seeded items should be tagged with a non-biodegradable label identifying the items as inert and providing a contract reference, a point of contact address, phone number, and a target identifier.

   A tabulated list, available in digital format, containing the seed items, ID numbers, depths, proposed orientation (or survey information on the nose, tail, and center point of the item) shall be included. Inert munition items should be used whenever possible.

c. Site Preparation. Describe any preparation that may be necessary to allow accessibility with geophysical instruments. This may include vegetation removal and/or surface clearance. After this step, the test plot should duplicate, as closely as possible, the conditions under which the geophysical surveys will be conducted.

d. Location Surveying. Describe the location methods to be employed. The location of the test plot corners and seed items shall be surveyed to a horizontal accuracy established during the TPP process and/or project team meetings.

e. Pre-Seeding (Background) Geophysical Mapping. Describe background geophysical mapping. After a site has been selected and the surface prepared, pre-seeding geophysical surveys shall be performed with each detector type in order to determine and document base-line geophysical conditions at the site.

f. Quality Control. Describe Quality Control measures to be implemented.

g. Anomaly Avoidance. Anomaly avoidance will be performed by all site workers for all anomalies located, visually or with metal detectors, during preparation of the test plot site. A statement that the contractor shall use anomaly avoidance techniques shall be included. This is to ensure the location of each excavation and corner marker/stake is clear of metallic anomalies before placing seed items or site corner markers, and includes utilizing the background geophysical data.

h. Data Collection Variables. It is important to collect and analyze test plot data using the same equipment and procedures that are planned for field use. It is strongly recommended that key personnel from the IVS perform the production survey to minimize the learning curve and provide project continuity. Some data collection elements are subject to modification and evaluation and multiple geophysical surveys using each proposed geophysical instrument may be performed. These elements include: instrument height, instrument orientation and direction of travel, instrument channel selections, measurement interval along survey line, lane width, etc.

i. Data Analysis and Interpretation. All data collected from each geophysical instrument will be post-processed and analyzed. It is required that all data channels are analyzed to ensure the best methodology is established for each site.

j. Data Evaluation. The geophysical data must be evaluated and scored so that the different geophysical approaches can be compared and ranked. No single geophysical system is likely to achieve maximum scores in all evaluated areas. Therefore, the evaluation team must determine which approach is likely to be most efficient for the site.

IVS Approval and Reporting.

After the IVS field work has been completed, the contractor shall present the data to the Project Geophysicist and Project Manager, or the Project Manager's designee for approval prior to site work. The stationary positioning of the seed items must be shown relative to the data to provide comparison of the anomaly location with the seed item location to evaluate positional accuracy. The results of the IVS will be summarized in the geophysical report and will include:

a. As-built drawing of the IVS plot;
b. Pictures of the seed items;
c. Profile and/or contour maps of the geophysical data;
d. Summary of the IVS results;
e. Proposed geophysical equipment, techniques, and methodologies; and
f. Sufficient supporting information to justify the project team's recommendations.

The Contractor may not proceed with production geophysical mapping until the designated project team member approves the IVS results.

Table 1: Geophysical Equipment QC Tests
Munitions and Explosives of Concern Sites
Military Munitions Response Program

Test No.	Test Description	Acceptance Criteria	Power On	Beginning of Day	Beginning, Middle and End of Day	1st Day on Site
1	Equipment Warm-up	Equipment Specific (typically 5 minutes)	X			
2	Equipment Null	Conduct in non-anomalous areas				X
3	Record Sensor Positions	± 2 inches (standard EM61/858), ±6 inches EM31				X
4	Personnel Test	EM61 2 mV p-p (channel 3 on MkII), magnetometer 2 nT, EM31 1 mS/m or ppt		X		
5	Static Background and Static Spike	Background: EM61 ± 3 mV p-p, magnetometer ± 5 nT, EM31 ±1 mS/m or ppt. Spike: ± 20% of standard item response, after background correction		X		
6	Base-Line Test	Check for instrument drift /diurnal ch. (to correct data readings if needed)			X (EM31 or MAG)	
7	Pull Away Test	Navigation equipment should have minimal effect on readings				X
8	GPS Positioning	Positional Accuracy: sub-meter		Once at beginning and once towards		X

			end of each day	
9	Azimuth Test	Strong signal strength, no dropouts		X

Notes: cm – centimeter, mV – millivolt, ppt – parts per thousand, nT – nanotesla, mS/m – millisiemens per meter

TETRA TECH NUS, INC.

