Amendment to the Expanded Site Inspection Work Plan for Munitions Response Program, Former Cat Island Bomb Target BT-2, Marine Corps Air Station Cherry Point

PREPARED FOR: NAVFAC Mid-Atlantic
MCAS Cherry Point

PREPARED BY: CH2M HILL

DATE: May 27, 2014

This technical memorandum is an amendment to the *Work Plan for Munitions Response Program, Former Cat Island Bomb Target BT-2, Expanded Site Inspection* (CH2M HILL, 2010). The modifications described in this Work Plan Amendment will be implemented during the March 2014 Wood Island surface debris removal effort at the Former Cat Island Bomb Target BT-2 (referred to hereafter as BT-2). The 2014 BT-2 surface clearance activities will be conducted by CH2M HILL under the Naval Facilities Engineering Command (NAVFAC) Comprehensive Long-term Environmental Action - Navy (CLEAN) Contract No. N62470-08-D-1000, Contract Task Order (CTO) 69.

Since the 2010 BT-2 surface clearance, additional material potentially presenting an explosive hazard (MPPEH) and non-munitions-related debris have accumulated on the surface of Wood Island due to erosion and tidal action. Additional surface removal activities will be performed in 2014 to remove the MPPEH and non-munitions-related debris. During a September 2013 site visit, MPPEH was primarily observed on the sandy areas on the north side of the island. The 2014 surface removal will focus on MPPEH removal from the sandy portions of the island; however, if MPPEH is observed in other portions of the island during the surface removal activities, that material will also be removed.

The Explosives Safety Submission (ESS) has been updated for the March 2014 surface removal effort to describe the modified procedures for commercial explosives management, MPPEH demilitarization, and to provide updated explosives safety quantity distance (ESQD) arcs. The updated ESS is entitled *Explosives Safety Submission for Munitions Response Activities Former Cat Island Bomb Target BT-2 and Surface Danger Zone, Correction 1* (CH2M HILL, 2014). If commercial explosives are needed for the controlled detonation of MEC on Wood Island, the explosives will be delivered to Bogue Field on an on-call basis instead of being stored in explosives magazines on Bogue Field. Instead of using a shredder for demilitarization of MPPEH on Bogue Field, a remotely-operated chop saw will be used for MPPEH demilitarization.

A summary of the Work Plan modifications is presented in Table 1. Updated site figures and tables are included as attachments to the Work Plan Amendment. The original Work Plan is included as Attachment A.

TABLE 1

Amendments to the Expanded Site Inspection Work Plan

Former Cat Island Bomb Target BT-2

MCAS Cherry Point, North Carolina

Section	Section Title	Modification
Section 1.0	Introduction	The 2014 BT-2 surface clearance activities will be conducted by CH2M HILL under the Naval Facilities Engineering Command (NAVFAC) Comprehensive Long-term Environmental Action - Navy (CLEAN) Contract No. N62470-08-D-1000, Contract Task Order (CTO) 69.
Section 1.1	Purpose and Scope	Since the 2010 surface clearance, additional material potentially presenting an explosive hazard (MPPEH) have accumulated on the surface of Wood Island due to erosion and tidal action. The project objective is to remove MPPEH and non-munitions-related debris that has accumulated on the surface of Wood Island since the 2010 surface clearance. Accumulated material was primarily observed on the beach areas on the north side of the island; however, if MPPEH is observed in other portions of the island that material will also be removed.
Section 1.1	Purpose and Scope	The Explosives Safety Submission (ESS) has been updated for the March 2014 surface removal effort. The updated ESS is entitled *Explosives Safety Submission for Munitions Response Activities Former Cat Island Bomb Target BT-2 and Surface Danger Zone, Correction 1* (CH2M HILL, 2014).
Section 2.3	Previous Site Investigations	From October 29 through November 10, 2010, a surface clearance of metallic debris was performed on Wood Island. During the 2010 site activities, 3,385 pounds of munitions-related debris were removed from the surface of Wood Island and disposed of at an approved off-site facility. The MPPEH items identified during the 2010 surface clearance were AN-Mk 23 and AN-Mk 5 Mod 1 miniature practice bombs; 2.25-inch Mk 4 and Mk 6 subcaliber aircraft rockets; and an M38A2 100-pound practice bomb (CH2M HILL, 2011).
Section 3.1.1	Project Organization	A Site Work Subcontractor will not be procured for the 2014 surface removal activities as no preparation (grading, vegetation clearance) on Bogue Field will be needed for site operations.
Table 3-1	Project Personnel Contact Information	An updated version of Table 3-1 Project Personnel Contact Information has been attached to this Work Plan Amendment.
Figure 3-1	Project Schedule	An updated project schedule has been included as Figure 3-1.
Section 3.2.3	Task 3 - Reporting	Instead of the Expanded SI Report specified in the 2010 Work Plan, a technical memorandum will be prepared following the 2014 surface removal to document the findings of the surface removal activities. Preliminary draft, draft, and final versions of the technical memorandum will be prepared. The existing draft After Action Report will be updated to document the surface removal activities in accordance with the 2010 Work Plan.
Section 4.1	Overview of Expanded Site Inspection Activities	A remote-operated chop saw will be utilized on Bogue Field for MPPEH demilitarization instead of the shredding machine that was used during the 2010 activities. Commercial explosives will not be sited in magazines on Bogue Field during the 2014 surface removal activities. On-call delivery of explosives will be performed if controlled detonations are to be performed on Wood Island.
Section 4.3	Notification and Coordination	Public notification of the 2014 surface removal will be made through newspaper publications. Fact sheets and public meetings will not be used for public notification.
Section 4.4.1	Site Preparation	Commercial explosives magazines and the shredder will not be used during the 2014 surface removal activities. The separation distances described in this section are no longer applicable.
Section 4.4.2	Bogue Field Equipment and Material Storage Staging	Commercial explosives magazines and the shredder will not be used during the 2014 surface removal activities. The information associated with these items is no longer applicable.
Section 4.4.2	Bogue Field Equipment and Material Storage Staging	A remotely operated chop saw will be used on Bogue Field to open subscale practice bombs to determine if an unfired signal cartridge is present. The ESQD arcs for the chop saw operation will be based on a 3 lb Practice Bomb MK23 with a NEW of 0.00882 pounds.
Figure 4-1		The Bogue Field ESQD arcs are presented on an updated Figure 4-1.
Table 4-1	Controlling Exclusion Zones for Former BT-2	An updated version of Table 4-1 has been attached to this Work Plan Amendment.
Section 4.4.3	MGFD and Associated ESQD Arcs	The intentional detonation ESQD arc for Wood Island has been updated to 1,833 feet.
Section 4.4.7	MEC Identification, Removal, and Disposal	If commercial explosives are needed for the controlled detonation of MEC on Wood Island, the explosives will be delivered to Bogue Field on an on-call basis instead of being stored on Bogue Field.
Section 4.4.7	MEC Identification, Removal, and Disposal	No stakeholder meetings are planned, so invitation to attend such meetings by local emergency services will not take place.
Section 4.4.8	Disposition of MPPEH and Other Debris	A remotely operated chop saw will be used to demilitarize MPPEH on Bogue Field instead of the shredder described in the 2010 Work Plan.
Section 4.4.8	Disposition of MPPEH and Other Debris	The following statement will be included on each DD Form 1348-1 instead of the statement included in the 2010 Work Plan. "The material listed on this form has been inspected or processed by DDESB-approved means, as required by DOD policy, and to the best of my knowledge and belief does not pose an explosive hazard."
Figure 4-1	Bogue Field ESQD Arcs	An updated version of Figure 4-1 has been attached to this Work Plan Amendment.
Figure 4-2	ESQD Arcs for Primary MGFD	An updated version of Figure 4-2 has been attached to this Work Plan Amendment.
Figure 4-3	Project Transportation Route - Bogue Field	An updated version of Figure 4-3 has been attached to this Work Plan Amendment.
Figure 4-4	Project Transportation Route - Bogue Sound	An updated version of Figure 4-4 has been attached to this Work Plan Amendment.
Table 5-1	Definable Features of Work	Instead of the Expanded SI Report specified in the 2010 Work Plan, a technical memorandum will be prepared following the 2014 surface removal to document the findings of the surface removal activities.
Section 6.1.1	Description and Estimated Quantities	Commercial explosives will not be sited in magazines on Bogue Field during the 2014 surface removal activities. On-call delivery of explosives will be performed if controlled detonations are to be performed on Wood Island.
Section 6.2.2	Reconciling Discrepancies	Commercial explosives will not be sited in magazines on Bogue Field during the 2014 surface removal activities. On-call delivery of explosives will be performed if controlled detonations are to be performed on Wood Island.
Section 8.7	Vegetation Removal	No vegetation removal is planned for Bogue Field during the 2014 surface removal activities. Limited vegetation removal may be performed on Wood Island if needed to remove metallic debris from a vegetated portion of the site.
Figure 8-2	Bogue Field Wetlands Locations	An updated version of Figure 8-2 has been attached to this Work Plan Amendment.
Appendix A	Health and Safety Plan	The Health and Safety Plan has been updated to address the 2014 surface removal activities and will be provided under separate cover.

Updated Tables

TABLE 3-1
Project Personnel Contact Information

Name/Title/Organization	Mailing Address	Telephone/Fax/E-mail
Bill Hannah, P.G. Activity Manager CH2M HILL	5701 Cleveland Street Suite 200 Virginia Beach, VA 23462	757-671-6277 (office) 757-497-6885 (fax) Bill.Hannah@ch2m.com
Renee Hunt, P.E. Project Manager CH2M HILL	135 S. 84th Street Suite 400 Milwaukee, WI 53207	414-847-0349 (office) 704-877-3421 (cell) 414-272-4408 (fax) Renee.Hunt@ch2m.com
Tim Garretson Senior Technical Consultant CH2M HILL	9428 Baymeadows Road Suite 300 Jacksonville, FL 32256	904-374-5633 (office) Timothy.Garretson@ch2m.com
Tom Roth, P.E. Senior Technical Consultant CH2M HILL	1000 Abernathy Road Suite 1600 Atlanta, GA 30328	404-474-7640 (office) 404-259-6674 (cell) 770-604-9183 (fax) Tom.Roth@ch2m.com
George DeMetropolis Corporate MR Safety and QC Officer CH2M HILL	402 W. Broadway Suite 1450 San Diego, CA 92101	619-272-7239 (office) 619-564-9627 (cell) George.DeMetropolis@ch2m.com
Howard Gordon Program H&S Manager CH2M HILL	9193 South Jamaica Street Englewood, CO 80112	720-286-0240 (office) 303-888-3233 (cell) Howard.Gordon@ch2m.com

TABLE 4-1
Controlling Exclusion Zones for Former BT-2

Operation	Sited as	ES	Basis	ESQD (feet)
Wood Island manual operations[1]	Unintentional detonation (primary MGFD)	UXO team's Team Separation Distance (TSD)	K40 of the MGFD	162
Wood Island manual operations[1]	Unintentional detonation (primary MGFD)	Public and non-essential personnel	HFD of the MGFD	413
Wood Island MEC treatment up to 62 lbs NEW (individual items)	Intentional detonation	Public and all personnel	MFD-H of the MGFD	1,833
Wood Island MEC or MPPEH treatment up to 174 lbs NEW (consolidated items) [2]	Intentional detonation	Public and all personnel	MFD of the MGFD	1,833
Bogue Field MPPEH collection area for consolidation and storage (up to 10 lb NEW per container)[3]	Metal Storage Container (i.e., SEA container)	Non-essential personnel in structures	IBD	474
		Non-essential personnel in the open	PTR	284
Bogue Field MPPEH Processing (Chop Saw)	High Input Mechanized MEC Processing	Non-essential personnel	K328[4]	69
		Essential personnel	K24[4]	5

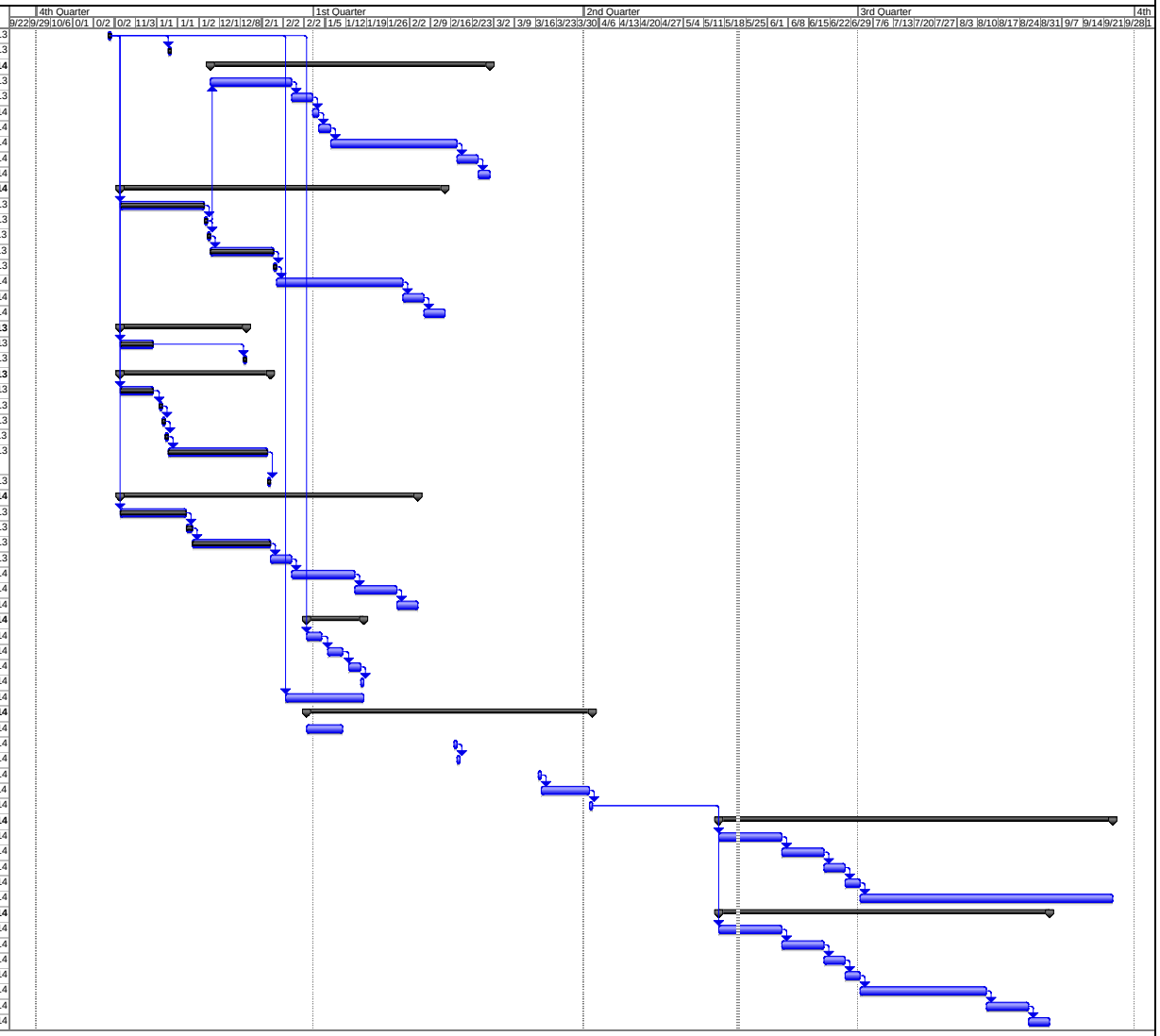
Table notes:

1. Manual operations involve excavating surface MEC with hand tools.
2. MPPEH storage allows storage of individual items up to a total of 10 lbs NEW.
3. Based on Table 7-9, OP-5, Volume 1, 7th Revision (NAVSEA, 2007).
4. From Fragmentation Data Review Form for 3 lb practice bomb Mk23 Database Revision Date 4/16/2013.

Updated Figures

Figure 3-1 Project Schedule
Surface Debris Removal Effort
Former Cat Island Bomb Target BT-2
MCAS Cherry Point, North Carolina

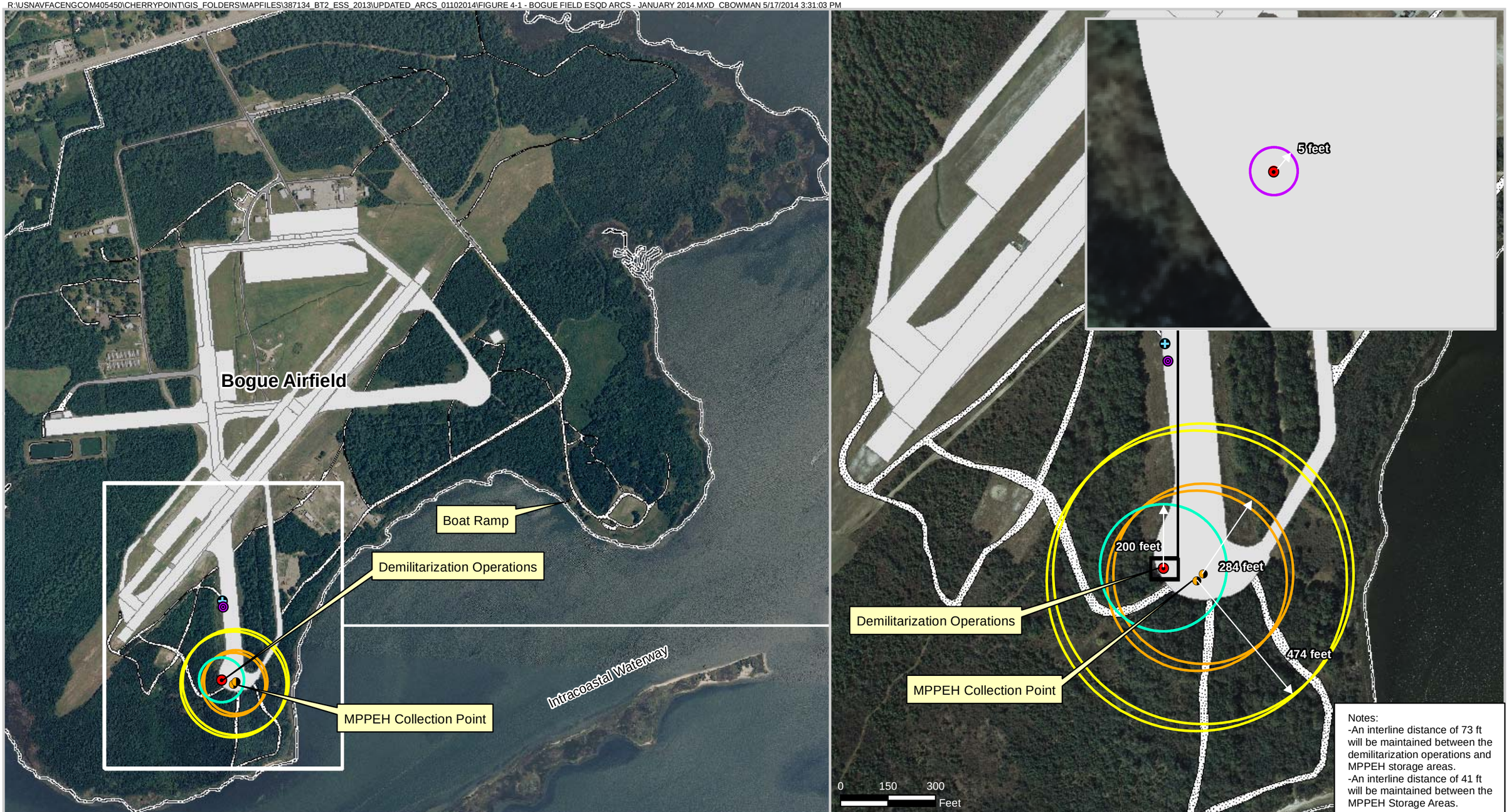
ID		Task Name	Duration	Start	Finish
1	✓	Direction to Proceed with BT-2 Surface Removal Planning	1 day	Fri 10/25/13	Fri 10/25/13
2	✓	Stakeholder Meeting for Surface Removal Approach	1 day	Thu 11/14/13	Thu 11/14/13
3		**Work Plan Amendment**	**67 days**	**Thu 11/28/13**	**Fri 2/28/14**
4		Preparation of Draft WP Amendment	19 days	Thu 11/28/13	Tue 12/24/13
5		NAVFAC/Cherry Point Review of Draft WP Amendment	5 days	Wed 12/25/13	Tue 12/31/13
6		Resolution of NAVFAC Comments	2 days	Wed 1/1/14	Thu 1/2/14
7		Preparation of Draft Final WP Amendment	2 days	Fri 1/3/14	Mon 1/6/14
8		NCDENR Review of Draft Final WP Amendment	30 days	Tue 1/7/14	Mon 2/17/14
9		Resolution of NCDENR Comments	5 days	Tue 2/18/14	Mon 2/24/14
10		Preparation of Final WP Amendment	4 days	Tue 2/25/14	Fri 2/28/14
11		**Explosives Safety Submittal**	**78 days**	**Tue 10/29/13**	**Thu 2/13/14**
12	✓	Review and modification (if needed) of existing ESS	20 days	Tue 10/29/13	Mon 11/25/13
13	✓	Submittal of ESS Amendment (if needed) to address modified approach	1 day	Tue 11/26/13	Tue 11/26/13
14	✓	NAVFAC/Cherry Point Review of ESS	1 day	Wed 11/27/13	Wed 11/27/13
15	✓	Resolution of NAVFAC Comments	15 days	Thu 11/28/13	Wed 12/18/13
16	✓	Preparation of Draft ESS Amendment	1 day	Thu 12/19/13	Thu 12/19/13
17		MARCORSYSCOM Revision of ESS Amendment	30 days	Fri 12/20/13	Thu 1/30/14
18		Resolution of MARCORSYSCOM Comments	5 days	Fri 1/31/14	Thu 2/6/14
19		Preparation of Final ESS Amendment	5 days	Fri 2/7/14	Thu 2/13/14
20	✓	**Memorandum of Agreement**	**30 days**	**Tue 10/29/13**	**Mon 12/9/13**
21	✓	Preparation of MOA	9 days	Tue 10/29/13	Fri 11/8/13
22	✓	Determination that the MOA would not be needed	1 day	Mon 12/9/13	Mon 12/9/13
23	✓	**CAMA Negative Determination**	**36 days**	**Tue 10/29/13**	**Tue 12/17/13**
24	✓	Preparation of CAMA Negative Determination	9 days	Tue 10/29/13	Fri 11/8/13
25	✓	NAVFAC/Cherry Point Review of CAMA Negative Determination	1 day	Mon 11/11/13	Mon 11/11/13
26	✓	Resolution of NAVFAC Comments	1 day	Tue 11/12/13	Tue 11/12/13
27	✓	Submittal of CAMA Negative Determination to NCDENR	1 day	Wed 11/13/13	Wed 11/13/13
28	✓	NCDENR Review (Multiple Stakeholders) of CAMA Negative Determination	23 days	Thu 11/14/13	Mon 12/16/13
29	✓	Finalization of the CAMA Negative Determination	1 day	Tue 12/17/13	Tue 12/17/13
30		**Temporary Emergency RCRA Permit**	**71 days**	**Tue 10/29/13**	**Tue 2/4/14**
31	✓	Preparation of Temporary Emergency RCRA Permit Application	16 days	Tue 10/29/13	Tue 11/19/13
32	✓	NAVFAC/Cherry Point Review of Permit Application	2 days	Wed 11/20/13	Thu 11/21/13
33	✓	Resolution of NAVFAC Comments	18 days	Fri 11/22/13	Tue 12/17/13
34		Submittal of RCRA Permit Application to NCDENR	5 days	Wed 12/18/13	Tue 12/24/13
35		NCDENR Review of Permit Application	15 days	Wed 12/25/13	Tue 1/14/14
36		Resolution of NCDENR Comments	10 days	Wed 1/15/14	Tue 1/28/14
37		Finalization of the Temporary Emergency RCRA Permit	5 days	Wed 1/29/14	Tue 2/4/14
38		**Notice to Mariners**	**15 days**	**Mon 12/30/13**	**Fri 1/17/14**
39		Preparation of Notice to Mariners	5 days	Mon 12/30/13	Fri 1/3/14
40		NAVFAC/Cherry Point Review of Notice to Mariners	5 days	Mon 1/6/14	Fri 1/10/14
41		Resolution of NAVFAC Comments	4 days	Mon 1/13/14	Thu 1/16/14
42		Submittal of Notice to Mariners to USCG	1 day	Fri 1/17/14	Fri 1/17/14
43		Subcontractor Procurement	20 days	Mon 12/23/13	Fri 1/17/14
44		**Field Preparation/Field Work**	**69 days**	**Mon 12/30/13**	**Thu 4/3/14**
45		Preparation of Field Instructions	10 days	Mon 12/30/13	Fri 1/10/14
46		ORR	1 day	Mon 2/17/14	Mon 2/17/14
47		Internal Field Planning Call	1 day	Tue 2/18/14	Tue 2/18/14
48		Mobilization/First Day Kickoff Meeting	1 day	Mon 3/17/14	Mon 3/17/14
49		Surface Removal Effort	12 days	Tue 3/18/14	Wed 4/2/14
50		Demobilization	1 day	Thu 4/3/14	Thu 4/3/14
51		**After Action Report**	**93 days**	**Fri 5/16/14**	**Tue 9/23/14**
52		Preparation of Preliminary Draft AAR	15 days	Fri 5/16/14	Thu 6/5/14
53		NAVFAC/Cherry Point Review of AAR	10 days	Fri 6/6/14	Thu 6/19/14
54		Resolution of NAVFAC Comments	5 days	Fri 6/20/14	Thu 6/26/14
55		Preparation of Draft AAR	3 days	Fri 6/27/14	Tue 7/1/14
56		MARCORSYSCOM Review of Draft AAR	60 days	Wed 7/2/14	Tue 9/23/14
57		**Technical Memorandum**	**78 days**	**Fri 5/16/14**	**Tue 9/2/14**
58		Preparation of Preliminary Draft TM	15 days	Fri 5/16/14	Thu 6/5/14
59		NAVFAC/Cherry Point Review of TM	10 days	Fri 6/6/14	Thu 6/19/14
60		Resolution of NAVFAC Comments	5 days	Fri 6/20/14	Thu 6/26/14
61		Preparation of Draft TM	3 days	Fri 6/27/14	Tue 7/1/14
62		NCDENR Review of Draft TM	30 days	Wed 7/2/14	Tue 8/12/14
63		Resolution of NCDENR Comments	10 days	Wed 8/13/14	Tue 8/26/14
64		Preparation of Final TM	5 days	Wed 8/27/14	Tue 9/2/14



Project: MSProj11
Date: Thu 5/22/14

Task | Milestone | Project Summary | External Milestone | Deadline
Split | Summary | External Tasks | Progress

R:\USNAVFACENGCOM405450\CHERRYPOINT\GIS_FOLDERS\MAPFILES\387134_BT2_ESS_2013\UPDATED_ARCS_01102014\FIGURE 4-1 - BOGUE FIELD ESQD ARCS - JANUARY 2014.MXD CBOWMAN 5/17/2014 3:31:03 PM



Notes:
-An interline distance of 73 ft will be maintained between the demilitarization operations and MPPEH storage areas.
-An interline distance of 41 ft will be maintained between the MPPEH Storage Areas.

Legend

- MPPEH Collection Point (10lb NEW)
- MDAS Storage Area
- Other Debris Storage Area
- Demilitarization Operations
- Buildings
- Runway
- Unpaved Road
- Paved Road
- Base Boundary
- Essential Personnel EZ (5 feet)
- Non-essential Personnel EZ (200 feet)
- MPPEH Collection Point IBD (474 feet)
- MPPEH Collection Point PTR (284 feet)

N
W E
S

0 850 1,700
Feet

IBD - Inhabited Building Distance
MPPEH - Material Potentially Presenting an Explosive Hazard
NEW - Net Explosive Weight
PTR - Public Transporation Route
MDAS - Material determined as safe
EZ - Exclusion Zone

Figure 4-1
Bogue Field ESQD Arcs
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

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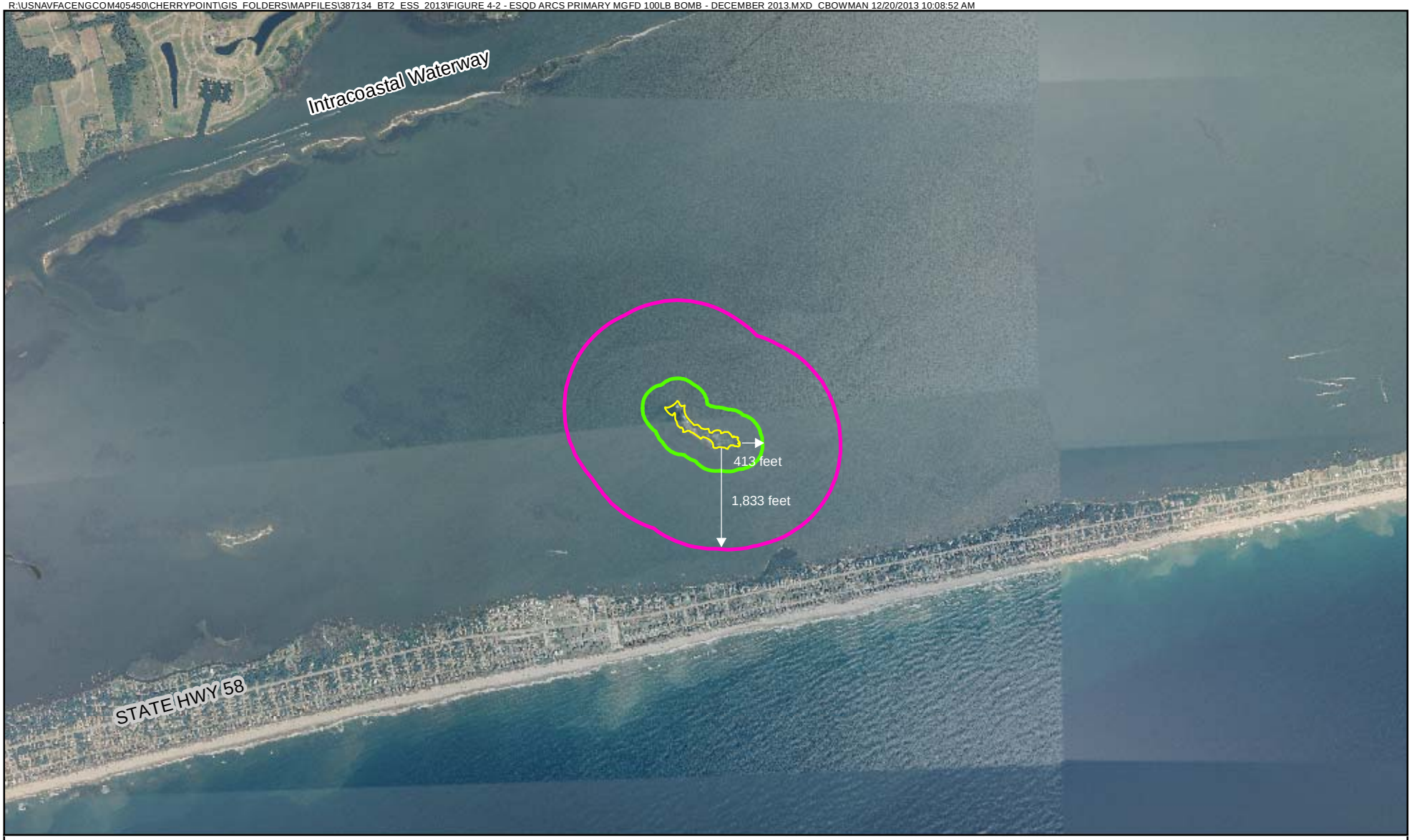
R:\USNAVFACENGCOM405450\CHERRYPOINT\GIS_FOLDERS\MAPFILES\387134_BT2_ESS_2013\FIGURE 4-2 - ESQD ARCS PRIMARY MGFD 100LB BOMB - DECEMBER 2013.MXD CBOWMAN 12/20/2013 10:08:52 AM



Legend

- Intentional Detonation (1,833 feet)
- Unintentional Detonation (413 feet)
- Wood Island

N
W E
S

0 1,250 2,500
Feet

Figure 4-2
ESQD Arcs for Primary MGFD (100lb Bomb)
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

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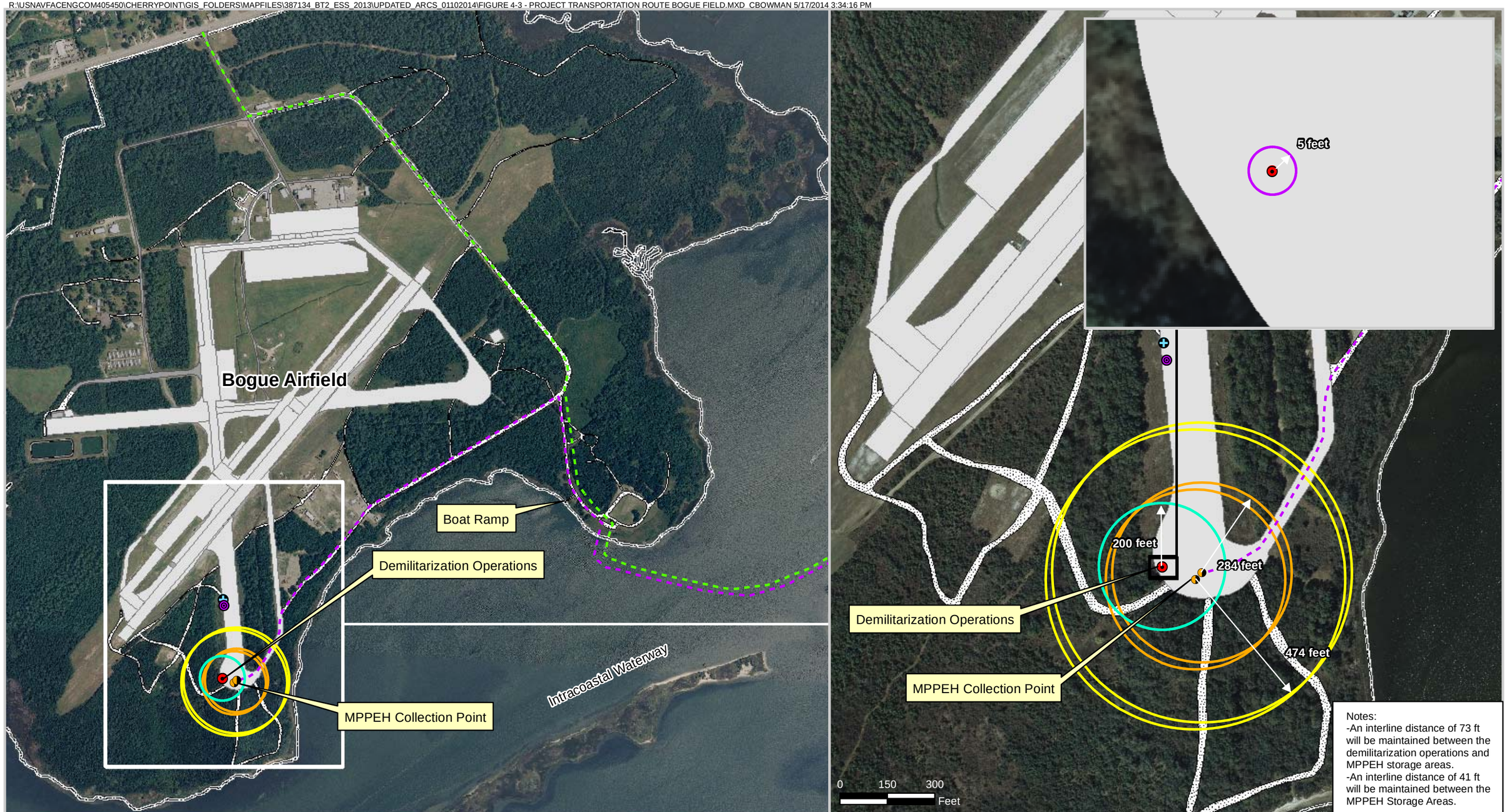
R:\USNAVFACENGCOM405450\CHERRYPOINT\GIS_FOLDERS\MAPFILES\387134_BT2_ESS_2013\UPDATED_ARCS_01102014\FIGURE 4-3 - PROJECT TRANSPORTATION ROUTE BOGUE FIELD.MXD CBOWMAN 5/17/2014 3:34:16 PM



Notes:
-An interline distance of 73 ft will be maintained between the demilitarization operations and MPPEH storage areas.
-An interline distance of 41 ft will be maintained between the MPPEH Storage Areas.

Legend

- MPPEH Collection Point (10lb NEW)
- MDAS Storage Area
- Other Debris Storage Area
- Demilitarization Operations
- Buildings
- Runway
- Unpaved Road
- Paved Road
- Base Boundary
- Essential Personnel EZ (5 feet)
- Non-essential Personnel EZ (200 feet)
- MPPEH Collection Point IBD (474 feet)
- MPPEH Collection Point PTR (284 feet)
- Anticipated MPPEH Transportation Route
- Anticipated Commercial Explosives Transportation Route

N
W E
S

0 850 1,700 Feet

IBD - Inhabited Building Distance
MPPEH - Material Potentially Presenting an Explosive Hazard
NEW - Net Explosive Weight
PTR - Public Transporation Route
MDAS - Material determined as safe
EZ - Exclusion Zone

Figure 4-3
Project Transportation Route - Bogue Field
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

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\\NORTHEND\PROJ\USNAVFACENGCOM\CHERRYPOINT\GIS_FOLDERS\MAPFILES\381277_BT_2_TM\FIGURE 4-4 - PROJECT TRANSPORTATION ROUTE BOGUE SOUND.MXD CBOWMAN 6/3/2010 11:29:54

Legend

- Anticipated MPPEH Transportation Route
- Anticipated Commercial Explosives Transportation Route
- Wood Island
- Base Boundary
- Runway

Note: Transportation routes may be modified based on observed site conditions.

N
W E
S

0 2,000 4,000 Feet

Figure 4-4
Project Transportation Route - Bogue Sound
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

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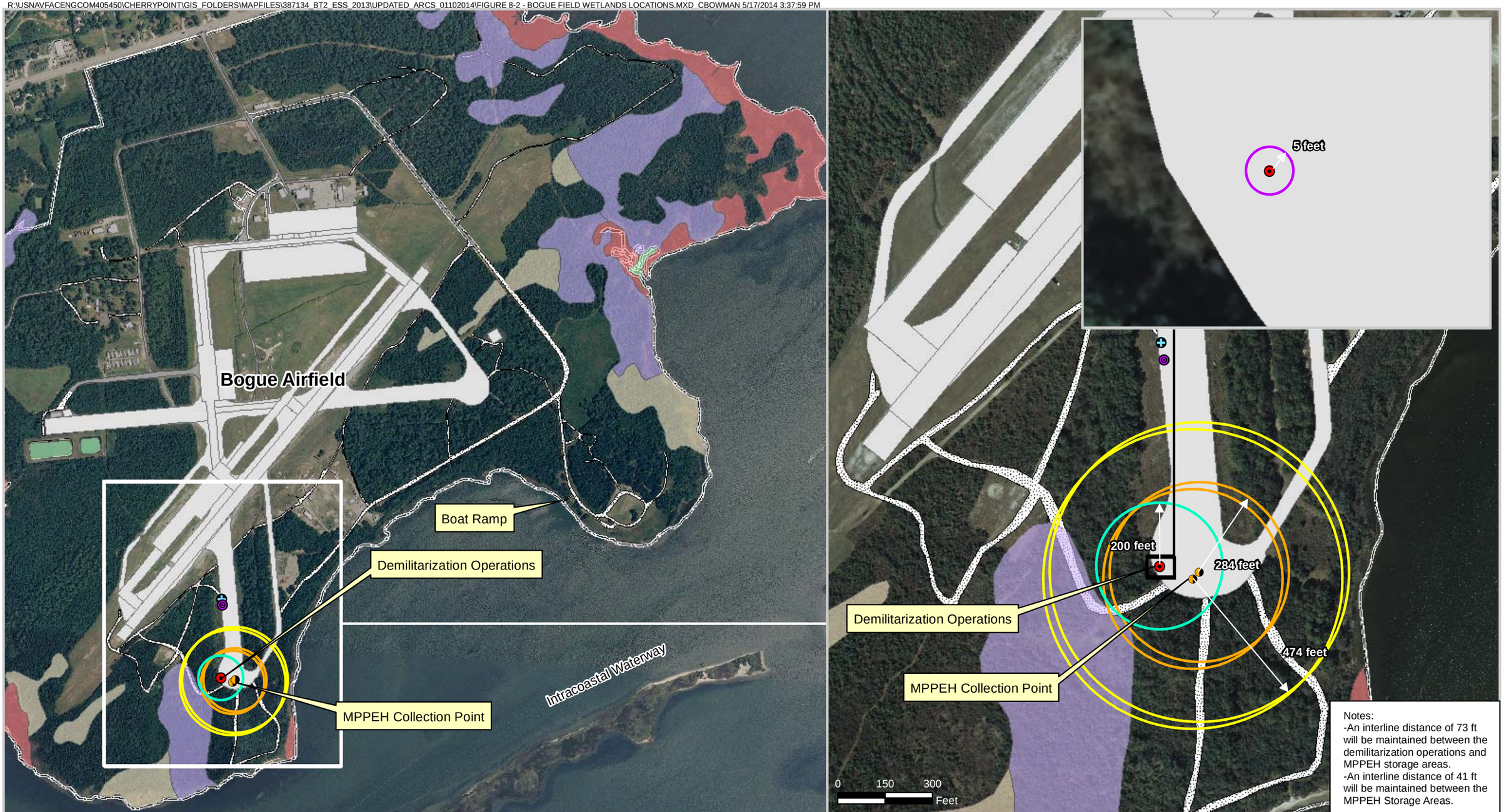
R:\USNAVFACENGCOM405450\CHERRYPOINT\GIS_FOLDERS\MAPFILES\387134_BT2_ESS_2013\UPDATED_ARCS_01102014\FIGURE 8-2 - BOGUE FIELD WETLANDS LOCATIONS.MXD CBOWMAN 5/17/2014 3:37:59 PM



Notes:
-An interline distance of 73 ft will be maintained between the demilitarization operations and MPPEH storage areas.
-An interline distance of 41 ft will be maintained between the MPPEH Storage Areas.

Legend

- MPPEH Collection Point (10lb NEW)
- MDAS Storage Area
- Other Debris Storage Area
- Demilitarization Operations
- Buildings
- Runway
- Unpaved Road
- Paved Road
- Base Boundary
- Essential Personnel EZ (5 feet)
- Non-essential Personnel EZ (200 feet)
- MPPEH Collection Point IBD (474 feet)
- MPPEH Collection Point PTR (284 feet)

Wetlands

- Emergent Wetland
- Forested Wetland
- Scrub-Shrub Wetland
- Unconsolidated Bottom

Note:
Wetlands data received from MCAS Cherry Point, NC. Last update 2003.

IBD - Inhabited Building Distance
MPPEH - Material Potentially Presenting an Explosive Hazard
NEW - Net Explosive Weight
PTR - Public Transporation Route
MDAS - Material determined as safe
EZ - Exclusion Zone

N
W E
S

0 850 1,700
Feet

Figure 8-2
Bogue Field Wetlands Locations
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

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Attachment A

Final

Work Plan for Munitions Response Program Former Cat Island Bomb Target BT-2 Expanded Site Inspection

Marine Corps Air Station Cherry Point Havelock, North Carolina

Contract Task Order 043

October 2010

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Under the

NAVFAC CLEAN 1000 Program
Contract N62470-08-D-1000

NORTH CAROLINA PROFESSIONAL SEAL 030914 ENGINEER 10-18-10 MICHAEL P. SKEEAN, JR.

Prepared by

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Contents

Acronyms and Abbreviations ..... **ix**

1 Introduction **1-1**
1.1 Purpose and Scope 1-1
1.2 Work Plan Organization 1-1

2 Site Description and Background **2-1**
2.1 Site Description 2-1
2.1.1 Site Location 2-1
2.1.2 Regional Climate 2-1
2.1.3 Regional Geology 2-2
2.1.4 Site Geology 2-2
2.2 Site History 2-2
2.3 Previous Site Investigations 2-4

3 Technical Management Plan **3-1**
3.1 Project Organization, Personnel, and Schedule 3-1
3.1.1 Project Organization 3-1
3.1.2 Project Personnel 3-2
3.1.3 Project Schedule 3-4
3.2 Technical Approach 3-4
3.2.1 Task 1—Project Planning 3-4
3.2.2 Task 2—Site Investigation 3-4
3.2.3 Task 3—Reporting 3-5

4 Field Investigation Plan **4-1**
4.1 Overview of Expanded Site Inspection Activities 4-1
4.2 Regulatory Concerns and Project Time Constraints 4-1
4.3 Notification and Coordination 4-2
4.4 Surface Debris Removal Operations 4-3
4.4.1 Site Preparation 4-3
4.4.2 Bogue Field Equipment and Material Storage Staging 4-3
4.4.3 MGFD and Associated ESQD Arcs 4-4
4.4.4 General Methodology 4-5
4.4.5 Overall Safety Precautions 4-6
4.4.6 Surface Debris Clearance Procedures 4-6
4.4.7 MEC Identification, Removal, and Disposal 4-7
4.4.8 Disposition of MPPEH and Other Debris 4-8
4.5 Environmental Sampling 4-11
4.6 Vibration and Noise Monitoring 4-11
4.7 Geospatial Information and Electronic Submittals 4-11
4.7.1 Data Collection and Storage 4-11
4.7.2 Digital Data 4-12

5 Quality Control Plan 5-1
5.1 Project Organization and Responsibilities 5-1
5.1.1 Project Manager 5-1
5.1.2 Activity Manager 5-1
5.1.3 Senior Consultants 5-1
5.1.4 Corporate Munitions Response Safety and Quality Control Officer 5-2
5.1.5 Senior UXO Supervisor 5-2
5.1.6 UXO Safety Officer 5-2
5.1.7 Unexploded Ordnance Quality Control Specialist 5-2
5.1.8 Health and Safety Manager 5-3
5.1.9 Field Team Leader 5-3
5.2 Definable Features of Work and the Three-phase Control Process 5-4
5.2.1 DFOW 5-4
5.2.2 Three Phases of Control 5-4
5.2.3 Preparatory Phase 5-4
5.2.4 Initial Phase 5-5
5.2.5 Follow-up Phase 5-6
5.2.6 Additional Audits 5-7
5.2.7 Final Acceptance Audit 5-7
5.3 Audit Procedures 5-7
5.4 Corrective/Preventive Action Procedures 5-7
5.4.1 Preventive Measures 5-7
5.4.2 Continual Improvement 5-8
5.4.3 Deficiency Identification and Resolution 5-8
5.4.4 Corrective Action Request 5-8
5.4.5 Deficiency and Corrective Action Tracking 5-9
5.4.6 Lessons Learned and Other Documentation 5-9
5.5 Records Generated 5-9
5.5.1 Onsite Project File 5-9
5.5.2 Weekly QC Report 5-10
5.6 Submittal Management 5-11
5.6.1 Review of Plans and Specifications 5-11
5.6.2 Review and Approval of Submittals 5-11
5.7 Personnel Qualifications and Training 5-11
5.7.1 UXO Technician I 5-12
5.7.2 UXO Technician II 5-12
5.7.3 UXO Technician III 5-12
5.7.4 UXO Quality Control Specialist 5-13
5.7.5 UXO Safety Officer 5-13
5.7.6 Senior UXO Supervisor 5-13
5.8 Testing and Maintenance 5-14

6 Explosives Management Plan 6-1
6.1 Acquisition 6-1
6.1.1 Description and Estimated Quantities 6-1
6.1.2 Acquisition Source 6-1

6.2 Initial Receipt 6-1
6.2.1 Procedures for Receipt of Explosives 6-1
6.2.2 Reconciling Discrepancies 6-1
6.3 Receipt Procedures 6-2
6.3.1 Records Management 6-2
6.3.2 Authorized Individuals 6-2
6.4 Lost, Stolen, or Unauthorized Use of Explosives 6-2

7 Explosives Siting Plan 7-1
7.1 Demolition Areas 7-1
7.2 Controlled Detonation Activities 7-1
7.3 Safe Holding Areas 7-1

8 Environmental Protection Plan 8-1
8.1 Ecological Summary 8-1
8.2 Endangered/Threatened Species within the Project Site 8-3
8.2.1 Wood Island Endangered/Threatened Species 8-3
8.2.2 Bogue Field Endangered/Threatened Species 8-3
8.3 Wetlands 8-4
8.4 Cultural and Archaeological Resources 8-4
8.5 Water Resources 8-5
8.6 Coastal Zones 8-5
8.7 Vegetation Removal 8-5
8.8 Existing Waste Disposal Sites 8-6
8.9 Applicable or Relevant and Appropriate Requirements 8-6
8.10 Protection and Mitigation of Identified Resources 8-6

9 References 9-1

Appendices

A Health and Safety Plan
B Vibration Monitoring Plan
C Quality Control Forms
D Applicable or Relevant and Appropriate Requirements

Tables

2-1 Ordnance Reportedly Employed at BT-2

3-1 Project Personnel Contact Information

4-1 Controlling Exclusion Zones for BT-2 Surface Removal Activities

5-1 Definable Features of Work

8-1 Species Potentially Occurring on or Adjacent to Bogue Field in Carteret County, Listed as Threatened, Endangered, or of Special Concern by the USFWS

Figures

2-1 Site Location Map

3-1 Project Schedule

4-1 ESQD Arcs for Bogue Field
4-2 ESQD Arcs for Primary MGFD (100 lb Bomb)
4-3 Project Transportation Route—Bogue Field
4-4 Project Transportation Route—Bogue Sound

8-1 Wood Island Wetland Locations
8-2 Bogue Field Wetland Locations

Acronyms and Abbreviations

AAR	After Action Report
ADGM	Airborne Digital Geophysical Mapping
ARAR	applicable or relevant and appropriate requirements
ATF&E	Bureau of Alcohol, Tobacco, Firearms, and Explosives
BMP	best management practice
BRAC	Base Realignment and Closure Act
CAD	computer-aided design
CAMA	Coastal Area Management Act
CAP	Corrective Action Plan
CAR	Corrective Action Request
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long Term Environmental Action—Navy
CTO	Contract Task Order
^{o}F	degrees Fahrenheit
DCM	Division of Coastal Management
DDESB	Department of Defense Explosives Safety Board
DFOW	definable features of work
DID	data item description
DoD	Department of Defense
DoDI	Department of Defense Instruction
DOJ	Department of Justice
DoN	Department of the Navy
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
EOD	Explosive Ordnance Disposal
EODB	Explosive Ordnance Disposal Bulletin
EP	Engineering Pamphlet
ER	Engineering Report
ESA	Endangered Species Act
ESQD	explosives safety quantity distance
ESS	Explosives Safety Submission
EZ	exclusion zone
FAR	Federal Acquisition Regulations
FCR	Field Change Request
FRC-East	Fleet Readiness Center—East
ft	feet

FTL	field team leader
FUDS	Formerly Used Defense Site
GIS	geographic information system
GPS	global positioning system
H&S	health and safety
HFD	horizontal fragmentation distance
HSM	health and safety manager
HSP	Health and Safety Plan
HTRW	hazardous, toxic, and radioactive wastes
IBD	inhabited building distance
IRP	Installation Restoration Program
lbs	pounds
MARCORSYSCOM	Marine Corps Systems Command
MCALF	Marine Corps Auxiliary Landing Field
MCAS	Marine Corps Air Station
MDAS	material documented as safe
MDEH	material documented as an explosive hazard
MEC	munitions and explosives of concern
MFD	maximum fragmentation distance
MFD-H	maximum fragmentation distance—horizontal
MGFD	munition with the greatest fragmentation distance
MLI	Munitions List Items
mm	millimeter
MMR	Military Munitions Rule
MOA	Memorandum of Agreement
MPPEH	material potentially presenting an explosive hazard
MR	munitions response
MRS	munitions response site
msl	mean sea level
NAVFAC	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
NC	North Carolina
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
NCNHP	North Carolina Natural Heritage Program
NEPA	National Environmental Policy Act
NEW	net explosive weight
NOAA	National Oceanic and Atmospheric Administration
NOSSA	Naval Ordnance Safety and Security Activity
NRHP	National Register of Historic Places
OP	Ordnance Publication
ORW	Outstanding Resource Waters

PDF	portable document format
PM	Project Manager
POC	point of contact
PTR	public transportation route
QA	quality assurance
QC	quality control
QCP	Quality Control Plan
RCRA	Resource Conservation and Recovery Act
RCW	red-cockaded woodpecker
RPM	Remedial Project Manager
SDZ	surface danger zone
SI	Site Inspection
SSC	Site Safety Coordinator
STC	Senior Technical Consultant
SOP	standard operating procedure
SUXOS	Senior UXO Supervisor
TAL	target analyte list
TM	Technical Memorandum
TMP	Technical Management Plan
TNT	trinitrotoluene
TP	Technical Paper
TSD	team separation distance
UFP-SAP	Unified Federal Policy Sampling and Analysis Plan
USACE	United States Army Corps of Engineers
USAESCH	United States Army Engineering Support Center, Huntsville
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USMC	United States Marine Corps
UXO	unexploded ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	UXO Safety Officer

SECTION 1

Introduction

Marine Corps Air Station (MCAS) Cherry Point is in the process of investigating closed ranges associated with the Air Station following the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) investigation process. An Expanded Site Inspection (SI) is being conducted at the Former Cat Island Bomb Target BT-2 (hereafter referred to as BT-2) to address munitions and explosives of concern (MEC) and material potentially presenting an explosive hazard (MPPEH) on the surface of Wood Island, the island located in the immediate vicinity of the BT-2 targets. This Expanded SI will be conducted by CH2M HILL under the Naval Facilities Engineering Command (NAVFAC), Comprehensive Long-term Environmental Action—Navy (CLEAN) Contract No. N62470-08-D-1000, Contract Task Order (CTO) 043.

1.1 Purpose and Scope

The purpose of the Expanded SI is to conduct surface clearance of MEC and MPPEH, present on Wood Island to eliminate potential explosive hazards associated with these items. MEC, along with MPPEH that is not safe to transport, will undergo controlled detonation on Wood Island, while MPPEH determined to be safe to transport and other debris will be transported from Wood Island to nearby Marine Corps Auxiliary Landing Field (MCALF) Bogue Field (hereafter referred to as Bogue Field) for storage, demilitarization, as necessary, and eventual off-site disposal. Surface debris removal operations will be conducted according to this Work Plan and the *Explosives Safety Submission for Munitions Response Activities Former Cat Island Bomb Target BT-2 and Surface Danger Zone* (CH2M HILL, 2010a), which has been submitted for Marine Corps Systems Command (MARCORSYSCOM) and Department of Defense Explosives Safety Board (DDESB) review.

1.2 Work Plan Organization

This Work Plan identifies the activities to be conducted during the Expanded SI at BT-2 and provides detailed implementation instructions to the project team. The Work Plan is organized as follows:

- **Section 1, Introduction**—This section provides the purpose and scope of the Expanded SI activities and details the document format.
- **Section 2, Site Description and Background**—This section provides a site description and background information related to historic site use and previous investigations at BT-2.
- **Section 3, Technical Management Plan (TMP)**—This section describes how the Expanded SI will be implemented by identifying project objectives, project organization and personnel, and communication procedures. This section also identifies project

deliverables, presents the project schedule, and discusses subcontractor and field investigation management protocols.

- **Section 4, Field Investigation Plan**—This section presents the overall approach to munitions response (MR) activities, identifies the areas of concern at the site, and provides MEC/MPPEH identification, handling, and disposal procedures.
- **Section 5, Quality Control Plan (QCP)**—The QCP provides the approach, methods, and operational procedures to be employed for quality control (QC) during the Expanded SI.
- **Section 6, Explosives Management Plan**—This section addresses the management of explosives in accordance with applicable regulations.
- **Section 7, Explosives Siting Plan**—This section provides explosives safety criteria for planning and siting explosives operations.
- **Section 8, Environmental Protection Plan**—This section identifies the approach, methods, and operational procedures to be employed to protect the environment during the performance of Expanded SI tasks.
- **Section 9, References**—This section provides references cited in the preceding sections.
- **Appendix A, Health and Safety Plan (HSP)** — The HSP describes the activities to be performed as part of the process for maintaining a safe environment through the duration of the field activities.
- **Appendix B, Vibration Monitoring Plan**—The Vibration Monitoring Plan presents the methods and procedures to be used to conduct vibration monitoring during the Expanded SI effort.
- **Appendix C, Quality Control Forms**—The QC Forms are provided to be used in the field as a method of assuring that the highest level of quality is maintained.
- **Appendix D, Applicable or Relevant and Appropriate Requirements**—Applicable or relevant and appropriate requirements (ARARs) for protection of the environment are summarized.

SECTION 2

Site Description and Background

2.1 Site Description

2.1.1 Site Location

MCAS Cherry Point is a 13,164-acre military reservation north of the town of Havelock, in southeastern Craven County, North Carolina (**Figure 2-1**). Commissioned in 1942, MCAS Cherry Point currently provides support facilities and services for the Second Marine Aircraft Wing, the Fleet Readiness Center – East (FRC-East), Service Support Detachment 21 of the Second Force Service Support Group, the Naval Air Maintenance Training Group Detachment, and the Defense Reutilization and Marketing Office (DRMO). MCAS Cherry Point maintains facilities for training and supporting the Atlantic Fleet Marine Force aviation units and is designated as a primary aviation supply point.

BT-2 is a closed range located in Bogue Sound in Western Carteret County, between Emerald Isle (located on Bogue Banks) and the North Carolina mainland at Latitude 34º 41′ 12″N and Longitude 76º 57′ 06″ W, as shown in **Figure 2-1**. The coordinates of BT-2 were modified several times during operation of the target location, but all target coordinates were located in the immediate vicinity of Wood Island. A partially submerged shoal located to the west of BT-2 is identified as Cat Island. The partially submerged shoal identified as Cat Island was not the location of the BT-2 targets, although the range is identified as the Former Cat Island Bomb Target BT-2. The munitions response site (MRS) includes Former Cat Island Bomb Target BT-2 and associated Surface Danger Zones (SDZs). SDZs associated with this site extend up to three miles from the target location. The MRS consists of Wood Island, an approximate 12-acre island primarily covered with marsh grasses and other vegetation, and the associated three-mile radius SDZ. The MRS includes an area of approximately 18,100 acres.

Surface removal equipment and materials staging will be performed at Bogue Field, which is located approximately 4 miles west of Wood Island, as shown on **Figure 2-1**. Bogue Field is an 875-acre auxiliary landing field that fronts Bogue Sound and serves as a training facility primarily for AV-8B Harriers from MCAS Cherry Point, as well as other locally-based Marine Corps aircraft, such as C-130 transports from MCAS Cherry Point, F-18 fighters from Beaufort, South Carolina, and helicopters from MCAS New River. Staging operations will be conducted adjacent to the entrance of Bogue Field and within the southwestern area adjacent to Bogue Sound.

2.1.2 Regional Climate

Proximity to the Atlantic Ocean significantly influences the climate of BT-2. The climate is warm and humid with short, mild winters and long, hot summers. Winter temperatures average 46 degrees Fahrenheit (°F), and summer temperatures average 77°F. Precipitation is not evenly distributed, with the greatest monthly precipitation occurring during July, August, and September (6 to 8 inches per month). In the other months, monthly rainfall

averages 3 to 4 inches. Average precipitation for the Coastal Plain is approximately 50 inches per year (Giese, Eimers, and Coble, 1997).

2.1.3 Regional Geology

The regional geologic and hydrogeologic framework for North Carolina presented here is based principally on information compiled and developed as part of the United States Geological Survey's (USGS) Regional Aquifer-System Analysis.

The Coastal Plain Province of North Carolina is underlain by an eastward-thickening wedge of unconsolidated gravel, sand, silt, and clay with scattered beds of shells and loosely consolidated beds of limestone, sandy limestone, and shell limestone (Winner and Coble, 1996). The sedimentary sequence ranges in age from Quaternary to Cretaceous and reaches a thickness of 10,000 feet (ft) at the Atlantic coast. Near MCAS Cherry Point, the Coastal Plain Province sediments are estimated to be approximately 2,500 ft thick (Lloyd and Daniel, 1988). The lower sedimentary sequence is predominantly nonmarine deltaic in origin and consists of discontinuous and heterogeneous sand-and-clay sequences. The upper sequences are predominantly marine in origin and include near-shore and estuarine deposits. The sedimentary deposits overlie pre-Cretaceous crystalline basement rock. Historical Coastal Plain Province sedimentation and deposition were controlled by fluctuations in sea level on a subsiding continental margin.

2.1.4 Site Geology

The marshland soils at Wood Island are level and very poorly-drained mucks. The dominant soil is classified as the Newham-Corolla complex and is composed of marine sediment deposits and organic mucks. The northern one-third (4 acres) of the island is a vegetated dune with an elevation of 9 feet above mean sea level (msl); the elevation of the southern two-thirds of the island is less than 3 feet above msl. Except for the higher elevation dune habitat, the land is subject to tidal flooding. Some marshlands are present on the island, and have semi-permanently saturated and flooded soils. Strong storm tides may flood the terrestrial dune habitat (USMC, 2001). The sediments surrounding the island are dominantly poorly-graded fine sands with trace to minor clay and silt components.

2.2 Site History

Munitions use at BT-2 included inert target-practice munitions with spotting charges used between 1943 and 1952. In 1952, the use of live munitions was initiated at this site (DoN, 1957a). The *Range Identification and Preliminary Range Assessment* (USACE, 2001) stated that general purpose bombs, armor piercing bombs, semi-armor piercing bombs, depth bombs, rockets, and machine guns (.30 caliber to 20 millimeter [mm]) were used for training activities at BT-2 including air delivered munitions, including up to 2,000-pound bombs. In approximately 1955, the use of live munitions was discontinued at BT-2 due to the proximity of nearby residences (DoN, 1956). In 1972, the land was used for "dry run" type training (USACE, 2001).

Table 2-1 lists the types of munitions reportedly used at BT-2.

TABLE 2-1
Ordnance Reportedly Employed at BT-2

Ordnance Type	Net Explosive Weight (lbs)
Bomb, AP, 1600, MK 1	Unknown
Bomb, Depth, 325 LB, MK 17	224 lbs Trinitrotoluene (TNT)
Bomb, Depth, 350 LB, MK 44/MK 47	252 lbs Torpex
Bomb, Depth, 650 LB, MK 29/MK 37/MK 38	464 lbs TNT
Bomb, Depth, 700 LB, MK 49/MK 38	425 lbs TNT
Bomb, Frag, 20 LM, M41	2.7 lbs TNT
Bomb, Frag, 220 LB, M88	46.69 lbs Comp B
Bomb, Frag, 260 LB, M81	34.1 lbs Comp B
Bomb, GP, 100 LB, M30	62 lbs Tritonal
Bomb, GP, 1000 LB, M65/M44	595 lbs Comp B
Bomb, GP, 2000 LB, M66/M34	1146 lbs Comp B
Bomb, GP, 250 LB, M57	129.02 lbs TNT
Bomb, GP, 500 LB, M64/M43	274 lbs Comp B
Bomb, Practice, 100 LB, Water Filled	N/A
Bomb, Practice, 500 LB, Water Filled	N/A
Bomb, Practice, 1000 LB, Water Filled	N/A
Bomb, Practice, Miniature, Mk 3, 4, and 5	N/A
Bomb, Practice, MK 106	N/A
Bomb, Practice, MK 76/BDU-33	N/A
Bomb, SAP, 1000 LB, M59	320 lbs TNT
Bomb, SAP, 500 LB, M58	160 lbs TNT
Cartridge, 20mm, TP	N/A
Cartridge, Caliber .30, Ball	N/A
Cartridge, Caliber .50, Ball	N/A
Cluster, Frag, 100 LB, M1 (6 ea 20 LB Frag)	2.7 lbs TNT x 6 each = 16.2 lbs TNT
Missile, TOW	5.3 lbs Octol (75/25)
Projectile, 75mm M48	1.47 lbs TNT
Rocket, 2.75” w/Inert Warhead	N/A
Rocket, 2.75” MK 6, HE (Assumed to be M151)	8.7 lbs Comp B4
Rocket, 2.75” MK 7, HEAT (Assumed to be M247)	2.0 lbs Comp B4
Rocket, 5” MK 28, HE	Unknown
Rocket, 5” MK 32, HEAT	Unknown
Rocket, 5” AP/ASW	Unknown
Rocket, 5” MK 36, PWP	Unknown

Source: *Final Range Identification and Preliminary Range Assessment, Marine Corps Air Station Cherry Point, New Bern, North Carolina* (USACE, 2001)

2.3 Previous Site Investigations

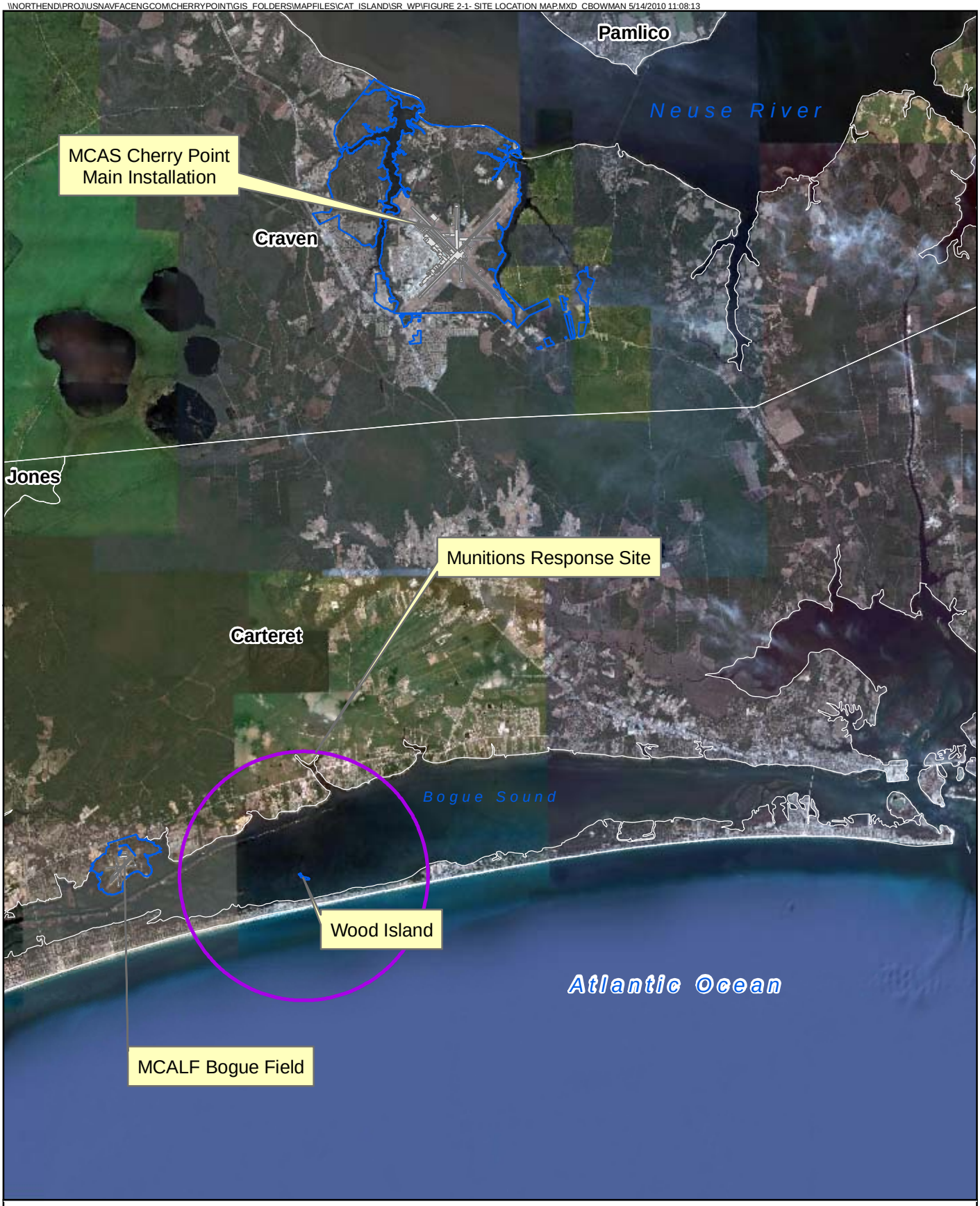
The Department of the Navy (DoN) performed unexploded ordnance (UXO) clearance, referred to as surface decontamination, of Wood Island in 1957. The details and extent of the level of UXO clearance is unknown. At that time, the DoN concluded that there was a high probability that UXO was present below the surface of the island that could not be detected by probing, and that UXO may continue to be exposed through tidal action and storms. The DoN stated that Wood Island remained a potentially dangerous area (DoN, 1957b).

On November 21 and 27, 1963, the MCAS Cherry Point Explosive Ordnance Disposal (EOD) team conducted a surface sweep of Wood Island for UXO. No UXO was found; however, items of inert and expended ordnance were found. At that time, no responsible officer would certify that Wood Island had been decontaminated with respect to UXO due to the potential for ordnance to be buried to a depth of 30 feet or more and due to the potential for buried ordnance to be brought to the surface through tidal action and storms (USMC, 1963).

MCAS Cherry Point EOD performed a site visit in August 2007. Miniature practice bombs and rocket components were identified on the island surface and were destroyed by EOD personnel.

Site reconnaissance visits were made to Wood Island in February 2008 and January 2009 by CH2M HILL, NAVFAC, and MCAS Cherry Point personnel. During the site reconnaissance visits, surface and partially buried MPPEH was observed on the island. A higher concentration of surface MPPEH was observed on the beaches located on the western portion of Wood Island.

In March through May 2009, a Site Inspection (SI) was initiated at BT-2 and the surrounding SDZ within Bogue Sound. This investigation included surface water, surface soil, and sediment sampling and airborne digital geophysical mapping (ADGM). Low concentrations of explosives residues, perchlorate, and metals were detected in site media, but no unacceptable risk to human or ecological receptors was identified. The ADGM survey identified a high concentration of metallic anomalies in the immediate vicinity of Wood Island that may be related to historic military activities at BT-2 (CH2M HILL, 2010).



Legend

- MRS Boundary and 3-Mile Surface Danger Zone
- Installation Boundary

N
W E
S

0 8,500 17,000
Feet

Figure 2-1
Site Location Map
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

CH2MHILL

SECTION 3

Technical Management Plan

3.1 Project Organization, Personnel, and Schedule

3.1.1 Project Organization

The key organizations involved in this project are NAVFAC, MCAS Cherry Point, the North Carolina Department of Environment and Natural Resources (NCDENR), the United States Environmental Protection Agency (USEPA) and CH2M HILL. CH2M HILL will issue subcontracts for munitions response support, boating services, and vegetation clearing/site work. Project execution will be conducted by CH2M HILL and its subcontractors; specific duties for CH2M HILL and its subcontractors are described below.

Prime Contractor

As the prime contractor, CH2M HILL is the primary point of contact with NAVFAC and MCAS Cherry Point. CH2M HILL will manage the overall project, providing day-to-day oversight and related program management support to execute the project successfully. Project duties controlled by CH2M HILL include the following:

- Project planning, implementation, and reporting
- Subcontractor selection, management, and control
- Program- and project-level QC
- Program- and project-level health and safety (H&S)
- Site management
- Technical direction for removal operations and data management
- Data analysis and reporting
- Project closeout

Unexploded Ordnance Subcontractor

The UXO subcontractor will provide services related to identification, removal, and processing of all metallic surface debris on Wood Island. These services will include controlled detonation of MEC and MPPEH determined not safe to transport from Wood Island, conveyance of MPPEH determined to be safe to transport, other debris, and donor explosives between Wood Island and Bogue Field, and the demilitarization and processing of MPPEH, as necessary. Specific project duties will include the following:

- Identify and document MEC and MPPEH on Wood Island
- In the event that MEC is encountered or MPPEH that cannot be safety transported to Bogue Field, coordinate with CH2M HILL personnel to transport donor explosives to Wood Island from Bogue Field to perform a controlled detonation of MEC on Wood Island
- Convey MPPEH determined to be safe to transport and other debris from Wood Island to Bogue Field, and demilitarize and process MPPEH, as necessary

- Perform inspection of material in accordance with the project Explosives Safety Submission (ESS) (CH2M HILL, 2010a)
- Manage the material staging areas including donor explosives, MPPEH, material documented as safe (MDAS), and other debris on Bogue Field
- Properly dispose of MDAS and other debris generated during removal activities

The UXO subcontractor will provide the labor, equipment, and supplies required for the work described above. CH2M HILL MR personnel will provide oversight of all activities conducted.

Boat Services Subcontractor

The boat services subcontractor will provide up to 5 shallow draft vessels with licensed captains for transporting personnel and equipment between Wood Island and Bogue Field. Specific project duties assigned to the boat subcontractor include the following:

- Transport project personnel and materials between from Bogue Field to Wood Island to support controlled detonation events
- Provide transportation of project personnel within Bogue Sound to monitor the presence of unauthorized personnel within the explosives safety quantity distance (ESQD) arcs.

The boat subcontractor will provide the labor, equipment, and materials required for the work described above. The boat subcontractor will comply with all Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF&E), Department of Transportation (DOT) and United States Coast Guard (USCG) requirements for transport of personnel, equipment, and materials.

Site Work Subcontractor

A site work subcontractor will perform site work such as vegetation clearing and surface grading at Bogue Field to allow for access to material storage areas, explosives magazines, and shredding equipment. The subcontractor will provide the labor, equipment, and materials required for the described work.

3.1.2 Project Personnel

The reporting relationship between key project personnel and the roles and responsibilities of the key personnel are discussed below. Contact information for key project personnel for project work at this site is shown in **Table 3-1**.

- **CH2M HILL Senior Technical Consultant** provides overall direction and oversight of project implementation, and ensures that appropriate reviews are conducted on all submittals.
- **CH2M HILL Activity Manager** coordinates the implementation of all MCAS Cherry Point projects, provides regional direction and leadership to project managers, and ensures that information is shared between project teams and communicates with the Navy Remedial Project Manager (RPM).

- **CH2M HILL Project Manager (PM)** has overall CH2M HILL responsibility for technical support and oversight, budget and schedule review and tracking, invoice review, personnel resources planning and allocation, and project coordination.
- **CH2M HILL Corporate MR Safety and QC Officer** oversees implementation of the HSP and QC Plan to ensure that they meet the specific needs of the project and that appropriate H&S and QC requirements specifically related to MEC and MPPEH are defined and properly executed.
- **CH2M HILL Program Health and Safety Manager** supports the implementation of the HSP to ensure that it meets all specific needs of the project and that appropriate H&S requirements are defined.
- **CH2M HILL Field Team Leader (FTL)** is CH2M HILL's onsite representative to coordinate and oversee the activities of field support personnel and subcontractor personnel. The FTL is also responsible for implementation of and compliance with HSP and QC requirements during the field effort.

TABLE 3-1
Project Personnel Contact Information

Name/Title/Organization	Mailing Address	Telephone/Fax/E-mail
Doug Bitterman, P.G. Activity Manager CH2M HILL	5700 Cleveland Street Suite 101 Virginia Beach, VA 23462	757-671-8311 x46209 (office) 703-627-3291 (cell) 703-376-5968 (fax) Doug.Bitterman@ch2m.com
Mike Skeean, P.E. Project Manager CH2M HILL	11301 Carmel Commons Blvd. Suite 304 Charlotte, NC 28226	704-543-3285 (office) 704-206-0869 (cell) 678-579-8129 (fax) Mike.Skeean@ch2m.com
Tim Garretson Senior Technical Consultant CH2M HILL	5700 Cleveland Street Suite 101 Virginia Beach, VA 23462	757-671-6224 (office) 757-287-5222 (cell) 757-497-6885 (fax) Timothy.Garretson@ch2m.com
Tom Roth, P.E. Senior Technical Consultant CH2M HILL	1000 Abernathy Road Suite 1600 Atlanta, GA 30328	404-474-7640 (office) 404-259-6674 (cell) 770-604-9183 (fax) Tom.Roth@ch2m.com
Dan Young, CSP, CRSP Corporate MR Safety and QC Officer CH2M HILL	1766 Sea Lark Lane Navarre, FL 32566	251-962-2963 (office) 251-752-0148 (cell) Dan.Young@ch2m.com
Mark Orman, CSP, CHMM, ARM Program H&S Manager CH2M HILL	135 South 84th Street Suite 325 Milwaukee, WI 53214	414-847-0597 (office) 414-712-4138 (cell) Mark.Orman@ch2m.com
Renee Clore, P.E. Task Manager CH2M HILL	125 South Wacker Drive Suite 3000 Chicago, IL 60606	312-873-9758 (office) 312-873-9801 (fax) Renee.Clore@ch2m.com

3.1.3 Project Schedule

A detailed project schedule, including key milestones, is provided on **Figure 3-1**.

3.2 Technical Approach

3.2.1 Task 1—Project Planning

This task includes project management, meetings, ESS preparation, work plan preparation, and subcontractor procurement.

Project management includes all work necessary for controlling the project budget and schedule. This includes monthly status reports and invoicing, as well as all other administrative tasks needed for project performance.

Meetings are planned throughout the course of this project. The meetings will be held to discuss proposed work, present investigation findings, and project status. The meetings may be held at MCAS Cherry Point, CH2M HILL's Charlotte office, or other locations, as necessary.

Preliminary draft, draft, and final versions of the work plan will be prepared under this task. A preliminary draft will be provided in electronic format to NAVFAC and MCAS Cherry Point for review. Hard copies and CDs of the draft document will be presented to NAVFAC, MCAS Cherry Point, USEPA, and NCDENR for review and comment. Lastly, a final work plan will be submitted addressing all stakeholder comments.

3.2.2 Task 2—Site Investigation

All field investigation activities will be performed under this task. The scope of the field investigation and the technical approach are presented in Section 4. The primary field investigation activities are the following:

- Notify the public and other stakeholders of site investigation activities
- Identify and document MEC and MPPEH on the surface of Wood Island
- Conduct vibration and noise monitoring on Wood Island and Bogue Banks
- Perform controlled detonations of MEC on Wood Island and all MPPEH determined not safe to transport off Wood Island
- Perform environmental sampling for munitions constituents following controlled detonations on Wood Island to assess risks to human and ecological receptors in soil and surface water.
- Convey MPPEH determined to be safe to transport and other debris from Wood Island to Bogue Field and demilitarize and process the MPPEH
- Properly dispose of MDAS and other debris generated during removal activities off site

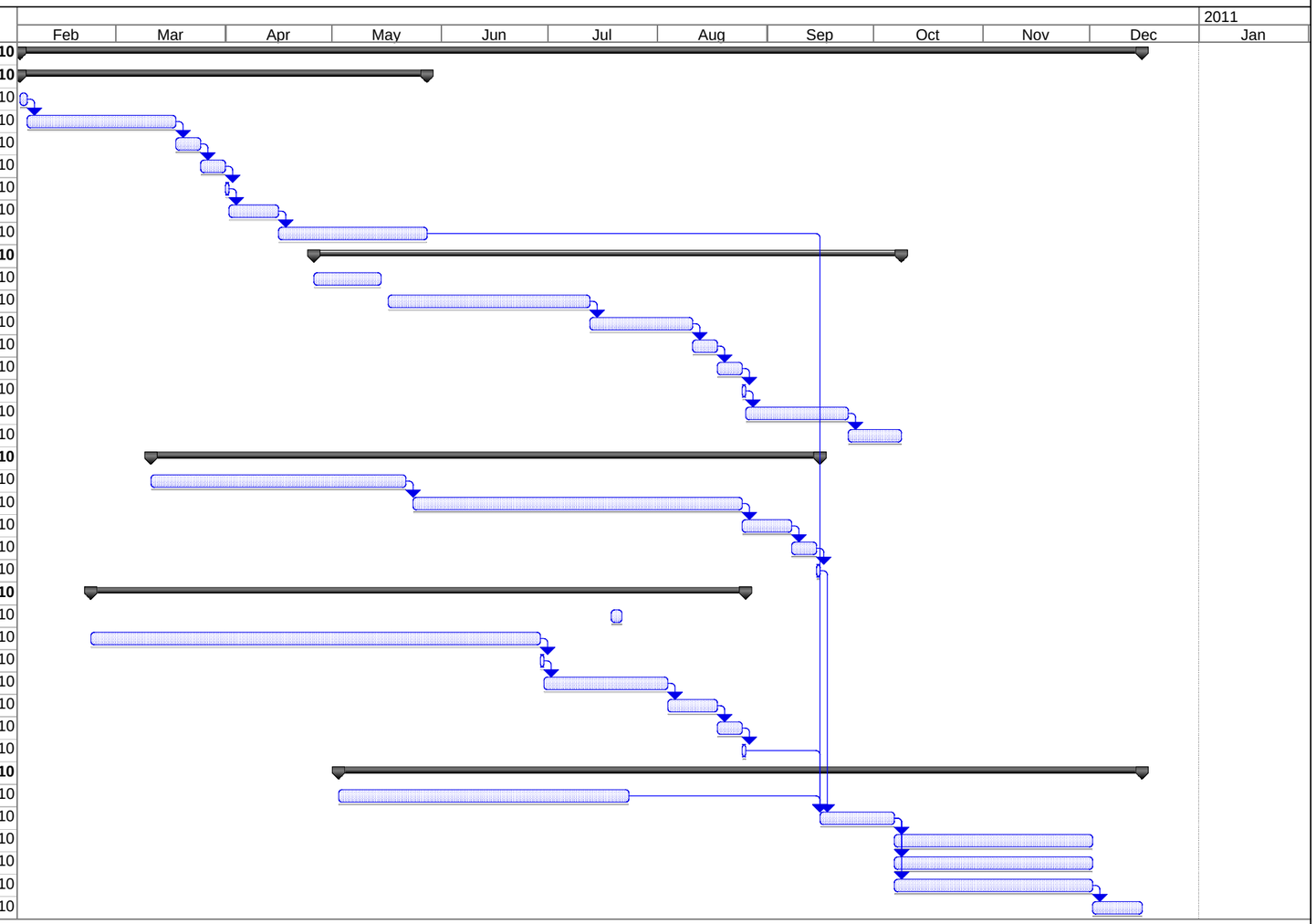
3.2.3 Task 3—Reporting

A preliminary draft Expanded SI Report will be provided in electronic format to NAVFAC and MCAS Cherry Point for review. A Draft Expanded SI Report will be prepared to document the findings of the field investigation and will be submitted to the USEPA and NCDENR for review and comment. A Final Expanded SI Report will be submitted to address all stakeholder comments.

The After Action Report (AAR) will be prepared in accordance with Naval Ordnance Safety and Security Activity (NOSSA) Instruction 8020.15B (NOSSA, 2009). The AAR will be submitted electronically to NAVFAC and MCAS Cherry Point for review. Following NAVFAC and MCAS Cherry Point approval, the AAR will be submitted to MARCORSYSCOM.

Figure 3-1 Project Schedule
Surface Debris Removal Effort
Former Cat Island Bomb Target BT-2
MCAS Cherry Point, North Carolina

ID	Task Name	Duration	Start	Finish
1	**BT-2 Surface Removal Effort**	**227 days**	**Tue 2/2/10**	**Wed 12/15/10**
2	**ESS**	**83 days**	**Tue 2/2/10**	**Thu 5/27/10**
3	Preparartion of ESS	2 days	Tue 2/2/10	Wed 2/3/10
4	MARCORSYSCOM Review of ESS	30 days	Thu 2/4/10	Wed 3/17/10
5	Address MARCORSYSCOM Comments (if any)	5 days	Thu 3/18/10	Wed 3/24/10
6	Prepare Revised ESS	5 days	Thu 3/25/10	Wed 3/31/10
7	Submit Revised ESS to Cherry Point	1 day	Thu 4/1/10	Thu 4/1/10
8	Cherry Point Submits Revised ESS to MARCORSYSCOM	10 days	Fri 4/2/10	Thu 4/15/10
9	MARCORSYSCOM and DDESB Review and Approval	30 days	Fri 4/16/10	Thu 5/27/10
10	**UFP SAP**	**120 days**	**Mon 4/26/10**	**Fri 10/8/10**
11	Procure Lab and Data Validator	3 wks	Mon 4/26/10	Fri 5/14/10
12	Preparation of UFP-SAP	41 days	Mon 5/17/10	Mon 7/12/10
13	NAVFAC Review of Internal Draft UFP SAP	21 days	Tue 7/13/10	Tue 8/10/10
14	Respond To/Resolve Internal Draft UFP SAP Comments	5 days	Wed 8/11/10	Tue 8/17/10
15	Prepare Draft UPF SAP	5 days	Wed 8/18/10	Tue 8/24/10
16	Submit Draft UFP SAP to Regulatory Agencies	1 day	Wed 8/25/10	Wed 8/25/10
17	Regulatory Review of Draft UFP SAP	21 days	Thu 8/26/10	Thu 9/23/10
18	Response to Comments and Submit Final UFP SAP	11 days	Fri 9/24/10	Fri 10/8/10
19	**CAMA Consistency Determination**	**135 days**	**Thu 3/11/10**	**Wed 9/15/10**
20	Preparation of Negative Determination	52 days	Thu 3/11/10	Fri 5/21/10
21	NC DCM Review (90-day)	67 days	Mon 5/24/10	Tue 8/24/10
22	Respond To/Resolve Draft Final Determination Comments	10 days	Wed 8/25/10	Tue 9/7/10
23	Prepare Final Determination	5 days	Wed 9/8/10	Tue 9/14/10
24	Submit Final Determination	1 day	Wed 9/15/10	Wed 9/15/10
25	**Surface Removal Work Plan**	**133 days**	**Mon 2/22/10**	**Wed 8/25/10**
26	Stakeholder Meetings	3 days	Mon 7/19/10	Wed 7/21/10
27	Prepare Draft Work Plan	91 days	Mon 2/22/10	Mon 6/28/10
28	Submit Draft Work Plan to Regulatory Agencies	1 day	Tue 6/29/10	Tue 6/29/10
29	Regulatory/Agency Review of Draft Work Plan	25 days	Wed 6/30/10	Tue 8/3/10
30	Respond To/Resolve Draft Work Plan Comments	10 days	Wed 8/4/10	Tue 8/17/10
31	Prepare Final Work Plan	5 days	Wed 8/18/10	Tue 8/24/10
32	Submit Final Work Plan	1 day	Wed 8/25/10	Wed 8/25/10
33	**Surface Removal**	**163 days**	**Mon 5/3/10**	**Wed 12/15/10**
34	Subcontractor Procurement	60 days	Mon 5/3/10	Fri 7/23/10
35	Mobilization and Set Up	15 days	Thu 9/16/10	Wed 10/6/10
36	Wood Island - Surface Removal	40 days	Thu 10/7/10	Wed 12/1/10
37	Surface Soil / Surface Water Sampling	40 days	Thu 10/7/10	Wed 12/1/10
38	Bogue Field - MPPEH Demolition/Disposal	40 days	Thu 10/7/10	Wed 12/1/10
39	Demobilization	10 days	Thu 12/2/10	Wed 12/15/10



Project: Cat Island and Skeet & Trap Range #1 Schedule
Date: Fri 5/14/10

Task | Progress | Summary | External Tasks | Split
Split | Milestone | Project Summary | External MileTask

Note: Schedule is subject to change. Changes or delays will be communicated to the NAVFAC RPM as soon as they are identified.

SECTION 4

Field Investigation Plan

4.1 Overview of Expanded Site Inspection Activities

The project objective is to conduct surface clearance of MEC and MPPEH on Wood Island to eliminate potential hazards associated with these items. No debris will be removed from the subsurface or from the waters around Wood Island. Surface and partially buried materials located above the low tide line will be removed. The scope of activities for the surface clearance effort includes:

- Notify the public and other stakeholders of site investigation activities
- Identify, document, and remove MEC and MPPEH from the surface of Wood Island
- Enforce applicable ESQD arcs during site activities on Wood Island and Bogue Field
- Perform controlled detonations of MEC on Wood Island and all MPPEH determined not safe to transport off Wood Island
- Conduct vibration and noise monitoring on Wood Island and Bogue Banks
- Collect environmental samples to be analyzed for munitions constituents following controlled detonation events on Wood Island to evaluate the impacts of munitions constituents on human and ecological.
- Convey MPPEH determined to be safe to transport and other debris from Wood Island to Bogue Field and demilitarize and process the MPPEH, as necessary
- Perform inspection and re-inspection of MPPEH to classify it as MDAS in accordance with the project ESS (CH2M HILL, 2010a)
- Establish a material staging area on Bogue Field for the staging of commercial donor explosives magazines and material storage containers for MPPEH, MDAS, and other debris removed from Wood Island
- Establish an MPPEH demilitarization and processing area, including staging and operation of a shredding machine on Bogue Field
- Dispose of MDAS and other debris generated during removal activities

4.2 Regulatory Concerns and Project Time Constraints

Prior to the commencement of MPPEH removal from Wood Island, a temporary emergency Resource Conservation and Recovery Act (RCRA) permit will be obtained from NCDENR to allow for the processing of MPPEH on Bogue Field. MCAS Cherry Point will submit the application for the temporary emergency RCRA permit. Expanded SI efforts must be completed within 90 day time frame allowed by the temporary emergency permit.

MPPEH that is transported off Wood Island for processing on Bogue Field will be considered a solid waste and is subject to RCRA Subtitle C regulation. Pursuant to 40 CFR Part 260, et al. Military Munitions Rule (MMR): Hazardous Waste Identification and Management; Explosives Emergencies; Manifest Exemption for Transport of Hazardous Waste on Public Right-of-Ways on Contiguous Properties; Final Rule, February 12, 1997, Section 266.202.(c)(1) states that a used or fired military munition is a solid waste when "*…transported off range or from the site of use, where the site of use is not a range, for the purposes of storage, reclamation, treatment, disposal, or treatment prior to disposal*". Applicable hazardous waste manifesting procedures will be implemented during the surface debris removal effort to properly document the transport of MPPEH from Wood Island to Bogue Field.

As Wood Island is designated as a Colonial Waterbird Nesting Area, access to the island is prohibited between April 1 and August 31. Therefore, site investigation activities must be performed between September 1 and March 31.

All transportation of commercial explosives and MPPEH will be performed in accordance with applicable DOT, RCRA, DoN, and USCG requirements. Regulatory requirements will be implemented by CH2M HILL, the UXO subcontractor, and the boat subcontractor.

4.3 Notification and Coordination

The following notification and coordination activities will be performed for the surface debris removal effort:

- Fact sheets will be provided to the public prior to and following the Expanded SI effort.
- Notifications will be published in local newspapers and public meetings will be held to notify nearby communities of proposed site activities.
- Local agencies including municipalities and law enforcement agencies will be notified of the proposed site activities prior to the commencement of field work. Additionally, a stakeholder meeting will be held prior to the field effort to coordinate the level of communication between local agencies and the project team during site activities.
- A Notice to Mariners will be issued through the USCG for the duration of surface clearance activities to alert boaters of potential hazards and restricted access areas within Bogue Sound.
- A Notice to Airmen will be issued through the Federal Aviation Administration (FAA) for the duration of surface clearance activities.
- NCDENR will be notified at the commencement and completion of debris removal activities on Wood Island and Bogue Field as specified in the temporary emergency RCRA permit requirements.
- Coordination with MCAS Cherry Point and Bogue Field personnel will be performed to arrange for personnel site access, after-hours security, transport of commercial explosives onto Bogue Field, and enforcement of ESQD arcs within Bogue Field.
- Radios will be used for communication between project teams during the field effort. Radios will be maintained by the FTL or their designee throughout the project duration.

4.4 Surface Debris Removal Operations

4.4.1 Site Preparation

Vegetation clearing and related site work will be performed at Bogue Field prior to staging the shredder and material storage containers for commercial explosives, MPPEH, MDAS, and other debris. Additionally, a 50-foot firebreak will be present around the shredder, explosives magazines, and MPPEH storage containers in accordance with Ordnance Publication (OP)-5, Section 4-1.10 (NAVSEA, 2007b). Vegetation clearing around the MPPEH storage containers and the shredder is not anticipated as these will be located on a paved area. Site access roads will be graded as necessary to ensure safe transportation of MPPEH from the boat dock to the shredder/MPPEH storage area. Equipment and storage containers will be placed based on the inter-line distances specified in the ESS (CH2M HILL, 2010a), as shown on **Figure 4-1**. As detailed in the ESS, a minimum distance of 44 feet will be maintained between the shredder and essential personnel, 73 feet between the shredder and MPPEH storage area, and 596 feet between the shredder and all non-essential personnel. The required inter-line distances between the two commercial explosives magazines is 40 feet. The required inter-line distance between the two MPPEH storage containers is 41 feet. All required inter-line distances will be verified through field measurements during the site mobilization effort.