DAILY QUALITY CONTROL REPORT

Contract Number:	Project:
Location:	Date:

List Features of Work and Equipment Used, Locations (areas surveyed), and List Personnel Present

Rework Items Identified Today (Not Corrected by Close of Business)	Rework Items Corrected Today

Remarks/Describe any Idle or Downtime and/or Equipment Problems

On behalf of the contractor, I certify that this report is complete and correct and the equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report.

ERT Representative _____ Date _____

Tetra Tech Quality Assurance

Quality Assurance Representative Remarks and/or Exceptions to the Report

Inspection of Field Activities Performed

Tetra Tech QA Representative _____ Date _____

TETRA TECH NUS, INC.

DAILY INSTRUMENT	IVS REPORT

Project Name:	Project No:	Location:	Date:

I. Test Plot Information

Item Number	Inert Item/Surrogate Description	Depth (inches)	Azimuth/ Inclination Angle(Degrees)	Comments
1				
2				
3				
4				
5				
6				
7				
8				

II. Instrument Information

Instrument Type/Manufacture	Instrument Serial Number	Test Plot Items Instrument Tested on (List Item Numbers)	Settings On Instrument Tested (As Per WP)	Test Results, ☒ indicates good for operation	Personnel Testing Equipment	Comments
				☐		
				☐		
				☐		
				☐		

III. Problems Encountered / Corrective Actions Taken / Additional Comments.

explain in space below:

IV. Supervisor

Name and Signature:	Title/Company:	Date:

TETRA TECH NUS, INC.

QUALITY CONTROL SURVEILLANCE REPORT	Report Number:
Project Name:	Contract No:
Client:	Project Manager:

1 - Activity

☐ Project Readiness UFP-SAP Review	☐ Pre-Operational Team Training Review	☐ Mobilization/Site Preparation	☐ Brush Cutting and Vegetation Clearance
☐ Pre-Survey IVS Review	☐ Daily Function Test	☐ UXO Detector-Aided Surface Sweeps/Quality Control Check	☐ UXO Detector-Aided Surface Sweep Field Data Collection &Transcription
☐ Geophysical Survey	☐ Geophysical Survey Field Data Collection and Transcription	☐ GPS Data	☐ Demobilization
☐ Other:	☐ Other:	☐ Other:	☐ Other:

2 - Phase

☐ Preparatory	☐ Initial	☐ Follow up

3 - References [1]

4 – Observed Condition/Activities and Comments [1]

5 – Results of Surveillance

☐ Acceptable	☐ Unacceptable	Deficiency #: NCR #:
Conducted By:	Signature:	Date:

6 – Project Manager Review

☐ Concur ☐ Non-Concur	Signature:	Date:

7 - Distribution

☐ PM ☐ FOL ☐ SUXOS ☐ UXO Manager ☐ Safety ☐ Other:

[1] **Add / reference continuation sheets as necessary.**

TETRA TECH NUS, INC.

IVS Checklist

Project Name: _____
Project Location: _____
Name and Title: _____
Date: _____

Objectives

Have survey objectives been determined, clarified, and documented?	Y	N	NA
Will the IVS be available during the project for the evaluation of suspected instrument malfunctions or evaluation of new equipment and operators?	Y	N	NA

Site Preparation

Has surface clearance been performed?	Y	N	NA
Has background geophysical survey been performed before burial?	Y	N	NA

IVS Seeding

Have the following steps been taken to ensure accurate locations for the seeded items:

Thorough notes taken on each item's burial?	Y	N	NA
Measure depth to top and center of mass of each object?	Y	N	NA
GPS or a land surveyor employed to record the position of each item?	Y	N	NA

TETRA TECH NUS, INC.