Vegetation removal, if needed to access surface debris, on Wood Island will consist of manual removal of vegetation. Vegetation removal on Wood Island will be minimized to the extent possible to preserve the wildlife habitat present on the island. Vegetation removal will be conducted by UXO Technicians, and activities will be conducted in conjunction with a visual UXO surface clearance by UXO Technicians to protect personnel and equipment.

4.4.2 Bogue Field Equipment and Material Storage Staging

Two ATF&E Type II magazines, each with a 31-pound maximum net explosive weight (NEW), will be located on Bogue Field for the duration of the investigation. These magazines will be used to store commercial donor explosives to perform controlled detonations on Wood Island. The explosives magazines will be grounded for lightning protection in accordance with OP-5, Chapter 6 (NAVSEA, 2007b).

Sea containers will also be located on Bogue Field for the storage of MPPEH, MDAS, and other debris transported from Wood Island to Bogue Field. Each MPPEH container will be sited with a 10-pound maximum NEW. The MPPEH containers will also be grounded for lightning protection in accordance with OP-5, Chapter 6 (NAVSEA, 2007b).

A mechanical shredder will be located on Bogue Field to demilitarize MPPEH from Wood Island, as necessary. The ESQD arcs for shredder operation will be based on a MGFD for a 2.75- inch rocket motor MK40 with a NEW of 6 pounds, which is the amount of propellant contained in a 2.75-inch Rocket Motor MK40. The site layout for equipment and material storage at Bogue Field, including associated ESQD, arcs is presented on **Figure 4-1**. Information regarding controlling the various exclusion zones on both Wood Island and Bogue Field is presented in **Table 4-1**.

TABLE 4-1
Controlling Exclusion Zones for Former BT-2

Operation	Sited as	ES	Basis	ESQD (feet)
Wood Island manual operations[1]	Unintentional detonation (primary MGFD)	UXO team's Team Separation Distance (TSD)	K40 of the MGFD	172
Wood Island manual operations[1]	Unintentional detonation (primary MGFD)	Public and non-essential personnel	HFD of the MGFD	483
Wood Island MEC treatment up to 62 lbs NEW (individual items)	Intentional detonation	Public and all personnel	MFD-H of the MGFD	1831
Wood Island MEC or MPPEH treatment up to 174 lbs NEW (consolidated items) [2]	Intentional detonation	Public and all personnel	MFD of the MGFD	1831
Bogue Field MPPEH collection area for consolidation, storage, and re-inspection (up to 10 lb NEW per container)[3]	Metal Storage Container (i.e., SEA container)	Non-essential personnel in structures	IBD[4]	474
		Non-essential personnel in the open	PTR [4]	284
Bogue Field Portable Magazine (31 lb NEW per container)	Above ground United States Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) Type II magazine (5'x 5' x 5')	Non-essential personnel in structure	IBD[4]	200
		Non-essential personnel in the open	PTR [4]	120
Bogue Field MPPEH Shredder (6 lb NEW)	High Input Mechanized MEC Processing	Non-essential personnel	K328[5]	596
		Essential personnel	K24[6]	44

Table notes:

1. Manual operations involve excavating surface MEC with hand tools.
2. The maximum NEW for which blast overpressure (K328) does not exceed the MFD of the MGFD.
3. MPPEH storage allows storage of individual items up to a total of 10 lbs NEW.
4. Based on Table 7-9, OP-5, Volume 1, 7th Revision (NAVSEA, 2007).
5. From Fragmentation Data Review Form for the 2.75 inch rocket motor MK40.
6 Calculated using $D=KW^{1/3}$, with W equaling the NEW of the MGFD.

4.4.3 MGFD and Associated ESQD Arcs

The 100-pound M30 Bomb is the primary munition with the greatest fragmentation distance (MGFD). This item was selected as the primary MGFD because there is a potential for this item to be present at BT-2; the M30 Bomb is reported to have been employed at this site and fragments of an M30 Bomb were observed on the island during a previous site visit. Although larger munitions were reported to have been employed at BT-2, no evidence of larger munitions has been observed on the surface of Wood Island during recent site visits. Because this Expanded SI addresses only the surface of Wood Island, the MGFD was

selected from those items reasonably expected to be found on the ground surface based on recent site visits.

The intentional detonation ESQD arc (1,831 feet) allows this item to be detonated on Wood Island without impacting residents of Emerald Isle, located approximately 2,000 feet south of Wood Island. The ESQD arcs for the primary MGFD are shown on **Figure 4-2**.

If a MEC item with a fragmentation distance greater than the primary MGFD is encountered during the course of this project, all MR personnel will immediately cease operations, and an amendment to the ESS will be prepared. The MEC item will be guarded during preparation and approval of the ESS amendment.

4.4.4 General Methodology

The MR field activities will be conducted under the following guidance documents, regulations, and policies:

- *Methodologies for Calculating Primary Fragment Characteristics,* **DDESB TP 16 (DDESB, 2008)**. Technical Paper (TP) 16 provides DDESB-approved methodologies for calculating the characteristics of primary fragments. It includes methodologies for calculating primary fragment mass and velocity, maximum fragment range, hazardous fragment distance, effects of detonating stacks of items, effects of detonating buried items, and penetration information.
- *Minimum Qualifications for UXO Technicians and Personnel,* **DDESB TP 18 (DDESB, 2004)**. This document provides minimum qualification standards for personnel performing UXO-related operations in support of the Department of Defense (DoD) with the exception of DDESB personnel.
- ***DoD Ammunition and Explosives Safety Standards,* DoDI 6055.9 STD (DoD, 2008a)**. Department of Defense Instruction (DoDI) 6055.9 STD is the primary DoD regulation that establishes uniform safety standards for ammunition and explosives, associated personnel and property, and unrelated personnel and property exposed to the potential damaging effects of an accident involving ammunition and explosives. It applies for determining minimum safety distances, explosives storage requirements, facility construction and staging (e.g., work sites, magazines), and ESQD requirements.
- ***Defense Materiel Disposition Manual,* DoDI 4160.21-M (DoD, 1997), and *Defense Demilitarization and Trade Security Control Manual*, DoDI 4160.21-M-1 (DoD, 1995)**. DoDI 4160.21-M implements the Federal Property Management Regulation and other laws and regulations applying to the disposition of excess, surplus, and foreign excess personal property. DoDI 4160.21-M-1 contains specific guidance for property identified as Munitions List Items (MLI) and Commerce Control List Items. The guidance is applicable for the demilitarization and disposal of MPPEH.
- ***Military Munitions Response Program,* EP 1110-1-18 (USACE, 2005)**. Engineering Pamphlet (EP) 1110-1-18 provides the procedures and processes used to manage and execute all aspects of MEC Removal Actions. It applies to all phases of MEC-related projects.

- ***Explosives Safety and Health Requirements Manual,* EP 385-1-97 (USACE, 2008)**. This guidance document establishes the safe operating procedures for dealing with MEC items on Formerly Used Defense Sites (FUDS), Base Realignment and Closure Act (BRAC) installations, and Installation Restoration Program (IRP) projects. This guidance is applicable for all MEC-related projects.

4.4.5 Overall Safety Precautions

General work practices outlined in *Explosives Safety and Health Requirements Manual,* EP 385-1-97 (USACE, 2008), will be followed. Other basic precautions are as follows:

- The work periods for UXO Technicians are limited to maximums of 10 hours per day and 50 hours per week, unless specified otherwise by the MR Safety and QC Officer. Work will be conducted on weekends only to make up for lost time due to weather or other delays.
- A field team will consist of a UXO Technician III and six or fewer team members. The Senior UXO Supervisor (SUXOS) will oversee no more than 10 teams.

4.4.6 Surface Debris Clearance Procedures

The UXO subcontractor will perform a surface clearance of metallic debris on Wood Island. UXO Technicians will manually clear vegetation, if necessary, to access any visible debris. Metallic debris will be inspected by UXO Technicians and classified as MEC, MPPEH determined not safe to transport, MPPEH determined to be safe to transport, or other debris.

Each MEC item's location and description will be recorded in a tracking database and a digital photo will be taken of the item. Every effort will be made to conduct controlled detonation operations on the day of MEC discovery. If demolition cannot be completed on the day the item is found, personnel will secure the location overnight. Controlled detonation operations for MEC are discussed in Section 4.4.7.

The following information will be recorded for each MEC item recovered:

- Location – Recorded in the tracking database
- Item nomenclature, condition, etc.
- Who found it, assigned identification number

Following inspection, MPPEH that is determined to be safe to transport from Wood Island will be consolidated in a temporary collection point and will be transferred to Bogue Field daily for inspection, re-inspection, and demilitarization. MPPEH determined not safe to transport will be consolidated on Wood Island for controlled detonation with donor explosives. Detailed procedures for the disposition of MPPEH are provided in Section 4.4.8.

Other debris will be placed in a separate staging point and transferred to Bogue Field for disposal. Detailed procedures for the disposition of other debris are provided in Section 4.4.8.

4.4.7 MEC Identification, Removal, and Disposal

This section discusses the procedures for reporting and disposing of MEC items encountered during the project.

Data Reporting

The collection of accurate and detailed data is essential to documenting the MEC-related activities for future reference. A tracking database will be used to document data for each MEC item encountered and removed. The MEC tracking sheet will be filled out with the following information:

- Northing and Easting Coordinates and who found it
- Orientation — Geographical direction (N, S, E, W) the item is pointing, unless vertical
- Nomenclature by type of munition, filler, and fuze
- Date/time found and date/time disposed of
- Photograph Identification – Photograph number(s) from camera or item identification number if included in photo
- Comments — Any comments of note.

Demolition and Engineering Controls

Demolition operations will be conducted in accordance with EOD disposal procedures in Technical Manual (TM) 60A 1-1-31 (USAESCH, 2000) and *Ammunition and Explosives Safety Ashore,* OP-5 Volume I (NAVSEA, 2007b). If engineering controls are used, they will conform to *Use of Sandbags for Mitigation of Fragment and Blast Effects Due to Intentional Detonation of Munitions, HNC-ED-CS-S-98-7* (Serena and Crull, 1998) as approved by DDESB on February 23, 1999.

Once an item is identified as MEC, the SUXOS or their designee will determine whether the MEC is safe to move. MEC items determined to be safe to move may be consolidated on Wood Island for controlled detonation with donor explosives. All other MEC items will be blown-in-place. MEC will be flagged and the site will be secured until controlled detonation is complete. Commercial explosives will be transported from a storage location on Bogue Field to Wood Island. The anticipated transportation route for the donor explosives on Bogue Field and in Bogue Sound is provided in **Figure 4-3** and **Figure 4-4**, respectively.

Qualified UXO personnel will dispose of all MEC items using controlled detonation procedures by countercharging these items with an explosive donor charge and detonating the donor charge. This will be performed by a demolition team consisting of one UXO Technician III as the Demolition Supervisor and two UXO Technician II personnel, with the SUXOS responsible for the operation. At all times the UXO Safety Officer (UXOSO) will be present to confirm that all demolition materials are handled and prepared correctly and that Work Plan and ESS procedures are followed. Each demolition team member has the authority to stop operations if he/she observes an unsafe condition. Demolition operations will not commence until the unsafe condition has been made safe to the satisfaction of the SUXOS, UXOSO, and the demolition team performing the operation. Weather conditions

will be assessed by the SUXOS prior to each controlled detonation event. Controlled detonations will not be performed if weather conditions are determined to be unfavorable.

Donor charges used for controlled detonation operations will be transported to the island via boat. Every effort will be made to complete controlled detonation operations on the day of MEC discovery. If controlled detonation operations cannot be completed on the day the item is found, personnel will secure the location overnight. All donor explosives will be removed from Wood Island following demolition activities. No explosives will be stored on Wood Island.

Prior to project implementation, local emergency services will be notified of project activities and invited to a stakeholder meeting to voice concerns. Coordination with local emergency services will be maintained throughout the duration of field activities in order to reduce public exposure, maintain safety, and keep the public informed. The emergency contacts and phone numbers are provided in the HSP (**Appendix A**). The exclusion zones (EZ) will be evacuated, and notification deemed appropriate (e.g., warning siren, boats with "Live Firing" signs, and/or buoy markers) will be used to protect the public.

4.4.8 Disposition of MPPEH and Other Debris

This section discusses the procedures for reporting and disposing of MPPEH items and other debris encountered during the project. MPPEH determined to be safe to transport will be conveyed to Bogue Field for storage and demilitarization through use of a shredder. MPPEH that cannot be safely transported will be consolidated with the MEC for controlled detonation on Wood Island in accordance with the demolition operations requirements specified in the ESS (CH2M HILL, 2010a). Until it is inspected and re-inspected, MPPEH must be managed as presenting an explosive hazard. Examples of MPPEH that may be encountered at BT-2 include, but are not limited to munitions, range debris, and empty casings or other expended munitions. If the item is identified as MPPEH and is determined to be safe to transport, it will be staged temporarily on Wood Island and transported on a daily basis to Bogue Field. Once the MPPEH has been transported to Bogue Field it will be secured until demilitarization is performed and that demilitarized material is processed into the category of MDAS.

Inspection and Segregation

A systematic approach will be used for collecting, inspecting, and segregating site debris. The approach is designed so that materials undergo a continual evaluation/inspection process from the time they are acquired until the time they are removed from the site.

Segregation procedures begin at the time the metallic item is discovered by the UXO Technician. At this point, the UXO Technician makes a preliminary determination as to the classification of the item. If the UXO Technician makes a preliminary determination that the item is MPPEH, it is placed in a temporary accumulation point and will undergo the following procedure.

MPPEH Disposition

MPPEH encountered on Wood Island that is safe to transport will be placed into a storage box, labeled "MPPEH", and transported by boat to the MPPEH storage area at Bogue Field

on a daily basis. The anticipated transportation route for MPPEH on Bogue Field and in Bogue Sound is provided in **Figure 4-3** and **Figure 4-4**, respectively.

Sea containers will be marked "MPPEH" and will be used to store MPPEH at Bogue Field prior to demilitarization. These containers will be located at the site as shown on **Figure 4-1**. The two collection containers will be located a minimum of 30 feet apart. MPPEH that cannot be certified and verified as MDAS will remain at the collection point until treated or demilitarized as necessary.

MPPEH will be demilitarized as needed on Bogue Field through use of a shredder. Following demilitarization, the material will be inspected and re-inspected and once determined to be MDAS placed into a "MDAS" storage box for offsite disposal. If during the MPPEH inspection process at Bogue Field, explosives or other energetic material is discovered, that material will be reclassified as material documented as an explosive hazard (MDEH). The UXO technician III in charge of the inspection process will prepare a DD 1348 which will include the following statement: "This certifies that the material potentially presenting an explosive hazard listed has been 100 percent properly inspected and to the best of my knowledge and belief presents an explosion hazard". The type of explosive hazard or contamination, the presence of un-vented cavities and the estimated maximum credible net explosive weight will also be listed on the DD 1348 form. The UXO technician III will sign the DD 1348. (Note: certification as hazardous only requires one signature) A copy of the DD 1348 will be retained for the project files and the original will accompany the material through the remaining storage, transportation and disposal process. The now MDEH will be packaged and marked as MDEH and stored in the MPPEH storage container awaiting transportation back to Wood Island. The MDEH will be transported back to Wood Island for disposal by controlled detonation in the same manner as it was transported to Bogue Field. When the MDEH is destroyed, the DD 1348 form that accompanied the material, will be noted "item destroyed by detonation", the date and will be signed by the UXO technician III demolition supervisor. The completed DD 1348 form will be retained in the project files.

A UXO Technician III will perform the 100 percent inspection and document that the MPPEH is free of explosive hazards. Per OP-5 (NAVSEA, 2007b) and/or DoDI 4140.62 (DoD, 2008b), a second UXO Technician III will conduct the re-inspection and document that the MPPEH is free of explosive hazards. With these two visual inspections, and the execution of the DD Form 1348-1, the MPPEH becomes MDAS.

DD Form 1348-1 will be used as 100 percent inspection/100 percent re-inspection documentation. All DD Form 1348-1 forms will clearly show the following information in typed or printed letters:

- Name of SUXOS and the Government representative
- Organization
- Two signatures not in the same chain of command (i.e., UXO Technician III and the Unexploded Ordnance Quality Control Specialist [UXOQCS])
- Contractor's office
- Field office phone number(s) of the persons certifying and verifying the MDAS

- Basic material content (type of metal - for example, steel or mixed)
- Estimated weight
- Unique identification of each sealed container
- Location where MDAS was obtained
- Seal identification, if different from the unique identification of the sealed container.

Another sea container will be marked "MDAS" to indicate the status of the contents. A status of MDAS means that the contents have been certified and verified as not presenting an explosive hazard, and are consequently safe for unrestricted transfer or release pending any further demilitarization requirements or trade security controls. Material that has been certified safe will be transferred to the MDAS sea container for storage and disposal.

As part of the transfer of MDAS to an off-site facility for final disposition, the following statement will be entered on each DD Form 1348-1 and will be signed by the SUXOS and the second UXO Technician III.

> This certifies that material potentially presenting an explosive hazard listed has been 100 percent properly inspected and to the best of our knowledge and belief, is inert and/or free of explosives or related materials.

Copies of each DD Form 1348-1 will be maintained on MCALF Bogue Field for the project duration and will subsequently be maintained in the project file. CH2M HILL will arrange for maintaining the chain of custody and final disposition of the MDAS. The MDAS will be released only to an organization that will:

1. Provide signed documentation stating that the organization has received the containers, that each container has an unbroken seal and unique identification, and that after reviewing the documentation accompanying the containers, agrees that the sealed containers contained no explosive hazards when received. This documentation will be signed on company letterhead and state that the contents of these sealed containers will not be sold, traded, or otherwise given to another party until the contents have been smelted and are identifiable only by their basic content.
2. Send notification and supporting documentation to CH2M HILL documenting that the MDAS has been smelted and is now identifiable only by its basic content.

These documents will be incorporated into the final AAR.

Disposition of Other Debris

If the item is identified as other debris, it is placed at a temporary accumulation point located on Wood Island. Other debris will be transferred from Wood Island to Bogue Field at regular intervals. This metal debris will be stored on Bogue Field (**Figure 4-1**) temporarily and will be disposed of at a local metal recycler.

For other debris, the DD Form 1348-A1 will clearly indicate the following:

1. Basic material content (type of metal, for example, steel or mixed)
2. Estimated weight

3. Name of SUXOS
4. Organization
5. Signatures
6. Phone number(s) of the persons certifying and verifying the scrap metal

4.5 Environmental Sampling

Environmental sampling of surface soil and surface water will be performed on Wood Island following controlled detonation activities to confirm that detonation activities have not impacted the site with munitions constituents. Surface soil and surface water samples will be collected and analyzed for explosives residues, perchlorate, and target analyte list (TAL) metals. Environmental sampling methods, analytical procedures, and reporting requirements for the Expanded SI effort will be addressed in a Unified Federal Policy Sampling and Analysis Plan (UFP-SAP) that will be submitted under separate cover prior to the commencement of the Expanded SI effort.

4.6 Vibration Monitoring

Vibration monitoring will be performed during controlled detonation events to evaluate potential impacts of controlled detonations on the surrounding community. Monitoring equipment will be installed on Bogue Banks and Wood Island for this evaluation. The vibration monitoring plan is presented in **Appendix B**.

4.7 Geospatial Information and Electronic Submittals

This subsection describes the methods, equipment, and accuracy requirements for conducting location surveys and mapping. This plan also identifies the requirements for the electronic submittal of documents, mapping, and geographic information system (GIS) data.

All geospatial data will conform to the computer-aided drafting (CAD)/GIS Technology Center Spatial Data Standards for Facilities Infrastructure and Environment and will be provided in metric units.

4.7.1 Data Collection and Storage

The following data will be collected while in the field:

- Project Information (e.g., personnel, teams, instrument serial numbers, grid IDs, locations)
- FTL Notes (e.g., safety meetings, logbooks, field requests to management)
- UXO Team notes (e.g., files, personnel, methods, instruments, global positioning system (GPS) coordinates, descriptions of items found)
- Demolition Tracking
- QC (e.g., QC on notes and surface debris removal activities)

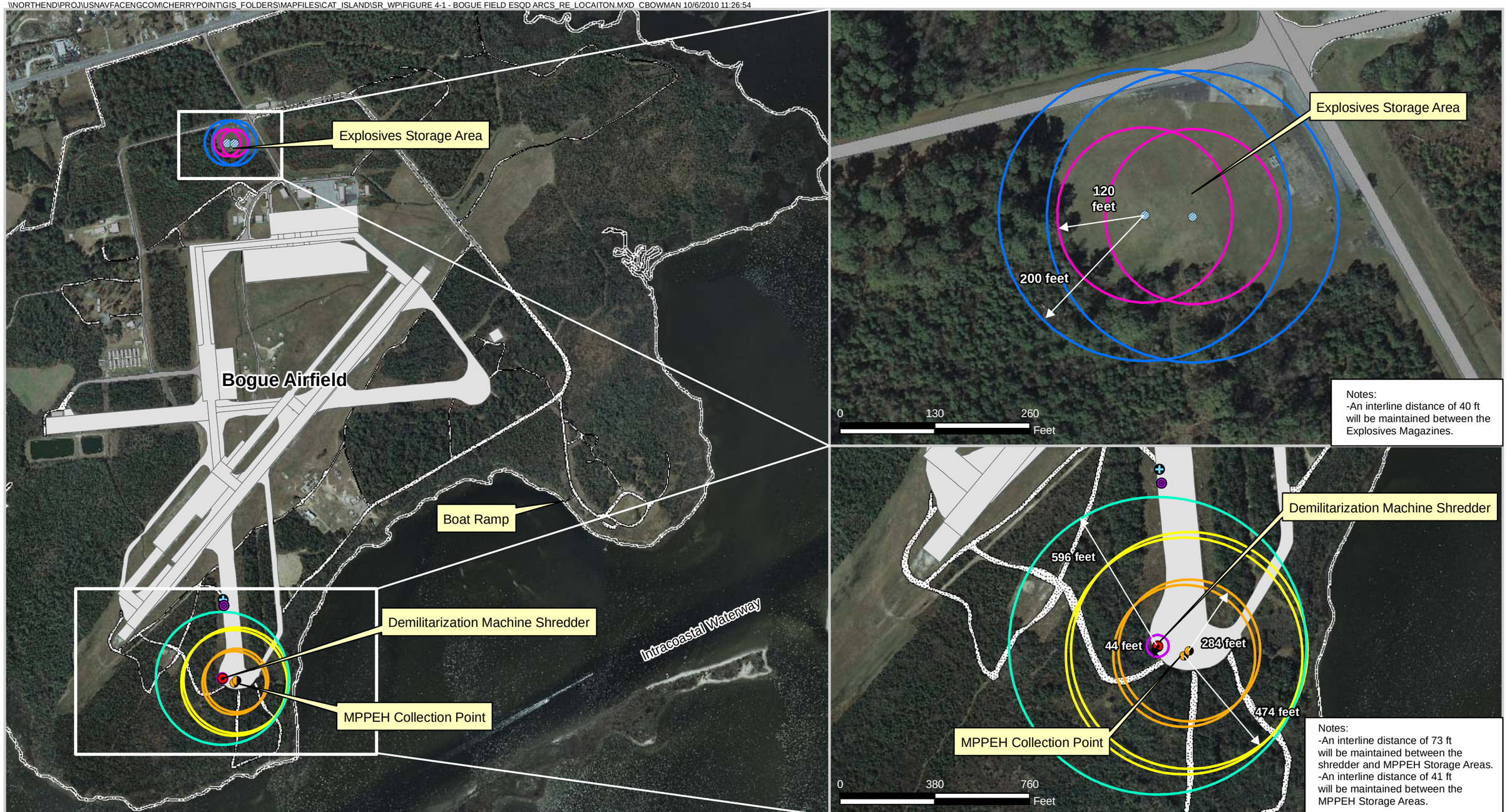
A database will be used for tracking MEC discovered on Wood Island. The data is transferred daily to the database, where it is validated (QC checks) by the UXOQCS. Paper forms may be used prior to inputting information into the database. Forms will be filled out

in ink and corrections will be made by crossing out the incorrect data and initialing next to the correction. All forms will be reviewed by the UXOQCS for completeness and accuracy. Completed and QC-accepted forms will be maintained by the SUXOS or UXOQCS. The data will be transcribed to an electronic database and the original forms will be scanned and saved as portable document format (PDF) files.

4.7.2 Digital Data

Location information will be collected as part of the surface debris removal effort and will be sufficient to accurately relocate the former position of debris in the field and accurately plot each position in the GIS.

\\NORTHEND\PROJ\USNAVFACENGCOM\CHERRYPOINT\GIS_FOLDERS\MAPFILES\CAT_ISLAND\SR_WP\FIGURE 4-1 - BOGUE FIELD ESQD ARCS_RE_LOCAITON.MXD CBOWMAN 10/6/2010 11:26:54



Notes:
-An interline distance of 40 ft will be maintained between the Explosives Magazines.

Notes:
-An interline distance of 73 ft will be maintained between the shredder and MPPEH Storage Areas.
-An interline distance of 41 ft will be maintained between the MPPEH Storage Areas.

Legend

- MPPEH Collection Point (10lb NEW)
- Commercial Explosives Storage (31lb NEW)
- MDAS Storage Area
- Other Debris Storage Area
- Demilitarization Machine Shredder
- Buildings
- Runway
- Unpaved Road
- Paved Road
- Base Boundary
- Essential Personnel EZ (44 feet)
- Non-essential Personnel EZ (596 feet)
- MPPEH Collection Point IBD (474 feet)
- MPPEH Collection Point PTR (284 feet)
- Explosives Magazine IBD (200 feet)
- Explosives Magazine PRT (120 feet)

N
W E
S

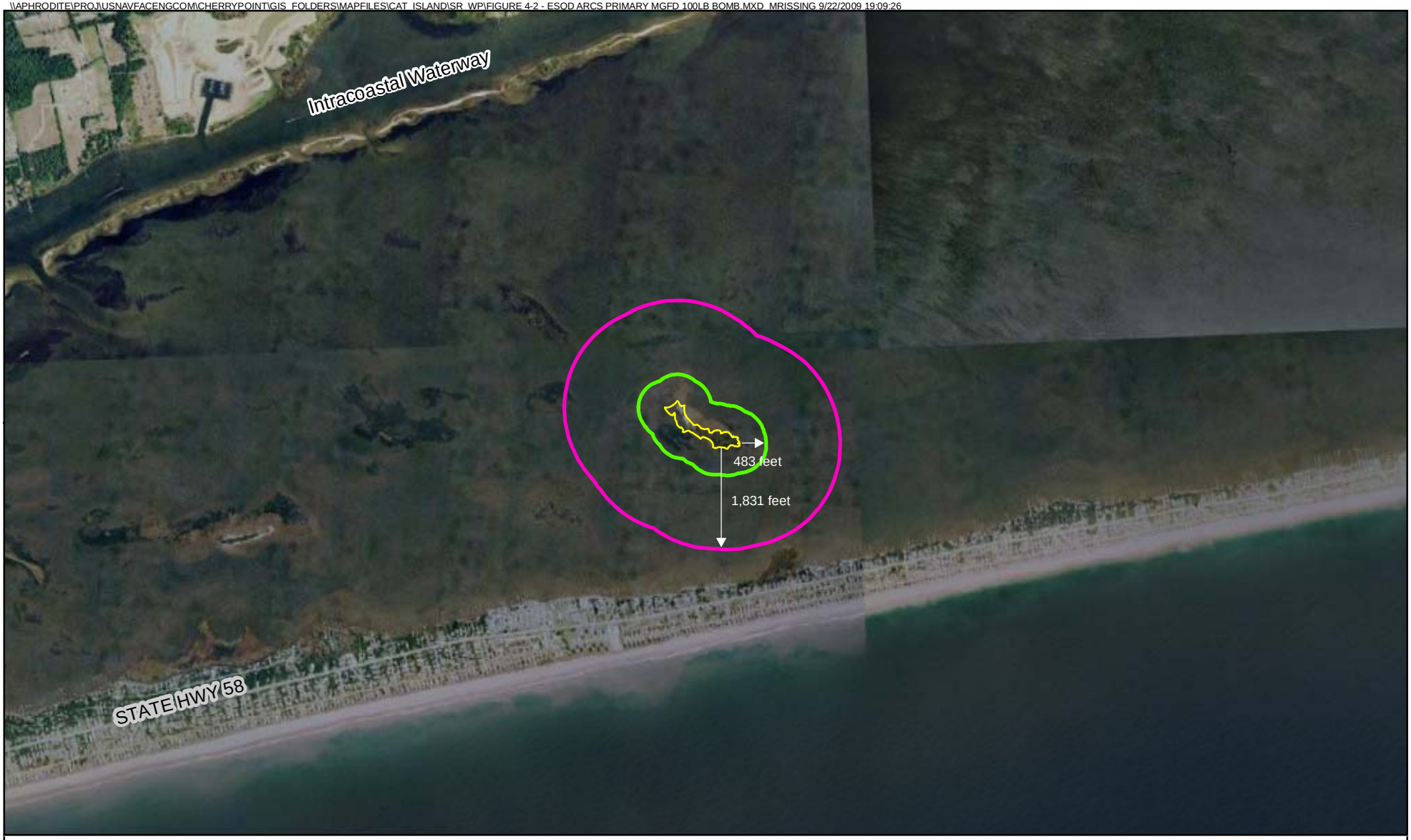
0 850 1,700
Feet

IBD - Inhabited Building Distance
MPPEH - Material Potentially Presenting an Explosive Hazard
NEW - Net Explosive Weight
PTR - Public Transporation Route
MDAS - Material determined as safe
EZ - Exclusion Zone

Figure 4-1
Bogue Field ESQD Arcs
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

CH2MHILL

\\APHRODITE\PROJ\USNAVFACENGCOM\CHERRYPOINT\GIS_FOLDERS\MAPFILES\CAT_ISLAND\SR_WP\FIGURE 4-2 - ESQD ARCS PRIMARY MGFD 100LB BOMB.MXD MRISSING 9/22/2009 19:09:26



Legend

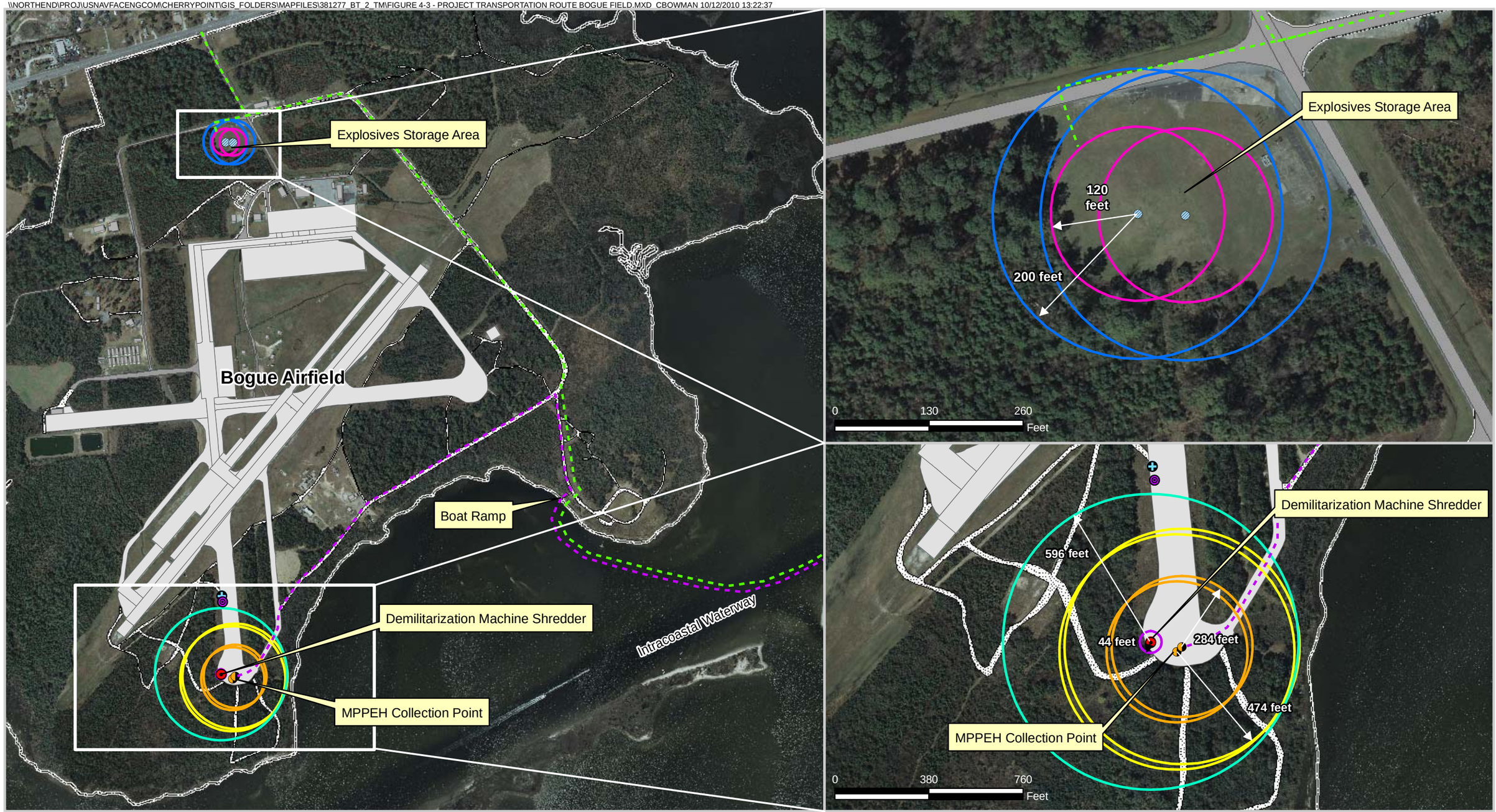
- Intentional Detonation (1,831 feet)
- Unintentional Detonation (483 feet)
- Wood Island

N
W E
S

0 1,250 2,500
Feet

Figure 4-2
ESQD Arcs for Primary MGFD (100lb Bomb)
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

CH2MHILL



Legend

- MPPEH Collection Point (10lb NEW)
- Commercial Explosives Storage (31lb NEW)
- MDAS Storage Area
- Other Debris Storage Area
- Demilitarization Machine Shredder
- Buildings
- Runway
- Unpaved Road
- Paved Road
- Base Boundary
- Essential Personnel EZ (44 feet)
- Non-essential Personnel EZ (596 feet)
- MPPEH Collection Point IBD (474 feet)
- MPPEH Collection Point PTR (284 feet)
- Explosives Magazine IBD (200 feet)
- Explosives Magazine PRT (120 feet)
- Anticipated MPPEH Transportation Route
- Anticipated Commercial Explosives Transportation Route

N
W E
S

0 850 1,700
Feet

IBD - Inhabited Building Distance
MPPEH - Material Potentially Presenting an Explosive Hazard
NEW - Net Explosive Weight
PTR - Public Transporation Route
MDAS - Material determined as safe
EZ - Exclusion Zone

Figure 4-3
Project Transportation Route - Bogue Field
Former Cat Island Bomb Target BT-2
Project Instructions
MCAS Cherry Point
North Carolina

CH2MHILL

\\NORTHEND\PROJ\USNAVFACENGCOM\CHERRYPOINT\GIS_FOLDERS\MAPFILES\381277_BT_2_TM\FIGURE 4-4 - PROJECT TRANSPORTATION ROUTE BOGUE SOUND.MXD CBOWMAN 6/3/2010 11:29:54

Legend

- Anticipated MPPEH Transportation Route
- Anticipated Commercial Explosives Transportation Route
- Wood Island
- Base Boundary
- Runway

Note: Transportation routes may be modified based on observed site conditions.

N
W E
S

0 2,000 4,000 Feet

Figure 4-4
Project Transportation Route - Bogue Sound
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

CH2MHILL

SECTION 5

Quality Control Plan

This QCP describes the QC approach and procedures for surface debris removal activities to be conducted on Wood Island and Bogue Field. The requirements and systems established in this QCP are relevant and applicable to project work performed by CH2M HILL and its subcontractors. The QC forms referenced throughout this section are provided in **Appendix C**.

5.1 Project Organization and Responsibilities

The organizational structure and responsibilities of the project team are designed to provide project quality assurance (QA)/QC for MEC investigation activities. Selected positions are described in the following paragraphs.

5.1.1 Project Manager

The PM is responsible for overall project activities, including cost control, schedule control, and technical quality. In addition, the PM oversees development of the Work Plan and monitors task order activities to ensure compliance with project objectives and scope. The PM also communicates with NAVFAC, MCAS Cherry Point, and other designated parties regarding project progress.

The PM has ultimate responsibility within the project team for producing deliverables that are technically adequate, satisfactory to the client, and cost-effective. To accomplish this, the PM develops an internal project review schedule, provides written instructions and frequent guidance to the project team, and monitors budgets and schedules. The PM will work with the project team to select an internal QA/QC review team, to coordinate review efforts, to address review comments, and to adjudicate technical issues.

5.1.2 Activity Manager

The primary objectives of the Activity Manager are to build and maintain the relationship with the client and to provide continuity across all projects at MCAS Cherry Point. The Activity Manager will provide overall guidance with regards to NAVFAC and MCAS Cherry Point and will serve as the alternate CH2M HILL contact. The Activity Manager has overall responsibility for client satisfaction.

5.1.3 Senior Consultants

The senior technical consultants (STCs) are company-wide resources with significant experience in the various technical aspects involved in a complex project. The senior technical consultants are responsible for evaluating the technical merit of the work planning documents before field activities begin, and reviewing all deliverables before submittal to NAVFAC and MCAS Cherry Point. The STCs assist the PM in coordinating review efforts, addressing review comments, and resolving technical issues.

5.1.4 Corporate Munitions Response Safety and Quality Control Officer

The Corporate MR Safety and QC Officer's responsibilities include, but are not limited to, the following:

- Review and approve the qualifications of proposed UXO staff and UXO subcontractors
- Ensure that the requisite MEC safety records are generated and retained as prescribed in this QCP
- Perform MEC QC audits and surveillance as needed
- Ensure that the responsibilities specific to MR operations are performed by the UXO Technicians.

The Corporate MR Safety and QC Officer will coordinate with the PM and the Site Manager and has authority to enforce the MEC procedures defined in this QCP. The Corporate MR Safety and QC Officer (along with all UXO Technicians onsite) has the authority to stop work to ensure project activities comply with MEC-related specifications of this QCP, the Contract, and the project. This authority applies equally to all project activities, whether performed by CH2M HILL or its subcontractors. The Corporate MR Safety and QC Officer also has authority to restart work following a stop-work incident.

5.1.5 Senior UXO Supervisor

The SUXOS will have responsibility for the execution of all onsite activities. The SUXOS will be responsible for overseeing scheduling of UXO personnel and ensuring that activities are performed in accordance with the specified plans. The SUXOS will be familiar with all aspects this work plan and the H&S requirements and will coordinate with the UXOSO to ensure H&S of site personnel. The SUXOS will ensure the accuracy of this Work Plan.

5.1.6 UXO Safety Officer

The UXOSO will be responsible for implementing the HSP, inclusive of the MEC-related and general safety components. The UXOSO will verify compliance with applicable H&S requirements and will report independently of project management to the CH2M HILL Corporate MR Safety and QC Officer. The UXOSO will implement the approved safety programs in compliance with all DoD, federal, state, and local statutes and codes; analyze operational risks, hazards, and safety requirements; and conduct safety inspections to ensure compliance with safety codes.

5.1.7 Unexploded Ordnance Quality Control Specialist

The UXOQCS is responsible for implementing the MEC-related provisions of the project QC program; will conduct QC inspections of all MEC-related operations for compliance with established procedures; and will direct and approve all corrective actions to ensure that all MEC-related work complies with contractual requirements. The UXOQCS will have a direct line of communication with the CH2M HILL PM, STC, and Corporate MR Safety and QC Officer. The UXOQCS is responsible for the accuracy of this Work Plan and the documentation required by this Work Plan.

5.1.8 Health and Safety Manager

The Health and Safety Manager (HSM) reviews and approves the project-specific HSP as well as subcontractor HSPs. The HSM serves as the point of contact (POC) for the Site Safety Coordinator (SSC) for any health- or safety-related issues, and may conduct project audits. The HSM is also responsible for investigating accidents should any occur during the course of the project.

5.1.9 Field Team Leader

The FTL reports to the PM and is responsible for efficiently applying the resources of the project team to execute the field phase of this project. In addition, the FTL is responsible for local client interface regarding details of the project and the project team while assigned to the site. The FTL will assist the PM in maintaining sufficient resource allocations to meet the project schedule and budget and will provide daily feedback to the PM on project progress, issues requiring resolution, and other project-specific issues, as required.

The quality-related responsibilities of the FTL include, but are not limited to, the following:

- Notifying the PM if problems arise with the schedule
- Providing scheduling and integration of subcontractor services in support of the SUXOS
- Serving as liaison for communications with project staff and subcontractors, as well as with the onsite client and regulatory agency representatives
- Providing logistical support for field operations
- Continuously monitoring work progress and adherence to authorized work scopes, budgets, and schedules
- Aiding in the preparation of submittals
- Reviewing the project Work Plan regularly

During the field investigation phase of projects, the field teams will meet daily to review the status of the project and to discuss technical and safety issues. When necessary, other meetings will be scheduled or the FTL will meet individually with field personnel or the subcontractors to resolve problems. During the field effort, the FTL will prepare a weekly report detailing project progress.

During the field effort, the FTL will be in regular telephone or face-to-face contact with the project team. When significant problems or decisions requiring additional authority occur, the FTL can immediately contact the PM for assistance.

5.2 Definable Features of Work and the Three-phase Control Process

MEC-related QC will be monitored through the definable features of work (DFOW) using a three-phase control process.

5.2.1 DFOW

The DFOW for this project are divided into activities related to planning, field operations, and final project reports and closeout:

1. **Planning**
   - Pre-Mobilization Activities: System setup for GIS, document management and control, data management, and subcontracting
   - Preparing the ESS, Work Plan, and other applicable planning documents
2. **Field Operations**
   - Site Preparation – mobilization
   - Surface debris clearance and processing
   - Demobilization
3. **Final Project Reports and Closeout**
   - Draft and Final Reports: preparing and obtaining approval
   - Data archiving and project closeout

5.2.2 Three Phases of Control

The Corporate MR Safety and QC Officer is responsible for ensuring that the three-phase control process, including the Preparatory Phase, Initial Phase, and Follow-up Phase, is implemented for each DFOW listed in this QCP, regardless of whether it is performed by CH2M HILL or its subcontractors. Each control phase is important for obtaining a quality product and meeting the project objectives; however, the preparatory and initial audits are particularly valuable in preventing problems. Production work is not to be performed on a DFOW until successful Preparatory and Initial Phases have been completed.

5.2.3 Preparatory Phase

The Preparatory Phase culminates with the planning and design process leading up to actual field activities. Successful completion of the Preparatory Phase verifies that the project delivery, QC, and safety plans have been completed. The following actions will be performed as applicable for each DFOW:

- Confirm that the appropriate technical procedures are incorporated into the project Work Plan and review procedures.
- Confirm that adequate testing is called for to ensure quality delivery.

- Confirm definition of preliminary work required at the work site and examine the work area to confirm required preliminary work has been properly completed.
- Confirm availability of required materials and equipment. Examine materials and equipment to confirm compliance with approved submittals and procedures. Ensure equipment testing procedures are in place, with control limits and frequency, for each piece of equipment.
- Confirm qualifications/training of personnel and verify roles/responsibilities are well-defined and communicated.
- Confirm with the HSM that the site HSP adequately addresses the work operations and that applicable safety requirements have been incorporated into the plan.
- Discuss methods to be employed during the field activities.
- Confirm any required permits and other regulatory requirements are met.
- Verify that lessons learned during previous similar work have been incorporated as appropriate into the project procedures to prevent recurrence of past problems.

Project staff must correct or resolve discrepancies between existing conditions and the approved plans/procedures identified by the PM, Corporate MR Safety and QC Officer, and the team during the Preparatory Phase. The PM or designee must verify that unsatisfactory and nonconforming conditions have been corrected prior to granting approval to begin work.

Results of the activity are to be documented in the Preparatory Inspection Checklist (Form B-1b) specific for the DFOW and summarized in the Weekly QC Report.

5.2.4 Initial Phase

The Initial Phase occurs at the startup of field activities associated with a specific DFOW. The Initial Phase confirms that this QCP, other applicable Work Plan sections, and procedures are being effectively implemented and the desired results are being achieved.

During the Initial Phase, the initial segment of the DFOW is observed and inspected to ensure that the work complies with contract and Work Plan requirements. The Initial Phase should be repeated if acceptable levels of specified quality are not met. The following shall be performed for each DFOW:

1. **Establish the quality of work required to properly deliver the project in accordance with contractual requirements.** The FTL will ensure that the field teams are aware of expectations associated with the field methods established under the Preparatory Phase by observing the initial work activities and interacting with the PM, Activity Manager, and responsible subcontractors' supervisors.
2. **Resolve conflicts.** The STC will guide the PM and responsible supervisor(s) in resolving conflicts. Should conflicts arise in establishing the baseline quality for the DFOW, the responsibility to resolve the conflict falls to the PM. Should the conflict not be resolved in a manner that satisfies the project requirements, the Senior Technical Consultant must elevate the conflict to the program level (i.e., the Program QC Manager) and issue a non-

conformance report. The STC may direct a cessation of work activity with the concurrence of the Program QC Manager should the issue jeopardize the results of the DFOW or put the project at risk of non-conformance.

3. **Verify with the HSM that the site HSP was developed to ensure that the identified hazards adequately address field conditions.** Confirm that applicable safety requirements are being implemented during field activities.

Upon completion of Initial Phase activities, the results are to be documented in the Initial Phase Inspection Checklist (Form B-2b) and the QC logbook and summarized in the Weekly QC Report. Should results be unsatisfactory, the Initial Phase will be rescheduled and performed again.

5.2.5 Follow-up Phase

Completion of the Initial Phase of QC activity leads directly into the Follow-up Phase, which covers the routine day-to-day activities at the site. Specific concerns associated with the Follow-up Phase include:

1. Inspection of the work activity to ensure work complies with the Contract, ESS, and Work Plan.
2. Evaluation and confirmation that the quality of work is being maintained at least at the level established during the Initial Phase.
3. Evaluation and confirmation that required testing is being performed in accordance with procedures established during the Preparatory Phase and confirmed during the Initial Phase.
4. Confirmation that nonconforming work is being corrected promptly and in accordance with the direction provided by the PM, SUXOS, FTL, STC, or Corporate MR Safety and QC Officer.

To conduct and document these inspections, the FTL is to generate the Follow-up Phase Inspection Checklist (Form B-3b). The Follow-up Phase inspections will be performed daily or as otherwise identified in this QCP until the completion of each DFOW.

The SUXOS and FTL are responsible for onsite monitoring of the practices and operations taking place and verifying continued compliance with the specifications and requirements of the Contract, project, and approved project plans and procedures. The SUXOS and FTL are also responsible for verifying that a daily H&S inspection is performed and documented as prescribed in site specific HSP. Discrepancies between site practices and approved plans and procedures are to be resolved and corrective actions for unsatisfactory and nonconforming conditions or practices are to be verified by the UXOQCS or a designee prior to granting approval to continue work. Follow-up Phase inspection results are to be documented in the QC logbook and summarized in the Weekly QC Report.

5.2.6 Additional Audits

Additional audits performed on the same DFOW may be required at the discretion of the Program QC Officer, STC, Corporate MR Safety and QC Officer, HSM, or the PM. Additional preparatory and initial audits are generally warranted under any of the following conditions: unsatisfactory work, changes in key personnel, resumption of work after a substantial period of inactivity (i.e., 2 weeks or more), or changes to the project scope of work/specifications.

5.2.7 Final Acceptance Audit

Upon conclusion of the DFOW and prior to closeout, the Final Acceptance Inspection must be performed to verify that project requirements relevant to the work are satisfied. Outstanding and nonconforming items are to be documented on the Final Inspection Checklist (Form B-4b). Resolution of each item must be noted on the checklist. Contractor acceptance and closeout of each definable work feature is a prerequisite to project closeout.

5.3 Audit Procedures

The Corporate MR Safety and QC Officer is responsible for verifying compliance with this QCP through audits and surveillance. The UXOQCS, PM or a designee is to inspect/audit the quality of work being performed for the DFOW. The UXOQCS, PM or a designee is to verify that procedures conform to applicable specifications stated in this Work Plan or other applicable guidance. Identified deficiencies are to be communicated to the responsible individual and documented in the QC logbook and Weekly QC Report. Corrective actions are to be verified by the Corporate MR Safety and QC Officer and recorded in the Weekly QC Report.

The specific QC audit procedures for the DFOWs most commonly employed at MR sites, including the phase during which it is performed, the frequency of performance, the pass/fail criteria, and actions to take if failure occurs, are presented in **Table 5-1**.

The Inspection Schedule and Tracking Form (Form B-5b) is to be used by the UXOQCS and SUXOS for planning, scheduling and tracking the progress of audits for this project. The information on the form is to be kept up to date and reviewed by the Corporate MR Safety and QC Officer for planning purposes. Audit activities and corrective actions are to be documented by the UXOQCS in accordance with this chapter. Audit records are to be maintained as part of the project QC file.

5.4 Corrective/Preventive Action Procedures

The corrective and preventive action procedures are designed to prevent quality problems and to facilitate process improvements, as well as identify, document, and track deficiencies until corrective action has been verified.

5.4.1 Preventive Measures

While the entire QC program is directed toward problem prevention, certain elements of the program have greater potential to be proactive. The primary tools for problem prevention on this project are discussed in Section 5.4.2 and Section 5.8. Should these preventive

measures fail, tracking and communicating deficiencies provide a mechanism for preventing their recurrence.

5.4.2 Continual Improvement

Project staff at all levels are encouraged to provide recommendations for improvements in established work processes and techniques. The intent is to identify activities that are compliant but can be performed in a more efficient or cost-effective manner. Typical quality improvement recommendations include identifying an existing practice that should be improved and/or recommending an alternate practice that provides a benefit without compromising prescribed standards of quality. Project staff members are to bring their recommendations to the attention of project management or the QC staff through verbal or written means. However, deviations from established protocols are not to be implemented without prior written approval by the PM and concurrence of the Senior UXO Consultant. Where a staff-initiated recommendation results in a tangible benefit to the project, public acknowledgment is to be given by the PM.

5.4.3 Deficiency Identification and Resolution

While deficiency identification and resolution occurs primarily at the operational level, QC audits provide a backup mechanism to address problems that either are not identified or cannot be resolved at the operational level. Through implementation of the audit program prescribed in this QCP, the QC staff is responsible for verifying that deficiencies are identified, documented as prescribed herein, and corrected in a timely manner. Deficiencies identified by the QC staff are to be corrected by the operational staff and documented by the QC staff.

5.4.4 Corrective Action Request

A Corrective Action Request (CAR) (Form B-6b) can be issued by any member of the project staff, including CH2M HILL and subcontractor employees. If the individual issuing the CAR is also responsible for correcting the problem, then that individual should do so and document the results on Part B of the CAR (Form B-6b). Otherwise, the CAR should be forwarded to the PM, who is then responsible for evaluating the validity of the request, formulating a resolution and prevention strategy, assigning personnel and resources, and specifying and enforcing a schedule for corrective actions. Once a corrective action has been completed, the CAR and supporting information are to be forwarded to the Corporate MR Safety and QC Officer for closure. Sufficient information is to be provided to allow the QC reviewer to verify the effectiveness of the corrective actions.

In addition to observing actual work operations, CARs are to be reviewed during follow-up QC audits. The purposes of this review are as follows: to ensure that established protocols are implemented properly; to verify that corrective action commitments are met; to ensure that corrective actions are effective in resolving problems; to identify trends within and among similar work units; and to facilitate system root cause analysis of larger problems. Particular attention is to be given by the QC staff to work units that generate either an unusually large or unusually small number of CARs.

The PM will determine whether a written Corrective Action Plan (CAP) (Form B-7b) is necessary, based on whether or not any of the following are met: the CAR priority is high; deficiency requires a rigorous corrective action planning process to identify similar work product or activities affected by the deficiency; or deficiency requires extensive resources

and planning to correct the deficiency and to prevent recurrence. The CAP is developed by a PM designee and approved and signed by the PM. The CAP is to indicate whether it is submitted for informational purposes or for review and approval. In either event, the operational staff members are encouraged to discuss the corrective action strategy with the QC staff throughout the process. The CAP form is included at the end of this chapter.

5.4.5 Deficiency and Corrective Action Tracking

Each CAR must be given a unique identification number and tracked until corrective actions have been taken and documented in Part B of the form and the CAR is submitted to the PM or a designee for verification and closure.

5.4.6 Lessons Learned and Other Documentation

The lessons learned through the deficiency management process are documented on CARs and CAPs. To share the lessons learned, these documents can be submitted to the Client through a Weekly QC Report summarizing the week's QC activities and including a grouping of the Daily QC Reports (Form B-8b) and all other pertinent reports created during the week.

CARs should be cited in the Weekly QC Report. Minor deficiencies identified during a QC audit that are readily correctable and can be verified in the field are to be documented in the QC logbook and Weekly QC Report without initiating a CAR. Deficiencies that cannot be readily corrected are to be documented by the QC staff on a CAR and in the Weekly QC Report. Copies of CARs are to be referenced in and attached to the Weekly QC Report. CAPs will also be attached to Weekly QC Reports to document the final outcome of the deficiency. Similar or related deficiencies may be addressed on a single CAP.

5.5 Records Generated

5.5.1 Onsite Project File

The FTL will establish and maintain an onsite project file in accordance with the CH2M HILL corporate quality manual for document control. The onsite files will be maintained in the project field office or designated field vehicle. The purpose of these files is to maintain a complete set of all documents, reports, certifications, and other records that provide information on project plans, contractual agreements, and project activities.

Field data will be compiled in a centralized location and inputted into a project database. This database will contain information that can be easily presented and delivered through automated report production. The database will be backed-up daily and stored in an offsite location as well as in the project trailer. Other information collected by the field team (e.g., daily reports) will be recorded on field forms or in log books. The files (in either paper or digital format) will include copies of the following:

- Qualifications and training records of all site personnel
- Submittals
- Schedule and progress reports
- Survey records
- Conversation logs
- Meeting minutes and agenda

- Audit logs and schedules
- Photo documentation
- Site maps
- Equipment check records
- Nonconformance and corrective action reports
- Daily work activity summary reports, which may include:
  - Weekly QC Report
  - Daily H&S Report
  - Daily Report (including activity log)
  - Daily UXO Team Logs (Field Data Sheets)
  - Equipment check records
  - Chain-of-custody records
  - Incident reports
  - Truck load tickets and shipping papers (if applicable)

As the project activities progress, the FTL will monitor the usefulness of the project filing system for information retrieval. If additional file sections are needed, the FTL will expand the initial filing structure to include additional sections.

5.5.2 Weekly QC Report

The FTL is responsible for preparing and submitting the Weekly QC Report to the Corporate MR Safety and QC Officer and for the project file and providing concurrent courtesy copies to the PM.

The Weekly QC Report is to provide an overview of QC activities performed each day, including those performed by subcontractors. The QC reports must present an accurate and complete picture of QC activities by reporting both conforming and deficient conditions, and the reports should be precise, factual, legible, and objective. Copies of supporting documentation, such as checklists and surveillance reports, are to be attached.

A field QC log is to be maintained by the SUXOS, UXOQCS and FTL to document details of field activities during QC monitoring activities. At the end of each day, copies of the log entries are to be attached to the Weekly QC Report. The information in the field QC log provides backup information and is intended to serve as a phone log and memory aid in the preparation of the Weekly QC Report and for addressing follow-up questions.

UXOQCS and UXOSO input for the Weekly QC Report is to be provided in writing to the FTL at a previously agreed upon time and place, generally no later than 1 hour before normal close of business. For the sake of simplicity and completeness, the format for QC staff input should follow the same format as the Weekly QC Report with only the relevant sections completed.

Copies of Weekly QC Reports with attachments and field QC logs no longer in use are to be maintained in the project QC file. Upon project closeout, all QC logs are to be included in the project QC file.

5.6 Submittal Management

The PM is responsible for overall management and control of project submittals. The PM is also responsible for submittal scheduling and tracking.

The PM is responsible for ensuring, through detailed review, that submittals as well as the materials and the work they represent, are in full compliance with applicable contractual specifications and the project plans. The PM is also responsible for ensuring that a project file is established and maintained and that accountable project documents are retained and controlled appropriately.

5.6.1 Review of Plans and Specifications

During the Preparatory Phase of a DFOW, the PM is responsible for staffing and reviewing the plans and, when necessary, requesting clarification from the project team. The primary purpose of this review is to identify and resolve potential conflicts prior to initiating work operations. The SUXOS will review and approve the Work Plan prior to implementation in the field. Pin and ink changes are authorized for minor corrections. Changes involving or impacting safety or quality requires a Field Change Request (FCR).

5.6.2 Review and Approval of Submittals

The PM must review submittals prepared by CH2M HILL and subcontractors for completeness and compliance with the specifications of the project and Contract. Non-compliant submittals are to be returned to the originator for corrective action and re-submittal to the PM or his designee. Although part of the QC process, technical reviewers may include, but are not limited to, the QC staff.

For each project document that is submitted for technical review, a Document Review and Release Form (Form B-9b) is to be initiated by the author, submitted with the document to be reviewed, and used to document and track the review process. A copy of the completed Document Review and Release Form is to be submitted to the PM together with the corrected document for his review and certification. Each document is to provide a signature block for PM and STC certification. Original Document Review and Release Forms, reviewer comments, and annotated versions are to be retained with the deliverable in the project file and reviewed by the QC staff during project audits.

5.7 Personnel Qualifications and Training

All project staff members will be qualified to perform their assigned jobs in accordance with the terms outlined in the Contract and by the project plans. UXO personnel meet the *Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel* DDESB TP-18 (DDESB, 2005).

H&S training requirements for onsite project personnel have been established in accordance with Occupational Safety and Health Act/Occupational Safety and Health Administration requirements for hazardous site workers (29 Code of Federal Regulations [CFR] 1910.120) and are specified in the HSP. These training requirements must be met before project personnel can begin site work.

The SUXOS and FTL will maintain records documenting the required qualifications, training, and certifications for each site worker. The SUXOS and FTL will monitor expiration dates to provide advance warning to the PM of when employees will require refresher training or other renewals. The SUXOS and FTL will maintain records of site-specific and routine training for personnel and visitors, as required by these project plans. These records will be maintained onsite for audit purposes. Specific qualifications and training required for UXO-qualified personnel are stated in the following subsections.

5.7.1 UXO Technician I

UXO Technician I personnel may, with the direction and supervision from UXO-qualified personnel, perform the following tasks:

- Reconnoiter and classify MEC
- Identify all types of military munitions, including possible fuzes and their condition, armed or unarmed

5.7.2 UXO Technician II

In addition to being able to perform all functions of the UXO Technician I listed in this chapter, for this project, UXO Technician II personnel may:

- Determine precise location in field environment using a variety of techniques such as global positioning equipment or basic land navigation using topographical map and compass
- Escort personnel who are not directly involved in UXO-related operations
- Inspect MPPEH for the presence of explosive safety hazards

5.7.3 UXO Technician III

In addition to being able to perform all functions of the UXO Technicians I and II listed in this chapter, UXO Technician III personnel may:

- Supervise and perform the onsite demolition of MEC and handle demolition materials.
- Prepare an explosives storage plan per all applicable guidance.
- Prepare required UXO MR actions and/or range maintenance administrative reports.
- Prepare Standard Operation Procedures (SOPs) for onsite munitions responses and/or range clearance activities.
- Conduct daily site safety briefings.
- Supervise the conduct of all onsite UXO-related operations.
- Inspect and certify and/or verify MPPEH as safe or as to the explosive hazard it may present for transfer within DoD or release from DoD control per current policies and standards.

5.7.4 UXO Quality Control Specialist

In addition to being able to perform all functions of the UXO Technicians I, II, and III listed in this chapter, a UXOQCS may:

- Develop and implement the MEC-specific sections of the QCP for all explosives-related operations.
- Conduct daily audits of the procedures used by UXO teams and individuals for processing MPPEH.
- Conduct QC audits of all explosives operations for compliance with established procedures.
- Identify and verify completion of all corrective actions to ensure all explosives operations comply with requirements.

5.7.5 UXO Safety Officer

In addition to being able to perform all functions of the UXO Technicians I, II, and III listed in this chapter, UXOSO may:

- Develop and implement approved explosives and MEC H&S program in compliance with applicable DoD policy and federal, state, and local H&S statutes, regulations and codes.
- Analyze operational risks, explosive hazards, and safety requirements.
- Establish and ensure compliance with all site-specific explosives operations safety requirements.
- Conduct, document, and report the results of safety inspections to ensure compliance with all applicable explosives safety policies, standards, regulations and codes.
- Ensure all protective works and equipment are operated in compliance with applicable DoD policy, DDESB approvals, and federal, state, and local H&S statutes, regulations and codes.

5.7.6 Senior UXO Supervisor

In addition to being able to perform all functions of the UXO Technicians I, II, and III listed in this chapter, the SUXOS will:

- Plan, coordinate, and supervise all explosives operations
- Assist in the development of MR plans
- Supervise multiple teams

5.8 Testing and Maintenance

Testing and maintenance of equipment such as radios, cell phones, vehicles, and other equipment will be performed per the manufacturer's specifications, this Work Plan, and all applicable SOPs.

Test results must be documented by the individual performing the test. Testing and maintenance records associated with the measuring and testing of equipment must be generated by the individual performing the activity. Documentation for testing and maintenance of equipment is to be made available to the client upon request.

The SUXOS and FTL is responsible for ensuring that the tests are performed and that the results are summarized and provided with the weekly QC report. To track each failing test for future retesting, the failing test must be noted on the deficiency log. Resolution of the failing test is complete when retesting is performed and the corrective action is verified on the deficiency log.

TABLE 5-1
Definable Features of Work
Former Cat Island Bomb Target BT-2 and SDZ
MCAS Cherry Point
Havelock, North Carolina

Definable Feature of Work with Auditable Function	Responsible Person(s)[1]	Audit Procedure[2]	QC Phase[3]	Freq. of Audit	Pass/Fail Criteria	Action if Failure Occurs
Planning						
Geographical Information System (GIS) Setup (Pre-mobilization Activities)	Project Manager	Verify GIS system has been set up and is ready for site data.	PP	O	GIS system has been set up and is ready for site data.	Do not proceed with field activities until criterion is passed.
Document management and control (Pre-mobilization Activities)	Project Manager	Verify appropriate measures are in place to manage and control project documents.	PP	O	Appropriate measures are in place to manage and control project documents.	Do not proceed with field activities until criterion is passed.
Data Management – (Pre-mobilization Activities)	Project Manager	Verify appropriate measures are in place to manage and control project data.	PP	O	Appropriate measures are in place to manage and control project data.	Do not proceed with field activities until criterion is passed.
Subcontracting – (Pre-mobilization Activities)	Project Manager, Site Manager	Verify subcontractor qualifications, training, and licenses.	PP/IP	O	Subcontractors' qualifications, training, and licenses are up to date and acceptable.	Ensure subcontractor provides the qualifications, training, and licenses or change subcontractor.
Technical and Operational approach – (Technical Project Planning)	Project Manager	Verify technical and operational approaches have been agreed on by the project team.	PP/IP	O	Technical and operational approaches have been agreed on by project team and incorporated into the Work Plans.	Do not proceed with field activities until criterion is passed
Work Plan and Explosives Safety Submission (ESS) preparation and approval	Project Manager	Verify Work Plan and ESS Amendment have been prepared and approved.	PP/IP	O	Work Plan has been approved by NAVFAC, MCAS Cherry Point, USEPA, and NCDENR and ESS approved by MARCORSYSCOM and DDESB.	Do not proceed with field activities (excluding site mobilization) until criterion is passed.
Field Operations						
Site preparation – (Mobilization)	Site Manager	Verify local agencies are coordinated.	PP/IP	O	Local agencies are coordinated.	Do not proceed with field activities until criterion is passed.
Site preparation – (Mobilization)	Site Manager	Verify equipment has been inspected and tested.	PP/IP	E	Equipment passes inspection and testing.	Proceed only with activities for which equipment has passed inspection and testing.
Site preparation – (Mobilization)	Site Manager	Verify communications and other logistical support are coordinated.	PP/IP	O	Communications and other logistical support are coordinated.	Do not proceed with field activities until criterion is passed.
Site preparation – (Mobilization)	Site Manager	Verify emergency services have been coordinated.	PP/IP	O	Emergency services are coordinated.	Do not proceed with field activities until criterion is passed.
Site preparation – (Mobilization)	SUXOS	Verify explosive storage and MMPEH debris/scrap storage areas have been established.	PP/IP	O	Explosive storage and MPPEH debris/scrap storage areas are established.	Do not proceed with field activities until criterion is passed.
Site preparation – (Mobilization)	SUXOS, Site Manager	Verify site-specific training is performed and acknowledged.	PP/IP	O	Site-specific training is performed and acknowledged	Do not proceed with field activities until criterion is passed.
Site preparation – (Mobilization)	SUXOS, Site Manager	Hold pre-mobilization meeting and Operations Readiness Review (ORR) with the project team.	PP/IP	O	Project plans are reviewed and acknowledged by team members.	Do not proceed with field activities until criterion is passed.
Site Preparation – (Site Survey)	Site Manager	Verify site boundaries and grids have been established.	PP/IP	O	Site boundaries and grids have been established.	Do not proceed with dependent field activities until criterion is passed.
Site Preparation – (Vegetation Removal)	Site Manager, UXOQCS	Verify vegetation removal is conducted IAW Work Plan.	FP	D	Vegetation removal is conducted IAW Technical Work Plan.	Stop vegetation removal activities until full compliance can be assured and any activities not performed within compliance are re-evaluated and re-performed if necessary.
Site Preparation – (Surface Clearance)	UXOQCS	Verify equipment testing is performed per Work Plan.	IP/FP	O/D	Equipment passes daily function test in equipment check area.	Repair or replace instrument.

TABLE 5-1
Definable Features of Work
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MCAS Cherry Point
Havelock, North Carolina

Definable Feature of Work with Auditable Function	Responsible Person(s)[1]	Audit Procedure[2]	QC Phase[3]	Freq. of Audit	Pass/Fail Criteria	Action if Failure Occurs
Site Preparation – (Surface Clearance)	UXOQCS	Verify area/boundary.	PP/IP	O	Area/boundary is marked.	Stop activities until area/boundary can be verified.
Site preparation – (Surface Clearance)	UXOQCS	Verify work methods are conducted IAW Work Plan and MEC Standard Operating Procedures (SOPs): – Survey/Sweeps – MEC Surface Sweeps – Analog Detection and Removal Actions – Ammunition and Explosives Transportation – Explosives Storage and Accountability – Disposal/Demolition Operations – Scrap Inspection Operations	IP/FP	D	Work methods are being performed IAW the Work Plan and SOPs.	Stop activities until Work Plan and SOPs are being followed and any activities not performed within compliance are re-evaluated and re-performed if necessary.
Site Preparation – (Surface Clearance)	UXOQCS	Verify team separation distance IAW Work Plan.	IP/FP	D	Team separation distance is appropriate for work being performed and the site MGFD.	Stop activities until appropriate separation distance is being followed.
Site Preparation – (Surface Clearance)	UXOQCS	Check at least 10% of each grid for any remaining MEC or metal.	FP	E	No MEC or visible metallic item equal to or greater in mass to a 20mm projectile is found.	Perform additional 20% quality control (QC) check in grid, and if additional item is found, grid must be redone.
Surface Debris Removal	UXOQCS	Verify equipment tested IAW Work Plan.	IP/FP	D	Equipment testing performed and tests passed.	Repair or replace instrument.
Surface Debris Removal	UXOQCS	Verify surface debris removal activities conducted IAW Work Plan and MEC Removal SOPs: – Survey/Sweeps – MEC Surface Sweeps – Analog Detection and Removal Actions – Ammunition and Explosives Transportation – Explosives Storage and Accountability – Disposal/Demolition Operations – Scrap Inspection Operations	IP/FP	D	Work performed IAW Work Plan and referenced MEC SOPs.	Stop activity until full compliance can be assured and any activities not performed within compliance are re-evaluated and re-performed if necessary.
Surface Debris Removal	UXOQCS	Verify team separation distance is as established in Explosives Siting Plan.	IP/FP	D	Team separation distance is appropriate for work being performed and the site MGFD.	Stop activities until appropriate separation distance is being followed
MPPEH/MDAS/Other Debris Management	UXOQCS	Verify personnel qualifications.	IP/FP	O	Personnel are qualified per Work Plan.	Replace unqualified personnel with qualified personnel
MPPEH/MDAS/Other Debris Management	UXOQCS	Verify inspections conducted IAW Work Plan.	IP/FP	D/E	Inspection being conducted IAW Work Plan.	Stop activity until full compliance can be assured and any activities not performed within compliance are re-evaluated and re-performed if necessary
MPPEH/MDAS/Other Debris Management	UXOQCS	Verify disposal is conducted IAW Work Plan.	IP/FP	D/E	Disposal is conducted IAW Work Plan.	Stop activity until full compliance can be assured and any activities not performed within compliance are re-evaluated and re-performed if necessary
Demilitarization of MPPEH/MDAS	UXOQCS	Verify personnel qualifications.	IP/FP	O	Personnel are qualified per Work Plan.	Replace unqualified personnel with qualified personnel
Demilitarization of MPPEH/MDAS	UXOQCS	Verify operations conducted IAW Work Plan.	IP/FP	E	Operations conducted IAW Work Plan and Subcontractor SOP.	Stop activity until full compliance can be assured and any activities not performed within compliance are re-evaluated and re-performed if necessary
Demobilization	Site Manager	Verify facilities-support infrastructures are dismantled and shipped to appropriate location and area is returned to original condition.	FP	O	Facilities-support infrastructures are dismantled and shipped to appropriate location and site is returned to original condition.	Ensure that all support facilities are removed and that the site is returned to original condition

TABLE 5-1
Definable Features of Work
Former Cat Island Bomb Target BT-2 and SDZ
MCAS Cherry Point
Havelock, North Carolina

Definable Feature of Work with Auditable Function	Responsible Person(s)[1]	Audit Procedure[2]	QC Phase[3]	Freq. of Audit	Pass/Fail Criteria	Action if Failure Occurs
Final Project Reports and Closeout						
Site Specific Final Report preparation and approval	Project Manager, Project Geophysicist	Verify tabulations of all MEC, MD, and other material recovered during the removal actions are accurate and complete.	IP	O	Tabulations of all MEC, MD, and other material recovered during the removal actions are accurate and complete.	Ensure tabulation of all MEC, MD, and other material recovered during the removal actions are accurate and complete
Site Specific Final Report preparation and approval	Project Manager, Project Geophysicist	Verify all dig sheets where geophysical mapping and investigation performed are accurate and complete.	FP	O	All dig sheets where geophysical mapping and investigation performed are accurate and complete.	Ensure all dig sheets where geophysical mapping and investigation performed are accurate and complete
Expanded SI Report Acceptance	Project Manager	Verify Final Report has been approved.	IP	O	Final Report has been approved by NAVFAC, MCAS Cherry Point, USEPA, and NCDENR.	Take appropriate actions to ensure SSFR gets approved
Archiving	GIS Manager	Verify data back-up systems are in place.	IP	O	Data back-up systems are in place	Ensure data back-up systems are in place
Project Closeout	Project Manager	Verify purchase orders have been closed out.	IP	O	Purchase orders have been closed out	Ensure purchase orders are closed out
Project Closeout	Project Manager	Verify invoices completed and approved.	IP	O	Invoices completed and approved	Ensure invoices are completed and approved

Notes:
IAW = in accordance with

QC Phase	Frequency
PP = Preparatory Phase	O = Once
IP = Initial Phase	D = Daily
FP = Follow-up Phase	W = Weekly
	E = Each occurrence

[1] The responsible person (if other than the UXOQCS) is the individual with whom the UXOQCS will coordinate with to ensure compliance with requirements and to verify that any necessary follow-up actions are taken.
[2] Where appropriate, a reference has been included referring the reader to a more detailed description of the procedures being audited.
[3]Documentation to be in accordance with the three-phase control process as outlined in the Quality Control Plan.

SECTION 6

Explosives Management Plan

This EMP details the management of explosives to support the disposal of MEC and MPPEH items that may be encountered during the Expanded SI activities at Wood Island. This plan was developed in accordance with Federal Acquisition Regulations (FAR) Subpart 45.5; *Explosives Management Plan,* DID MR-005-03 (USAESCH, 2003b); *ATF Explosives Laws and Regulations,* P 5400.7 (ATF&E, 1990); *DoD Ammunition and Explosives Safety Standards*, 6055.9-STD (DoD, 2008a), DOT regulations, and local and state laws and regulations.

6.1 Acquisition

CH2M HILL and the UXO subcontractor will maintain valid ATF&E permits for the purchase and use of explosives. The UXO subcontractor will be the POC for all use of the explosives used during this project. Copies of these permits will be maintained on MCALF Bogue Field and, upon request, will be made available to any local, state, or federal authority.

6.1.1 Description and Estimated Quantities

The quantity of donor explosives used will be dependent upon the amount of MEC encountered during investigation activities. The quantity of donor explosives stored onsite will never exceed the allowable storage capacity of the on-site explosives magazines.

6.1.2 Acquisition Source

The UXO subcontractor will acquire explosives from a commercial explosives vendor who will deliver the materials to Bogue Field. Authority to order explosives will be given by the CH2M HILL PM prior to the UXO subcontractor ordering explosives.

6.2 Initial Receipt

6.2.1 Procedures for Receipt of Explosives

Commercial explosives will be transported by a licensed and permitted commercial explosives carrier to Bogue Field. The UXO contractor will be responsible for verifying that the type, quantity, and lot number of each explosive item has been checked against the manifest and properly recorded.

The original receipt and shipping documents will be maintained onsite with other project records by the UXO contractor with a copy provided to the CH2M HILL UXOQCS.

6.2.2 Reconciling Discrepancies

Any discrepancies between the actual type and quantity of explosives received and the shipping documentation will be noted on the shipping documentation with the signatures of both the delivery driver and the individual authorized to receive the explosives. A legible copy will be filed onsite. The authorized individual receiving the explosives will immediately inform the UXOQCS and SUXOS of the discrepancy.

CH2M HILL will coordinate with Bogue Field's Explosives Safety Officer to obtain proper approvals to bring commercial explosives onto Bogue Field. Commercial explosives will be stored in two ATF&E Type II magazines located on Bogue Field during the field effort.

Donor explosives will be transported from Bogue Field via boat to Wood Island for controlled detonation of the identified MEC and MPPEH items. All DoN, ATF&E, DOT, and USCG regulations will be observed and all required permits will be obtained prior to any transportation of explosives.

6.3 Receipt Procedures

This section describes the procedures for maintaining records of donor explosives inventories.

6.3.1 Records Management

At the time of an explosives delivery and explosives issuance, the UXO contractor will ensure that all additions and subtractions from the shipment inventory are properly recorded. The CH2M HILL SUXOS will verify accuracy. All explosives management records will be maintained by the UXO subcontractor at MCALF Bogue Field for the duration of the project. Copies of the explosives management records will be provided by the UXO subcontractor to CH2M HILL. The UXO subcontractor will archive all explosives inventory records generated for at least 5 years in accordance with ATF&E regulations.

6.3.2 Authorized Individuals

The UXO contractor shall have an ATF&E Permit to purchase, use, handle, transport, and store explosives. The UXO contractor's Blaster in Charge will be responsible for the proper receipt of explosives from the explosives vendor. The Blaster in Charge may specifically authorize other individuals to perform the receipt and initial inventory of the explosives, but the Blaster in Charge cannot delegate the responsibility for ensuring that the inventory, receipt, and handling of the explosives are performed in accordance with the requirements of this plan. The SUXOS will retain authority to approve detonation.

Any individual authorized to receive explosives will be at least a UXO Technician III and will be either a Department of Justice (DOJ) Employee Possessor or Responsible Person for the UXO contractor. Written authorization designating the personnel who can receive or use explosives will be provided by the UXO contractor. As the end user of explosives, the Blaster in Charge will certify in writing that the explosives were used for their intended purpose. A copy of this certification, along with all inventory records, will be provided to the CH2M HILL Project Manager.

6.4 Lost, Stolen, or Unauthorized Use of Explosives

If explosives are discovered to be lost, stolen, or used without authorization, the incident will be reported immediately to the SUXOS, who in turn will inform CH2M HILL's PM and MR Operations Manager. The CH2M HILL PM will notify the Activity Manager who will notify the client.

The ATF&E permit holder is required by law to report the theft or loss of explosives to the ATF&E within 24 hours (27 CFR 55.30). In the event of such an occurrence, the following procedures will be followed:

- The area will be sealed until the appropriate authorities complete their investigation.
- The UXO subcontractor will make the appropriate notifications per 27 CFR 55.30, which include calling the **ATF&E (1-800-424-9555)** and the local law enforcement authorities.
- The UXO subcontractor is responsible for completing and forwarding ATF&E Form 5400.5, *Report of Theft or Loss – Explosive Materials.* This form will be completed by the SUXOS and provided to the MR Operations DirectorPM, and the UXOQCS. Final disposition of the form will be the responsibility of the MR Operations Director.

SECTION 7

Explosives Siting Plan

This Explosives Siting Plan provides explosives safety criteria for planning and siting explosives operations for the Expanded SI activities at BT-2. This plan was prepared in accordance with DID MR-005-04 (USAESCH, 2004c).

7.1 Demolition Areas

All MEC will undergo controlled detonation on Wood Island. The SUXOS and a UXO Technician III will evaluate the recovered MEC and existing ESQD arcs to confirm that disposal by detonation can be performed safely.

7.2 Controlled Detonation Activities

Prior to the initiation of controlled detonation operations, all personnel within the EZ will be evacuated. The appropriate local authorities will be notified prior to the commencement of controlled detonation activities. The EZ within Bogue Sound will be enforced by watercraft located within the sound. Should unauthorized personnel be present within the EZ, all activities will cease until they have departed the EZ. All personnel in the vicinity of the ESQDs will be informed of the controlled detonation activities being conducted and asked to vacate the area. Radio communications will be maintained between project personnel at all times. Upon completion of disposal operations, the UXOSO will visually inspect the disposal site(s) and the UXO Technician III will stand by at a safe distance, ready to render assistance in the event of an emergency. Upon completion of this inspection and if no residual hazards have been identified, the SUXOS will authorize the resumption of site operations.

7.3 Safe Holding Areas

Designated secure areas have been established at Bogue Field for the collection of MPPEH, MDAS, and other debris. A designated magazine storage area has also been established for the donor explosives. These areas will be locked and will have controlled access. The SUXOS or their designee will maintain control of the keys to all material storage areas. Material storage keys may be signed out by authorized CH2M HILL and UXO subcontractor personnel.

SECTION 8

Environmental Protection Plan

8.1 Ecological Summary

MCAS Cherry Point is located in the Neuse River Basin. An Integrated Resources Management Plan was developed for MCAS Cherry Point in 2001. The INRMP is an environmental assessment as well as a management plan.

According to the INRMP, Wood Island includes a forested dune habitat and marshland. The following description of the communities located on and near Wood Island is an excerpt from the MCAS Cherry Point INRMP (USMC, 2001):

> The marshland soils at [Wood] Island are level and very poorly drained mucks. The dominant soil is classified as the Newham-Corolla complex and is composed of marine sediment deposits and organic mucks. The northern one-third (4 acres) of the island is a forested dune with an elevation of 9 ft msl; the southern two-thirds is less than 3 ft msl. Except for dune habitat, the land is subject to tidal flooding. Marshlands have semi-permanently saturated and flooded soils. Strong storm tides may flood the terrestrial dune habitat.

The marshland of the southern two thirds of Wood Island supports the salt marsh community and is dominated by saltmarsh cordgrass. The northern third supports a small maritime evergreen forest community dominated by live oak, greenbriers, and poison ivy. The ground surface of the maritime evergreen forest is disturbed by bomb craters creating microhabitats, some of which include weedy species.

CH2M HILL conducted a site visit on March 3 and 4, 2009 to evaluate the presence of species federally listed as threatened, endangered, or those proposed for listing under the Endangered Species Act (ESA) of 1973, as amended, or potentially suitable habitat for listed or proposed species. During the 2009 site visit, it was noted that all of the live oaks on the island were dead, with only remnants of the main trunks remaining. The majority of the island continues to support a saltmarsh cordgrass community and suitable nesting habitat is present for Colonial wading birds such as egrets, herons, and ibises. Dominant plant species noted on the island during the site visit included *Sarcocornia perennis*, *Distichlis spicata*, *Batis maritime, Panicum amarum* var. *amarulum, Solidago sp., Smilax auriculata, Baccharis halimifolia, and Myrica cernifera*. There were several yucca plants present during the 2009 survey, but they could not be confirmed as the state listed species, *Yucca gloriosa.* Birds identified during the 2009 site visit included common tern (*Sterna hirundo*), double crested cormorant (*Phalcrocorax auritus*) and sanderling (*Calidris alba*).

According to the INRMP, Bogue Field includes a marshland and forested communities. The following description of the communities located on Bogue Field is an excerpt from the MCAS Cherry Point INRMP (USMC, 2001):

> There are five different soils on Bogue Field including Seabrook fine sand (Se), Carteret sand (CH), Wando fine sand (WaB), Leon sand (Ln), and Arapahoe fine sandy loam (Ap). Seabrook fine sand is a rarely flooded soil in low-lying areas and is susceptible to wind erosion. Wando fine sand (from which the airfield soils, Wando-Urban land complex [WuB], have been developed) is a well-drained soil. Carteret sand is found in narrow strips around Bogue Sound. Arapahoe fine sandy loam is nearly level and very poorly drained and found along the western border of the Station (United States Department of Agriculture [USDA], Soil Conservation Service 1978). The land surface of MCALF Bogue Field is part of the Pamlico Terrace Plain formed of unconsolidated marine sediment deposits. It is characterized by low, nearly flat relief, with an elevation gradient from sea level at the coastal edge, to 20 feet above sea level on the inland terrace. Low valleys associated with streambeds have been channelized and partially relocated. In the northern area of the installation, groundwater is near the surface, producing wetter soils. This area serves as the headwaters for most of the streambeds. The estuarine fringe of the installation is subject to tidal influence."

Bogue Sound is classified as Outstanding Resource Waters by North Carolina, and contains commercial fish and shellfish resources. Narrow bands of salt marsh found along the Bogue Sound shoreline are dominated by saltmarsh or saltmeadow cordgrasses. Beyond the brackish marshes is a narrow band of forest dominated by water oak (*Quercus nigra*) and loblolly pine. The majority of the unimproved land at Bogue Field is pine forest.

Site-specific training on the ecological resources present within the project area will be provided to all site workers prior to the commencement of project activities. Surface debris removal activities will be conducted in a manner which minimizes potential impacts to rare, threatened, and endangered species and species of concern and their habitats on Wood Island. Vegetation disturbance or removal will be minimized to the extent practical for ordnance debris removal of specific items or groups of items. Personnel will avoid unnecessary disturbance of vegetation during all sites activities on Wood Island and on Bogue Field.

8.2 Endangered/Threatened Species within the Project Site

The North Carolina Natural Heritage Program (NCNHP) and United States Fish and Wildlife Services (USFWS) databases contain records of occurrences of 38 federally protected threatened, endangered or species of concern in Carteret County. None of the species listed in **Table 8-1** were observed during the March 2009 field reconnaissance.

8.2.1 Wood Island Endangered/Threatened Species

Wood Island supports one state listed rare plant (moundlilly yucca [*Yucca gloriosa*]) and five state listed species of concern (three birds and two reptiles) (INRMP, 2001). The little blue heron (*Egretta caerulea*), the snowy egret (*Egretta thula*), and the tri-colored heron (*Egretta tricolor*) have established rookeries on the island. In 1992 and 1993, the NCNHP did an inventory of the rare species, natural communities, and critical areas of MCAS Cherry Point and its surrounding areas which included Wood Island. A visit to the island on June 8, 1993, revealed that it was an exemplary special habitat for the wading bird rookery. The blue heron and the snowy egret were also documented nesting at Wood Island. The state-listed Carolina water snake (*Nerodia sipedon williamengelsi*) and diamondback terrapin (*Malaclemys terrapin*) are both found on the island as well. The diamondback terrapin (*Malaclemys terrapin*), is also listed as a federal species of concern (INRMP, 2001).

According to the *Inventory of the Rare Species, Natural Communities, and Critical Areas of the Cherry Point Marine Corps Air Station, North Carolina* issued in 1994, Wood Island has been designated a special management area due to the rare species of animals and plants that are indigenous to this island and infrequent human disturbance (LeBlond, Fussell, and Braswell, 1994).

Environmental reviews completed in preparation for the INRMP determined that the remaining species listed in **Table 8-1** are not expected to exist at the site. Signs posted on the island read "Colonial Waterbird Nest Area – Entry Prohibited, April 1 – August 31", therefore site work will be avoided during this period.

No adverse impacts to listed species are expected to result from the proposed work at Wood Island. Expanded site investigation activities will be conducted outside of the Colonial Waterbird nesting season and in a manner that will minimize impacts to the site habitat by minimizing the number of detonation events conducted and through the use of engineering controls during detonation events. A spotter will confirm that no marine, avian, or terrestrial wildlife are in proximity to the work area prior to conducting detonation events.

8.2.2 Bogue Field Endangered/Threatened Species

There are no known federally listed species occurring at Bogue Field. The red-cockaded woodpecker (RCW) potentially occurs at Bogue Field (INRMP, 2001). There are RCW colonies a mile from the Bogue Field in the Croatan National Forest; however, surveys have not located any of the birds or cavity trees in Bogue Field (INRMP, 2001). Generally, the habitat at Bogue Field for RCW's is not of high quality and RCW are not expected in the area. Should there be incidental RCW activity in the vicinity, the level of human activity associated with detonation events would cause any RCW in the area to relocate away from the planned detonation area. No impacts to this species would be anticipated.

One state listed rare plant (Chapman's sedge) occurs at Bogue Field. As identified in the INRMP (USMC, 2001), the state listed Chapman's sedge is located at the northwestern corner of the MCALF Bogue installation, west of the Explosives Storage Area. Because of the spatial separation of the Chapman's sedge population from the planned storage area, no adverse impacts to this species are expected to result from the proposed work at Bogue Field.

In waters adjacent to Wood Island and Bogue Field, several federally endangered listed species could occur, including the manatee (*Trichechus manatus*), sea turtles (*Caretta caretta, Chleonia mydas, Dermochelys coriacea*, *Eretmochelys imbricate*, and *Lepidochelys kempii*), and the shortnose sturgeon (*Acipenser brevirostrum*) (INRMP, 2001). In a cooperative effort with the National Marine Fisheries, MCAS Cherry Point is tagging and monitoring sea turtles in the area of the Cherry Point bombing ranges. These turtles potentially traverse the water near Wood Island but have not been observed in the area. The bottlenosed dolphin occurs in Bogue Sound and is protected by the Marine Mammal Protection Act.

8.3 Wetlands

Groundwater is near or at the surface in the broad, level terraces on Wood Island. The soil is poorly drained due to the low relief and the water retention capacity of loam. As a level of conservatism, the entire island is considered to be wetlands as presented in **Figure 8-1**. Disturbance of soil on Wood Island will be minimized through the use of engineering controls.

Approximately 270 acres, 30% of the Bogue Field consist of wetlands (**Figure 8-2**). Wetland areas occur in the vicinity of the MPPEH storage area (**Figure 8-2**). However, all wetland areas are located outside of the area of active use and no work will be performed in wetland areas. No significant soil disturbance is anticipated from planned site work as described in this Work Plan.

Beyond localized temporary disturbance from controlled detonation events on Wood Island, no wetlands on Wood Island or the Bogue Field storage and shredding areas are expected to be impacted by the project. However, if the potential for runoff to wetlands exists, appropriate silt barriers or other best management practices (BMP) will be put in place to prevent loose debris from migrating to the wetlands during the work to be conducted on Wood Island and Bogue Field. Due to the size of the area of investigation, the site is below the threshold for requiring a storm water pollution prevention plan.

8.4 Cultural and Archaeological Resources

The proposed site activities involve a very limited degree of intrusive activity. The probability that any significant cultural or archeological resources will be impacted by the field investigation is low. Consultation with the base archaeologist confirms Phase II NRHP eligibility testing is currently underway for an archaeological site potentially eligible for the National Register of Historic Places (NRHP). This site lies approximately 300 meters to the northeast of the proposed MPPEH storage area. Activities at the MPPEH storage area will not have an impact on archaeological site or other eligible/potentially eligible sites. The Explosives Storage Area at the northern end of Bogue Field is free of known archaeological sites. If any unmapped cultural or archaeological materials or resources are discovered

within the project investigation area, the Base archaeologist will be notified to provide guidance on performing further work in the area. Should future work be planned within the known archaeological resource area (NRHP eligible site), the base project manager will be contacted and submit a Request for Environmental Impact Review through the National Environmental Policy Act (NEPA) process, prior to subsurface activity within the boundary.

8.5 Water Resources

Wood Island and Bogue Field are located in and adjacent to Bogue Sound, respectively. The North Carolina Environmental Commission has designated Bogue Sound as one of the state's Outstanding Resource Waters (ORW). According to the *2005 Land Use Plan Update Carteret County,* this designation is intended to protect unique and special waters having excellent water quality and being of exceptional state or national ecological or recreational significance (Carteret County, 2005).

Up to five shallow draft vessels will transport site personnel, equipment, explosives and other debris to and from Wood Island and Bogue Field as described in the work plan. Controlled detonation procedures will be followed on the island when possible. Otherwise, MPPEH and other debris will be transported to Bogue Field and stored and shredded in the designated areas (**Figure 8-2**).

8.6 Coastal Zones

Carteret County is subject to the rules and policies of the North Carolina Coastal Resources Commission, which administers the Coastal Area Management Act (CAMA). Federal projects within a State's coastal zone are reviewed under the Coastal Zone Management Act, which requires that a proposed Federal action be consistent, to the maximum extent practicable, with the relevant enforceable policies of the State's coastal management program. North Carolina's coastal zone management program consists of, but is not limited to, CAMA, the State's Dredge and Fill Law, Chapter 7 of Title 15A of the North Carolina Administrative Code (NCAC), and the land use plan of the County and/or local municipality in which the proposed project is located.

The UXO subcontractor will perform a surface clearance of MEC, MPPEH, and other metallic debris on Wood Island. All metallic debris will be inspected, classified, then undergo controlled detonation on Wood Island or transported for storage and shredding at Bogue Field. As outlined in Subpart "C" of 15 CFR 930, the U.S. Marine Corps has determined that the proposed project would have no permanent effects on any coastal use or resource. Should it be determined by collection of new or additional information that development, as defined under CAMA, would occur under the proposed project further coordination with DCM would be initiated.

8.7 Vegetation Removal

Vegetation removal is anticipated in association with the field activities described in this Work Plan. Vegetation will be removed, as necessary, to create a 50-foot fire break around the shredder, explosives magazines, and MPPEH storage containers at Bogue Field (**Figure 4-1**). Vegetation clearing around the MPPEH storage containers and the shredder is not anticipated as these will be located on a paved area.

Vegetation removal on Wood Island will consist of manual removal of vegetation to perform surface debris removal. UXO Technicians will manually clear vegetation, if necessary, to access any visible debris. Vegetation removal on Wood Island will be minimized to the extent possible to preserve the wildlife habitat present on the island. Procedures in place will prevent excessive exposure of bare ground. The 2001 INRMP identifies several species of concern that could occupy the island. Removal of the state listed rare plant, the moundlilly yucca (*Yucca gloriosa)* will be avoided. All Yucca plants will be assumed to be *Yucca gloriosa* until positively identified as otherwise.

8.8 Existing Waste Disposal Sites

No waste disposal sites are known to be present at Wood Island or Bogue Field.

8.9 Applicable or Relevant and Appropriate Requirements

ARARs concerning environmental protection, pollution control, and abatement have been evaluated for the proposed project work. **Appendix D** lists the ARARs identified for environmental protection.

Additional project stakeholders were identified during the initial SI effort and provided the initial SI Work Plan for review and comment. The following project stakeholders provided comments on the initial SI Work Plan and indicated they would like to be informed of future site activities: NCDENR – Division of Land Resources; NCDENR – Division of Water Quality; NCDENR – Division of Environmental Health, Shellfish Sanitation and Recreational Water Quality; and NCDENR – Division of Marine Fisheries. These stakeholders were provided with the draft *Alternatives Analysis for Response Action at the Former Cat Island Bomb Target BT-2* (CH2M HILL, 2010c), which summarized the response action alternatives evaluated for implementation at BT-2.