Checklist for Out of Box Equipment Tests

Project Name: _____
Project Location: _____
Name and Title: _____
Date: _____

Has the equipment been inventoried and inspected for damage or wear?	Y	N	NA
Are spare parts (cables) included with the system?	Y	N	NA
Has the cable shake test been performed? (Replace any fault components)	Y	N	NA

TETRA TECH NUS, INC.

Checklist for Initial Instrument Tests

Project Name: _____
Project Location: _____
Name and Title: _____
Date: _____

Has the sensor travel test been performed (for underwater surveys), and are the results acceptable to meet survey objectives?	Y	N	NA
Has the GPS unit been checked for accuracy requirements against two known locations?	Y	N	NA
Has the optimum sensor height for each instrument been determined?	Y	N	NA
Have the pull-away and/or interferences tests been performed and successfully demonstrated no influence for navigational or towing equipment?	Y	N	NA
Has an appropriate data acquisition rate been selected?	Y	N	NA

TETRA TECH NUS, INC.

Checklist for Daily Instrument Checks

Project Name: _____
Project Location: _____
Name and Title: _____
Date: _____

Has the operator been checked for presence of metal?	Y	N	NA
Has the instrument been warmed-up?	Y	N	NA
Have the sensor positions been measured and recorded?	Y	N	NA
Has a static background and spike test been performed successfully?	Y	N	NA
Has the equipment function test been performed with detection of all the test targets?	Y	N	NA
Have all loose cables been secured?	Y	N	NA
Has the EM61 or EM31 been nulled (power on)?			
Has the geophysical equipment been set up according to manufacturer's specifications?	Y	N	NA
Were the data monitored during data collection for anything unusual?	Y	N	NA

STANDARD OPERATING PROCEDURE
MUNITIONS RESPONSE PROGRAM (MRP) SOP 05
GPS DATA COLLECTION AND TRANSFER

1.0 OVERVIEW

The primary purpose of this Standard Operating Procedure (SOP) is to provide the Field Technicians with basic instructions for operating a handheld Global Positioning System (GPS) unit allowing them to set GPS parameters in the receiver, record GPS positions on the field device, and transfer the data for integration into existing Geographic Information System (GIS) figures.

This SOP is specific to GIS quality data collection for Trimble-specific hardware and software.

If possible, the Trimble GeoXT or XH Operators Manual should be downloaded onto the operator's personal computer for reference before or while in the field. The manual can be downloaded at the following website:
http://trl.trimble.com/docushare/dsweb/Get/Document-311749/TerraSyncReferenceManual.pdf

Unless the operator is proficient in the setup and operation of the GPS unit, the Project Manager (or designee) should have the GPS unit shipped to the project-specific contact listed below in the Pittsburgh, Pennsylvania office at least five working days prior to field mobilization so project-specific data files (i.e. shape files), background images, data dictionaries, and correct coordinate systems can be uploaded into the unit.

Tetra Tech NUS
Attn: Linda Klink
661 Anderson Drive, Bldg #7
Pittsburgh, PA 15220

The SOP also describes how field collected data is to be transferred through the use of the MRP Website. (http://www.ttnus.com/MRPRepository/). This website serves as a centralized portal to facilitate data exchange for field personnel, GIS staff, and project managers. The website contains a "Reference" page that will contain the latest version of this SOP and other valuable documentation.

For technical questions regarding operation of the GPS units and data collection, please contact John Wright (john.wright@tetratech.com). For general questions about this SOP and use of the MRP website, please contact Mark Maguire (mark.maguire@tetratech.com).

2.0 REQUIRED EQUIPMENT

The following hardware and software should be utilized for locating and establishing GPS points in the field:

2.1 GPS Hardware & Equipment

- Hand-held GPS Unit capable of sub-meter accuracy. This includes the docking cradle, a/c adapter, stylus, and USB cable for data transfer. Two models, the GeoXH and GeoXT, are acceptable for use. The XH yields higher accuracy (in both real-time and post-processed) and should always be requested when highly precise data is required.

- An external antenna will yield better satellite reception, especially in heavy tree canopy. Associated accessories include a range pole and hardware clamp, for mounting the GPS unit to the pole.

- Indelible marker.

- Non-metallic pin flags for temporary marking of positions.