8.10 Protection and Mitigation of Identified Resources

Protective measures taken during site activities will include, but are not limited to, the following:

- Expanded site investigation activities will be conducted outside of the Colonial Waterbird nesting season and in a manner that will minimize impacts to the site habitat by minimizing the number of detonation events conducted and through the use of engineering controls during detonation events.
- A spotter will confirm that no marine, avian, or terrestrial wildlife are in proximity to the work area prior to detonation events.
- Should any cultural or archaeological material or resource be discovered within the project areas, a qualified archaeologist will be notified to provide guidance on performing further work in the area.

TABLE 8-1
Species Potentially Occurring on or Adjacent to Bogue Field, in Carteret County, Listed as Threatened, Endangered, or of Special Concern by the USFWS

Common Name	Scientific name	Federal Status	Record Status	Habitat
Vertebrate:				
American alligator	*Alligator mississippiensis*	T (S/A)	Current	Rivers, swamps, estuaries, lakes, and marshes.
American eel	*Anguilla rostrata*	FSC	Current	The American eel is catadromous; it spawns in oceanic waters but uses freshwater, brackish and estuarine systems for most of its developmental life. Migrates in autumn to the Sargasso Sea to spawn. Usually occurs in permanent streams with continuous flow. Hides during the day in undercut banks and in deep pools near logs and boulders.
Bachman's sparrow	*Aimophila aestivalis*	FSC	Current	Occurs only in pine forests of the southeastern U.S.
Black rail	*Laterallus jamaicensis*	FSC	Current	Marsh/wetlands; The "Eastern" Black Rail can be found in appropriate salt marsh habitat along the eastern seaboard from Connecticut to Florida and along the Gulf Coast.
Black-throated green warbler	*Dendroica virens waynei*	FSC	Current	Northern variety favors canopy of conifers and mixed forest. Southern variety favors cypress swamps.
Carolina crawfish frog	*Rana capito capito*	FSC	Current	Carolina crawfish frogs live primarily in the sandhills and pine barrens of the North Carolina Coastal Plain. Crawfish frogs are more terrestrial than most frogs, generally only coming to the water to breed. They are nocturnal, spending daylight hours underground in burrows.
Eastern Henslow's sparrow	*Ammodramus henslowii susurrans*	FSC	Current	A species of tallgrass prairies, agricultural grasslands, and pine savannas of the eastern U.S.; the species migrates south to spend the non-breeding season in the native pine savanna habitats of the southeastern U.S.
Eastern painted bunting	*Passerina ciris ciris*	FSC	Current	Found mainly in southern states and Mexico, where the brushy, weedy shrub-scrub habitat that this bird prefers abound.
Eastern puma (cougar)	*Puma concolor couguar*	E	Obscure	No preference for specific habitat types has been noted. The primary need is apparently for a large wilderness area with an adequate food supply. Male cougars of other subspecies have been observed to occupy a range of 25 or more square miles, and females from 5 to 20 square miles.
Green sea turtle	*Chelonia mydas* (incl. *agassizi)*	T	Current	Green turtles are generally found in fairly shallow waters (except when migrating) inside reefs, bays, and inlets. The turtles are attracted to lagoons and shoals with an abundance of marine grass and algae. Open beaches with a sloping platform and minimal disturbance are required for nesting.
Hawksbill (=carey) sea turtle	*Eretmochelys imbricata*	E	Historic	Found in hard-bottomed and reef habitats containing sponges. They also reside in shoals, lagoons of oceanic islands, and continental shelves. In general, they are found in water no deeper than sixty feet (18.3 m). When hawksbill turtles are young, they are unable to dive into deep water and are forced to live in masses of floating sea plants, such as sargassum.
Kemp's (=Atlantic) ridley sea turtle	*Lepidochelys kempii*	E	Historic	Prefer open ocean and gulf waters with the females only coming ashore to lay eggs in beach sand. Young Kemp's Ridley sea turtles float on large mats of sargassum (a type of brown algae) in the Gulf of Mexico and Atlantic Ocean. The primary nesting site for these turtles is Rancho Nuevo beach, Tamaulipas, Mexico. A secondary nesting population has been established on Padre Island National Seashore.

TABLE 8-1
Species Potentially Occurring on or Adjacent to Bogue Field, in Carteret County, Listed as Threatened, Endangered, or of Special Concern by the USFWS

Common Name	Scientific name	Federal Status	Record Status	Habitat
Leatherback sea turtle	*Dermochelys coriacea*	E	Current	An open ocean species, it sometimes moves into shallow bays, estuaries and even river mouths.
Loggerhead sea turtle	*Caretta caretta*	T	Current	The loggerhead is widely distributed within its range. It may be found hundreds of miles out to sea, as well as in inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers.
Mimic glass lizard	*Ophisaurus mimicus*	FSC	Current	This species is found in the southeastern Coastal Plain. They are most common in pine flatwoods and open woodlands.
Northern diamondback terrapin	*Malaclemys terrapin terrapin*	FSC	Current	Coastal marshes, tidal flats, coves, estuaries, inner edges of barrier beaches—in general any sheltered and unpolluted body of salt or brackish water. Adjacent sandy dry upland areas are required for nesting.
Piping plover	*Charadrius melodus*	T	Current	Open, sandy beaches close to the primary dune of the barrier islands and coastlines of the Atlantic for breeding. They prefer sparsely vegetated open sand, gravel, or cobble for a nest site. They forage along the rack line where the tide washes up onto the beach.
Red-cockaded woodpecker	*Picoides borealis*	E	Current	For nesting/roosting habitat, open stands of pine containing trees 60 years old and older. Red-cockaded woodpeckers need live, older pines in which to excavate their cavities. Longleaf pines (*Pinus palustris*) are most commonly used, but other species of southern pine are also acceptable. Dense stands (stands that are primarily hardwoods, or that have a dense hardwood understory) are avoided. Foraging habitat is provided in pine and pine hardwood stands 30 years old or older with foraging preference for pine trees 10 inches or larger in diameter. In good, moderately-stocked, pine habitat, sufficient foraging substrate can be provided on 80 to 125 acres.
Roseate tern	*Sterna dougallii dougallii*	E	Historic	Coastal species that nests on barrier islands and salt marshes and forages over shallow coastal waters, inlets, and offshore seas. Nesting colonies are located above the high-tide line, often within vegetated dunes where dense concentrations of beach grasses and seaside goldenrod (*Solidago sempervirens*) provide cover.
Shortnose sturgeon	*Acipenser brevirostrum*	E	Probable/potential	Sturgeon inhabits the lower sections of larger rivers and coastal waters along the Atlantic coast. It may spend most of the year in brackish or salt water and move into fresh water only to spawn. The fish feeds on invertebrates (e.g., shrimp, worms) and stems and leaves of macrophytes.
Southern hognose snake	*Heterodon simus*	FSC	Obscure	These snakes are found in sandy fields and woods of the Coastal Plain, particularly in the Sandhills region.
West Indian manatee	*Trichechus manatus*	E	Current	Manatees inhabit both salt and fresh water of sufficient depth (1.5 m to usually less than 6 m) throughout their range.

TABLE 8-1
Species Potentially Occurring on or Adjacent to Bogue Field, in Carteret County, Listed as Threatened, Endangered, or of Special Concern by the USFWS

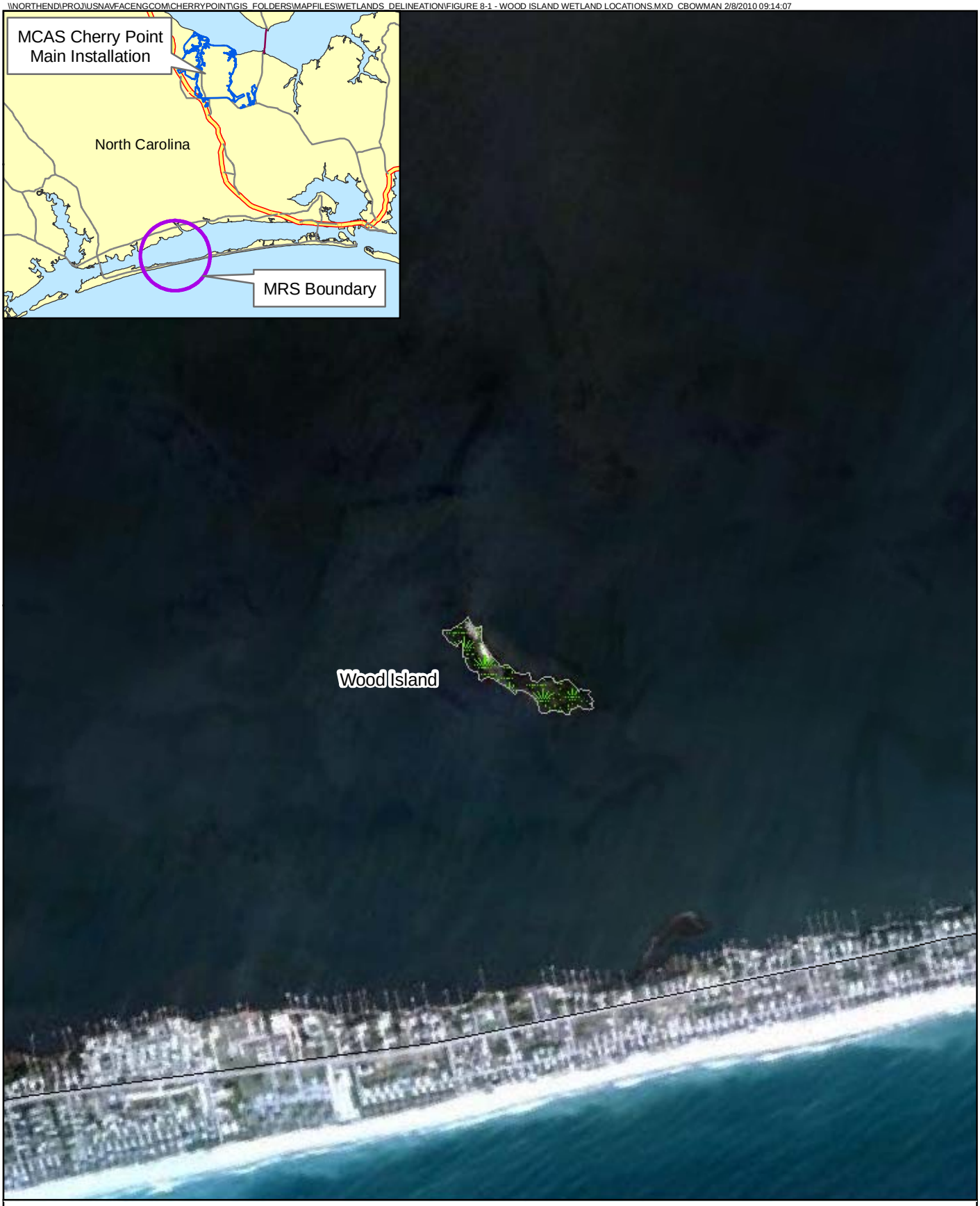
Common Name	Scientific name	Federal Status	Record Status	Habitat
Invertebrate:				
Buchholz's dart moth	*Agrotis buchholzi*	FSC	Current	Found in Forested wetlands, scrub-shrub wetlands, shrubland/chaparral and coniferous woodlands This moth is found mostly in recently burned habitats. Populations can persist up to about a decade or rarely two without fire, until litter accumulates sufficiently to cover foodplants. In most cases habitat is probably suboptimal beginning about 5 years after a fire.
Carter's noctuid moth	*Spartiniphaga carterae*	FSC	Historic	Associated with pine barren reed grass (*Calamavilfa brevipilis*), which is probably the exclusive larval foodplant. Normal habitats include edges of boggy shrublands, swales and pitch pine lowlands in NJ and edges of pocosins and wet wire grass savannahs in NC. Found primarily in recently burned areas. Habitats can be seasonally xeric at surface, but always with moisture slightly below. Late instar larvae and pupae are probably below surface of soil.
Eastern beard grass skipper	*Atrytone arogos arogos*	FSC	Current	Grassland/herbaceous, Old field, Savanna, Woodland - Conifer: Habitats vary regionally from xeric and sandy to boggy with a sphagnum substrate and are defined in large part by dominance or co-dominance of the regional foodplant grass.
Venus flytrap cutworm	*Hemipachnobia subporphyrea*	FSC	Obscure	Large stands of venus fly trap in wet pine savannas, around pocosins etc. Fire patterns may also affect suitability.
a skipper	*Atrytonopsis* sp.	FSC	Current	One species, the dusteds are fairly rare at the coast but found throughout North Carolina (*A. hianna*). An assumption is made that the genius is generally defined.
Vascular Plant:				
Coastal beaksedge	*Rhynchospora pleiantha*	FSC	Current	Extremely rare, found at fewer than 25 sites throughout its North Carolina-to-Alabama range
Dune blue curls	*Trichostema* sp. nov. 1	FSC	Current	Dune Blue Curls, Carolina Blue Curls. Cp (NC, SC): dunes on barrier islands, vegetated with perennial grasses (especially *Uniola paniculata*), openings in maritime scrub; Endemic to barrier islands from slightly north of Cape Hatteras, NC south to North Island, Georgetown County, SC, north of Cape Romain.
Loose watermilfoil	*Myriophyllum laxum*	FSC	Current	Riparian habitats.
Pickering's dawnflower	*Stylisma pickeringii* var. *pickeringii*	FSC	Current	Inhabits dry to xeric, nutrient-poor, well-drained, coarse sandy soils with little competing vegetation or litter. Tree cover is sparse to non-existent, composed of pines and scrubby oaks, although a few occurrences on Fort Bragg are in moderately dense pine/oak woodland areas. Most plants have been found on aeolian sand deposits, including Lakeland sands in North Carolina, Lakewood/Lakehurst sands in New Jersey, as well as sandy river terraces along the Little Pee Dee River in South Carolina and the Little River in North Carolina.
Pondspice	*Litsea aestivalis*	FSC	Current	Freshwater habitats.
Raven's boxseed	*Ludwigia ravenii*	FSC	Current	Found in the coastal plain of Virginia, South Carolina, North Carolina, and northeast Florida. Restricted to open, wet, peaty places, such as ditches and the margins of swamps, ponds, and bogs. *Ludwigia ravenii* is considered an obligate wetland plant.

TABLE 8-1
Species Potentially Occurring on or Adjacent to Bogue Field, in Carteret County, Listed as Threatened, Endangered, or of Special Concern by the USFWS

Common Name	Scientific name	Federal Status	Record Status	Habitat
Rough-leaved loosestrife	*Lysimachia asperulaefolia*	E	Current	Species generally occurs in the ecotones or edges between longleaf pine uplands and pond pine pocosins (areas of dense shrub and vine growth usually on a wet, peaty, poorly drained soil), on moist to seasonally saturated sands and on shallow organic soils overlaying sand. Rough-leaved loosestrife has also been found on deep peat in the low shrub community of large Carolina bays
Seabeach amaranth	*Amaranthus pumilus*	T	Current	Occurs on barrier island beaches
Spring-flowering goldenrod	*Solidago verna*	FSC	Current	The only spring-flowering goldenrod that occurs in the Sandhills and Coastal Plain of the Carolinas. It can be found in a wide array of habitats, including pine savannas, Atlantic white cedar bogs, and pine barrens.
Venus' fly-trap	*Dionaea muscipula*	FSC	Current	Bogs, pinelands.
Nonvascular plant:				
Savanna campylopus	*Campylopus carolinae*	FSC	Current	Restricted to scrub oak-longleaf pine, sandhill communities of the Atlantic Coastal Plain. It grows in almost pure quartz sand with a low organic content. The canopy is principally *Pinus palustris* and the understory is dominated by *Quercus laevis, Q. margarettae, and Q. incana* and other scattered hardwoods.

Definitions of Federal Status Codes:
E = endangered. A taxon "in danger of extinction throughout all or a significant portion of its range."
T = threatened. A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."
P = proposed. A taxon proposed for official listing as endangered or threatened.
C = candidate. A taxon under consideration for official listing for which there is sufficient information to support listing. (Formerly "C1" candidate species.)
FSC = federal species of concern. A species under consideration for listing, for which there is insufficient information to support listing at this time. These species may or may not be listed in the future, and many of these species were formerly recognized as "C2" candidate species.
T(S/A) = threatened due to similarity of appearance. A species that is threatened due to similarity of appearance with other rare species and is listed for its protection. These species are not biologically endangered or threatened and are not subject to Section 7 consultation.
EXP = experimental population. A taxon listed as experimental (either essential or nonessential). Experimental, nonessential populations of endangered species (e.g., red wolf) are treated as threatened species on public land, for consultation purposes, and as species proposed for listing on private land.

Definitions of "Record Status" qualifiers:
Current - the species has been observed in the county within the last 50 years.
Historic - the species was last observed in the county more than 50 years ago.
Obscure - the date and/or location of observation is uncertain.
Incidental/migrant - the species was observed outside of its normal range or habitat.
Probable/potential - the species is considered likely to occur in this county based on the proximity of known records (in adjacent counties), the presence of potentially suitable habitat.



Legend

- Wood Island Boundary
- Wetlands Area

N
W E
S

0 1,200 2,400
Feet

Figure 8-1
Wood Island Wetland Locations
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

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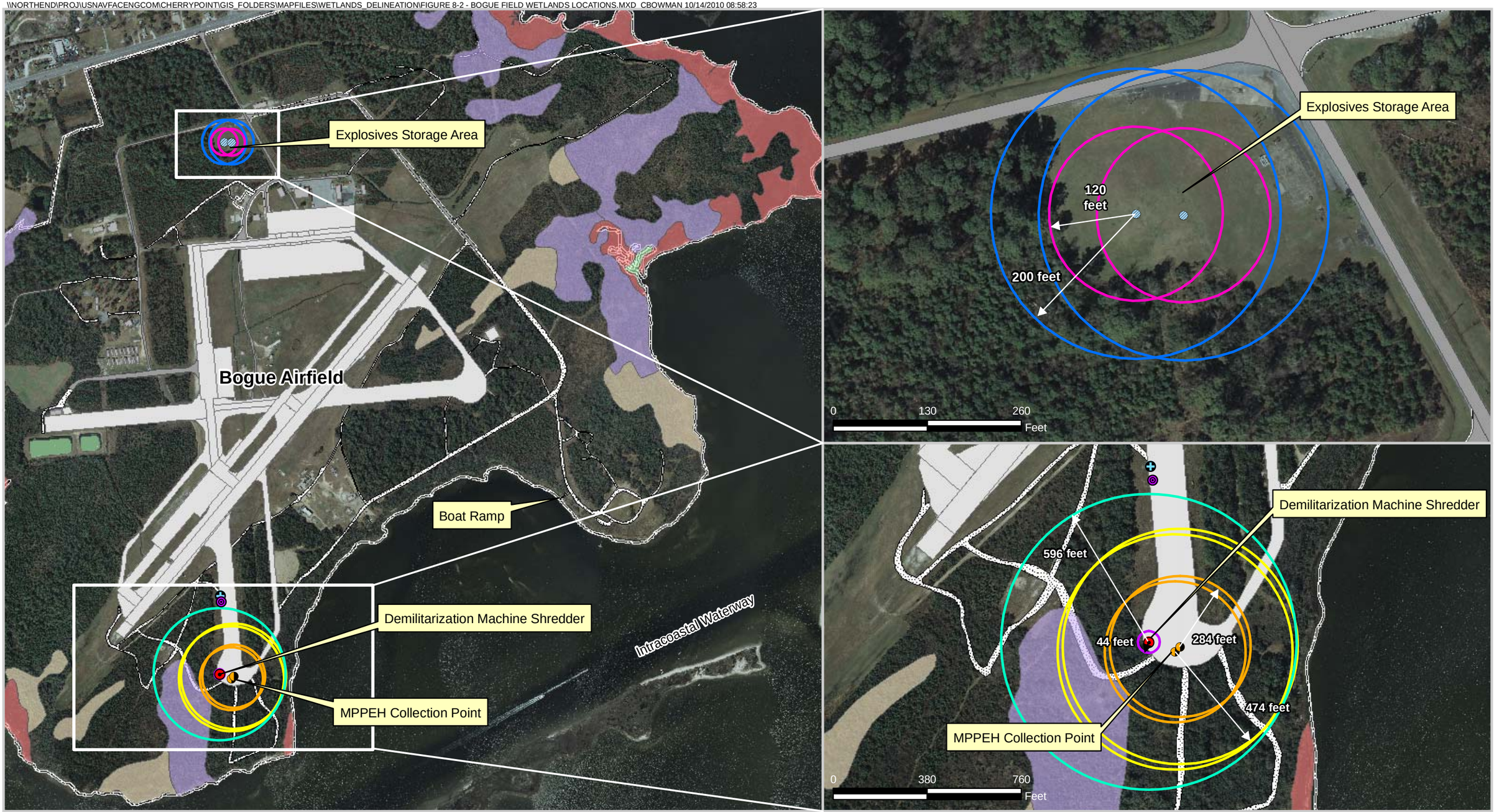
\\NORTHEND\PROJ\USNAVFACENGCOM\CHERRYPOINT\GIS_FOLDERS\MAPFILES\WETLANDS_DELINEATION\FIGURE 8-2 - BOGUE FIELD WETLANDS LOCATIONS.MXD CBOWMAN 10/14/2010 08:58:23



Legend

- MPPEH Collection Point (10lb NEW)
- Commercial Explosives Storage (31lb NEW)
- MDAS Storage Area
- Other Debris Storage Area
- Demilitarization Machine Shredder
- Buildings
- Runway
- Unpaved Road
- Paved Road
- Base Boundary
- Essential Personnel EZ (44 feet)
- Non-essential Personnel EZ (596 feet)
- MPPEH Collection Point IBD (474 feet)
- MPPEH Collection Point PTR (284 feet)
- Explosives Magazine IBD (200 feet)
- Explosives Magazine PRT (120 feet)

Wetlands

- Emergent Wetland
- Forested Wetland
- Scrub-Shrub Wetland
- Unconsolidated Bottom

Note:
Wetlands data received from MCAS Cherry Point, NC. Last update 2003.

IBD - Inhabited Building Distance
MPPEH - Material Potentially Presenting an Explosive Hazard
NEW - Net Explosive Weight
PTR - Public Transporation Route
MDAS - Material determined as safe
EZ - Exclusion Zone

N
W E
S

0 850 1,700
Feet

Figure 8-2
Bogue Field Wetlands Locations
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

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SECTION 9

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Appendix A
Health and Safety Plan

Health and Safety Plan

Expanded Site Inspection for Former Cat Island Bomb Target BT-2

Prepared for

Department of the Navy
Naval Facilities Engineering Command

6505 Hampton Boulevard
Norfolk, VA 23508-1278

November 2013

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Charlotte, North Carolina

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Contents

1.0 Tasks to be Performed under this Plan 1-1
1.1 Description of Tasks 1-1
1.1.1 Hazwoper-Regulated Tasks 1-1
1.1.2 Non-Hazwoper-Regulated Tasks 1-1
1.2 Change Management 1-2

2.0 Hazard Controls 2-1
2.1 Project-Specific Hazards 2-1
2.1.1 Drum Handling 2-1
2.1.2 Electrical 2-2
2.1.3 Field Vehicles 2-4
2.1.4 Fire Prevention 2-4
2.1.5 Hand and Power Tools 2-5
2.1.6 Manual Lifting 2-6
2.1.7 Noise 2-6
2.1.8 Visible Lighting 2-7
2.1.9 Working Around Material Handling Equipment 2-7
2.1.10 Working over Water 2-8
2.2 General Hazards 2-9
2.2.1 General Practices and Housekeeping 2-9
2.2.2 Personal Hygiene 2-10
2.2.3 Substance Abuse 2-10
2.2.4 Driving 2-11
2.2.5 Hazard Communication 2-11
2.2.6 Inclement Weather 2-11
2.2.7 Ultraviolet (UV) Radiation (sun exposure) 2-12
2.2.8 Temperature Extremes 2-13
2.2.9 Heat Stress 2-13
2.2.10 Cold 2-19
2.3 Munitions and Explosives of Concern Hazards and Controls 2-21
2.3.1 Munitions and Explosives of Concern 2-21
2.3.2 Munitions with the Greatest Fragmentation Distance 2-22
2.3.3 Bogue Field Equipment and Material Storage Siting 2-23
2.3.4 Hazard Mitigation 2-23
2.3.5 Types of Explosives to be used on Site 2-24
2.3.6 Explosives Storage, Transportation and Management 2-24
2.4 Potential Chemical Hazards and Controls 2-24
2.4.1 Metals 2-24
2.4.2 Explosive Compounds 2-24
2.5 Biological Hazards and Controls 2-25
2.5.1 Bees and Other Stinging Insects 2-25
2.5.2 Bloodborne Pathogens 2-25
2.5.3 Mosquito Bites 2-26
2.5.4 Poison Ivy, Poison Oak, and Poison Sumac 2-27

2.5.5 Snakes 2-28
2.5.6 Spiders - Brown Recluse 2-29
2.5.7 Widow Spiders 2-30
2.5.8 Ticks 2-31

3.0 Project Organization and Personnel 3-1
3.1 CH2M HILL Employee Medical Surveillance and Training 3-1
3.1.1 Hazardous Waste Operations Training 3-1
3.1.2 MEC Training 3-2
3.2 Field Team Chain of Command and Communication Procedures 3-3
3.2.1 Client Contacts 3-3
3.2.2 CH2M HILL Personnel 3-3
3.2.3 Staff Responsibilities 3-4
3.3 CH2M HILL Subcontractors 3-9

4.0 Personal Protective Equipment (PPE) 4-1
4.1 Required PPE 4-1

5.0 Air Monitoring/Sampling 5-1

6.0 Decontamination 6-1
Decontamination Specifications 6-1
Diagram of Personnel-Decontamination Procedures 6-1

7.0 Spill Containment Procedures 7-1

8.0 Site-Control Plan 8-1
8.1 Site-Control Procedures 8-1
8.2 Hazwoper Compliance Plan 8-1

9.0 Emergency Response Plan 9-1
9.1 Pre-Emergency Planning 9-1
9.2 Emergency Equipment and Supplies 9-2
9.3 Incident Response 9-2
9.4 Emergency Medical Treatment 9-2
9.5 Evacuation 9-3
9.6 Evacuation Signals 9-3

10.0 Incident Notification, Reporting, and Investigation 10-1
10.1 General Information 10-1
10.2 Section Definitions 10-1
10.3 Reporting Requirements 10-2
10.4 HITS System and Incident Report Form 10-2
10.5 Injury Management/Return-to-Work (for US/Puerto Rico based CH2M HILL Staff Only) 10-3
10.5.1 Background 10-3
10.5.2 The Injury Management/Return-to-Work Notification Process: 10-3
10.6 Serious Incident Reporting Requirements 10-4
10.6.1 Serious Incident Determination 10-4
10.6.2 Serious Incident Reporting 10-4
10.7 Incident Root Cause Analysis 10-6
10.7.1 Corrective Actions 10-7

11.0 Behavior Based Loss Prevention System 11-1
11.1 Activity Hazard Analysis 11-1
11.2 Pre-Task Safety Plans 11-2
11.3 Safe Behavior Observations 11-2
11.4 Loss/Near Loss Investigations 11-2

12.0 Approval 12-1

13.0 Attachments 13-1

CH2M HILL HEALTH AND SAFETY PLAN

This Health and Safety Plan (HSP) will be kept on the site during field activities and will be reviewed as necessary. The plan will be amended or revised as project activities or conditions change or when supplemental information becomes available. The plan adopts, by reference, the Enterprise-wide Core Standards (CS) and Standard Operating Procedures (SOPs), as appropriate. In addition, this plan adopts procedures in the project Work Plan. The Safety Coordinator (SC) is to be familiar with the CSs and SOPs and the contents of these instructions. CH2M HILL's personnel and subcontractors must be trained on this plan and sign Attachment 1.

Project Information and Background

PROJECT NO: 387134

CLIENT: NAVFAC

PROJECT/SITE NAME: Former Cat Island Bomb Target BT-2 and Surface Danger Zone

SITE ADDRESS: 34° 41′ 09″ N, 76° 57′ 05″ W

CH2M HILL PROJECT MANAGER: Mike Skeean/CLT

CH2M HILL OFFICE: Charlotte, North Carolina

DATE HEALTH AND SAFETY PLAN PREPARED: February 2010, Revised November 2013

DATE(S) OF SITE WORK: 2010 through 2015

SITE BACKGROUND AND SETTING: Munitions use at BT-2 included practice munitions with spotting charges between 1943 and 1952. In 1952, the use of high explosives munitions was initiated at this site. The *Range Identification and Preliminary Range Assessment* stated that general purpose bombs, armor piercing bombs, semi-armor piercing bombs, depth bombs, rockets and machine guns (.30 caliber to 20 millimeter [mm]) were used for training activities at BT-2. Air delivered munitions, including up to 2,000-pound bombs, were reportedly used at BT-2. In approximately 1955, the use of high explosives munitions was discontinued at BT-2 due to the proximity of nearby residences. In 1972, the land was used for "dry run" type training.

BT-2 is a closed range located in Bogue Sound in Western Carteret County, between Emerald Isle and the North Carolina mainland at Latitude 34º 41′ 12″N and Longitude 76º 57′ 06″ W. The coordinates of BT-2 were modified several times during operation of the target location, but all target coordinates were located in the immediate vicinity of Wood Island. A partially submerged shoal located to the west of BT-2 is identified as Cat Island. The partially submerged shoal identified as Cat Island was not the location of the BT-2 targets, although the range is identified as the Former Cat Island Bomb Target BT-2. The MRS includes Former Cat Island Bomb Target BT-2 and associated SDZs. SDZs associated with this site extend up to three miles from the target location. The MRS consists of an approximate 12-acre island primarily covered with marsh grasses and other vegetation and the associated three-mile radius SDZ. The munitions response site (MRS) includes an area of approximately 18,100 acres.

Equipment and materials staging will be performed at Bogue Field approximately 4 miles to the west of Wood Island. Bogue Field is the primary location for AV-8B Harrier practice operations. It is also used by other locally-based Marine Corps aircraft. This 875-acre landing field fronts Bogue Sound. It is primarily used for field carrier landing practice. Staging operations will be conducted on the southern border of Bogue Field, adjacent to Bogue Sound.

Site Map – MCALF Bogue Field

Emergency Contacts

24-hour CH2M HILL Serious Incident Reporting Contact/Pager – 720-286-4911

If injured on the job, notify your supervisor and then call 1-866-893-2514 to contact CH2M HILL'S Occupational Nurse

Medical Emergency -- 911 **Facility Medical Response #: N/A** **Local Ambulance #: 911** **MCAS Cherry Point EOD: 252-466-7606**	**CH2M HILL- Medical Consultant** WorkCare Dr. Peter Greaney M.D. 300 S. Harbor Blvd, Suite 600 Anaheim, CA 92805 800-455-6155 714-978-7488
Urgent Care Facility Beachcare Urgent Care Center 5059 Highway 70 W Morehead City, NC 252-808-3696	**CH2M HILL Director – Health, Safety, Security & Environment** Andy Strickland/DEN (720) 480-0685 (cell) or (720) 286-2393 (office)
Fire/Spill Emergency -- 911 **Facility Fire Response #:** 252-466-0662 **Local Fire Dept #:** 252-728-8472	**Responsible Health and Safety Manager (RHSM)** Name: Carl Woods Phone: 513-889-5771
Security & Police – 911 **MCALF Bogue Field Security #:** 252-466-0624 **Local Police #:** Cape Carteret Police 252-393-2183 Carteret County Sheriff 252-504-4800	**CH2M HILL Human Resources Department** Phone: Employee Connect toll-free number 1-877-586-4411 (U.S. and Canada)
Utilities Emergency Phone Numbers Water: N/A Gas: N/A Electric: N/A	**CH2M HILL Worker's Compensation:** Contact Business Group HR dept. to have form completed or contact Jennifer Rindahl after hours: (720)891-5382
Safety Coordinator (SC) Name: To be determined Phone: To be determined	**Media Inquiries Corporate Strategic Communications** Name: John Corsi Phone: (720) 286-2087
Project Manager Name: Renee Hunt Phone: 414-847-0349 (office) 704-877-3421 (cell)	**Automobile Accidents** Rental: Jennifer Rindahl/DEN: 720-286-2449 CH2M HILL owned vehicle: Linda George/DEN: 720-286-2057
Federal Express Dangerous Goods Shipping Phone: 800/238-5355	**CH2M HILL Dangerous Goods Shipping** **Phone: 800/255-3924**

Facility Alarms: N/A	Evacuation Assembly Area(s): Evacuation assembly areas will be sited in the field before starting surface removal activities.

Facility/Site Evacuation Route(s): If necessary, Wood Island will be evacuated by boat. The MCALF Bogue Field evacuation route is through the front gate onto North Carolina Highway 24.

Directions to Local Hospitals

Carteret General Hospital
3500 Arendell Street
Morehead City, NC 38557
252-808-6000

1. Depart MCALF Bogue Field through the main gate.
2. Turn right onto NC Highway 24.
3. Drive approximately 14 miles on NC Highway 24.
4. Turn right at Arendell Street (NC Highway 70).
5. Drive approximately 2.5 miles on Arendell Street.
6. The Carteret General Hospital will be on the left side of the road.

Onslow Memorial Hospital
317 Western Boulevard
Jacksonville, NC 28546
910-577-2345

1. Depart MCALF Bogue Field through the main gate.
2. Turn left onto NC Highway 24.
3. Drive approximately 22 miles on NC Highway 24.
4. Turn right at Western Boulevard.
5. Drive approximately 1 mile on Western Boulevard.
6. The Onslow Memorial Hospital will be on the left side of the road.

1.0 Tasks to be Performed under this Plan

1.1 Description of Tasks

Refer to project documents (i.e., Work Plan) for detailed task information. A health and safety risk analysis (Table 1) has been performed for each task and is incorporated in this plan through task-specific hazard controls and requirements for monitoring and protection. Tasks other than those listed below require an approved amendment or revision to this plan before tasks begin.

1.1.1 Hazwoper-Regulated Tasks

- Surface Clearance of Metallic Debris on Wood Island
- Controlled detonation of MEC and MPPEH determined unsafe to transport on Wood Island
- Transport of MPPEH determined safe to transport and other debris from Wood Island to Bogue Field
- Transport of commercial explosives
- Demilitarization and processing of MPPEH

1.1.2 Non-Hazwoper-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hazwoper-trained personnel. **Prior approval from the Responsible Health and Safety Manager (RHSM) is required before these tasks are conducted on regulated hazardous waste sites.**

TASKS	CONTROLS
• Bogue Field vegetation clearance • Bogue Field mobilization, site setup, and demobilization • Enforcement of ESQD arcs in Bogue Sound	• Brief on hazards, limits of access, and emergency procedures

1.2 Change Management

PROJECT HS&E Change Management Form *This evaluation form should be reviewed on a **continuous** basis to determine if the current site health and safety plan adequately addresses ongoing project work, and should be completed whenever new tasks are contemplated or changed conditions are encountered.*	
Project Task:	Project/Task Manager:
Project Number:	Project Name:

	Evaluation Checklist	Yes	No
1.	Has the CH2M HILL staff listed in the original HASP changed?		
2.	Has a new subcontractor been added to the project?		
3.	Is any chemical or product to be used that is not listed in Attachment 2 of the plan?		
4.	Have additional tasks been added which were not originally addressed in Section 1.1 of the plan?		
5.	Have new contaminants or higher than anticipated levels of original contaminants been encountered?		
6.	Has other safety, equipment, activity or environmental hazards been encountered that are not addressed in Section 2.1 of the plan?		

If the answer is "YES" to Questions 1-3, an HSP revision is NOT needed. Please take the following actions:

- Confirm that staff's medical and training status is current – check training records at: http://www.int.ch2m.com/hands (or contact your regional SPA), and confirm subcontractor qualifications.
- Confirm with the project KA that subcontractor safety performance has been reviewed and is acceptable.
- Confirm with H&S that subcontractor safety procedures have been reviewed and are acceptable.

If the answer is "YES" to Questions 4-6, an HSP revision MAY BE NEEDED.

TABLE 1 HAZARD ANALYSIS
(Refer to Section 2.0 for Hazard Controls)

POTENTIALHAZARDS	PROJECT ACTIVITIES							
	Surface Clearance of Debris on Wood Island	Controlled Detonation of MEC/MPPEH on Wood Island	Transport of MPPEH and Other Debris	Transport of Commercial Explosives	Demilitarization and Processing of MPPEH	Bogue Field Vegetation Clearance	Bogue Field Mobilization, Setup, and Demobilization	Enforcement of ESQD Arcs in Bogue Sound
Biological Hazards	X	X	X	X	X	X	X	X
Electrical Safety					X			
Field Vehicles	X	X	X	X	X	X	X	X
Fire Prevention	X	X	X	X	X			
Hand & Power Tools	X	X	X	X	X	X	X	
Haul Truck Operations			X		X		X	
Manual Lifting	X	X	X	X	X	X	X	
MEC/UXO	X	X	X		X			
Noise		X			X	X		
Slips, trips, and falls	X	X	X	X	X	X	X	X
Traffic Control	X	X	X	X	X	X	X	X
Vehicle Traffic	X	X	X	X	X	X	X	X
Visible Lighting	X	X	X	X	X	X	X	X
Work Over Water	X	X	X	X				X

2.0 Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the RHSM for clarification.

The health and safety hazards posed by field activities have been identified for each project activity and are provided in the Hazard Analysis Table (Table 1). Hazard control measures for project-specific and general H&S hazards are provided in Sections 2.1, 2.2, and 2.3.

In addition to the controls specified in this section, Project-Activity Self-Assessment Checklists are contained in Attachment 4. These checklists are to be used to assess the adequacy of CH2M HILL and subcontractor site-specific safety requirements. The objective of the self-assessment process is to identify gaps in project safety performance and prompt corrective actions in addressing these gaps. Self-assessment checklists should be completed early in the project, when tasks or conditions change, or when otherwise specified by the RHSM. The self-assessment checklists, including documented corrective actions, should be made part of the permanent project records.

Applicable project activity self-assessment checklists (see Attachment 4) shall be completed weekly by a CH2M HILL representative during the course of the project depending on the work performed at the time.

2.1 Project-Specific Hazards

2.1.1 Drum Handling

- Ensure that personnel are trained in proper lifting and moving techniques to prevent back injuries.
- Provide equipment to keep the operator removed from the drums to lessen the likelihood of injury. Such equipment might include: a drum grappler attached to a hydraulic excavator; a small front-end loader, which can be either loaded manually or equipped with a bucket sling; a rough terrain forklift; Roller conveyor equipped with solid rollers; drum carts designed specifically for drum handling.
- Make sure the vehicle selected has sufficient rated load capacity to handle the anticipated loads, and make sure the vehicle can operate smoothly on the available road surface.
- Ensure there are Plexiglas cab shields on loaders, backhoes, etc., when handling drums containing potentially explosive materials.
- Equipment cabs should be supplied with fire extinguishers, and should be air-conditioned to increase operator efficiency.
- Supply operators with appropriate respiratory protective equipment when needed.
- Ensure that drums are secure and are not in the operator's view of the roadway.
- Prior to handling, all personnel should be warned about hazards of handling.

- Throughout handling, personnel should be alert for information leading to the identity of new hazards. Exercise extreme caution in handling drums that are not intact and tightly sealed.
- Before moving anything, determine the most appropriate sequence in which the various drums and other containers should be moved (e.g. small containers may have to be removed first to permit heavy equipment to enter and move the drums.
- Overpack drums and an adequate volume of absorbent should be kept near areas where minor spills may occur.

2.1.2 Electrical

(Reference CH2M HILL SOP HSE-206, *Electrical Safety*)

General Electrical Safety

- Only qualified personnel are permitted to work on unprotected energized electrical systems.
- Only authorized personnel are permitted to enter high-voltage areas.
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented.
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service.
- CH2M HILL has selected Ground Fault Circuit Interrupters (GFCIs) as the standard method for protecting employees from the hazards associated with electric shock.
  - GFCIs shall be used on all 120-volt, single phase 15 and 20-amphere receptacle outlets which are not part of the permanent wiring of the building or structure.
- An assured equipment grounding conductor program may be required under the following scenarios:
  - GFCIs cannot be utilized
  - Client requires such a program to be implemented
  - Business group decides to implement program in addition to GFCI protection
- Extension cords must be equipped with third-wire grounding. Cords passing through work areas must be covered, elevated or protected from damage. Cords should not be routed through doorways unless protected from pinching. Cords should not be fastened with staples, hung from nails, or suspended with wire.
- Electrical power tools and equipment must be effectively grounded or double-insulated UL approved.
- Operate and maintain electric power tools and equipment according to manufacturers' instructions.
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet

from overhead power lines for voltages of 50 kV or less, and 10 feet plus ½ inch for every 1 kV over 50 kV.

- Temporary lights shall not be suspended by their electric cord unless designed for suspension. Lights shall be protected from accidental contact or breakage.
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

Portable Generator Hazards

- Portable generators are useful when temporary or remote electric power is needed, but they also can be hazardous. The primary hazards to avoid when using a generator are carbon monoxide (CO) poisoning from the toxic engine exhaust, electric shock or electrocution, and fire.
- NEVER use a generator indoors or in similar enclosed or partially-enclosed spaces. Generators can produce high levels of carbon monoxide (CO) very quickly. When you use a portable generator, remember that you cannot smell or see CO. Even if you can't smell exhaust fumes, you may still be exposed to CO.
- If you start to feel sick, dizzy, or weak while using a generator, get to fresh air RIGHT AWAY. DO NOT DELAY. The CO from generators can rapidly lead to full incapacitation and death.
- If you experience serious symptoms, get medical attention immediately. Inform project staff that CO poisoning is suspected. If you experienced symptoms while indoors have someone call the fire department to determine when it is safe to re-enter the building.
- Follow the instructions that come with your generator. Locate the unit outdoors and away from doors, windows, and vents that could allow CO to come indoors.
- Keep the generator dry and do not use in rain or wet conditions. To protect from moisture, operate it on a dry surface under an open, canopy-like structure. Dry your hands if wet before touching the generator.
- Plug appliances directly into the generator. Or, use a heavy duty, outdoor-rated extension cord that is rated (in watts or amps) at least equal to the sum of the connected appliance loads. Check that the entire cord is free of cuts or tears and that the plug has all three prongs, especially a grounding pin.
- Most generators come with Ground Fault Circuit Interrupters (GFCI). Test the GFCIs daily to determine whether they are working
- If the generator is not equipped with GFCI protected circuits plug a portable GFCI into the generator and plug appliances, tools and lights into the portable GFCI.
- Never store fuel near the generator or near any sources of ignition.
- Before refueling the generator, turn it off and let it cool down. Gasoline spilled on hot engine parts could ignite.

2.1.3 Field Vehicles

- Field vehicles may be personal vehicles, rental vehicles, fleet vehicles or project vehicles.
- Emergency kits are available in all NWR offices for personal and rental vehicles. Fleet vehicles are equipped with emergency supplies. It is a project responsibility to equip all project vehicles with emergency equipment.
- Maintain both a First Aid kit and Fire Extinguisher in the field vehicle at all times.
- Utilize a rotary beacon on vehicle if working adjacent to active roadway.
- Car rental must meet the following requirements:
  - Dual air bags
  - Antilock brakes
  - Be midsize or larger
- Familiarize yourself with rental vehicle features:
  - Mirror adjustments
  - Seat adjustments
  - Cruise control features, if offered
  - Pre-program radio stations
- Always wear seatbelt while operating vehicle.
- Adjust headrest to proper position.
- Tie down loose items if utilizing a van.
- Pull off the road, put the car in park and turn on flashers before talking on a mobile phone.
- Close car doors slowly and carefully. Fingers can get pinched in doors.
- Park vehicle in a location where it can be accessed easily in the event of an emergency. If not possible, carry a phone.
- Have a designated place for storing the field vehicle keys when not in use.

2.1.4 Fire Prevention

- Fire extinguishers shall be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet. When 5 gallons or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet. Extinguishers must:
  - be maintained in a fully charged and operable condition,
  - be visually inspected each month, and
  - undergo a maintenance check each year.
- The area in front of extinguishers must be kept clear.
- Post “Exit” signs over exiting doors, and post “Fire Extinguisher” signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet from any building.

- Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.
- Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.

2.1.5 Hand and Power Tools

(Reference CH2M HILL, SOP HSE-210, *Hand and Power Tools*)

- Tools shall be inspected prior to use and damaged tools will be tagged and removed from service.
- Hand tools will be used for their intended use and operated in accordance with manufacturer's instructions and design limitations;
- Maintain all hand and power tools in a safe condition.
- Use PPE (such as gloves, safety glasses, earplugs, and face shields) when exposed to a hazard from a tool.
- Do not carry or lower a power tool by its cord or hose.
- Portable power tools will be plugged into GFCI protected outlets; and
- Portable power tools will be Underwriters Laboratories (UL) listed and have a three-wire grounded plug or be double insulated.
- Disconnect tools from energy sources when they are not in use, before servicing and cleaning them, and when changing accessories (such as blades, bits, and cutters).
- Safety guards on tools must remain installed while the tool is in use and must be promptly replaced after repair or maintenance has been performed.
- Store tools properly in a place where they will not be damaged or come in contact with hazardous materials.
- If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical standards and manufacturer's specifications.
- Tools used in an explosive environment must be rated for work in that environment (that is, intrinsically safe, spark-proof, etc.).
- When using a knife or blade tool, stroke or cut away from the body with a smooth motion. Be careful not to use excessive force that could damage the tool, the material being cut or unprotected hands.
- Working with manual and pistol-grip hand tools may involve highly repetitive movement, extended elevation, constrained postures, and/or awkward positioning of body members (for example, hand, wrist, arm, shoulder, neck, etc.). Consider alternative tool designs, improved posture, the selection of appropriate materials, changing work organization, and sequencing to prevent muscular, skeletal, repetitive motion, and cumulative trauma stressors.

Machine Guarding

- Ensure that all machine guards are in place to prevent contact with drive lines, belts, chains, pinch points or any other sources of mechanical injury.
- Unplugging jammed equipment will only be performed when equipment has been shut down, all sources of energy have been isolated and equipment has been locked/tagged and tested.
- Maintenance and repair of equipment that results in the removal of guards or would otherwise put anyone at risk requires lockout of that equipment prior to work.