2.2 GPS Software

The following software is required to transfer data from the handheld GPS unit to a personal computer:

- Trimble TerraSync version 2.6 or later (pre-loaded onto GPS unit from vendor)

- Microsoft ActiveSync version 4.5 or later. Download to personal computer from:
  http://www.microsoft.com/windowsmobile/en-us/downloads/microsoft/activesync-download.mspx

  Note: Windows Vista and Windows 7 users should download Windows Mobile Device Center version 6.1 or later from the following site, if it is not already loaded on the machine:
  http://www.microsoft.com/windowsmobile/en-us/downloads/microsoft/device-center-download.mspx

- Trimble Data Transfer Utility (freeware version 2.1 or later). Download to personal computer from:
  http://www.trimble.com/datatransfer.shtml

3.0 START-UP PROCEDURES

Prior to utilizing the GPS in the field, ensure the unit is fully charged. The unit may come charged from the vendor, but an overnight charge is recommended prior to fieldwork.

The Geo-series GPS units require a docking cradle for both charging and data transfer. The Geo-series GPS unit is docked in the cradle by first inserting the far domed end in the top of the cradled, then gently seating the contact end into the latch. The power charger is then connected to the cradle at the back end using the twist-lock connector. Attach a USB cable as needed between the cradle (B end) and the laptop/PC (A end).

It is recommended that the user also be familiar and check various Windows Mobile settings. One critical setting is the Power Options. The backlight should be set as needed to conserve power when not in use.

3.1 Initial Start Up

1) Power on the GPS unit by pushing the small green button located on the lower right front of the unit.

2) Utilizing the stylus that came with the GPS unit, launch **TerraSync** from the Windows Operating System by tapping on the start icon located in the upper left hand corner of the screen and then tap on **TerraSync** from the drop-down list.

3) If the unit does not default to the Setup screen, tap the Main Menu (uppermost left tab, just below the Windows icon) and select Setup.

4) If the unit was previously shipped to the Pittsburgh office for setup, you can skip directly to Section 4.0. However, to confirm or change settings, continue on to Section 3.1.

3.2 Confirm Setup Settings

Use the Setup section to confirm the TerraSync software settings. To open the Setup section, tap the Main Menu and select Setup. (Note that if the unit was shipped from the Pittsburgh office, these settings should have been set for your specific project. Feel free to contact Pittsburgh staff with any questions.)

1) Tap on the Coordinate System.
2) Verify the project specs are correct for your specific project by scrolling through the various settings. Edit as needed and then tap OK; otherwise, tap Cancel to return to Setup Menu. **Note:** It is always best to utilize the Cancel tab rather than the OK tab if no changes are made since configurations are easily changed by mistake.
3) Tap on the Units.
4) Verify the user preferences are correct for your specific project by scrolling through the various settings. Edit as needed and then tap OK; otherwise, tap Cancel to return to Setup Menu.
5) Tap Real-time Settings.

6) Verify the Real-time Settings are correct for your specific project by scrolling through the various settings. Edit as needed and then tap OK; otherwise, tap Cancel to return to Setup Menu.
7) The GPS unit is now configured correctly for your specific project.

3.3 Antenna Connection

1) If a connection has been properly made with the internal antenna, a satellite icon along with the number of usable satellites will appear at the top of the screen next to the battery icon. If no connection is made (e.g.: no satellite icon), tap on the GPS tab to connect antenna.
2) At this point the GPS unit is ready to begin collecting data.

3.4 Loading a Background file

This section provides instructions on pulling in a pre-loaded background file. These files are helpful in visualizing your current location.

1) From the Main Menu select Map, then tap on Layers, select the background file from drop down list.
2) Select the project-specific background file from the list of available files.
3) Once the selected background file appears, the operator can manipulate the screen utilizing the +/- and <-/-> functions at the bottom of the screen.
4) In operating mode, the operator's location will show up on the background file as a floating "x".

4.0 FIELD DATA COLLECTION

For MRP data collection activities, a new GPS file should be created **every day** and transferred **nightly** using the MRP website (see Section 9.0). This is to insure the timely transfer of data, file organization in the database, and allow for next-day GIS mapping. Also, individual GPS data files should be **unique to a particular site** or unit (typically a UXO number). If multiple sites are visited in a single data, multiple files should be created.