2.1.6 Manual Lifting

(Reference CH2M HILL SOP HSE-112, *Manual Lifting*)

- Back injuries are the leading cause of disabling work and most back injuries are the result of improper lifting techniques or overexertion. Office or field tasks and activities involving manual lifting are to be identified and a program implemented to assist employees to mitigate the risks associated with manual lifting.
- When possible, the task should be modified to minimize manual lifting hazards.
- Lifting of loads weighing more than 40 pounds (18 kilograms) should be evaluated by the SC using the Lifting Evaluation Form contained in SOP HSE-112.
- Using mechanical lifting devices is the preferred means of lifting heavy objects such as forklifts; cranes, hoists, and rigging; hand trucks; and trolleys.
- Personnel shall seek assistance when performing manual lifting tasks that appear beyond their physical capabilities.
- In general, the following steps must be practiced when planning and performing manual lifts: Assess the situation before you lift; ensure good lifting and body positioning practices; ensure good carrying and setting down practices.
- All employees must receive training for the correct procedures to lift safely using the computer-based health and safety training or project-specific training.

2.1.7 Noise

(Reference CH2M HILL SOP HSE-108, *Hearing Conservation*)

- A noise assessment shall be conducted by the RHSM or designee based on potential to emit noise above 85 dBA.
- Areas or equipment emitting noise at or above 90dBA shall be evaluated to determine feasible engineering controls. When engineering controls are not feasible, administrative controls can be developed and appropriate hearing protection will be provided.
- Areas or equipment emitting noise levels at or above 85 dBA, hearing protection must be worn.
- Employees exposed to 84 dBA or a noise dose of 50% must participate in the Hearing Conservation program including initial and annual (as required) audiograms.

- The RHSM will evaluate appropriate controls measures and work practices for employees who have experienced a standard threshold shift (STS) in their hearing.
- Hearing protection is selected based upon noise levels and specific tasks to be performed.
- Employees are trained in the hazards of noise and how to properly wear and maintain their hearing protection.
- Hearing protection will be maintained in a clean and reliable condition, inspected prior to use and after any occurrence to identify any deterioration or damage, and damaged or deteriorated hearing protection repaired or discarded.
- In work areas where actual or potential high noise levels are present at any time, hearing protection must be worn by employees working or walking through the area.
- Areas where tasks requiring hearing protection are taking place may become hearing protection required areas as long as that specific task is taking place.
- High noise areas requiring hearing protection should be posted or employees must be informed of the requirements in an equivalent manner.

2.1.8 Visible Lighting

- While work is in progress outside construction areas shall have at least 33 lux (lx).
- Construction work conducted inside buildings should be provided with at least 55 lux light.
- The means of egress shall be illuminated with emergency and non-emergency lighting to provide a minimum 11 lx measured at the floor. Egress illumination shall be arranged so that the failure of any single lighting unit, including the burning out of an electric bulb will not leave any area in total darkness.

2.1.9 Working Around Material Handling Equipment

- Never approach operating equipment from the rear. Always make positive contact with the operator, and confirm that the operator has stopped the motion of the equipment.
- Never approach the side of operating equipment; remain outside of the swing and turning radius.
- Maintain distance from pinch points of operating equipment.
- Never turn your back on any operating equipment.
- Never climb onto operating equipment or operate contractor/subcontractor equipment.
- Never ride contractor/subcontractor equipment unless it is designed to accommodate passengers and equipped with firmly attached passenger seat.
- Never work or walk under a suspended load.
- Never use equipment as a personnel lift; do not ride excavator buckets or crane hooks.
- Always stay alert and maintain a safe distance from operating equipment, especially equipment on cross slopes and unstable terrain.

2.1.10 Working over Water

If any activities pose a risk to drowning do the following during the activity:

- Fall protection should be provided to prevent personnel from falling into water. Where fall protection systems are not provided and the danger of drowning exists, U.S. Coast Guard-approved personal flotation devices (PFDs), or a life jacket, shall be worn.
- Provide employees with an approved (USCG for U.S. operations) life jacket or buoyant work vest.
  - Employees should inspect life jackets or work vests daily before use for defects. Do not use defective jackets or vests.
- Post ring buoys with at least 90 feet of 3/8-inch solid-braid polypropylene (or equal) line next to the work area. If the work area is large, post extra buoys 200 feet or less from each other.
- Provide at least one life saving skiff, immediately available at locations where employees are working over or adjacent to water.
  - Ensure the skiff is in the water and capable of being launched by one person and is equipped with both motor and oars.
- Designate at least one employee on site to respond to water emergencies and operate the skiff at times when there are employees above water.
  - If the designated skiff operator is not within visual range of the water, provide him or her with a radio or provide some form of communication to inform them of an emergency.
  - Designated employee should be able to reach a victim in the water within three to four minutes.
- Ensure at least one employee trained in CPR and first aid is on site during work activities.
- No smoking is permitted on board vessels or during refueling operations.
- The boat skipper has the final authority with regard to boat safety and navigational safety.
- Use the checklist below to evaluate vessel integrity.

Marine Vessel Checklist		
	Yes	**N/A**
Personal Flotation Devices (PFDs)		
Visual Distress Signals		
Anchor and Anchor Line		
Sound-Producing Devices		
Navigation Lights and Shapes		
Fire Extinguishers		
Alternative Propulsion (for example, paddles)		
Overall Vessel Condition Satisfactory		

Marine Vessel Checklist		
	Yes	**N/A**
State Requirements		
Marine Sanitation Device		
Navigation Rules		
Ropes and Buoys		
First Aid Kit and Bloodborne Pathogen Kit		
Nonslip Deck		
Personnel Access Ladder		

2.2 General Hazards

2.2.1 General Practices and Housekeeping

- Site work should be performed during daylight hours whenever possible.
- Good housekeeping must be maintained at all times in all project work areas.
- Common paths of travel should be established and kept free from the accumulation of materials.
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions.
- Provide slip-resistant surfaces, ropes, and/or other devices to be used.
- Specific areas should be designated for the proper storage of materials.
- Tools, equipment, materials, and supplies shall be stored in an orderly manner.
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area.
- Containers should be provided for collecting trash and other debris and shall be removed at regular intervals.
- All spills shall be quickly cleaned up. Oil and grease shall be cleaned from walking and working surfaces.
- Review the safety requirements of each job you are assigned to with your supervisor. You are not expected to perform a job that may result in injury or illness to yourself or to others.
- Familiarize yourself with, understand, and follow jobsite emergency procedures.
- Do not fight or horseplay while conducting the firm's business.
- Do not use or possess firearms or other weapons while conducting the firm's business.
- Report unsafe conditions or unsafe acts to your supervisor immediately.
- Report occupational illnesses, injuries, and vehicle accidents.
- Do not remove or make ineffective safeguards or safety devices attached to any piece of equipment.

- Report unsafe equipment, defective or frayed electrical cords, and unguarded machinery to your supervisor.
- Shut down and lock out machinery and equipment before cleaning, adjustment, or repair. Do not lubricate or repair moving parts of machinery while the parts are in motion.
- Do not run in the workplace.
- When ascending or descending stairways, use the handrail and take one step at a time.
- Do not apply compressed air to any person or clothing.
- Do not wear steel taps or shoes with metal exposed to the sole at any CH2M HILL project location.
- Do not wear finger rings, loose clothing, wristwatches, and other loose accessories when within arm's reach of moving machinery.
- Remove waste and debris from the workplace and dispose of in accordance with federal, state, and local regulations.
- Note the correct way to lift heavy objects (secure footing, firm grip, straight back, lift with legs), and get help if needed. Use mechanical lifting devices whenever possible.
- Check the work area to determine what problems or hazards may exist.

2.2.2 Personal Hygiene

- Keep hands away from nose, mouth, and eyes.
- Keep areas of broken skin (chapped, burned, etc.) covered.
- Wash hands with hot water and soap frequently prior to eating and smoking.

2.2.3 Substance Abuse

(Reference CH2M HILL SOP HSE-105, *Drug-Free Workplace*)

Employees who work under the influence of controlled substances, drugs, or alcohol may prove to be dangerous or otherwise harmful to themselves, other employees, clients, the company, the company's assets and interests, or the public. CH2M HILL does not tolerate illegal drug use, or any use of drugs, controlled substances, or alcohol that impairs an employee's work performance or behavior. Drug and/or alcohol testing is applicable under CCI and munitions response projects performed in the United States. In addition, employees may be required to submit to drug and/or alcohol testing as required by clients. When required, this testing is performed in accordance with SOP HSE-105, Drug-Free Workplace. Employees who are enrolled in drug or alcohol testing are required to complete annual training located on the VO.

Prohibitions onsite include:

- Use or possession of intoxicating beverages while performing CH2M HILL work.
- Abuse of prescription or nonprescription drugs.
- Use or possession of illegal drugs or drugs obtained illegally.
- Sale, purchase, or transfer of legal, illegal or illegally obtained drugs.

- Arrival at work under the influence of legal or illegal drugs or alcohol.

2.2.4 Driving

- Always be aware of surroundings while operating a vehicle. Avoid intellectual stress & worries, talking on a cellular phone, eating, drinking, smoking, reading a map, adjusting controls or looking at a passenger while driving.
- Use prudent speed limits, assure that backup warning devices are working, be aware of blind spots or other hazards associated with low visibility, etc. Use a spotter if necessary.
- Do no drive while drowsy. Drowsiness can occur at any time, but is most likely after 18 hours or more without sleep.

2.2.5 Hazard Communication

(Reference CH2M HILL SOP HSE-107, *Hazard Communication)*

The Hazard Communication Coordinator is to perform the following:

- Complete an inventory of chemicals brought on site by CH2M HILL using Attachment 2.
- Confirm that an inventory of chemicals brought on site by CH2M HILL subcontractors is available.
- Request or confirm locations of Material Safety Data Sheets (MSDSs) from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed.
- Before or as the chemicals arrive on site, obtain an MSDS for each hazardous chemical.
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly.
- Give employees required chemical-specific HAZCOM training using Attachment 3.
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

2.2.6 Inclement Weather

Sudden inclement weather can rapidly encroach upon field personnel. Preparedness and caution are the best defenses. Field crew members performing work outdoors should carry clothing appropriate for inclement weather. Personnel are to take heed of the weather forecast for the day and pay attention for signs of changing weather that indicate an impending storm. Signs include towering thunderheads, darkening skies, or a sudden increase in wind. If stormy weather ensues, field personnel should discontinue work and seek shelter until the storm has passed.

Protective measures during a lightning storm include seeking shelter; avoiding projecting above the surrounding landscape (don't stand on a hilltop--seek low areas); staying away from open water, metal equipment, railroad tracks, wire fences, and metal pipes; and positioning people several yards apart. Some other general precautions include:

- Know where to go and how long it will take to get there. If possible, take refuge in a large building or vehicle. Do not go into a shed in an open area.

- The inclination to see trees as enormous umbrellas is the most frequent and most deadly mistake. Do not go under a large tree that is standing alone. Likewise, avoid poles, antennae and towers.
- If the area is wide open, go to a valley or ravine, but be aware of flash flooding.
- If you are caught in a level open area during an electrical storm and you feel your hair stand on end, drop to your knees, bend forward and put your hands on your knees or crouch. The idea is to make yourself less vulnerable by being as low to the ground as possible and taking up as little ground space as possible. Lying down is dangerous, since the wet earth can conduct electricity. Do not touch the ground with your hands.
- Do not use telephones during electrical storms, except in the case of emergency

Remember that lightning may strike several miles from the parent cloud, so work should be stopped/restarted accordingly. The lightning safety recommendation is 30-30: Seek refuge when thunder sounds within 30 seconds after a lightning flash; and do not resume activity until 30 minutes after the last thunder clap.

High winds can cause unsafe conditions, and activities should be halted until wind dies down. High winds can also knock over trees, so walking through forested areas during high-wind situations should be avoided. If winds increase, seek shelter or evacuate the area. Proper body protection should be worn in case the winds hit suddenly, because body temperature can decrease rapidly.

2.2.7 Ultraviolet (UV) Radiation (sun exposure)

Health effects regarding UV radiation are confined to the skin and eyes. Overexposure can result in many skin conditions, including erythema (redness or sunburn), photoallergy (skin rash), phototoxicity (extreme sunburn acquired during short exposures to UV radiation while on certain medications), premature skin aging, and numerous types of skin cancer.

Acute overexposure of UV radiation to the eyes may lead to photokeratitis (inflammation of the cornea), also known as snow blindness. Symptoms include redness of the eyes and a gritty feeling, which progresses to pain and an inability to tolerate any kind of light. This condition can also occur when working in or around water and other UV radiation reflectors. In addition, long-term exposure to sunlight is thought to cause cataracts or clouding of the lens of the eye.

Limit Exposure Time

- Rotate staff so the same personnel are not exposed all of the time.
- Limit exposure time when UV radiation is at peak levels (approximately 2 hours before and after the sun is at its highest point in the sky).
- Avoid exposure to the sun, or take extra precautions when the UV index rating is high.

Provide Shade

- Take lunch and breaks in shaded areas.
- Create shade or shelter through the use of umbrellas, tents, and canopies.

- Fabrics such as canvas, sailcloth, awning material and synthetic shade cloth create good UV radiation protection.
- Check the UV protection of the materials before buying them. Seek protection levels of 95 percent or greater, and check the protection levels for different colors.

Clothing

- Reduce UV radiation damage by wearing proper clothing; for example, long sleeved shirts with collars, and long pants. The fabric should be closely woven and should not let light through.
- Head protection should be worn to protect the face, ears, and neck. Wide-brimmed hats with a neck flap or "Foreign Legion" style caps offer added protection.
- Wear UV-protective sunglasses or safety glasses. These should fit closely to the face. Wrap-around style glasses provide the best protection.

Sunscreen

- Apply sunscreen generously to all exposed skin surfaces at least 20 minutes before exposure, allowing time for it to adhere to the skin.
- Re-apply sunscreen at least every 2 hours, and more frequently when sweating or performing activities where sunscreen may be wiped off.
- Choose a sunscreen with a high sun protection factor (SPF). Most dermatologists advocate SPF 30 or higher for significant sun exposure.
- Waterproof sunscreens should be selected for use in or near water, and by those who perspire sufficiently to wash off non-waterproof products.
- Check for expiration dates, because most sunscreens are only good for about 3 years. Store in a cool place out of the sun.
- Remember—no sunscreen provides 100% protection against UV radiation. Other precautions must be taken to avoid overexposure.

2.2.8 Temperature Extremes

Each employee is responsible for the following:

- Recognizing the symptoms of heat or cold stress
- Taking appropriate precautionary measures to minimize their risk of exposure to temperature extremes
- Communicating any concerns regarding heat and cold stress to their supervisor or SC

2.2.9 Heat Stress

Heat-related illnesses are caused by more than just temperature and humidity factors.

Physical fitness influences a person's ability to perform work under heat loads. At a given level of work, the more fit a person is, the less the physiological strain, the lower the heart rate, the

lower the body temperature (indicates less retrained body heat—a rise in internal temperature precipitates heat injury), and the more efficient the sweating mechanism.

Acclimatization is a gradual physiological adaptation that improves an individual's ability to tolerate heat stress. Acclimatization requires physical activity under heat-stress conditions similar to those anticipated for the work. With a recent history of heat-stress exposures of at least two continuous hours per day for 5 of the last 7 days to 10 of the last 14 days, a worker can be considered acclimatized. Its loss begins when the activity under those heat-stress conditions is discontinued, and a noticeable loss occurs after 4 days and may be completely lost in three to four weeks. Because acclimatization is to the level of the heat-stress exposure, a person will not be fully acclimatized to a sudden higher level; such as during a heat wave.

Dehydration reduces body water volume. This reduces the body's sweating capacity and directly affects its ability to dissipate excess heat.

The ability of a body to dissipate heat depends on the ratio of its surface area to its mass (surface area/weight). **Heat dissipation** is a function of surface area, while heat production depends on body mass. Therefore, overweight individuals (those with a low ratio) are more susceptible to heat-related illnesses because they produce more heat per unit of surface area than if they were thinner. Monitor these persons carefully if heat stress is likely.

When wearing **impermeable clothing**, the weight of an individual is not as important in determining the ability to dissipate excess heat because the primary heat dissipation mechanism, evaporation of sweat, is ineffective.

SYMPTOMS AND TREATMENT OF HEAT STRESS

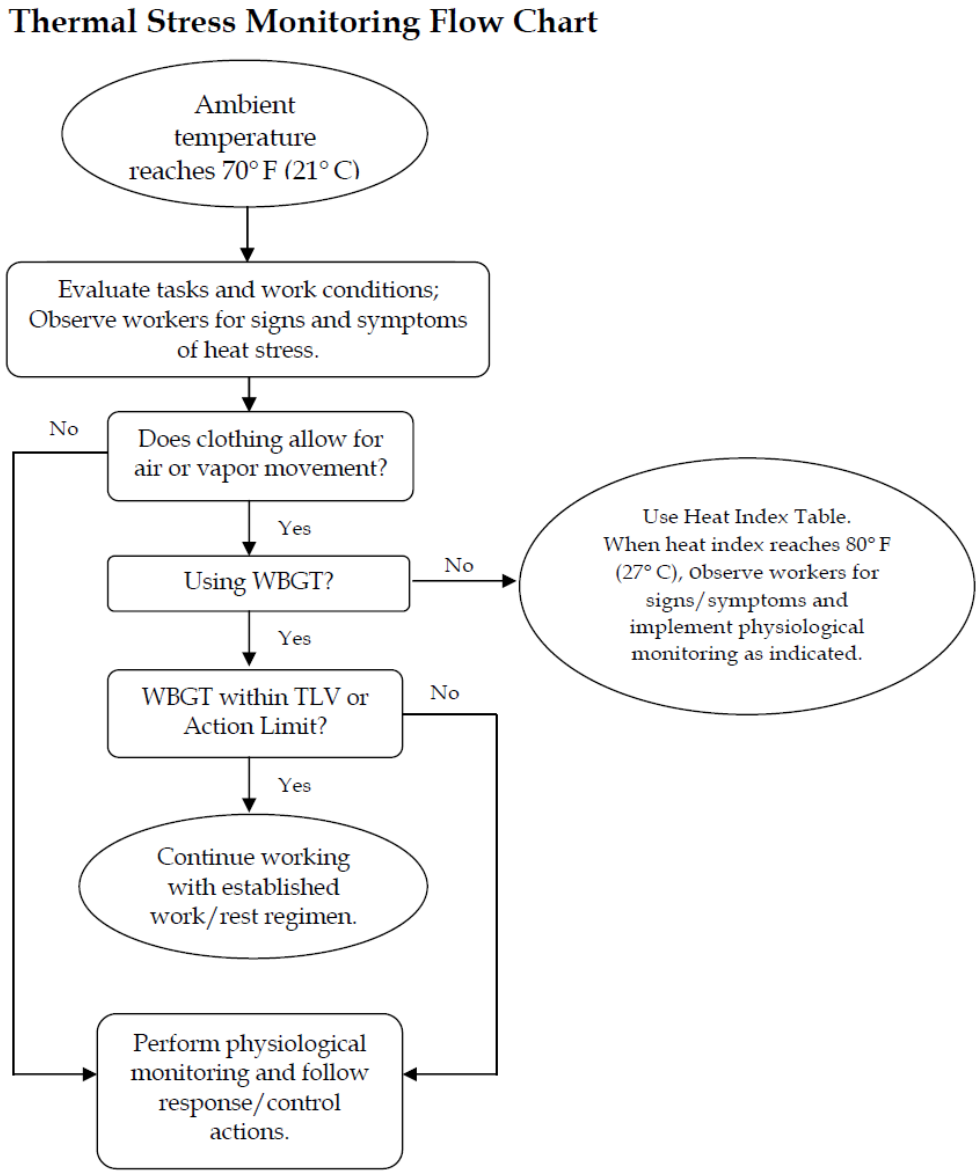
	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool–but not cold–water. Call ambulance, and get medical attention immediately!

Precautions

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50 °Fahrenheit (10 degrees Celsius [C]) to 60°Fahrenheit (F) (15.6 degrees C) should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons (7.5 liters) per day. Remind employees to drink water throughout their work shift.

- Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate to site work conditions by slowly increasing workloads; for example, do not begin site work with extremely demanding activities. Closely monitor employees during their first 14 days of work in the field.
- Supervisors and SCs must continually observe employees throughout the work shift for signs and symptoms of heat stress or illness. Employees must monitor themselves for heat stress as well as observe their co-workers.
- Effective communication must be maintained with employees throughout the work shift either by voice, observation, or electronic device.
- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Avoid direct sun whenever possible, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shade to protect personnel against radiant heat (sun, flames, hot metal).
- Use portable fans for convection cooling or in extreme heat conditions, an air-conditioned rest area when needed.
- In hot weather, rotate shifts of workers.
- Maintain good hygiene standards by frequent changes of clothing and showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should consult medical personnel.
- Brief employees initially before the project work begins and routinely as part of the daily safety briefing, on the signs and symptoms, of heat-relatedness illnesses, precautions to measures and emergency procedures to follow as described in this plan.
- Observe one another for signs of heat stress. PREVENTION and communication is key.

Thermal Stress Monitoring



Thermal Stress Monitoring – Permeable or Impermeable Clothing

When **permeable work clothes** are worn (street clothes or clothing ensembles over street clothes), regularly observe workers for signs and symptoms of heat stress and implement physiological monitoring as indicated below. This should start when the heat index reaches 80° F (27° C) [see Heat Index Table below], or sooner if workers exhibit symptoms of heat stress indicated in the table above. These heat index values were devised for shady, light wind conditions; exposure to full sunshine can increase the values by up to 15°F (8°C). Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

When wearing **impermeable clothing** (e.g., clothing doesn't allow for air or water vapor movement such as Tyvek), physiological monitoring as described below shall be conducted when the ambient temperature reaches 70° F (21° C) or sooner when climatic conditions may present greater risk of heat stress combined with wearing unique variations of impermeable clothing, or workers exhibit symptoms of heat stress

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	126	130					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Streuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Heat Index	Possible Heat Disorders	Minimum Frequency of Physiological Monitoring
80°F - 90°F (27°C - 32°C)	Fatigue possible with prolonged exposure and/or physical activity	Conduct initial monitoring as baseline and observe workers for signs of heat stress and implement physiological monitoring if warranted.
90°F - 105°F (32°C - 41°C)	Sunstroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity	Conduct initial monitoring as baseline, then at least every hour, or sooner, if signs of heat stress are observed.
105°F - 130°F (41°C - 54°C)	Sunstroke, heat cramps, or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.	Conduct initial monitoring as baseline, then every 30 minutes or sooner if signs of heat stress are observed.
130°F or Higher (54°C or Higher)	Heat/Sunstroke highly likely with continued exposure.	Conduct initial monitoring as baseline, then every 15 minutes or sooner if signs of heat stress are observed.
Source: National Weather Service		

Physiological Monitoring and Associated Actions

For employees wearing permeable clothing, follow the minimum frequency of physiological monitoring listed in the Heat Index Table.

For employees wearing impermeable clothing, physiological monitoring should begin initially at a 15 minute interval, then if the employee's heart rate or body temperature is within acceptable limits, conduct the subsequent physiological monitoring at 30 minutes, and follow the established regimen protocol below.

When physiological monitoring is required, use either radial pulse or aural temperature and follow actions below:

- The sustained heart rate during the work cycle should remain below 180 beats per minute (bpm) minus the individual's age (e.g. 180 – 35 year old person = 145 bpm). The sustained heart rate can be estimated by measuring the heart rate at the radial pulse for 30 seconds as quickly as possible prior to starting the rest period.
- The heart rate after one minute rest period should not exceed 120 beats per minute (bpm).
- If the heart rate is higher than 120 bpm after the FIRST minute into the rest period, the next work period should be shortened by 33 percent, while the length of the rest period stays the same.
- If the pulse rate still exceeds 120 bpm at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent.
- Continue this procedure until the rate is maintained below 120 bpm after the FIRST minute into the rest period.

Alternately, the body temperature can be measured, either oral or aural (ear), before the workers have something to drink.

- If the oral or aural temperature exceeds 99.6° F (37.6 ° F) at the beginning of the rest period, the following work cycle should be shortened by 33 percent.
- Continue this procedure until the oral or aural (ear) temperature is maintained below 99.6° F (37.6° C). While an accurate indication of heat stress, oral temperature is difficult to measure in the field, however, a digital aural (aural) thermometer is easy to obtain and inexpensive to purchase.
- Use the form attached to this HSP to track workers' measurements and actions taken.

Procedures for when Heat Illness Symptoms are Experienced

- **Always** contact the RHSM when any heat illness related symptom is experienced so that controls can be evaluated and modified, if needed.
- In the case of cramps, reduce activity, increase fluid intake, move to shade until recovered.
- In the case of all other heat-related symptoms (fainting, heat rash, heat exhaustion), and if the worker is a CH2M HILL worker, contact the occupational physician at 1-866-893-2514 and immediate supervisor.
- In the case of heat stroke symptoms, call 911, have a designee give location and directions to ambulance service if needed, follow precautions under the emergency medical treatment of this HSP.
- Follow the Incident Notification, Reporting, and Investigation section of this HSP.

2.2.10 Cold

General

Low ambient temperatures increase the heat lost from the body to the environment by radiation and convection. In cases where the worker is standing on frozen ground, the heat loss is also due to conduction.

Wet skin and clothing, whether because of water or perspiration, may conduct heat away from the body through evaporative heat loss and conduction. Thus, the body cools suddenly when chemical protective clothing is removed if the clothing underneath is perspiration soaked.

Movement of air across the skin reduces the insulating layer of still air just at the skin's surface. Reducing this insulating layer of air increases heat loss by convection.

Non-insulating materials in contact or near-contact with the skin, such as boots constructed with a metal toe or shank, conduct heat rapidly away from the body.

Certain common drugs, such as alcohol, caffeine, or nicotine, may exacerbate the effects of cold, especially on the extremities. These chemicals reduce the blood flow to peripheral parts of the body, which are already high-risk areas because of their large surface area to volume ratios. These substances may also aggravate an already hypothermic condition.

Precautions

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in wet weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- Wind-Chill Index (below) is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- Persons who experience initial signs of immersion foot, frostbite, and/or hypothermia should report it immediately to their supervisor/PM to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

SYMPTOMS AND TREATMENT OF COLD STRESS			
	Immersion (Trench) Foot	**Frostbite**	**Hypothermia**
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm–but **not** hot–water. Have victim drink warm fluids, but **not** coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but **not** coffee or alcohol. Get medical attention.

Wind Chill Chart

Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

2.3 Munitions and Explosives of Concern Hazards and Controls

2.3.1 Munitions and Explosives of Concern

Munitions use at BT-2 included inert practice munitions with spotting charges between 1943 and 1952. In 1952, the use of high explosives munitions was initiated at this site (DoN, 1957a). The *Range Identification and Preliminary Range Assessment* (USACE, 2001) stated that general purpose bombs, armor piercing bombs, semi-armor piercing bombs, depth bombs, rockets and machine guns (.30 caliber to 20 millimeter [mm]) were used for training activities at BT-2. Air delivered munitions, including up to 2,000-pound bombs, were reportedly used at BT-2. In approximately 1955, the use of live munitions was discontinued at BT-2 due to the proximity of nearby residences (DoN, 1956). In 1972, the land was used for "dry run" type training (USACE, 2001). Table 2-1 lists the ordnance reportedly used at the site.

TABLE 2-1
Reported Ordnance Used at Former BT-2

Ordnance Type	Net Explosive Weight (lbs)
Bomb, AP, 1600, MK 1	Unknown
Bomb, Depth, 325 LB, MK 17	224 lbs Trinitrotoluene (TNT)
Bomb, Depth, 350 LB, MK 44/MK 47	252 lbs Torpex
Bomb, Depth, 650 LB, MK 29/MK 37/MK 38	464 lbs TNT
Bomb, Depth, 700 LB, MK 49/MK 38	425 lbs TNT
Bomb, Frag, 20 LM, M41	2.7 lbs TNT
Bomb, Frag, 220 LB, M88	46.69 lbs Comp B
Bomb, Frag, 260 LB, M81	34.1 lbs Comp B
Bomb, GP, 100 LB, M30	62 lbs Tritonal

TABLE 2-1
Reported Ordnance Used at Former BT-2

Ordnance Type	Net Explosive Weight (lbs)
Bomb, GP, 1000 LB, M65/M44	595 lbs Comp B
Bomb, GP, 2000 LB, M66/M34	1146 lbs Comp B
Bomb, GP, 250 LB, M57	129.02 lbs TNT
Bomb, GP, 500 LB, M64/M43	274 lbs Comp B
Bomb, Practice, 100 LB, Water Filled	N/A
Bomb, Practice, 500 LB, Water Filled	N/A
Bomb, Practice, 1000 LB, Water Filled	N/A
Bomb, Practice, Miniature, Mk 3, 4, and 5	N/A
Bomb, Practice, MK 106	N/A
Bomb, Practice, MK 76/BDU-33	N/A
Bomb, SAP, 1000 LB, M59	320 lbs TNT
Bomb, SAP, 500 LB, M58	160 lbs TNT
Cartridge, Caliber .30, Ball	N/A
Cartridge, Caliber .50, Ball	N/A
Cluster, Frag, 100 LB, M1 (6 ea 20 LB Frag)	2.7 lbs TNT x 6 each = 16.2 lbs TNT
Missile, TOW	5.3 lbs Octol (75/25)
Projectile, 75mm M48 (Assumed to be MK1)	1.47 lbs TNT
Rocket, 2.75" MK 6, HE (Assumed to be M151)	8.7 lbs Comp B4
Rocket, 2.75" MK 7, HEAT (Assumed to be M247)	2.0 lbs Comp B4
Rocket, 2.75" MK 28, HE (Assumed to be M229)	18.1 lbs Comp B4
Rocket, 2.75" MK 32, HEAT	Unknown
Rocket, 2.75" AP/ASW	Unknown
Rocket, 2.75" MK 36, PWP (Assumed to be M156)	0.12 lbs Comp B
Rocket, 2.75" w/Inert Warhead	N/A
Rocket, 2.75", Motor, MK40	5.90 N5 Propellant

Note: The type of MEC anticipated at BT-2 were taken from the *Final Range Identification and Preliminary Range Assessment, Marine Corps Air Station Cherry Point, New Bern, North Carolina* (USACE, 2001)

2.3.2 Munitions with the Greatest Fragmentation Distance

The 100-pound M30 Bomb is the munition with the greatest fragmentation distance (MGFD). This item was selected as the MGFD as it is expected to be present at the MRS. The intentional detonation ESQD arc (1,831 feet) allows this item to be blown-in-place on Wood Island without impacting residents of Emerald Isle, located approximately 2,000 feet to the south of Wood Island. All MEC with a maximum fragmentation distance (MFD) less than or equal to that of the MGFD will undergo controlled detonation on Wood Island.

If a MEC item with a fragmentation distance greater than the MGFD is encountered during the course of this project, all MR personnel will immediately cease operations as specified in the ESS (CH2M HILL, 2010a).

2.3.3 Bogue Field Equipment and Material Storage Siting

Two ATF Type II magazines each with a 50-pound NEW will be sited on Bogue Field through the duration of the investigation. These magazines will be used to store commercial donor explosives to perform blow-in-place demolitions on Wood Island. The explosives magazines will be grounded for lightening protection in accordance with OP-5, Chapter 6 (NAVSEA, 2007).

Sea containers will also be sited on Bogue Field for the storage of MPPEH, MDAS, and other debris transported from Wood Island to Bogue Field. Each MPPEH container will be sited with a 10-pound NEW. The MPPEH containers will also be grounded for lightening protection in accordance with OP-5, Chapter 6 (NAVSEA, 2007).

A mechanical shredder will be sited on Bogue Field to demilitarize MPPEH from Wood Island, as necessary. The shredder will be provided by the MR subcontractor and will be capable of containing up to 1-pound NEW during MPPEH processing. The required shielding and barricades required during MPPEH processing will also be provided by the MR subcontractor. The site layout for equipment and material storage at Bogue Field including associated ESQD arcs are presented in **Table 2-2**.

2.3.4 Hazard Mitigation

Wood Island and Bogue Field explosives safety quantity-distances including the exclusion zones for nonessential personnel, safe separation distance for other UXO teams, inhabited building distance (IBD), and public transportation route (PTR) distance are presented in Table 2-2. The actual locations of the ESQD arcs will be based on the active work area at the time that MR operations are being performed.

TABLE 2-2
Controlling Exclusion Zones for Former BT-2 Surface Removal Activities

Operation	Sited As	Exposed Site	Basis	ESQD (ft)
Manual operations	Unintentional detonation (MGFD)	UXO teams Team Separation Distance (TSD)	K40 of the MGFD	172
Manual operations	Unintentional detonation (MGFD)	Public and non-essential personnel	HFD of the MGFD	483
MEC treatment up to 62 lbs NEW	Intentional detonation	Public and all personnel	MFR-H of the MGFD	1831
MPPEH collection area at Bogue Field for consolidation, storage, and re-inspection (up to 10 lb NEW per container)[2]	Metal Storage Container (i.e., SEA container)	Non-essential personnel in structures	Inhabited Building Distance (IBD)	474
		Non-essential personnel in the open	Public Transportation Route (PTR)	284
Portable Magazine (31 lb NEW per container) at Bogue Field	Above ground magazine (5'x 5' x 5')	Non-essential personnel in structure	IBD	200
		Non-essential personnel in the open	PTR	120

2.3.5 Types of Explosives to be used on Site

No explosives will be stored on Wood Island; however commercial explosives will be stored in ATF Type II magazines on Bogue Field. If MEC is discovered and demolition is required, all necessary explosives will be transported to Wood Island from Bogue Field. Unused explosives will be returned to Bogue Field at the end of each day. Types of explosives that may be used during the field effort include high explosives (e.g., booster, detonating cord, shaped charge) and initiating explosives (i.e., detonator assembly).

2.3.6 Explosives Storage, Transportation and Management

Explosives will be stored in ATF Type II magazines on Bogue Field and will be transported to Wood Island as needed for MEC demolition. Transportation and management will be in compliance with the Explosives Siting Plan (ESP) and the Explosives Management Plan (EMP) for this project. The ESP and EMP are provided in the Expanded Site Inspection Work Plan.

2.4 Potential Chemical Hazards and Controls

Exposure to site chemical contaminants of concern is not expected due to the non-intrusive nature of the tasks covered by this plan. The potential chemical hazards posed by the Expanded SI activities are dermal contact and ingestion of munitions constituents (MC)-contaminated soil and inhalation of airborne MC particulate. The dermal contact and ingestion hazards posed by MC-contaminated soil will be controlled using personal protective clothing and decontamination procedures with personal hygiene practices. The potential inhalation hazard posed by airborne MEC particulate will be controlled using engineering controls, during MEC operations when visible dust emissions are observed in the personnel breathing zone. The following chemical hazards can potentially be present during site operations.

2.4.1 Metals

Exposure to metals such as lead, aluminum, cadmium, and magnesium can be caused by ingestion of particles, inhalation of dust, or skin exposure. MEC-contaminated areas can have elevated levels of metals in the soil. The primary route of exposure to project personnel would be ingestion due to poor personal hygiene practices while working. Personnel will be required to wear work gloves to protect their hands.

Symptoms are nonspecific and can be hard to distinguish from minor seasonal illnesses. The symptoms are decreased physical fitness, fatigue, sleep disturbance, headache, aching bones and muscles, digestive disorders (particularly constipation), abdominal pains, and decreased appetite.

2.4.2 Explosive Compounds

Explosive compounds such as Trinitrotoluene (TNT) and Composition B are explosive fillers that can be found in the MEC on site. Exposure routes for these materials can be ingestion of particles, inhalation of dust, and skin contact. The primary route of exposure to project personnel would be ingestion of particles due to poor personal hygiene practices while working. Personnel will be required to wear work gloves to protect their hands.

Symptoms include skin irritation, sneezing, coughing, sore throat, and irritation to mucus membranes and anemia.

2.5 Biological Hazards and Controls

2.5.1 Bees and Other Stinging Insects

Bees and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform your supervisor and/or buddy. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; contact the occupational nurse at 1-866-893-2514 immediately if a reaction develops or 911 if the reaction is severe.

2.5.2 Bloodborne Pathogens

(Reference CH2M HILL SOP HSE-202, *Bloodborne Pathogens*)

Exposure to bloodborne pathogens may occur when rendering first aid or CPR, or when coming into contact with landfill waste or waste streams containing potentially infectious material (PIM).

- Employees trained in first-aid/CPR or those exposed to PIM must complete CH2M HILL's 1-hour bloodborne computer-based training module annually.
- Hepatitis B vaccine (HBV) is offered to employees who may be exposed to PIM when they complete training and within 10 working days of assignment. (Note: Employees whose exposure stems only from rendering first aid as a collateral duty receives the vaccine after exposure.)
- Employees who decline the HBV vaccine must sign the declination form (contact regional Safety Program Assistant [SPA]) indicating they declined the vaccination. Anyone who declines the vaccination and chooses to receive the vaccination at a later time may still receive the vaccination by contacting the SPA.
- Hepatitis B and tetanus vaccinations can be requested by completing the medical portion of the enrollment form, located under Tools & Forms at the HS&E web page, or by contacting the regional SPA.

Work Controls

- Observe universal precautions to prevent contact with blood or other PIMs. Where differentiation between body fluid types is difficult or impossible, consider all body fluids to be potentially infectious materials.
- Consider all sharps encountered at industrial, medical, dental, or biological waste facilities or sampling locations to be contaminated and PIMs.
- Always wash your hands and face with soap and running water after contacting PIMs. If washing facilities are unavailable, use an antiseptic cleanser with clean paper towels or moist towelettes. These must be provided for employees who have been exposed to PIMs. When antiseptic cleansers or towelettes are used, always rewash your hands and face with soap and running water as soon as available. Do not consume food or beverages until after thoroughly washing your hands and face.

- Decontaminate all potentially contaminated equipment and environmental surfaces with chlorine bleach as soon as possible. Clean and decontaminate on a regular basis (and immediately upon visible contamination) all bins, pails, cans, and other receptacles intended for reuse that have the potential for becoming contaminated.
- Use one part chlorine bleach (5.25 percent sodium hypochlorite solution) diluted with 10 parts water for decontaminating equipment or surfaces after initially removing blood or other PIMs. Remove contaminated PPE as soon as possible before leaving a work area.
- Place regulated waste in containers that are closable; are constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping; are labeled with a Biological warning label or color-coded; and are tightly closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.

Employees who participate in waste characterization studies, sort or sample refuse, or contact medical, dental, or biological waste streams should follow these procedures:

- If exposure is anticipated, this group of employees should wear safety goggles or glasses, puncture-resistant utility gloves with inner latex glove liners, Tyvek coveralls or cotton coveralls with a rubber apron, and puncture-resistant shoes or boots.
- If splash potential is present, employees should wear a full-face shield.
- If a respiratory hazard is present, a full-face respirator with HEPA filters should be worn.

Post Exposure

CH2M HILL will provide exposed employees with a confidential medical examination should an exposure to PIM occur. This examination includes the following procedures:

- Documenting the exposure
- Testing the exposed employee's and the source individual's blood (with consent)
- Administering post-exposure prophylaxis

2.5.3 Mosquito Bites

Due to the recent detection of the West Nile Virus in the Southwestern United States it is recommended that **preventative measures** be taken to reduce the probability of being bitten by mosquitoes whenever possible. Mosquitoes are believed to be the primary source for exposure to the West Nile Virus as well as several other types of encephalitis. The following guidelines should be followed to reduce the risk of these concerns for working in areas where mosquitoes are prevalent.

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Spray clothing with repellents containing permethrin or DEET since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET (N,N-diethyl-meta-toluamide). Repellents may irritate the eyes and mouth, so avoid applying repellent to the hands.

- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's DIRECTIONS FOR USE, as printed on the product.
- Note: Vitamin B and "ultrasonic" devices are NOT effective in preventing mosquito bites.

Symptoms of Exposure to the West Nile Virus

Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death.

The West Nile Virus incubation period is from 3-15 days.

Contact the project RHSM with questions, and immediately report any suspicious symptoms to your supervisor/PM and contact the occupational nurse at 1-866-893-2514.

2.5.4 Poison Ivy, Poison Oak, and Poison Sumac

Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas. Shrubs are usually 12 to 30 inches high, or can also be a tree-climbing vine, with triple leaflets and short, smooth hair underneath. Plants are red and dark green in Spring and Summer, with yellowing leaves anytime especially in dry areas. Leaves may achieve bright reds in Fall, but plants lose its (yellowed, then brown) leaves in Winter, leaving toxic stems. All parts of the plant remain toxic throughout the seasons. These plants contain urushiol (you-ROO-shee-ol), a colorless or pale yellow oil that oozes from any cut or crushed part of the plant, including the roots, stems and leaves and causes allergic skin reactions when contacted. The oil is active year round.

Become familiar with the identity of these plants (see below). Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.

Poison Ivy

Poison Sumac

Poison Oak

Contamination with poison ivy, sumac or oak can happen through several pathways, including:

- Direct skin contact with any part of the plant (even roots once above ground foliage has been removed).

- Contact with clothing that has been contaminated with the oil.
- Contact from removing shoes that have been contaminated (shoes are coated with urishol oil).
- Sitting in a vehicle that has become contaminated.
- Contact with any objects or tools that have become contaminated.
- Inhalation of particles generated by weed whacking, chipping, vegetation clearing.

If you must work on a site with poison ivy, sumac or oak the following precautions are necessary:

- Do not drive vehicles onto the site where it will come into contact with poison ivy, sumac or oak. Vehicles which need to work in the area, such as drill rigs or heavy equipment must be washed as soon as possible after leaving the site.
- All tools used in the poison ivy, sumac or oak area, including those used to cut back poison oak, surveying instruments used in the area, air monitoring equipment or other test apparatus must be decontaminated before they are placed back into the site vehicle. If on-site decontamination is not possible, use plastic to wrap any tools or equipment until they can be decontaminated.
- Personal protective equipment, including Tyvek coveralls, gloves, and boot covers must be worn. PPE must be placed into plastic bags and sealed if they are not disposed immediately into a trash receptacle.
- As soon as possible following the work, shower to remove any potential contamination. Any body part with suspected or actual exposure should be washed with "Tecnu" or other product designed for removing urushiol. If you do not have Tecnu wash with cold water. Do not take a bath, as the oils can form and invisible film on top of the water and contaminate your entire body upon exiting the bath.
- Tecnu may also be used to decontaminate equipment.
- Use IvyBlock or similar products to prevent poison oak, ivy and sumac contamination. Check with the closest CH2M HILL warehouse to see if these products are available. Follow all directions for application.

If you do come into contact with one of these poisonous plants and a reaction develops, contact your supervisor and the occupational nurse 1-866-893-2514.

2.5.5 Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If a person is bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Call the occupational nurse at 1-866-893-2514 immediately. **DO NOT** apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings.

2.5.6 Spiders - Brown Recluse

It is regarded by many as the most dangerous spider in the United States. Because of interstate shipping/transportation, the Brown Recluse spider can be found most anywhere in the United States. Brown Recluse Spiders are usually 1 inch or larger in size, including the legs and can grow as large as 3 inches. Young Brown Recluse spiders are smaller. Brown recluse spider bites don't always hurt right away. away. In fact, you may not know that you have been bitten until other symptoms appear. Symptoms of a brown recluse spider bite may include the following:

- Reddened skin followed by a blister that forms at the bite site.
- Mild to intense pain and itching for 2 to 8 hours following the bite.
- An open sore with a breakdown of tissue (necrosis) that develops within a few hours to 3 to 4 days following the bite and the area may become painful, itchy, hot, swollen, red and tender. An irregular ulcerous sore, caused by necrosis, will often appear that is from 1/4 inch to 10 inches in diameter. Prompt attention is the best defense against preventing the necrosis. The wound is often described as being reddish and surrounded by a bluish area with a narrow whitish separation in between the red and the blue. This gives it the famous "bull's eye" pattern. In just hours, a bite from the highly venomous Brown Recluse spider can create blisters and cause tissue damage.

Some people have a severe, systemic (whole-body) reaction to brown recluse spider bites, including the rapid destruction of red blood cells and anemia. Signs and symptoms include:

Fever and chills.

- Skin rash all over the body with many tiny, flat purple and red spots.
- Nausea or vomiting.
- Joint pain.

If you think you have been bitten by a brown recluse spider:

- Remain calm. Too much excitement or movement will increase the flow of venom into the blood.
- Try to collect the spider, without being bitten, (even a mangled specimen has diagnostic value), if possible, for positive identification by a spider expert. A plastic bag, small jar, or pill vial is useful and no preservative is necessary, but rubbing alcohol helps to preserve the spider.
- Apply a cool, wet cloth to the bite or cover the bite with a cloth and apply an ice bag to the bite.
- Do not apply a tourniquet. It may cause more harm than benefit.
- Try to positively identify the spider to confirm its type.
- Seek prompt medical attention.

A brown recluse bite can be serious and will likely require immediate medical care. Seek medical attention if you believe you have been bitten by a recluse spider, especially if severe symptoms develop throughout your body or an open sore and necrosis develop. A brown recluse spider bite is diagnosed through a physical examination and questions about the bite. You should be prepared to describe the spider, where and when the bite took place, and what you were doing at the time. Your health professional will ask what your main symptoms are, when they began, and how they have developed, progressed, or changed since the bite.

2.5.7 Widow Spiders

The Northern Black Widow spider may be encountered in Northern Regions of the United States. Other similar widow spiders are the Red Widow and the Brown Widow. Female widow spiders range from 8-15 mm in body length; males are smaller, sometimes very small (2 mm). Most have globose, shiny abdomens that are predominantly black with red markings (although some may be pale and/or have lateral stripes), with moderately long, slender legs. These spiders are nocturnal and build a three-dimensional tangled web, often with a conical tent of dense silk in a corner where the spider hides during the day. In nature, most species are found under rocks and logs, but they readily adapt to human-altered environments, where they are most commonly found in outbuildings (sheds, barns, privies), water meter holes, nursery cans, and under any item or structure (*e.g.*, barbeque grill, slide, sand box) that has been undisturbed for a lengthy period. Formerly, most bites by black widows (almost all by female spiders) occurred in outhouses, but presently, widow bites occur most frequently when the spider is trapped against human skin, either by reaching under objects where the spider is hiding or when putting on clothing, gloves or shoes containing the spider. Widow spiders are generally very timid and only bite in self-defense when they accidentally contact humans.