4.1 Creating a Data File

1) From the Main Menu select Data.
2) From the Sub Menu (located below the Data tab) select New which will bring up the New Data File menu.
3) An auto-generated filename appears and should be edited for your specific project. The following naming convention should be followed as closely as possible, for example: **IH-UXO4-01012010-TeamA**, where "IH" is the installation abbreviation (Indian Head), "UXO04" is the site, and "01012010" is the data in MMDDYYYY format. If multiple teams are being deployed across an individual site on the same day, it is important to

specify the field team name at the end of the file name ("TeamA"). If the integral keyboard does not appear, tap the small keyboard icon at the bottom of the screen.

4) Select the data dictionary that will be used to collect features. The data dictionary provides predefined fields and drop-down menus to facilitate data collection as it relates to specific MRP data types. The MRP data dictionary is entitled "**MRP Data Collection**" and should appear in the data dictionary drop-down list. This should have been pre-loaded into the GPS prior to use. The data dictionary file is available on the MRP website under the "Reference" section.
5) After entering the file name and selecting the data dictionary, tap Create to create the new file.
6) Confirm antenna height if screen appears. Antenna height is the height that the GPS unit will be held from the ground surface (Typically 3 to 4 feet)
7) The Choose Feature screen appears.

4.2 Collecting Features

1) If not already open, the Collect Feature screen can be opened by tapping the Main Menu and selecting Data. The Sub Menu should default to Collect.
2) **<u>Do not</u> begin the data logging process until you are at the specific location for which you intend to log the data.**
3) A known reference or two should be shot at the beginning and at the end of each day in which the GPS unit is being used. This allows for greater accuracy during post-processing of the data.
4) Upon arriving at the specific location, select the proper feature type from the data dictionary list (MEP Object, Transect End Point, GPS QC Point, or General Point).
5) Tap Create to begin data logging.
6) As the GPS is collecting positions, enter the feature attributes, starting with the Item ID. This field is required and will not allow the user to continue or save the position without entering a value. Enter any additional notes or feature descriptions in the appropriate fields.
7) Data logging can be confirmed by viewing the writing pencil icon in the upper part of the screen. Also, the logging counter will begin. As a Rule of Thumb, accumulate a minimum of 20 readings on the counter, per point, as indicated by the logging counter before saving the GPS data.
8) Once the counter has reached a minimum number of counts (i.e. 20), tap on OK to save the data point to the GPS unit. Confirm the feature. All data points are automatically saved within the GPS unit.
9) Repeat steps 2 through 8, giving each data point a unique name or number.

Note: If the small satellite icon or the pencil icon is blinking, this is an indication the GPS unit is not collecting data. A possible problem may be too few satellites. While still in data collection mode, tap on Main Menu in upper left hand corner of the screen and select Status. Skyplot will display as the default showing the number of available satellites. To increase productivity (number of usable satellites) use the stylus to move the pointer on the productivity and precision line to the left. This will decrease precision, but increase productivity. The precision and productivity of the GPS unit can be adjusted as the number of usable satellites changes throughout the day. To determine if GPS is correctly

recording data, see Section 5.2. If the precision toggle is decreased, the user should frequently check the Skyplot display to restore the default values as soon as possible.

4.3 Navigation

This section provides instructions on navigating to saved data points in an existing file within the GPS unit.

1) From the Main Menu select Map.
2) Using the Select tool, pick the point on the map to where you want to navigate.
3) The location you select will have a box placed around the point.
4) From the Options menu, choose the Set Nav Target (aka set navigation target).
5) The location will now have double blue flags indicating this point is you navigation target.
6) From the Main Menu select Navigation.
7) The dial and data on this page will indicate what distance and direction you need to travel to reach the desired target.
8) Follow the navigation guide until you reach the point you select.
9) Repeat as needed for any map point by going back to Step 1.

4.4 Data Quality Control

Quality control checks should be performed each day of data collection and/or data navigation. QC checks are important both to understand real-time accuracy while in the field, and also to provide control data needed during post-processing.