Black Widow

Red Widow

Brown Widow

Bite symptoms are systemic, spreading through the lymphatic system, and usually start about 1-3 hours after the bite. The most common symptoms are intense pain, rigid abdominal muscles, muscle cramping, malaise, local sweating, nausea, vomiting, and hypertension. Other symptoms may includetremors, labored breathing, restlessness, increased blood pressure, and fever. If left untreated, widow bite symptoms usually last 3-5 days.

If bitten, remain calm, and immediately seek medical attention (contact your physician, hospital and/or poison control center). Apply an ice pack directly to the bite area to relieve swelling and pain. Try to collect the spider, without being bitten, (even a mangled specimen has diagnostic value), if possible, for positive identification by a spider expert. A plastic bag, small jar, or pill vial is useful and no preservative is necessary, but rubbing alcohol helps to preserve the spider. A hospital stay may be recommended, particularly for those with a heart condition or with health problems. A physician may administer a specific antivenin to counteract the venom or

calcium gluconate to relieve pain. Calcium gluconate and/or antivenin may be administered to relieve or counteract symptoms.

2.5.8 Ticks

Every year employees are exposed to tick bites at work and at home putting them at risk of illness. Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch in size.

In some geographic areas exposure is not easily avoided. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray **only outside** of clothing with permethrin or permanone and spray skin with only DEET; and check yourself frequently for ticks.

Where site conditions warrant (vegetation above knee height, tick endemic area) or when tasks warrant (e.g., having to sit/kneel in vegetation) that diminish the effectiveness of the other controls mentioned above, bug-out suits (obtained from MKE warehouse)/Tyvek shall be used. Bug-out suits are more breathable than Tyvek.

Take precautions to avoid exposure by including pre-planning measures for biological hazards prior to starting field work. Contact the MKE Warehouse for preventative equipment such as repellants, protective clothing and tick removal kits. Use the buddy system and perform tick inspections prior to entering the field vehicle. If ticks were not planned to be encountered and are observed, do not continue field work until these controls can be implemented.

See Tick Fact Sheet attached to this HSP for further precautions and controls to implement when ticks are present. Information includes the procedure for submitting a removed tick for testing. If bitten by a tick, follow the removal procedures found in the tick fact sheet, call the occupational nurse at 1-866-893-2514 and submit the tick to Clongen laboratory using the form in the fact sheet attachment.

Be aware of the symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme: a rash might appear that looks like a bullseye with a small welt in the center. RMSF: a rash of red spots under the skin 3 to 10 days after the tick bite. In both RMSF and Lyme disease, chills, fever, headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, again contact the occupational nurse at 1-866-893-2514.

Be sure to complete an Incident Report (either use the HITS system on the VO) or see Attachment 5 if you do come in contact with a tick. For more detailed information go to HSSE website or contact the RHSM.

3.0 Project Organization and Personnel

3.1 CH2M HILL Employee Medical Surveillance and Training

(Reference CH2M HILL- SOPs HSE-113, *Medical Surveillance*, and HSE-110, *Training*)

3.1.1 Hazardous Waste Operations Training

All employees engaging in hazardous waste operations or emergency response shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65. At a minimum, the training shall have consisted of instruction in the topics outlined in the 29 CFR 1910.120 and 29 CFR 1926.65. Personnel who have not met these training requirements shall not be allowed to engage in hazardous waste operations or emergency response activities.

3.1.1.1 Initial Training

General site workers engaged in hazardous waste operations shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations, unless otherwise noted in the above-referenced standards.

Employees who may be exposed to health hazards or hazardous substances at treatment, storage, and disposal (TSD) operations shall receive a minimum of 24 hours of initial training to enable the employee to perform their assigned duties and functions in a safe and healthful manner.

Employees engaged in emergency response operations shall be trained to the level of required competence in accordance with 29 CFR 1910.120.

3.1.1.2 Three-Day Actual Field Experience

General site workers for hazardous waste operations shall have received three days of actual experience (on-the-job training) under the direct supervision of a trained, qualified supervisor and shall be documented. If the field experience has not already been received and documented at a similar site, this supervised experience shall be accomplished and documented at the beginning of the assignment of the project.

3.1.1.3 Refresher Training

General site workers and TSD workers shall receive 8-hours of refresher training annually (within the previous 12-month period) to maintain qualifications for fieldwork. Employees engaged in emergency response operations shall receive annual refresher training of sufficient content and duration to maintain their competencies or shall demonstrate competency in those areas at least annually.

3.1.1.4 Eight-Hour Supervisory Training

On site management or supervisors who will be directly responsible for, or supervise employees engaged in hazardous waste site operations, will have received at least 8 hours of additional specialized training on managing such operations. Employees designated as SC-HW employees are considered 8-hour HAZWOPER Site Safety Supervisor trained.

The employees listed meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training.

Employees designated "SC" have completed a 12-hour site safety coordinator course, and have documented requisite field experience. An SC with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. At least one FA-CPR designated employee must be present during all tasks performed in exclusion or decontamination zones. The employees listed below are currently active in a medical surveillance program that meets state and federal regulatory requirements for hazardous waste operations. Certain tasks (e.g., confined-space entry) and contaminants (e.g., lead) may require additional training and medical monitoring.

Pregnant employees are to be informed of and are to follow the procedures in CH2M HILL-SOP HSE-120, *Reproductive Health*, including obtaining a physician's statement of the employee's ability to perform hazardous activities before being assigned fieldwork.

Employee Name	Office	Responsibility	SC/FA-CPR
Doug Dronfield	CH2M HILL/WDC	CH2M HILL Program Manager/ Project Manager	SSC
Carl Woods	CH2M HILL/CIN	CH2M HILL Health & Safety Manager	SSC/FA-CPR
Doug Bitterman	CH2M HILL/VBO	CH2M HILL Activity Manager	SSC/FA-CPR
Renee Clore	CH2M HILL/MKE	CH2M HILL Project Manager	SSC/FA-CPR

3.1.2 MEC Training

All UXO-qualified personnel performing work that involves decisions of safety and condition of MEC must be graduates of one of the following schools:

- U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD
- U.S. Naval Explosive Ordnance Disposal (EOD) School, Indian Head, MD
- U.S. Naval EOD School, Eglin Air Force Base, FL

All UXO-qualified personnel will meet or exceed the minimum requirements established and verified by the U.S. Army Engineering and Support Center, Huntsville.

TABLE 3-1
UXO Personnel Training and Experience Hierarchy

Position Description	Training Required [1, 2, 3]	Minimum Years of EOD/UXO Experience [4]	Special Requirements
UXO Safety Officer	1,2	8 years	Experience in all phases of UXO remediation and applicable safety standards
UXO Quality Control Specialist	1,2	8 years	Experience in all phases of UXO remediation and the transportation, handling and storage of ordnance and explosives materials
Senior UXO Supervisor	1,2	10 years	Significant experience in all aspects of UXO remediation. Five years' experience in supervisory positions.
UXO Technician III	1, 2, or 3	8 years	Prior military EOD and/or commercial UXO experience
UXO Technician II	1, 2	N/A	Prior military EOD experience
	Or 3	3 years	Experience in UXO remediation/range clearance operations. Plus specific project/ordnance training
UXO Technician I	1, 2 or 3	0	Successfully completed approved course of instruction appropriate to this skill level

Notes:
[1] Graduate of the Army Bomb Disposal School at Aberdeen, MD
[2] Graduate of the Naval EOD School
[3] Graduate of a DoD certified UXO Training Program
[4] For computational purposes, 1 year is equal to 1,740 hours
This is the minimum experience requirement for designation. This is not an automatic designation, but reserved for those that have demonstrated the requisite knowledge, maturity, judgment and are recommended by the contractor for recognition at the specified skill level.

3.2 Field Team Chain of Command and Communication Procedures

3.2.1 Client Contacts

Contact Name: Bryan Revell/NAVFAC
Phone: 757-322-4636
Facility Contact Name: John Myers/MCAS Cherry Point
Phone: 252-466-4903

3.2.2 CH2M HILL Personnel

Program Manager: Doug Dronfield/WDC
Project Manager (PM): Renee Hunt/MKE
Responsible Health and Safety Manager (RHSM): Carl Woods/CIN
Field Team Leader: To be determined
Safety Coordinator (SC): To be determined

3.2.3 Staff Responsibilities

3.2.3.1 Project Manager

The project manager (PM) is responsible for providing adequate resources (budget and staff) for project-specific implementation of the HSE management process. The PM has overall management responsibility for the tasks listed below. The PM may explicitly delegate specific tasks to other staff, as described in sections that follow, but retains ultimate responsibility for completion of the following in accordance with this document:

- Incorporate standard terms and conditions, and contract-specific HSE roles and responsibilities in contract and subcontract agreements (including flow-down requirements to lower-tier subcontractors).
- Select safe and competent subcontractors by:
  - Choosing potential subcontractors based on technical ability and HSE performance;
  - Implementing the subcontractor prequalification process;
  - Ensuring that acceptable certificates of insurance, including CH2M HILL as named additional insured, are secured as a condition of subcontract award; and
  - Ensuring HSE submittals, subcontract agreements, and appropriate site-specific safety procedures are in place and accepted prior field mobilization.
- Ensure copies of training and medical monitoring records, and site-specific safety procedures are being maintained in the project file accessible to site personnel.
- Provide oversight of subcontractor HSE practices per the site-specific safety plans and procedures.
- Manage the site and interfacing with 3rd parties in a manner consistent with the contract and subcontract agreements and the applicable standard of reasonable care.
- Ensure that the overall, job-specific, HSE goals are fully and continuously implemented.
- Provide visible support and motivation for HSE programs, rules, procedures, processes, and training, leading by example and encouraging CH2M HILL employees to take ownership of HSE issues.
- Intervene or stop work when an unsafe condition or behavior is observed, and/or when an environmentally compromising condition is encountered.
- Make available to and require CH2M HILL employees to complete required HSE training within established timelines and provide project numbers for such training.
- Consistently and even-handedly enforce HSE rules, procedures, and requirements at the office and/or on project work sites.
- Promptly report all work-related HSE incidents or near misses.
- Wear any required personal protective equipment.
- Ensure CH2M HILL employees complete required HSE training within established timelines.

- Conduct, cooperate, or assist with HSE incident investigations.
- Consult with the Human Resources Delivery Partner before taking any disciplinary action (other than verbal counseling) associated with CH2M HILL Policy 203 and/or HSE programs rules, procedures, processes and training.

3.2.3.2 CH2M HILL Responsible Health and Safety Manager

The RHSM is responsible for the following:

- Review and evaluate subcontractor HSE performance using the pre-qualification process;
- Approve HSP and its revisions as well as Activity Hazard Analyses (AHA);
- Review and evaluate subcontractor site-specific safety procedures for adequacy prior to start of subcontractor's field operations;
- Support the oversight (or SC's direct oversight) of subcontractor and tiered subcontractor HSE practices;
- Permit upgrades and downgrades in respiratory protection after reviewing analytical data;
- Conduct audits as determined by project schedule and coordination with PM; and
- Participate in incident investigations, lessons learned, loss and near loss reporting.

3.2.3.3 CH2M HILL Project Environmental Manager

The Project EM is responsible for the following:

- Provide environmental program support in areas such as training, auditing, planning, permit tracking, and subcontractor oversight as needed or as specified in the project environmental plan;
- Review and evaluate qualifications for subcontractors with a history of environmental non-compliance and for waste transportation and disposal subcontractors;
- Evaluate any spills, releases, or environmental permit incidents for appropriate follow-up actions, notifications, and recordkeeping requirements; and
- Provide environmental compliance and environmental management expertise and advice to the project team as needed during the course of the project.

3.2.3.4 CH2M HILL Safety Coordinator

The SC is responsible for verifying that the project is conducted in a safe manner including the following specific obligations:

- Verify this HSP is current and amended when project activities or conditions change;
- Verify CH2M HILL site personnel and subcontractor personnel read the HSP and sign the Employee Sign-Off Form, prior to commencing field activities;
- Verify CH2M HILL site personnel have completed any required specialty training (for example, fall protection, confined space entry, among others) and medical surveillance as identified in this HSP;

- Verify that project files include copies of subcontractor training and medical monitoring records, and accepted site-specific safety procedures prior to start of subcontractor's field operations;
- Act as the project "Hazard Communication Coordinator" and perform the responsibilities outlined in the HSP;
- Act as the project "Emergency Response Coordinator" and perform the responsibilities outlined in the HSP;
- Post the Occupational Safety and Health Administration (OSHA) job-site poster; the poster is required at sites where project field offices, trailers, or equipment-storage boxes are established. If you work in a state with an OSHA State Plan, make sure the State Plan poster is posted, if required;
- Hold and/or verify that safety meetings are conducted and documented in the project file initially and as needed throughout the course of the project (as tasks or hazards change);
- Verify that project health and safety forms and permits are being used as outlined this HSP;
- Perform oversight and assessments of subcontractor HSE practices per the site-specific safety plan and verify that project activity self-assessment checklists are being used as outlined this HSP;
- Coordinate with the RHSM regarding CH2M HILL and subcontractor operational performance, and 3rd party interfaces;
- Verify appropriate personal protective equipment (PPE) use, availability, and training;
- Ensure that the overall, job-specific, HSE goals are fully and continuously implemented;
- Conduct accident investigations including root cause analysis;
- Calibrate and conduct air monitoring in accordance with the HSP; maintain all air monitoring records in project file;
- Maintain HSE records and documentation;
- Facilitate OSHA or other government agency inspections including accompanying inspector and providing all necessary documentation and follow-up;
- Deliver field HSE training as needed based on project-specific hazards and activities;
- Consistently and even-handedly enforce HSE rules, procedures, and requirements at the office and/or on project work sites;
- Wear any required personal protective equipment;
- Conduct, cooperate, or assist with HSE incident investigations;
- Contact the PM and RHSM when standards of conduct or CH2M HILL Policy 203 has been violated by a CH2M HILL employee;
- Contact the RHSM and PM in the event of an incident;
- Contact the RHSM and Project EM in the event of a spill or release immediately so evaluation of reportable quantity requirements and whether agency reporting is required;

- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, stop affected work until adequate corrective measures are implemented, and notify the PM and RHSM as appropriate; and
- Document all verbal health and safety-related communications in project field logbook, daily reports, or other records.

3.2.3.5 UXO Safety Officer

The UXOSO is responsible for implementing all MEC-related and general safety components. The UXOSO will verify compliance with all H&S requirements. The UXOSO will report independently of project management to the CH2M HILL Corporate MR Safety and QC Officer. The UXOSO will implement the approved safety programs in compliance with all DoD, federal, state, and local statutes and codes; analyze operational risks, hazards, and safety requirements; enforce personnel limits and safety EZs for MEC clearance operations, transportation, storage, and destruction; and conduct safety inspections to ensure compliance with safety codes. The UXOSO shall be onsite for the duration of project activity and share in the responsibility to:

- Make safety integral to each MR operation by promoting worker involvement in the work planning and hazard identification process.
- Implement the approved explosive safety programs.
- Analyze MEC and explosive operational risk and hazards.
- Enforce personnel limits and MEC-related EZs.
- Maintain active and visible involvement using open communication with employees regarding safety items on the project.
- Verify that the SSHP and AHAs are current and are amended when project activities or conditions change.
- Verify that the workforce is trained and qualified in accordance with the SSHP.
- Conduct HS&E orientation, safety briefings, etc., for all team members prior to entering the project work areas.
- Serve as the project "Hazard Communication Coordinator" and perform the responsibilities outlined in the SSHP.
- Serve as the project "Emergency Response Coordinator" and perform the responsibilities outlined in the SSHP.
- Perform weekly project activity self-assessment checklists to confirm ongoing project activities are in compliance with HS&E practices and procedures during the course of the project. Complete the applicable checklists depending on the work being performed at the time of the weekly assessment.
- Conduct and prepare reports of daily safety inspections of UXO work processes, site conditions, and equipment conditions and submit them to Field Team Leader.

- Coordinate with the Field Team Leader and Program ` regarding subcontractor operational performance and third-party interfaces.
- Verify appropriate PPE use, availability, and training.
- Conduct daily safety briefings for project personnel on MEC-related operations.
- Conduct accident investigations, including root cause analysis.
- Maintain HS&E records and documentation.
- Deliver field HS&E training as needed based on project-specific hazards and activities.
- Ensure that programs are effectively functioning to prevent and control hazards on the project.
- Provide H&S inputs into Daily QC Reports.
- Prepare safety hazard analyses for definable features of work.

3.2.3.6 Senior UXO Supervisor

The SUXOS is responsible for the execution of all onsite activities in the EZ. The SUXOS will be responsible for overseeing scheduling and ensuring that field activities are performed in accordance with the specified plans. The SUXOS will be familiar with all aspects of H&S as related to MEC and will coordinate with the UXOSO to ensure H&S of site personnel, the public and the environment. The SUXOS reports directly to the Project Manager and is responsible for:

- Directly controlling the operations of all field teams performing MR activities.
- Monitoring the MR field teams daily performance.
- Assisting the MR field teams in achieving maximum operational safety and efficiency.
- Implementing the approved work plans in the field.
- Supervising all MR teams on the project.
- Temporarily stopping work to correct an unsafe condition or procedure.

3.2.3.7 UXO Quality Control

The UXOQC is responsible for:

- Ensuring that the overall QC procedures and objectives of the project are met.
- Reviewing and ensuring that the Quality Control Plan (QCP) addresses all project-specific QC needs and that all appropriate QC requirements are addressed.
- Implementing the MEC-specific sections of the QC Program for all MR-related evolutions.
- Conducting QC inspections of all MEC and explosives operations for compliance with established procedures.
- Directing and approving all corrective actions to ensure that all MR-related work complies with contractual requirements.
- Temporarily stopping work to correct an unsafe condition or procedure.

- Reporting independently of project management to the Corporate MR Safety and QC Officer.
- Exceeding the requirements of the DDESB-approved "UXO Personnel Training and Experience Hierarchy."

3.2.3.8 UXO Technician III

UXO Technician III personnel report directly to the SUXOS and are responsible for:

- The safety and efficiency of their assigned field team.
- Temporarily stopping work in order to bring an unsafe condition or procedure to the attention of the SUXOS.
- Exceeding the requirements of the DDESB-approved "UXO Personnel Training and Experience Hierarchy."

3.3 CH2M HILL Subcontractors

(Reference CH2M HILL SOP HSE-215, *Contracts and Subcontracts)*

Subcontractor: USA Environmental Subcontractor Contact Name: To be determined Telephone: To be determined
Subcontractor: To be determined Subcontractor Contact Name: Telephone:

The subcontractors listed above are required to submit their own Site-Specific HSP. Other plans, such as Lead or Asbestos Abatement Compliance plans may be required as well. Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit their plans to CH2M HILL for review before the start of field work.

Subcontractors are also required to prepare an Activity Hazard Analysis (AHA) before beginning each activity posing H&S hazards to their personnel using the AHA form provided in Attachment 5 as a guide. The AHA shall identify the principle steps of the activity, potential H&S hazards for each step and recommended control measures for each identified hazard. In addition, a listing of the equipment to be used to perform the activity, inspection requirements and training requirements for the safe operation of the equipment listed must be identified.

CH2M HILL should continuously endeavor to observe subcontractors' safety performance and adherence to their Accident Prevention Plan and AHAs. This endeavor should be reasonable, and include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. Self-assessment checklists contained in Attachment 4 are to be used by CH2M HILL personnel to review subcontractor performance. CH2M HILL oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

Health and safety related communications with CH2M HILL subcontractors should be conducted as follows:

- Brief subcontractors on the provisions of this plan, and require them to sign the Employee Signoff Form included in Attachment 1.
- Request subcontractor(s) to brief project team on the hazards and precautions related to their work.
- When apparent non-compliance/unsafe conditions or practices are observed, notify the subcontractor safety representative and require corrective action – the subcontractor is responsible for determining and implementing necessary controls and corrective actions.
- When repeat non-compliance/unsafe conditions are observed, notify the subcontractor safety representative and stop affected work until adequate corrective measures are implemented.
- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify subcontractor safety representative, and stop affected work until adequate corrective measures are implemented. Notify the PM and RHSM as appropriate.
- Document all oral health and safety related communications in project field logbook, daily reports, or other records.

4.0 Personal Protective Equipment (PPE)

(Reference CH2M HILL- SOP HSE-117, *Personal Protective Equipment*)

4.1 Required PPE

- PPE must be worn by employees when actual or potential hazards exist and engineering controls or administrative practices cannot adequately control those hazards.
- A PPE assessment has been conducted by the RHSM based on project tasks (see PPE specifications below). Verification and certification of assigned PPE by task is completed by the RHSM or designee.
- Employees must be trained to properly wear and maintain the PPE.
- In work areas where actual or potential hazards are present at any time, PPE must be worn by employees working or walking through the area.
- Areas requiring PPE should be posted or employees must be informed of the requirements in an equivalent manner.
- PPE must be inspected prior to use and after any occurrence to identify any deterioration or damage.
- PPE must be maintained in a clean and reliable condition.
- Damaged PPE shall not be used and must either be repaired or discarded.
- PPE shall not be modified, tampered with, or repaired beyond routine maintenance.

The table below outlines PPE to be used according to task based on project-specific hazard assessment. If a task other than the tasks described in this table needs to be performed, contact the RHSM so this table can be updated.

Project-Specific PPE Requirements[a]

Task	Level	Body	Head	Respirator [b]
General site entry Surface debris clearance Material transport Vegetation clearing Enforcement of ESQD arcs Demilitarization and processing of MPPEH	D	Work clothes; safety toed work boots and gloves	Hardhat [c] Safety glasses with side shields Ear protection [d]	None required
Equipment decontamination if using pressure washer	Modified D with splash protection	**Coveralls:** Polycoated Tyvek® **Boots:** 16-inch-high steel-toed rubber boots **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] over safety glasses with side shields or splash goggles Ear protection [d]	None required

Reasons for Upgrading or Downgrading Level of Protection

Upgrade[f]	Downgrade
• Request from individual performing tasks. • Change in work tasks that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels (Section 5) exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decrease the hazard. • Change in work task that will reduce contact with hazardous materials.

[a] Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.
[b] No facial hair that would interfere with respirator fit is permitted.
[c] Hardhat and splash-shield areas are to be determined by the SC.
[d] Ear protection should be worn when conversations cannot be held at distances of 3 feet or less without shouting.
[e] See cartridge change-out schedule in Section 4.2.
[f] Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the RHSM, and an SC qualified at that level is present.

PPE Certification

I certify that the PPE requirements listed in the table above for the associated tasks are based upon the project-specific hazard assessment I performed.

Carl Woods	11/26/13	11/26/13
Name	Date of Certification	Date(s) of Project Hazard Assessment

5.0 Air Monitoring/Sampling

(Reference CH2M HILL SOP HSE-207, Exposure Monitoring for Airborne Chemical Hazards)

There are no air monitoring requirements for this project.

6.0 Decontamination

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations*)

Proper decontamination procedures will be required to ensure negative worker exposure to any identified constituents of concern or hazardous materials. Good personal hygiene practices must be exercised by CH2M HILL personnel to facilitate negative exposure. These practices include but are not limited to the following: 1) Eating, drinking, smoking and tobacco use shall only be conducted in designated areas and not in areas where there is any exposure to hazardous material/waste, flammable/combustible liquids and gases may exist and 2) wash hands and face, if applicable, before eating, drinking, smoking or using tobacco 3) shower as soon as feasible after completing field activities.

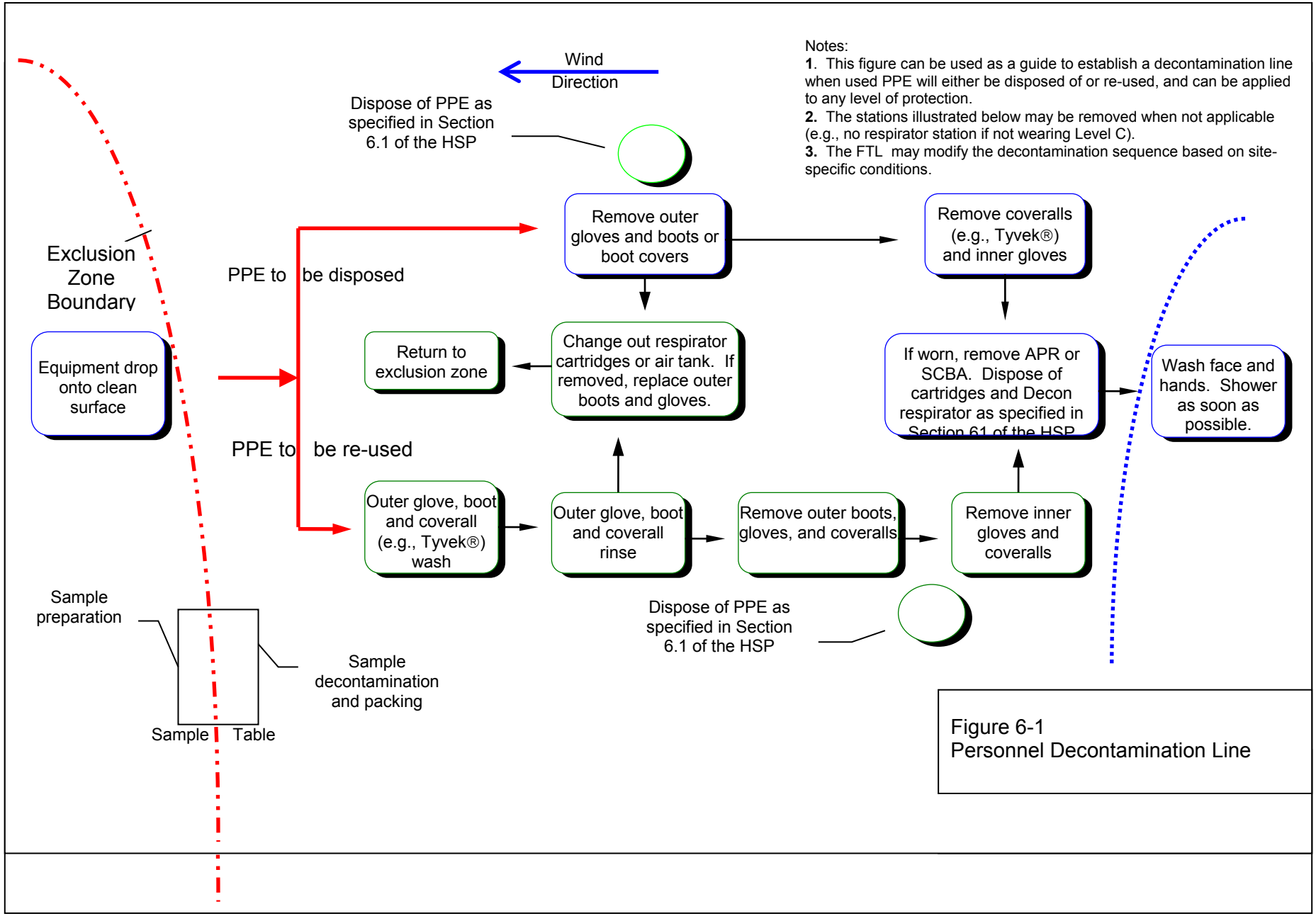
The FTL must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the FTL. The FTL must ensure that procedures are established for disposing of materials generated on the site.

Decontamination Specifications

Personnel	Sample Equipment	Heavy Equipment
• Dispose of PPE in municipal trash, or contain for disposal	• Wash/rinse equipment • Solvent-rinse equipment • Contain solvent waste for offsite disposal	• Power wash • Steam clean • Dispose of equipment rinse water to facility or sanitary sewer, or contain for offsite disposal

Diagram of Personnel-Decontamination Procedures

Figure 6-1 is a flow chart of the Personnel Decontamination Line. No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The FTL should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones. In all cases, whether Level D modified or Level C PPE is required, it is essential for workers to maintain good positive personal hygiene practices.



Notes:
1. This figure can be used as a guide to establish a decontamination line when used PPE will either be disposed of or re-used, and can be applied to any level of protection.
2. The stations illustrated below may be removed when not applicable (e.g., no respirator station if not wearing Level C).
3. The FTL may modify the decontamination sequence based on site-specific conditions.

Figure 6-1
Personnel Decontamination Line

7.0 Spill Containment Procedures

Sorbent material will be maintained in the support zone. Incidental spills will be contained with sorbent and disposed of properly.

8.0 Site-Control Plan

8.1 Site-Control Procedures

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations)*

- The SC will conduct a site safety briefing (see below) before starting field activities or as tasks and site conditions change.
- Topics for briefing on site safety: general discussion of Health and Safety Plan, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, emergencies.
- The SC records attendance at safety briefings in a logbook and documents the topics discussed.
- Post the OSHA job-site poster in a central and conspicuous location in accordance with CH2M HILL- Core Standard, *OSHA Postings*.
- Establish support, decontamination, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals
  - Air horn
  - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the "buddy system."
- Initial air monitoring is conducted by the SC in appropriate level of protection.
- The SC is to conduct periodic inspections of work practices to determine the effectiveness of this plan – refer to Sections 2 and 3. Deficiencies are to be noted, reported to the HSM, and corrected.

8.2 Hazwoper Compliance Plan

(Reference CH2M HILL SOP HSE-220, Written Plans and HSE-218 Hazardous Waste Operations)

Certain parts of the site work are covered by state or federal Hazwoper standards and therefore require training and medical monitoring. Anticipated Hazwoper tasks (Section 1.1.1) might occur consecutively or concurrently with respect to non-Hazwoper tasks. This section outlines procedures to be followed when approved activities specified in Section 1.1.2 do not require 24- or 40-hour training. Non-Hazwoper-trained personnel also must be trained in accordance with all other state and federal OSHA requirements.

- In many cases, air sampling, in addition to real-time monitoring, must confirm that there is no exposure to gases or vapors before non-Hazwoper-trained personnel are allowed on the site, or while non-Hazwoper-trained staff is working in proximity to Hazwoper activities. Other data (e.g., soil) also must document that there is no potential for exposure. The

RHSM must approve the interpretation of these data. Refer to Sections 2.0 and 5.0 for contaminant data and air sampling requirements, respectively.

- When non-Hazwoper-trained personnel are at risk of exposure, the SC must post the exclusion zone and inform non-Hazwoper-trained personnel of the:
  - nature of the existing contamination and its locations
  - limitations of their access
  - emergency action plan for the site
- Periodic air monitoring with direct-reading instruments conducted during regulated tasks also should be used to ensure that non-Hazwoper-trained personnel (e.g., in an adjacent area) are not exposed to airborne contaminants.
- When exposure is possible, non-Hazwoper-trained personnel must be removed from the site until it can be demonstrated that there is no longer a potential for exposure to health and safety hazards.

9.0 Emergency Response Plan

(Reference CH2M HILL SOP HSE-106, *Emergency Planning*)

9.1 Pre-Emergency Planning

- The Emergency Response Coordinator (ERC) performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate.
- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin, including driving route to hospital. Drills should take place periodically but no less than once a year.
- Brief new workers on the emergency response plan.
- The ERC will evaluate emergency response actions and initiate appropriate follow-up actions.

9.2 Emergency Equipment and Supplies

The ERC should mark the locations of emergency equipment on the site map and post the map.

Emergency Equipment and Supplies	Location
20 (or two 10) class A,B,C fire extinguisher	
First aid kit	
Potable water	
Bloodborne-pathogen kit	
Additional equipment (specify):	

9.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Notify appropriate response personnel.
- Shut down CH2M HILL operations and evacuate the immediate work area.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.
- Implement HSE-111, Incident Notification, Reporting and Investigation.
- Notify and submit reports to clients as required in contract.

Small fires or spills posing minimal safety or health hazards may be controlled with onsite spill kits or fire extinguishers without evacuating the site. When in doubt evacuate. Follow the incident reporting procedures in Section 9.7.

9.4 Emergency Medical Treatment

Emergency medical treatment is needed when there is a life-threatening injury (such as severe bleeding, loss of consciousness, breathing/heart has stopped). When in doubt if an injury is life-threatening or not, treat it as needing emergency medical treatment.

- Notify 911 or other appropriate emergency response authorities as listed in Emergency Contacts at the front of this HSP.
- The ERC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury, perform decontamination (if applicable) where feasible; lifesaving and first aid or medical treatment takes priority.
- Initiate first aid and CPR where feasible.
- Notify supervisor and if the injured person is a CH2M HILL employee, the supervisor will call the occupational nurse at 1-866-893-2514 and make other notifications as required by HSE SOP-111, *Incident Notification, Reporting and Investigation*.
- Make certain that the injured person is accompanied to the emergency room.
- Follow the Serious Incident Reporting process in HSE SOP-111, Incident Notification, Reporting and Investigation, and complete incident report forms in Attachment 5.

- Notify and submit reports to client as required in contract.

9.5 Evacuation

- Evacuation routes, assembly areas, and severe weather shelters (and alternative routes and assembly areas) are to be specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the ERC or designee before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The ERC and a "buddy" will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The ERC will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).
- The ERC will follow the incident reporting procedures in Section 9.7.

9.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

10.0 Incident Notification, Reporting, and Investigation

(Reference CH2M HILL SOP HSE-111, *Incident Notification, Reporting and Investigation*)

10.1 General Information

This section applies to the following:

- All injuries involving employees, third parties, or members of the public;
- Damage to property or equipment;
- Interruptions to work or public service (hitting a utility);
- Incidents which attract negative media coverage;
- Near misses;
- Spills, leaks, or regulatory violations; and
- Motor vehicle accidents.

Documentation, including incident reports, investigation, analysis and corrective measure taken, shall be kept by the SC and maintained onsite for the duration of the project.

10.2 Section Definitions

Incident: An incident is an event that causes or could have caused undesired consequences. An incident may be caused by natural forces, employees, subcontractors, or third parties in any location associated with CH2M HILL operations, including offices, warehouses, project sites, private property, or public spaces. Incidents include:

- Injury or illness to a CH2M HILL employee or subcontractor employee, or member of the public;
- Property damage;
- Spill or release;
- Environmental requirement or permit violation;
- A "near-miss"; or
- Other (e.g., fire, explosion, bomb threat, workplace violence, threats)

Accident: an incident involving actual loss through injury, damage to assets, or environmental harm.

Near Miss: A near-miss occurs when an intervening factor prevented an injury or illness, property damage, spill or release, permit violation or other event from occurring. Examples of near-miss situations include: a hard hat or other personal protective equipment (PPE) prevented an injury; secondary containment or emergency shutoff prevented a spill; or an alert co-worker prevented an incident.

Serious Incident:

A Serious Incident must be immediately reported to senior management includes:

- Work related death, or life threatening injury or illness of a CH2M HILL employee;
- subcontractor, or member of the public;
- Kidnap/missing person;

- Acts or threats of terrorism;
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than $ 500,000 in damage; or
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

10.3 Reporting Requirements

All employees and subcontractors' employees shall immediately report any incident (including "near misses," as defined in the section above) in which they are involved or witness to their supervisor.

The CH2M HILL or Subcontractor supervisor, upon receiving an incident report, shall inform his immediate superior and the CH2M HILL SC.

The SC shall immediately report the following information to the RHSM and PM by phone and e-mail:

- Project Name and Site Manager;
- Date and time of incident;
- Description of incident;
- Extent of known injuries or damage;
- Level of medical attention; and
- Preliminary root cause/corrective actions

If the incident was an environmental permit issue (potential permit non-compliance, other situation that result in a notice of violation) or a spill or release, contact the Project EM immediately so evaluation of reportable quantity requirements and whether agency reporting is required;

The CH2M HILL team shall comply with all applicable statutory incident reporting requirements such as those to OSHA, the police, or state or Federal environmental agency.

Be aware that many OSHA-designated states require reporting to the area OSHA office if one person is admitted to the hospital (e.g., California and Washington); whereas Federal OSHA requires it if three or more are admitted.

10.4 HITS System and Incident Report Form

CH2M HILL maintains a HITS entry and/or Incident Report Form (IRF) for all work-related injuries and illnesses sustained by its employees in accordance with recordkeeping and insurance requirements. A HITS entry and/or IRF will also be maintained for other incidents (property damage, fire or explosion, spill, release, potential violation, and near misses) as part of our loss prevention and risk reduction initiative.

The SC shall complete an entry into the Hours and Incident Tracking System (HITS) database system located on CH2M HILL's Virtual Office (or if VO not available, use the hard copy Incident Report Form and Root Cause Analysis Form and forward it to the RHSM) within 24 hours and finalize those forms within 3 calendar days.

10.5 Injury Management/Return-to-Work (for US/Puerto Rico based CH2M HILL Staff Only)

(Reference CH2M HILL, SOP HSSE-124, *Injury Management/Return-to-Work*)

10.5.1 Background

The Injury Management Program has been established to provide orderly, effective and timely medical treatment and return-to-work transition for an employee who sustains a work-related injury or illness. It also provides guidance and assistance with obtaining appropriate treatment to aid recovery, keep supervisors informed of employee status, and to quickly report and investigate work-related injury/illnesses to prevent recurrence.

To implement the Injury Management/Return-to-Work Program successfully, supervisors and/or SC should:

- Ensure employees are informed of the Injury Management/Return-to-Work Program;
- Become familiar with the Notification Process (detailed below); and
- Post the Injury Management/Return-to-Work Notification Poster.

10.5.2 The Injury Management/Return-to-Work Notification Process:

- Employee informs their supervisor.
- Employee calls the Injury Management Program toll free number 1-866-893-2514 immediately and speaks with the Occupational Injury Nurse. This number is operable 24 hours per day, 7 days a week.
- Supervisor ensures employee immediately calls the Injury Management Program number. Supervisor makes the call with the injured worker or for the injured worker, if needed.
- Nurse assists employee with obtaining appropriate medical treatment, as necessary schedules clinic visit for employee (calls ahead, and assists with any necessary follow up treatment). The supervisor or SC accompanies the employee if a clinic visit is necessary to ensure that employees receive appropriate and timely care.
- Supervisor or SC completes the HITS entry or Incident Report Form immediately (within 24 hours) and forwards it to the Project Manager and RHSM.
- Nurse notifies appropriate CH2M HILL staff by e-mail (supervisor, Health & Safety, Human Resources, Workers' Compensation).
- Nurse communicates and coordinates with and for employee on treatment through recovery.
- Supervisor ensures suitable duties are identified and available for injured or ill workers who are determined to be medically fit to return to work on transitional duty (temporary and progressive).
- Supervisor ensures medical limitations prescribed (if any) by physician are followed until the worker is released to full duty.

10.6 Serious Incident Reporting Requirements

(Reference CH2M HILL SOP HSE-111, *Incident Reporting, Notification and Investigation*)

The serious incident reporting requirements ensures timely notification and allows for positive control over flow of information so that the incident is handled effectively, efficiently, and in conjunction with appropriate corporate entities. This standard notification process integrates Health, Safety, Security and Environment and Firm Wide Security Operations requirements for the consistent reporting of and managing of serious events throughout our operations.

10.6.1 Serious Incident Determination

The following are general criteria for determining whether an incident on CH2M HILL owned or managed facilities or program sites is considered serious and must be immediately reported up to Group President level through the reporting/notification process:

- Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public;
- Kidnap or missing person;
- Acts or threats of terrorism;
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than $ 500,000 in damage; or
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

10.6.2 Serious Incident Reporting

If an incident meets the "Serious Incident" criteria, the Project Manager is to immediately contact the Crisis Manager at 720-286-4911, then follow the standard incident reporting procedure.

For all serious incidents this standard reporting process is implemented immediately so as to ultimately achieve notification to the Business Group President within 2 hours of incident onset or discovery, and notification to appropriate corporate Crisis Management Support Team.

ESBG US Operations
Incident Reporting Flow Diagram

Direct Reporting Responsibility → | Informational Reporting →

Incident:
- Injury or illness
- Hazardous substance exposure
- Damage to property
- Fire or explosion
- Spill, release, potential violation, or permit exceedance
- A "near-miss"

If incident is an **injury** to US or Puerto Rico based CH2M HILL personnel contact the Occupational Health Nurse at 866/893-2514. Outside the US, the supervisor must notify the HR representative.

The Ops Leader is responsible for completing the Incident Report Form (IRF) in **HITS** when there is an injury to a CH2M HILL employee. The PM, CM or SC is responsible for completing the IRF for all other incidents. ***The IRF/HITS must be completed within 24 hours of the incident and does not replace the required immediate PM and RHSM notifications.***

Incident
Ensure that Emergency Responders have been notified as necessary

Employee or Subcontractor
Provide immediate notification.

Supervisor – Construction Manager - Safety Coordinator
Provide immediate notification by phone and email to PM and RHSM. In addition, for spills, NOVs, and permit issues you may also call the EM.

CRISIS MANAGER:
If the incident meets the "**Serious Incident**" criteria, contact the Crisis Manager
(720.286.4911)

Third Party – Incidents outside of our contractual obligations do not need to be communicated, unless they are serious and/or may affect CH2M HILL. The RHSM will determine the level of communication necessary for third party incidents.

Serious Incident:
- Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
- Kidnap/missing person
- Acts or threats of terrorism
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than $ 500,000 US in damage.
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

Responsible HSM (RHSM)
Immediately notify the Sector OR Client Program HSE Manager, immediately notify the Responsible Environmental Manager (EM) for spills, NOVs, and permit issues, and direct the incident investigation.

Client Program HSE Manager
Notify Sector HSM, and coordinate communication and incident investigations.

Immediate notification to the Sector HSM is not required for some minor incidents. Follow the program or sector protocol.

Sector HSE Manager
Coordinate communication, direct significant incident investigations, notify Sector EM for spills, NOVs, & permit issues.

HSSE Director
Provide decision-making assistance or direction for incident resolution.

Project Manager
Provide notification to the Sector OR Program Project Delivery (PD) or Operations (Ops) Manager or designee. Notification is based on program or sector specific criteria.

Immediate notification to the PD/Ops Manager is not required for some minor incidents. Follow the program or sector protocol.

Sector or Program PD/Ops Manager
Notify Client Program Manager OR Sector Director, provide guidance and follow the incident through to resolution.

Client Program Manager
Notify Sector Director; provide decision-making assistance or direction for incident resolution.

Keep unnecessary communication of serious incidents to a minimum.

Sector Director
Provide decision-making assistance or direction for incident resolution.

ES US Operations Director/ Executive Leadership Team
Provide decision-making assistance, direction for incident resolution, and make higher level notifications as necessary

Post-emergency incident communications regarding serious incidents at a CH2M HILL office or project (regardless of the party involved) shall be considered sensitive in nature and must be controlled in a confidential manner.

10.7 Incident Root Cause Analysis

The accident analysis is essential if all causes of the incident are to be identified for the correct remedial actions to be taken to prevent the same and similar type of incident from recurring. Root Cause Analysis (RCA) shall be completed for all recordable injuries, property damage incidents in excess of $5000.00 (US), environmental permit violations, spills and releases which are required to be reported to regulatory agencies, and any other incident, including near misses where they RHSM or PM determines an RCA is appropriate. The RHSM/REM is responsible for ensuring it is completed and results entered in the incident report form in HITS. RCA's must be completed using a Team that includes, at least the RHSM or designee, the involved party(ies), a responsible operations representative (e.g. PM, construction manager, crew supervisor, etc.) and an independent management representative not associated with the incident.

The Root Cause Analysis Form must be completed for all Loss Incidents and Near Loss Incidents. This form must be submitted to the investigation team for review.

For minor losses or near losses, the information may be gathered by the supervisor or other personnel immediately following the loss. Based on the complexity of the situation, this information may be all that is necessary to enable the investigation team to analyze the loss, determine the root cause, and develop recommendations. More complex situations may require the investigation team to revisit the loss site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

Photographs or videotapes of the scene and damaged equipment should be taken from all sides and from various distances. This point is especially important when the investigation team will not be able to review the loss scene.

The investigation team must follow the Root Cause Analysis Flow Chart (see Attachment 4 of the SOP) to assist in identifying the root cause(s) of a loss. Any loss may have one or more root causes and contributing factors. The root cause is the primary or immediate cause of the incident, while a contributing factor is a condition or event that contributes to the incident happening, but is not the primary cause of the incident. Root causes and contributing factors that relate to the person involved in the loss, his or her peers, or the supervisor should be referred to as "personal factors." Causes that pertain to the system within which the loss or injury occurred should be referred to as "job factors."

Personal factors include:

- Lack of skill or knowledge;
- Correct way takes more time and/or requires more effort;
- Short-cutting standard procedures is positively reinforced or tolerated; or
- Person thinks there is no personal benefit to always doing the job according to standards.

Job Factors include:

- Lack of or inadequate operational procedures or work standards;
- Inadequate communication of expectations regarding procedures or standards; or
- Inadequate tools or equipment.

The root cause(s) could be any one or a combination of these seven possibilities or some other uncontrollable factor. In the vast majority of losses, the root cause is very much related to one or more of these seven factors. Uncontrollable factors should be used rarely and only after a thorough review eliminates all seven other factors.

10.7.1 Corrective Actions

Include all corrective actions taken or those that should be taken to prevent recurrence of the incident. Include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a timeframe for completion. Be sure the corrective actions address the causes.

Once the investigation report has been completed, the PM shall hold a review meeting to discuss the incident and provide recommendations. The responsible supervisors shall be assigned to carry out the recommendations, and shall inform the SC upon successful implementation of all recommended actions.

- Evaluation and follow-up of the IRF will be completed by the type of incident by the RHSM, EM, or FWSO.
- Incident investigations must be initiated and completed as soon as possible but no later than 72 hours after the incident.

11.0 Behavior Based Loss Prevention System

(Reference CH2M HILL SOP HSE-103, *Behavior Based Loss Prevention System*)

A Behavior Based Loss Prevention System (BBLPS) is a system to prevent or reduce losses using behavior-based tools and proven management techniques to focus on behaviors or acts that could lead to losses.

The four basic Loss Prevention tools that will be used by CH2M HILL projects to implement the BBLPS include:

- Activity Hazard Analysis (AHA)
- Pre-Task Safety Plans (PTSP)
- Safe Behavior Observations (SBO)
- Loss and Near Loss Investigations (NLI)

The SC or designated CH2M HILL representative onsite is responsible for implementing the BBLPS on the project site. The Project Manager remains accountable for its implementation. The SC or designee shall only oversee the subcontractor's implementation of their AHAs and PTSPs processes on the project.

11.1 Activity Hazard Analysis

An Activity Hazard Analysis (AHA) defines the activity being performed, the hazards posed and control measures required to perform the work safely. Workers are briefed on the AHA before doing the work and their input is solicited prior, during and after the performance of work to further identify the hazards posed and control measures required.