1) Known survey benchmarks, surveyed monitoring wells, or other established and documented control points should be identified
2) GPS equipment should be placed on known control points and positions recorded
3) For data collection tasks - QC check data should be collected at least at the start and completion of the fieldwork for the day of data collection. Additional occupation and collection of control point data should occur as possible during the work day, and should increase in frequency as the number of data points increase and the need for accurate data collection increases
4) For navigation tasks such as stake placement for planned sample locations, QC data checks should be done at least at the start and completion of the fieldwork for each day. Known visible targets should be occupied and observed by the user, while the GPS satellite status and other user interface data is reviewed. The user should assess whether the real-time accuracy settings on the GPS are within the tolerance of the observed visual reference points.

4.5 Viewing Data or Entering Additional Data Points to the Current File

1) To view the stored data points in the current file, tap on the Main Menu and select Map. Stored data points for that particular file will appear. Use the +/- and <-/-> icons in lower left hand corner of screen to zoom in/out and to manipulate current view.
2) To return to data collection, tap on the Main Menu and select Data. You are now ready to continue to collect additional data points.

4.6 Viewing Data or Entering Data Points from an Existing File

1) To view data points from a previous file, tap on Main Menu and select Data, then select File Manager from the Sub Menu.
2) Highlight the file you want to view and select Map from the Main Menu.
3) To add data points to this file, tap on Main Menu and select Data. Continue to collect additional data points.

4.7 Shutting Down

This section provides instruction for properly shutting down the GPS unit.

1) When shutting down the GPS unit for the day, first click on the "X" in the upper right hand corner.
2) You will be prompted to ensure you want to exit TerraSync. Select Yes.
3) Power off the GPS unit by pushing the small green button located on the bottom face of the unit.
4) Place the GPS unit in its cradle to recharge the battery overnight. Ensure the green charge light is visible on the charging cradle.

5.0 DATA TRANSFER

This section describes how data should be downloaded from the GPS units and uploaded to a central website for post-processing and integration into GIS datasets. GPS data collected on a given day should be transferred **that night** for post-processing by GIS staff the next morning. Once post-processed, the GPS data will be plotted on a map and be immediately provided to the project team for review. Data upload, download, and review will be facilitated through a secure MRP website: http://www.ttnus.com/MRPRepository/

5.1 Load Data from the GPS Unit to Your Computer

1) Install the Data Transfer and ActiveSync software installed on your PC (see section 2.2)
2) Connect the GeoXH/XT to your PC via an A/B USB cable (blade end and square end type "HP printer" style)
3) ActiveSync should auto-detect the connection and recognize the data collector
4) Make sure the data file desired is CLOSED in TerraSync prior to transfer
5) Connect via ActiveSync as a guest (not a partnership)

6) Run the Trimble Data Transfer Utility program on your PC
7) Select "***GIS Datalogger on Windows CE***" or similar selection
8) Hit the green connect icon to the right - the far right area should say "***Connected to ....***" if successful
9) Select the "***Receive***" data tab (under device)
10) Select "***Data***" from file types on the right
11) Find the file(s) needed for data transfer. You can sort the data files by clicking on the date/time header
12) Select or browse to a C-drive folder you can put this file for upload
13) When the file appears on the list, hit the "***Transfer All***". Once complete, a packet of multiple data files will appear on your computer in the specified folder.

5.2 Gain Access to MRP Website

1) Confirm that your computer has internet access
2) Click on the following link: http://www.ttnus.com/MRPRepository/
3) To register for the website, click on the "Register here" link. Enter your information and click "Submit." NOTE: Requests for registration are sent to Ralph Basinski, Program Manager, for approval. Please contact mark.maguire@tetratech.com if you experience any access issues.
4) Enter your username (Tetra Tech email address) and password to log in.

5.3 Upload GPS Data from Your Computer to the MRP Website

1) From the main page, select "Upload" from the menu at left.
2) Select the type of data you are uploading, typically "GPS Field Data"
3) Select the appropriate Installation and Site. Remember that GPS files should be unique for each site, even if multiple sites are visited in one day. If collected data is not associated with a site, select "Other."
4) Select "browse" to navigate to the appropriate *.SSF file on your computer. When you use the Trimble download utility to grab data from the GPS unit, multiple files will appear on your computer. You only need to the upload the *.SSF file.
5) Populate the "Comments" field to describe the dataset and any other pertinent information. This information will be provided to the GIS analyst who will be integrating the dataset, so be sure to be as descriptive as possible especially if there are any issues with the data. (For example, if you were to sample 16 points and for some reason you believe only 15 were logged, it is helpful to share this information.)
7) Select "Upload." Users will be notified if the files were uploaded successfully.

5.4 Download Data from the MRP Website to Your Computer

The download utility on the MRP website will serve different user types. **Field staff** will use the utility to download GIS figures (in PDF format) and view the previous day(s) field data on aerial photographs, checking for any discrepancies or missing data elements. **Project Managers** will also have the ability to download and view these figures, to visualize the data and track project

progress. This utility will also allow **GIS Analysts** to download the *.SSF files posted by field staff for post-processing and map plotting.

To download GIS Figures:

1) From the main page, select “Download” from the menu at left.
2) Select an Installation and Site
3) Users can view Figures for a particular date or by a range of dates, by selecting the ` appropriate options. To search all dates, leave all of these fields as the default.
4) Select “Search”
5) A table will appear showing the files available for download. Simply click on the link to the file and you will be prompted to save it to your computer.

STANDARD OPERATING PROCEDURE
MRP SOP 06
VEGETATION MANAGEMENT AT MEC SITES

A. SCOPE AND APPLICABILITY

This document is designed to set a standard operating procedure (SOP) for vegetation management during activities performed at Munitions and Explosives of Concern (MEC) sites. Inherently, a strong possibility exists that MEC and material potentially presenting an explosive hazard (MPPEH) may be encountered. The procedures detailed in MRP SOP 01, UXO Detector-Aided Surface Surveys, provide specific guidance for UXO survey operations and equipment. MRP SOP 02, MEC Management and Accountability, provides instructions and procedures to be followed in the event that suspect MEC/MPPEH is encountered. Additionally, MEC activities will be performed in accordance with all local, State, and federal regulations and will include all applicable DoD requirements.

B. BACKGROUND

Vegetation management may be required in preparation for field activities at MEC sites. Trees, brush, grass, and other vegetation can impede the performance of MEC operations, geophysical surveys, and related investigation and remediation activities. The degree of vegetation removal will be site-specific and based upon the conditions encountered and activities to be conducted. Following is a general discussion of the type of equipment/techniques that will be used.

- Hand held brush cutters (string or blade) will be used to cut light vegetation and small grassy areas.
- Mechanized lawn mowers will be used to mow larger grassy areas.
- Chain saws will be used in heavier brush areas, to trim tree limbs, and to cut small trees up to 2 inches in diameter.
- Tractor-mounted brush hogs will be used in larger areas and heavier brush areas.
- Brush/vegetation cutting will be left at the site of the area cleared. If this is impractical, a wood chipper may be utilized.

Smaller brush cutting/vegetation management operation will be conducted by the Unexploded Ordnance (UXO) staff. On larger project sites, subcontractors may be utilized. If it is necessary to utilize subcontractors, an UXO escort will be provided during subcontracted brush/vegetation management operation.

C. PERSONNEL QUALIFICATIONS

UXO personnel shall meet the training requirements as stated in DDESB TP-18. Subcontractors will meet the training and medical surveillance requirements as stated in the Tetra Tech NUS

Health and Safety Guidance Manual. Where applicable, vegetation management equipment will only be operated by personnel licensed or certified on that equipment.

D. VEGETATION MANAGEMENT

Vegetation management at MEC sites may range from minor grass cutting and tree limb trimming to the total removal of all site vegetation. The extent and methods of vegetation management are driven primarily by the project specific scope of work, but will also be influenced by such factors as munition sensitivity, terrain, impacts to the environment, threatened or endangered species, current and future land use, available technology, and cost.

Prior to conducting vegetation management operations, a visual UXO surface survey will be conducted. All suspect MEC/MPPEH will be located and marked. UXO avoidance will be practiced during vegetation management operations. Vegetation management crews will not work within marked areas containing suspect MEC/MPPEH. Additionally, brush and grass will be cut no closer than 6 inches from the ground surface to avoid inadvertent contact with partially buried or shallow subsurface MEC.

Site Setup

The boundary of the work area will be established by land survey or GPS coordinates. Corner points of grids and start and end points of transects will also be located. Boundary lines of grids and transect lines will be marked using engineers flagging tape to provide visual guidance for the vegetation management crew when line of sight between stakes or markers is impeded.

UXO Escort will be provided for survey personnel and no stakes or markers will be driven into the ground until the immediate area of the stake or marker is surveyed and declared clear of surface and shallow subsurface anomalies.

Tree Cutting

Tree cutting will occur on a case-by-case basis as required to accomplish the site specific scope of work. Trees will be cut using chainsaws or hand tools. Generally, trees 2 inches in diameter and smaller will be cut as necessary to facilitate the planned site activities. Trees will be sectioned, if necessary, and removed from the immediate work area to avoid interfering with site operations.

Brush Cutting

Brush cutting will be accomplished using hand held brush cutters equipped with string or blade cutting attachments. Larger or heavier brush may require the use of chainsaws. Where appropriate, a tractor or skid-steer with a bush hog mower attachment may also be used. Brush will be cut to a height that allows clearance for UXO operations and geophysical equipment operation but no closer than 6 inches above the ground surface.

Grass Cutting

Grass cutting will be accomplished using mechanized lawn mowing equipment or hand held brush cutters equipped with string attachments. Grass will be cut to a height that allows clearance for UXO operations and geophysical equipment operation but no closer than 6 inches above the ground surface.

Alternative Methods

In rare instances, large scale vegetation clearance methods such as controlled burning or hydraulic ax deforestation may be necessary. An UXO escort will be provided during large scale vegetation clearance operations. At no time will UXO staff directly engage in controlled burning operations or in the operation of hydraulic ax deforestation equipment.

E. VEGETATION DISPOSAL

Vegetation disposal must be coordinated with the facility environmental office. Provided that site activities do not result in significant quantities of material, the preferred method of vegetation disposal will be on-site disposal. Vegetation will be removed from the immediate work area to avoid interfering with site activities, and allowed to naturally decompose.

A wood chipper may also be used to effectively dispose of vegetation without removing the vegetation from the work site. Wood chips will be disposed of away from the immediate work area to avoid interfering with site activities when possible. If necessary, wood chips will be spread over the work site to a depth of no greater than 4 inches to avoid interference with detection depth capabilities of UXO and geophysics equipment.

F. SAFETY

General safety precautions are located in the Tetra Tech NUS Health and Safety Guidance Manual. Specific guidelines are located in the site-specific Health and Safety Plan (HASP) and the Accident Prevention Plan (APP).

Personal Protective Equipment (PPE)

PPE for vegetation management operations will be level D protection with the following additions:

- Logging helmet with attached face shield
- Chainsaw chaps
- Hearing protection
- Leather work gloves

Personnel Safety

The UXO Safety Officer (UXOSO) will be on-site at all times during vegetation management operations. The primary responsibilities of the UXOSO during vegetation management activities are:

- To provide a safety brief detailing the operation, safety, and maintenance of the specific equipment being utilized;
- To insure that MEC/MPPEH hazards remain a primary concern for personnel involved in vegetation management activities;
- To insure that PPE is serviceable and worn properly during vegetation removal activities; and
- To insure that individual personnel utilizing vegetation removal equipment maintain safe working distances from other personnel within the work area.

Additionally, an UXO Escort will be provided at all times during vegetation management activities. The UXO Escort will be utilized even when UXO Staff perform vegetation management. This will provide a more focused observation of the work area for MEC/MPPEH and related hazards.

Equipment Safety

Equipment will be inspected for serviceability daily prior to the commencement of vegetation management activities. Periodic spot checks will also be conducted throughout the day to insure that chains and blades remain properly tightened and sharpened. All equipment will be operated and maintained in accordance with the manufacturer's recommendations.