Activity Hazard Analysis will be prepared before beginning each project activity posing H&S hazards to project personnel using the AHA form provided in Attachment 5. The AHA shall identify the work tasks required to perform each activity, along with potential H&S hazards and recommended control measures for each work task. In addition, a listing of the equipment to be used to perform the activity, inspection requirements and training requirements for the safe operation of the equipment listed must be identified.

An AHA shall be prepared for all field activities performed by CH2M HILL and subcontractor activities during the course of the project. Hazard Controls (found in Sections 2.0 and its subsections of the HSP), the Hazard Analysis Table (Table 1), and applicable CH2M HILL CSs and SOPs should be used as a basis for preparing AHAs.

CH2M HILL subcontractors are required to provide AHAs specific to their scope of work on the project for acceptance by CH2M HILL. Each subcontractor shall submit AHAs for their field activities, as defined in their work plan/scope of work, along with their project-specific safety plan/accident prevention plan. Additions or changes in CH2M HILL or subcontractor field activities, equipment, tools or material to perform work or additional/different hazard encountered that require additional/different hazard control measures requires either a new AHA to be prepared or an existing AHA to be revised.

11.2 Pre-Task Safety Plans

Daily safety meetings are held with all project personnel in attendance to review the hazards posed and required H&S procedures/AHAs, which apply for each day's project activities. The PTSPs serve the same purpose as these general assembly safety meetings, but the PTSPs are held between the crew supervisor and their work crews to focus on those hazards posed to individual work crews. At the start of each day's activities, the crew supervisor completes the PTSP, provided in Attachment 5, with input from the work crew, during their daily safety meeting. The day's tasks, personnel, tools and equipment that will be used to perform these tasks are listed, along with the hazards posed and required H&S procedures, as identified in the AHA. The use of PTSPs, better promotes worker participation in the hazard recognition and control process, while reinforcing the task-specific hazard and required H&S procedures with the crew each day. The use of PTSPs is a common safety practice in the construction industry.

11.3 Safe Behavior Observations

Safe Behavior Observations (SBOs) shall be conducted by SC or designee for specific work tasks or operations comparing the actual work process against established safe work procedures identified in the project-specific HSP and AHAs. SBOs are a tool to be used by supervisors to provide positive reinforcement for work practices performed correctly, while also identifying and eliminating deviations from safe work procedures that could result in a loss. The SC or designee shall perform at least one SBO each week for tasks/operations addressed in the project-specific HSP or AHA. The SC or designee shall complete the SBO form in **Attachment 5** for the task/operation being observed and submit the SBO form weekly to Elaine Kyle/DEN.

11.4 Loss/Near Loss Investigations

Loss/Near Loss Investigations shall be performed for CH2M HILL and subcontractor incidents involving:

- Person injuries/illnesses and near miss injuries,
- Equipment/property damage,
- Spills, leaks, regulatory violations,
- Motor vehicle accidents.

The cause of loss and near loss incidents are similar, so by identifying and correcting the causes of near loss causes, future loss incidents may be prevented. The following is the Loss/Near Loss Investigation Process:

- Gather all relevant facts, focusing on fact-finding, not fault-finding, while answering the who, what, when, where and how questions.
- Draw conclusions, pitting facts together into a probable scenario.
- Determine incident root cause(s), which are basic causes on why an unsafe act/condition existed.
- Develop and implement solutions, matching all identified root causes with solutions.
- Communicate incident as a Lesson Learned to all project personnel.
- Filed follow-up on implemented corrective active action to confirm solution is appropriate.

The SC or designee shall perform an incident investigation, as soon as practical after incident occurrence during the day of the incident, for all Loss and Near Loss Incidents that occur on the project. Loss and Near Loss incident investigations shall be performed using the following incident investigation forms provided in **Attachment 5.**

- Incident Report Form (IRF)
- Root Cause Analysis Form

All Loss and Near Loss incident involving personal injury, property damage in excess of $1,000 or near loss incidents that could have resulted in serious consequences shall be investigated by completing the incident investigation forms and submitting them to the PM and RHSM within 24 hours of incident occurrence. A preliminary Incident Investigation and Root Cause Analysis shall be submitted to the Project Manager and RHSM within 24 hours of incident occurs. The final Incident Investigation and Root Cause Analysis shall be submitted after completing a comprehensive investigation of the incident.

12.0 Approval

This site-specific HSP has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if those conditions change.

Original Plan

Written By: *Renee Clore/CHC* **Date:** December 29, 2009

Approved By: Brian L. Parsley **Date:** January 5, 2010

Revisions

Revisions Made By: Carl Woods **Date: 11/16/13**

Revisions to Plan:

Updated Project Personnel, extended project duration and other miscellaneous updates.

Revisions Approved By: Carl Woods **Date:** 11/26/13

13.0 Attachments

Attachment 1: Employee Signoff Form – Health and Safety Plan
Attachment 2: Chemical Inventory/Register Form
Attachment 3: Chemical-Specific Training Form
Attachment 4: Project Activity Self-Assessment Checklists/Permits
Attachment 5: Behavior Based Loss Prevention Forms
Attachment 6: Material Safety Data Sheets
Attachment 7: Tick Fact Sheet
Attachment 8: Notice of Safety Violation Form
Attachment 9: Stop Work Order Form

CH2M HILL Health and Safety Plan

Attachment 1

Health and Safety Plan Employee Sign-off Form

EMPLOYEE SIGNOFF FORM

Health and Safety Plan

The CH2M HILL project employees and subcontractors listed below have been provided with a copy of this HSP, have read and understood it, and agree to abide by its provisions.

Project Name: **Project Number:**

EMPLOYEE NAME (Please print)	**EMPLOYEE SIGNATURE**	**COMPANY**	**DATE**

CH2M HILL Health and Safety Plan

Attachment 2

Chemical Inventory/Register Form

CH2MHILL

CHEMICAL INVENTORY/REGISTER FORM

Refer to SOP HSE-107, Attachment 1, for instructions on completing this form.

Location: _____

HCC: _____

☐ Office ☐ Warehouse ☐ Laboratory ☐ Project: _____

Project No.: _____

Regulated Product	Location	Container labeled (✓if yes)	MSDS available (✓if yes)

MSDS for the listed products will be maintained at: _____

CH2M HILL Health and Safety Plan

Attachment 3

Chemical-Specific Training Form

CH2MHILL

CHEMICAL-SPECIFIC TRAINING FORM

Refer to SOP HSE-107 Attachment 1 for instructions on completing this form.

Location:	Project # :
HCC:	Trainer:

TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

☐ Physical and health hazards

☐ Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)

☐ Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

CH2M HILL Health and Safety Plan

Attachment 4

Project Activity Self-Assessment Checklists/Permits/Forms

- **Hand and Power Tools**
- **Manual Lifting**
- **Personal Protective Equipment**

CH2M HILL Health and Safety Plan

Attachment 5

Behavior Based Loss Prevention System Forms

Activity Hazard Analysis

Pre-Task Safety Plans

Safe Behavior Observation

Incident Report and Investigation

(use electronic form when possible)

HITS

CH2M HILL Health and Safety Plan

Attachment

Material Safety Data Sheets

CH2M HILL Health and Safety Plan

Attachment 7

Tick Fact Sheet

Tick-Borne Pathogens

There are six tick-borne pathogens that present a significant field hazard, and in some areas account for more than half of our serious field incidents. These procedures should be applied during any field activity where vegetation is present.

Hazard Control

The methods for controlling exposure to ticks include, in order of most-preferred to least:

- Avoiding tick habitats and ceasing operations in heavily infested areas
- Reducing tick abundance through habitat disruption or application of acracide
- Personal protection through use of repellants and protective clothing
- Frequent tick inspections and proper hygiene

Vaccinations are not available and preventative antibiotic treatment after a bite is generally not recommended.

Avoidance and Reduction of Ticks

To the extent practical, tick habitats should be avoided. In areas with significant tick infestation, consider stopping work and withdrawing from area until adequate tick population control can be achieved. Stopping and withdrawing should be considered as seriously as entering an area without proper energy control or with elevated airborne contaminants – tickborne pathogens present risk of serious illness!

In areas where significant population density or infestation exists, tick reduction should be considered. Tick reduction can be achieved by disrupting tick habitats and/or direct population reduction through the use of tick-toxic pesticides (Damminix, Dursban, Sevin, etc.).

Habitat disruption may include only simple vegetative maintenance such as removing leaf litter and trimming grass and brush. Tick populations can be reduced between 72 and 100% when leaf litter alone is removed. In more heavily infested areas, habitat disruption may include grubbing, tree trimming or removal, and pesticide application (Damminix, Dursban, Sevin, etc.). This approach is practical in smaller, localized areas or perimeter areas that require occasional access. Habitat controls are to be implemented with appropriate health and safety controls, in compliance with applicable environmental requirements, and may be best left to the property owner or tenant, or licensed pesticide vendor. Caution should be exercised when using chemical repellents or pesticides in or around areas where environmental or industrial media samples will be collected for analysis.

Personal Protection

After other prevention and controls are implemented, personal protection is still necessary in controlling exposure to ticks. Personal protection must include all of the following steps:

- So that ticks may be seen on your clothing wear light-colored clothing. Full-body New Tyvek (paper-like disposable coveralls) may also be used.

- To prevent ticks from getting underneath clothing tuck pant legs into socks or tape to boots.
- Wear long-sleeved shirts, a hat, and high boots.
- Apply DEET repellent to exposed skin or clothing per product label.
- Apply permethrin repellent to the outside of boots and clothing before wearing, per product label.
- Frequently check for ticks and remove from clothing.
- Where site conditions warrant (vegetation above knee height, tick endemic area) or when tasks warrant (e.g., having to sit/kneel in vegetation) that diminish the effectiveness of the other controls mentioned above, bug-out suits (obtained from MKE warehouse)/Tyvek shall be used. Bug-out suits are more breathable than Tyvek.
- At the end of the day search your entire body for ticks (particularly groin, armpits, neck and head) and shower.
- To prevent pathogen transmission through mucous membranes or broken/cut skin, wash or disinfect hands and/or wear surgical-style nitrile gloves anytime ticks are handled.

Pregnant individuals and individuals using prescription medications should consult with their physician and/or pharmacists before using chemical repellents. Because human health effects may not be fully known, use of chemical repellents should be kept to a minimum frequency and quantity. Always follow manufacturers' use instructions and precautions. Wash hands after handling, applying, or removing protective gear and clothing. Avoid hand-to-face contact, eating, drinking, smoking, etc. when applying or using repellents. Remove and wash clothes per repellent product label. Chemical repellents should not be used on infants and children.

Vaccinations are generally not available for tick-borne pathogens. Although production of the LYMErix™ lyme disease vaccination has been ceased, vaccination may still be considered under specific circumstances and with concurrence from the consulting physician. Preventative antibiotic treatment in non-ill individuals who have had a recent tick bite is recommended in specific cases only.

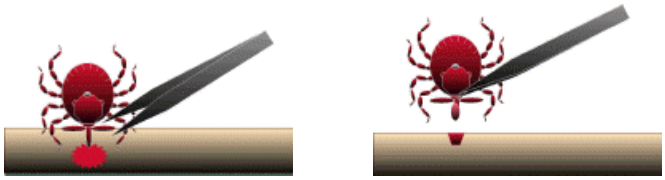
Tick Check

A tick check should be performed after field survey before entering the field vehicle (you do not want to infest your field vehicle with ticks). Have your field partner check your back; the backs of your legs, arms, and neck; and your hairline. Shake off clothing as thorough as possible before entering the vehicle. Once the field day is complete, repeat this procedure and perform a thorough self check.

If a tick has embedded itself into the skin, remove the tick as described below. After removal, preserve the specimen in a small air tight bag and send it to Clongen Laboratories, LLC located in Germantown, Maryland for analysis. The laboratory will have results within 1-3 days. A tick testing submission form (attached) should be properly completed and submitted with the tick.

Tick Removal

- Use fine-tipped tweezers or shield your fingers with a tissue, paper towel, or nitrile gloves.
- Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause the mouthparts to break off and remain in the skin. (If this happens, remove mouthparts with tweezers. Consult your healthcare provider if infection occurs.)



- Do not squeeze, crush, or puncture the body of the tick because its fluids (saliva, hemolymph, gut contents) may contain infectious organisms. Releasing these organisms to the outside of the tick's body or into the bite area may increase the chance of infectious organism transmission.
- Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin. This precaution is particularly directed to individuals who remove ticks from domestic animals with unprotected fingers. Children, elderly persons, and immunocompromised persons may be at greater risk of infection and should avoid this procedure.
- After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.
- You may wish to save the tick for identification in case you become ill. Your doctor can use the information to assist in making an accurate diagnosis. Place the tick in a plastic bag and put it in your freezer. Write the date of the bite on a piece of paper with a pencil and place it in the bag.

Note: Folklore remedies such as petroleum jelly or hot matches do little to encourage a tick to detach from skin. In fact, they may make matters worse by irritating the tick and stimulating it to release additional saliva, increasing the chances of transmitting the pathogen. These methods of tick removal should be avoided. In addition, a number of tick removal devices have been marketed, but none are better than a plain set of fine tipped tweezers.

First-Aid and Medical Treatment

Tick bites should always be treated with first-aid. Clean and wash hands and disinfect the bite site after removing embedded tick. Consult a healthcare professional if infection or symptoms and effects of tick-borne illnesses are develop.

Medical treatment for tick-borne infections include antibiotics and other medical interventions. Diagnosis of specific illness involves both clinical and laboratory confirmations. Preventative

antibiotic treatment in non-ill individuals who have had a recent tick bite is recommended in specific cases only.

Previously infected individuals are not conferred immunity – re-infection from future tick bites can occur even after a person has contracted a tick-borne disease.

Hazard Recognition

An important step in controlling tick related hazards is understanding how to identify ticks, their habitats, their geographical locations, and signs & symptoms of tick-borne illnesses.

Tick Identification

There are five varieties of hard-bodied ticks that have been associated with tick-borne pathogens. These tick varieties include:

- Deer (Black Legged) Tick (eastern and pacific varieties)
- Lone Star Tick
- Dog Tick
- Rocky Mountain Wood Tick

These varieties and their geographical locations are illustrated on the following page.

Tick Habitat

In eastern states, ticks are associated with deciduous forest and habitat containing leaf litter. Leaf litter provides a moist cover from wind, snow, and other elements. In the north-central states, is generally found in heavily wooded areas often surrounded by broad tracts of land cleared for agriculture. On the Pacific Coast, the bacteria are transmitted to humans by the western black-legged (deer) tick and habitats are more diverse. Here, ticks have been found in habitats with forest, north coastal scrub, high brush, and open grasslands. Coastal tick populations thrive in areas of high rainfall, but ticks are also found at inland locations.

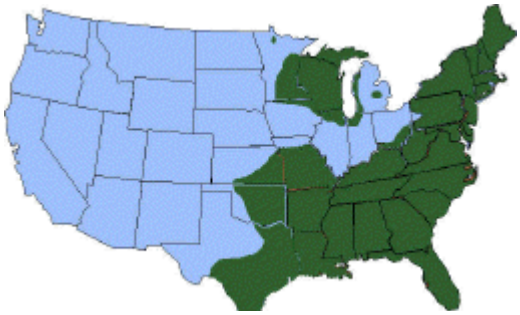
Deer Tick

From Left: adult female, adult male, nymph, and larvae Deer Tick (cm scale)

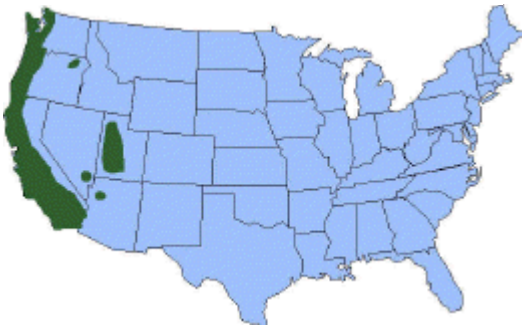
Lone Star Tick

Dog Tick

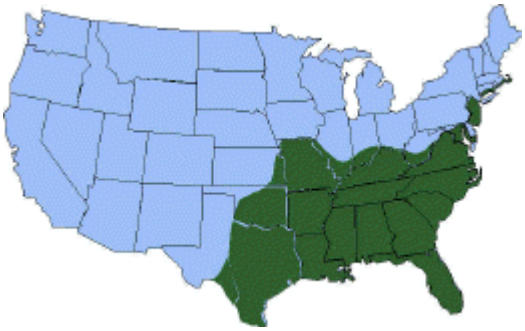
Rocky Mountain Wood Tick



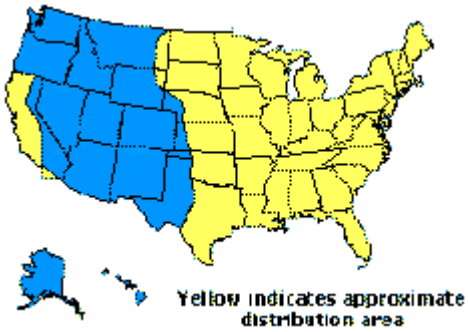
Distribution of Deer Tick (dark green)

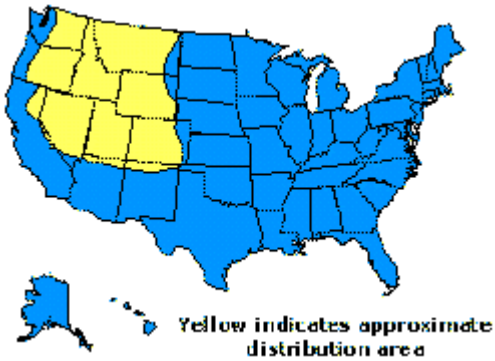


Distribution of Pacific Deer Tick (dark green)



Distribution of Lone Star Tick (Green)





Illnesses and Signs & Symptoms

There are six notifiable tick-borne pathogens that cause human illness in the United States. These pathogens may be transmitted during a tick bite – normally hours after attachment. The illnesses, presented in approximate order of most common to least, include:

- Lyme (bacteria)
- RMSF (bacteria)
- Ehrlichiosis (bacteria)
- STARI (Southern Tick-Associated Rash Illness) (bacteria)
- Tularemia (Rabbit Fever) (bacteria)
- Babesia (protozoan parasite)

Symptoms will vary based on the illness, and may develop in infected individuals typically between 3 and 30 days after transmission. Some infected individuals will not become ill or may develop only mild symptoms. These illnesses present with some or all of the following signs & symptoms: fever, headache, muscle aches, stiff neck, joint aches, nausea, vomiting, abdominal pain, diarrhea, malaise, weakness, small solid, ring-like, or spotted rashes. The bite site may be red, swollen, or develop ulceration or lesions. A variety of long-term symptoms may result when untreated, including debilitating effects and death.

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 8

Notice of Safety Violation Form

Notice of Safety Violation

REPORT PREPARED BY:

Name:	**Title:**	**Signature:**	**Date:**

VIOLATION:

Description:	Date:
	_____

SUBCONTRACTOR SIGNATURE OF NOTIFICATION:

Name:	**Title:**	**Signature:**	**Date:**

**** Corrective action is to be taken immediately. Note below the action taken, sign and return to CCI.****

SUBCONTRACTOR'S CORRECTIVE ACTION

Description:	Date of Nonperformance:
	_____

SUBCONTRACTOR SIGNATURE OF CORRECTION

Name:	**Title:**	**Signature:**	**Date:**

CH2M HILL HEALTH AND SAFETY PLAN

Attachment 9

Stop Work Order Form

Stop Work Order

REPORT PREPARED BY:

Name:	**Title:**	**Signature:**	**Date:**

ISSUE OF NONPERFORMANCE:

Description:	Date of Nonperformance:
	_____

SUBCONTRACTOR SIGNATURE OF NOTIFICATION:

Name:	**Title:**	**Signature:**	**Date:**

**** Corrective action is to be taken immediately. Note below the action taken, sign and return to CCI.* Work may not resume until authorization is granted by CH2M HILL Constructors, Inc. Representative,***

SUBCONTRACTOR'S CORRECTIVE ACTION

Description:	Date of Nonperformance:
	_____

SUBCONTRACTOR SIGNATURE OF CORRECTION

Name:	**Title:**	**Signature:**	**Date:**

Appendix B
Vibration Monitoring Plan

Vibration Monitoring Plan for the Wood Island Surface Debris Removal Effort, Former Cat Island Bomb Target BT-2, Marine Corps Air Station Cherry Point

PREPARED FOR: NAVFAC Mid-Atlantic
MCAS Cherry Point

PREPARED BY: CH2M HILL

DATE: June 30, 2010

This technical memorandum presents the vibration monitoring approach to be implemented during the Wood Island surface debris removal effort at the Former Cat Island Bomb Target BT-2 (referred to hereafter as BT-2). The surface debris removal effort is detailed in the *Work Plan for Munitions Response Program Former Cat Island Bomb Target BT-2 Expanded Site Inspection* (CH2M HILL, 2010). Vibration monitoring will be performed during controlled detonation events to evaluate potential impacts of controlled detonations on the surrounding community.

1.0 Project Background

The following background information was used to develop the vibration monitoring plan for the surface debris removal effort on Wood Island. This background information includes a site description, summary of planned surface debris removal activities, and a general discussion of the mechanisms associated with vibration propagation.

1.1 Site Location and Description

Marine Corps Air Station (MCAS) Cherry Point is a 13,164-acre military reservation located north of the town of Havelock, in southeastern Craven County, North Carolina (**Figure 1**). Commissioned in 1942, MCAS Cherry Point currently provides support facilities and services for the Second Marine Aircraft Wing, the Fleet Readiness Center – East (FRC-East), Service Support Detachment 21 of the Second Force Service Support Group, the Naval Air Maintenance Training Group Detachment, and the Defense Reutilization and Marketing Office (DRMO). MCAS Cherry Point maintains facilities for training and supporting the Atlantic Fleet Marine Force aviation units and is designated as a primary aviation supply point.

BT-2 is a closed range located in Bogue Sound in Western Carteret County, between Emerald Isle (located on Bogue Banks) and the North Carolina mainland at Latitude 34º 41′ 12″N and Longitude 76º 57′ 06″ W, as shown in **Figure 1**. The coordinates of BT-2 were modified several times during operation of the target location, but all target coordinates were located in the immediate vicinity of Wood Island. Wood Island is approximately 12

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acres in size and is primarily covered with marsh grasses and other vegetation. Wood Island is located approximately 2,000 feet from the barrier island of Bogue Banks and the town of Emerald Isle, North Carolina.

The *Range Identification and Preliminary Range Assessment* (USACE, 2001) stated that general purpose bombs, armor piercing bombs, semi-armor piercing bombs, depth bombs, rockets, and machine guns (.30 caliber to 20 millimeter [mm]) were used for training activities at BT-2, including air-delivered munitions comprised of up to 2,000-pound bombs.

1.2 Surface Debris Removal Activities

Surface debris removal activities will include controlled detonations of munitions and explosives of concern (MEC) and material potentially presenting an explosive hazard (MPPEH) on Wood Island to eliminate potential hazards associated with these items. The amount of explosives used for each detonation will be dependent upon the quantities and types of items on which controlled detonation is being performed. These detonations will take place periodically over a three-month period.

1.3 Propagation of Blast-Induced Vibrations

Each controlled detonation will create ground vibrations that propagate outward from the point of detonation. The vibration levels, measured in inches per second, will be highest at the point of detonation and will attenuate rapidly with distance from the source. Attenuation occurs from both the spreading of energy to wider and wider areas, as well as material damping that takes place in the soil as particles move back and forth.

Vibrations from controlled detonations on Wood Island will propagate through the soil and the sediment of the seafloor in a radial pattern. Levels of vibration on Bogue Banks are expected to be very small due to the distance between Wood Island and Bogue Banks, as well as the generally soft characteristics of the surficial soil and sediments between these locations. These soft soil conditions lead to higher material damping of the ground vibration. At the distances involved, the vibrations most likely will not be felt on Bogue Banks. However, there could be a perception of vibration as the detonation is heard and the natural human reaction is to “feel” what is heard.

Vibration measurements will involve the use of velocity-sensitive transducers placed on the ground surface that record the frequency and amplitude characteristics of the ground motion as a function of time. Frequency is defined as the number of vibrations per second, while amplitude is a measure of the vibration strength. Various empirical and semi-empirical charts and equations can then be used to determine whether the level of vibration is sufficient to cause damage to structures supported on the ground. This damage can be in the form of either movement of the ground from soil densification or displacements within the structure. Although the ground vibrations are expected to be very low and damage to structures is not anticipated, vibration measurements will be conducted to quantify the level of vibrations.

The potential for structural damage will depend on the level and frequency of vibration caused by the detonation. This level can be compared to levels of vibration associated with normal day-to-day use of the structure or activities in the area – such as vehicles traveling along the street. Levels of detonation-induced vibrations that are less than ambient or

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background levels will not be of concern. However, if the vibrations exceed the ambient level, then the potential for damage increases.

The intent of the vibration monitoring program is, therefore, to show how the vibration levels from the detonations compare to those from normal activities, as well as how the levels of vibration compare to levels required to cause damage to residential structures as described herein.

2.0 Vibration Monitoring Approach

Vibration monitoring will be performed during controlled detonation events to evaluate potential impacts on the surrounding community. The shortest distance between controlled detonation locations on Wood Island and privately-owned structures (located on Bogue Banks) is approximately 2,000 feet. The primary focus of the vibration monitoring program is to quantify the levels of vibration on Bogue Banks. However, vibration levels will also be recorded on Wood Island to evaluate the vibration attenuation between the point of detonation and Bogue Banks.

2.1 Monitoring Equipment and Locations

Instantel "Minimate Plus" seismographs (or equivalent) with three-axis geophones (velocity transducers) will be installed at two locations to monitor detonation-induced vibrations. Each seismograph will be housed in a weatherproof, locking steel box (a "SubTWarden" assembly provided by SubTerra, Inc. or equivalent) and will be powered by a 12-volt deep cycle battery. A wireless modem will allow automated upload of monitoring data. Each device will also include a pressure sensor to monitor air overpressure (AOP) reported in linear scale decibels (dB-L).

The two proposed monitoring locations are as follows:

- Vibration Monitoring Point No. 1 (VMP-1): Along the southern perimeter of Wood Island. This location will provide data relatively close to the detonations on Wood Island.
- Vibration Monitoring Point No. 2 (VMP-2): At the northern end of Burlington Street or 23rd Street (or other accessible street) in Emerald Isle. This location will provide data representative of the largest detonation-induced vibrations expected on Bogue Banks.

A third device will also be available on-site during the duration of the testing. This device will be an Instantel "Minimate Plus" seismograph, but will not include the SubTWarden support equipment (steel box, 12-volt battery, nor modem). This third device will be used during startup to monitor vibrations at a more remote location (VMP-3) on Bogue Banks to confirm vibration attenuation with distance from the center of detonation. After startup, this third device will be available as a backup for the primary devices (VMP-1 and VMP-2) in the event of equipment complications to prevent potential work delays. This third device will require daily battery charging and daily data downloads via connection to a PC. The estimated locations of the vibration monitoring points are shown on **Figure 1**. Monitoring locations may be modified based on the accessibility of each location.

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During operation, each seismograph will be capable of recording particle velocity (PV) and particle displacement (PD) for each of the three measured axes, plus AOP, at a frequency of at least 1000 measurements per second. Each seismograph can be set to operate in either "histogram" mode or "waveform" mode, as follows:

- In "histogram" mode, the peak values of PV, PD, and AOP measured over predetermined time periods (such as one-minute intervals) are recorded for each interval, and the remaining values are erased from the seismograph memory. This mode permits storage of more than one month of records in seismograph memory.
- In "waveform" mode, each of the measured values of PV, PD, and AOP (at least 1000 measurements per second) are stored for a predetermined period of time (typically 5 to 10 seconds). The seismograph can be set to trigger the "waveform" mode once some threshold value of PV or PD is exceeded. For example, a PV threshold value of 0.05 inch/sec could be set to trigger the waveform mode – this value is likely above most background vibration levels, but still below the common threshold value that could potentially cause structure damage (see "Data Evaluation and Reporting" below). Once the waveform duration is complete, the seismograph would default back to "histogram" mode.

The vibration monitoring equipment will be manually set for the "waveform" mode operation at VMP-2 and VMP-3 for the early part of the monitoring period (at least the first detonation, and perhaps subsequent detonations). Histogram mode with a set waveform mode trigger PV value will be used at VMP-1. Monitoring details are presented below.

2.2 Monitoring Procedures

Vibration monitoring will be performed in the following general manner. In addition, step-by-step procedures included in the equipment user's manual will be followed.

NOTE: Equipment setup and background monitoring (see below) should be initiated approximately 3-5 days prior to the scheduled start of detonations.

2.2.1 Equipment Setup

The seismograph and support equipment at both VMP-1 and VMP-2 will be housed within locking, weatherproof steel boxes. The geophones will record horizontal vibrations in two orthogonal directions and vertical vibrations. Cables will connect the geophones to the seismograph.

At VMP-1, the seismograph will be set up for automated operation on Wood Island each day prior to any detonations, and removed at the end of each day. Staff presence will not be required at VMP-1 during detonations. At VMP-2 (and at VMP-3, when used), the seismograph will be temporarily set up and staffed during each detonation.

The triaxial geophones will be installed in solid contact with the ground and connected to the seismograph via cable. The geophones should be covered with approximately 3 to 6 inches of tamped soil or a sandbag to ensure good ground contact. Once installed, the equipment at VMP-1 and VMP-2 will be checked for proper operation per the equipment user's manual.

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The location of each device (coordinates) will be recorded using a GPS device to a horizontal accuracy within 10 feet.

2.2.2 Background Monitoring

Prior to start of controlled detonations, background vibration readings on Bogue Banks will be measured at VMP-2. The purpose of these measurements is to define the background (cultural) vibration levels during different periods of the day. Two days of background monitoring are planned, as follows:

- Day 1: Data will be collected using the wave-form mode at VMP-2. Approximately ten 10-second waveforms will be collected at representative times throughout the day to document typical background events (i.e., passing cars, boats, or airplanes, possible construction activities, etc.). Detailed notes regarding the source of each recorded background vibration waveform will be recorded.
- Day 2: Data will be collected using the histogram mode at VMP-2. A PV threshold of 0.02 inch/sec will also be set to trigger waveform mode (10 second durations) during the second day of background monitoring.
- OPTIONAL BACKGROUND MONITORING AT VMP-1: If project staff will be working at Wood Island during the background monitoring period for other purposes, VMP-1 may also be set to record data in histogram mode during this time. This data could be used to verify that a PV value of 0.02 inches/sec is appropriate to trigger waveform mode recording at VMP-1, and for comparison with background vibrations at VMP-1. While this data may be useful, it is not considered necessary.

Background data will be uploaded from VMP-2 (and VMP-1 if used) to the equipment vendor's data center (SubTerra) via modem once each day. Once received at the data center, the data will be promptly processed and transmitted to the CH2M HILL designated representative via e-mail.

Once background monitoring is complete, the background data will be reviewed to select a reasonable threshold PV value to trigger waveform mode data collection at VMP-2 during controlled detonation monitoring. The threshold PV value should be set high enough to limit false triggering from background sources (less than five such false triggers per day, if possible), but no higher than 0.05 inches/sec to record any potentially damaging detonation-induced vibrations (see "Data Interpretation and Reporting" below).

2.2.3 Detonation-Induced Vibration Monitoring

After background monitoring is complete, the equipment at VMP-1 and VMP-2 (and VMP-3 for the first detonation) will be set to record detonation-induced PV, PD, and AOP values.

NOTE: If detonation-related airborne debris or excessively concentrated air pressures are expected at the VMP-1 location on Wood Island, additional shielding should be considered to prevent damage to the equipment. This may include installation of corrugated steel sheeting as a shield between the detonation and the monitoring equipment. The AOP sensor should be extended above this shielding.

First Detonation

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It is recommended that the first detonation should be relatively small in magnitude, and located on the northern portion of the work area (relatively far away from Bogue Banks).

Immediately prior to the first detonation, the third seismograph (VMP-3) should be temporarily set up at a location west of VMP-2, perhaps at the northernmost end of Park Drive or an alternate accessible location. This location will record detonation-induced vibrations along the shoreline (line of concern for potential damage) at a greater distance from the source than VMP-2.

For the first detonation, data will be collected at VMP-1, VMP-2, and VMP-3 in the following data collection modes:

- VMP-1: Data will be collected using the histogram mode. A threshold PV value will be set to trigger the waveform mode (0.02 inch/sec or other value to be determined from the background monitoring). Once triggered, waveforms will be recorded for at least 10 seconds.
- VMP-2: Data will be collected by manually triggering the waveform mode immediately prior to the first controlled detonation. The manual triggering will require communications with UXO technicians performing the detonation. Due to limited seismograph data storage capacity, waveform mode data recording should be initiated within approximately one minute prior to the detonation.
- VMP-3: Same as VMP-2 (manual triggering of waveform mode). A second staff member will be required to manually operate the seismograph.

Data from this first detonation should be promptly uploaded via modem from VMP-1 and VMP-2, and downloaded via PC connection fromVMP-3. The data will be reviewed to ensure the following:

- Proper data capture at all three seismographs, and proper "waveform" mode triggering at VMP-1,
- Confirm that the PV, PD, and AOP values at VMP-2 and VMP-3 are clearly below values that could cause structural damage (see "Data Interpretation and Reporting" below),
- Confirm proper operation of the VMP-1 equipment after the first detonation (i.e., no damage to the seismograph),
- Compare results at VMP-1, VMP-2, and VMP-3 to confirm that vibrations attenuate with distance as expected.

Subsequent Detonations

Once proper data capture is confirmed, and results of the first detonation indicate that vibrations on Bogue Banks will be acceptably low, detonations and vibration monitoring will continue in the planned sequence.

Data will be collected as follows:

At VMP-1, the equipment will be set up at the beginning of each day to record in histogram mode. A threshold PV value will be set to trigger the waveform mode (0.02 inch/sec or

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other value to be determined from the background monitoring). Once triggered, waveforms will be recorded for at least 10 seconds. Equipment will be removed each day.

At VMP-2, the equipment can be set to record either in the wave-form mode or in the histogram mode, as follows:

- In the wave-form mode, manual triggering will be required. The manual triggering will require communications with UXO technicians performing the controlled detonations. Due to limited seismograph data storage capacity, waveform mode data recording should be initiated within approximately one minute prior to each detonation.
- Alternatively, if staff support is limited or communication of the exact detonation time cannot be ensured, the histogram mode may be used. A threshold PV value will be set to trigger the waveform mode (to be determined from the background monitoring).

OPTIONAL MONITORING AT VMP-3: If data from the first detonation indicate that vibrations attenuate with distance from the detonation as expected, additional monitoring at VMP-3 is not considered necessary. However, if the data from the first detonation indicate unexpected vibration behavior along Bogue banks, additional monitoring at VMP-3 may be desired. If so, an alternate location for VMP-3 may be selected east of VMP-2 for the second detonation; for example, at the north end of 20th or 21st Streets.

Data will be uploaded from VMP-1 and VMP-2 to the equipment vendor's data center (SubTerra) via modem at the end of each day. Once received at the data center, the data will be promptly processed and transmitted to the CH2M HILL designated representative (and others as requested) via e-mail. The data will be reviewed and reported daily by the CH2M HILL representative (see "Data Interpretation and Reporting" below).

Other items to consider during detonation-induced vibration monitoring:

- The seismograph battery charge levels (voltage) will be automatically reported with the data uploads from VMP-1 and VMP-2. This data should be reviewed daily to confirm the battery charge is sufficient for continued operation. The 12-volt deep cycle batteries will require charge or replacement as necessary. Battery replacement or charge is not expected to be required more than once or twice per month during typical seismograph operation.
- The time and location (coordinates) of each detonation should be provided to the CH2M HILL representative each day to allow calculation of the distance between each detonation and VMP-1 and VMP-2.
- If a detonation is planned within approximately 200 feet of VMP-1, it may be necessary to move the VMP-1 monitoring equipment to a new location at least 200 feet away. The need for this will be discussed with the equipment vendor (SubTerra) prior to the subject detonation(s), and the decision will be based in part on the data from previous, more distant detonations.
- If technical problems arise with the equipment at VMP-1 or VMP-2, the third seismograph may be used as a short-term replacement until the dedicated

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equipment can be repaired. This third device will require daily battery charging and daily data downloads via connection to a PC (i.e., will not have a modem).

2.3 Data Interpretation and Reporting

Data interpretation and reporting will be performed throughout the duration of monitoring. Results will be reviewed as they are received to confirm that equipment and measurements are meeting the intent of the monitoring program. A final report documenting the vibration monitoring and interpretation will be prepared and included in the Expanded Site Inspection Report.

2.3.1 Vibration Threshold Criteria

Vibration levels that are noticeable or annoying to humans will often not cause any structural or architectural damage. Various regulatory and industry groups publish vibration criteria to prevent potential building damage. Common vibration criteria include the following (HMMH, 2006):

- Peak PV (PPV) below 0.1 inch/sec should have no effect on buildings
- PPV below 0.2 inch/sec is considered a threshold criterion to prevent damage to non-engineered buildings (i.e., timber or masonry).

To provide a margin against damage, PPV should be maintained below 0.05 inch/sec at adjacent structure locations during construction. As appropriate, other detonation-specific guidelines may be considered.

2.3.2 Data Reporting

Daily and final vibration monitoring reports will be prepared for this project, as follows.

Daily E-mail Reports

On days when controlled detonations are performed, the CH2M HILL representative will review the daily data downloads from VMP-1 and VMP-2 (and from VMP-3, if used), and summarize the following information on a daily basis (in e-mail form):

- Peak PV, PD, and AOC recorded for each detonation at each location;
- Distance of the center of each detonation to each monitoring location (based on detonation coordinates);
- Comparison of PV readings on Bogue Banks to the threshold value of 0.05 inches/sec;
- Report on battery charge (voltage);
- Copy of the uploaded electronic data files; and
- Any recommendations for future monitoring

Final Vibration Monitoring Report

A report will be prepared to summarize the vibration monitoring results for background conditions and for each detonation. Vibration monitoring results will be compared to the published vibration criteria described in Section 2.3.1.

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2.4 Quality Assurance

The following quality assurance actions will be implemented during this project:

- All vibration monitoring equipment shall be supplied with current calibration documents upon delivery. Calibration shall be confirmed to be current for the anticipated duration of the project. Copies of the calibration certificates shall be included in the project documentation.
- Data records uploaded from VMP-1 and VMP-2 shall be processed by the equipment vendor (SubTerra) in accordance with their data management policies prior to transmittal.
- CH2M HILL staff that set up and/or operate the seismograph equipment will be trained on monitoring requirements and to the equipment user's manuals prior to start of work. Equipment vendor (SubTerra) staff shall participate in this training, as appropriate.

All vibration monitoring work will be done in accordance with the project health and safety plan (HSP) and the project quality management plan (QMP).

3.0 References

CH2M HILL. 2010. *Draft Work Plan for Munitions Response Program Former Cat Island Bomb Target BT-2 Expanded Site Inspection.* May.

HMMH, 2006. *FTA Guidance Manual for Transit Noise and Vibration Impact Assessment. Chapter 12 – Noise and Vibration During Construction*. 2006

Longinow, A. 1999. *Monitoring Construction Vibrations*, Civil Engineering, ASCE, February.

United States Army Corps of Engineers (USACE). 2001. *Final Range Identification and Preliminary Range Assessment, Marine Corps Air Station Cherry Point, New Bern, North Carolina.* December.

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\\NORTHEND\PROJ\USNAVFACENGCOM\CHERRYPOINT\GIS_FOLDERS\MAPFILES\381277_BT_2_VIBRATION_MONITORING_TM\FIGURE 1 - VIBRATION MONITORING LOCATIONS.MXD MRISSING 6/23/2010 14:51:55

Legend

- VMP - Vibration Monitoring Point
- Wood Island

N
W E
S

0 350 700 1,400 Feet

Figure 1
Vibration Monitoring Locations
Former Cat Island Bomb Target BT-2
MCAS Cherry Point
North Carolina

CH2MHILL

Appendix C
Quality Control Forms

FORM C-1b

Preparatory Inspection Checklist
(Part I)

Contract No.:

Date: _____

TITLE AND NO. OF TECHNICAL SECTION: _____

_____

_____

_____

A. Planned Attendees:

	Name	Position	Company
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			
11)			

B. Submittals required to begin work:

	Item	Submittal No.	Action Code
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			

I hereby certify, that to the best of my knowledge and belief, that the above required materials delivered to the job site are the same as those submitted and approved.

_____

Contractor Quality Control Systems Manager

FORM C-1b (Continued)

Preparatory Inspection Checklist
(Part I)

Contract No.:

Date: _____

C. Equipment to be used in executing work:

1) _____
2) _____
3) _____
4) _____
5) _____

D. Work areas examined to ascertain that all preliminary work has been completed:

_____
_____

E. Methods and procedures for performing Quality Control, including specific testing requirements:

_____
_____

The above methods and procedures have been identified from the project plans and will be performed as specified for the Definable Feature of Work.

_____
Contractor Quality Control Systems Manager

FORM C-1b (Continued)

Preparatory Inspection Checklist
(Part II)

A. Persons in attendance: See Meeting Attendance Sheet (attached)

B. Because of mutual understanding developed during review of preparatory outline and Contract Requirements: (Contract items not specifically covered during the preparatory inspection conference are assumed to be in strict conformance with the contract requirements.)

The items noted above constitute a memorandum of mutual understanding and will be performed as planned and specified.

MEC QCS

Technical Representative

FORM C-2b

Initial Phase Check List

Contract No.:

Date: _____

Title and No. of Technical Section: _____

_____

_____

Description and Location of Work Inspected: _____

A. Key Personnel Present:

Name	Position	Company

B. Materials being used are in strict compliance with the contract plans and specifications: Yes ___ No ____

If not, explain: _____

_____

_____

_____

C. Procedures and/or work methods witnessed are in strict compliance with the contract specifications: Yes No ___

If not, explain: _____

_____

_____

_____

D. Workmanship is acceptable: Yes ____ No ____

State where improvement is needed: _____

_____

_____

_____

E. Workmanship is free of safety violations: Yes ____ No ____

If no, corrective action taken:

_____

_____

_____

_____

_____

MEC QCS

FORM C-3b

FOLLOW-UP CHECKLIST

Date:
Contractor:
Contract No:

Y=YES; N=NO; SEE REMARKS BLANK=NOT APPLICABLE	
WORK COMPLIES WITH CONTRACT AS APPROVED IN INITIAL PHASE	

IDENTIFY DEFINABLE FEATURE OF WORK, LOCATION, AND LIST PERSONNEL PRESENT

TESTING PERFORMED & WHO PERFORMED TEST (Include number of samples and/or tests taken)

QA Representative_____ **Date** _____

MEC QCS_____ **Date** _____

FORM C-4b

Final Inspection Checklist
(Part I)

DATE: _____

CONTRACT NO.:_____

Project / Area of Inspection: _____

_____

_____

A. DEFINABLE FEATURES OF WORK: Status of Inspection:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

I hereby certify, that to the best of my knowledge and belief, that the work inspected is complete and all materials and equipment used and work performed were completed in accordance with plans submitted and approved.

_____

CONTRACTOR QUALITY CONTROL SYSTEMS MANAGER

B. Final Acceptance is Approved, Subject to the Correction of the Punchlist Items Below:

_____

_____

_____

_____

_____

FORM C-4b (Continued)

Final Inspection Checklist
(Part I)

DATE:_____

CONTRACT NO.:

A. Persons in Attendance: See Meeting Attendance Sheet (attached)

B. Resolution of Punchlist Items:

The items noted above constitute a memorandum of mutual understanding and work has been performed as planned and specified.

MEC QCS

TECHNICAL REPRESENTATIVE

FORM C-4b (Continued)

Final Inspection Checklist
(Part II)

MEETING ATTENDANCE LIST

Meeting:		Date:
Name	**Organization**	**Phone Number**

FORM C-5b

INSPECTION SCHEDULE AND TRACKING FORM

Project:	**Project Manager:**	**MEC QCS:**

		Preparatory		**Initial**		**Follow-Up**		**Completion**		
Reference Number	Definable Feature of Work	Date Planned	Actual Date	Date Planned	Actual Date	Planned Begin/End	Actual Dates	Planned Begin/End	Actual Dates	Status

FORM C-6b

CORRECTIVE ACTION REQUEST

(2)CAR #:	(3)PRIORITY: ☐HIGH ☐NORMAL	(4)DATE PREPARED:

PART A: NOTICE OF DEFICIENCY

(5)PROJECT:	
(6)PROJECT MANAGER:	(7)MEC QCS:
(8)WORK UNIT:	(9)WORK UNIT MANAGER:
(10)ISSUED TO (INDIVIDUAL & ORGANIZATION):	
(11)REQUIREMENT & REFERENCE:	
(12)PROBLEM DESCRIPTION & LOCATION: (4)CAP REQUIRED? ☐YES ☐NO (14)RESPONSE DUE:	
(15)ISSUED BY (PRINTED NAME & TITLE): SIGNATURE: DATE:	(16)MANAGEMENT CONCURRENCE:

Form C-6B (continued)
CORRECTIVE ACTION REQUEST

PART B: CORRECTIVE ACTION

(17)PROPOSED CORRECTIVE ACTION/ACTION TAKEN: NOTE: SUPPORTING DOCUMENTATION MUST BE LISTED ON THE BACK OF THIS FORM AND ATTACHED.	
(18)PART B COMPLETED BY (NAME & TITLE): SIGNATURE: DATE:	(19)QC CONCURRENCE:

PART C: CORRECTIVE ACTION VERIFICATION

(20)CAR VERIFICATION AND CLOSE-OUT: (CHECK ONLY ONE & EXPLAIN STIPULATIONS, IF ANY)

- ☐ APPROVED FOR CLOSURE WITHOUT STIPULATIONS
- ☐ APPROVED FOR CLOSURE WITH FOLLOWING STIPULATIONS

COMMENTS/STIPULATIONS:

(21)CLOSED BY (PRINTED NAME & TITLE):

SIGNATURE: DATE:

Form C-6B (continued)
CORRECTIVE ACTION REQUEST

CORRECTIVE ACTION REQUEST (CAR) INSTRUCTION SHEET

(1) **MEC QCS**: Verify that the total number of pages includes all attachments.

(2) **MEC QCS**: Fill in CAR number from CAR log.

(3) **MEC QCS**: Fill in appropriate priority category. **High** priority indicates resolution of deficiency requires expediting corrective action plan and correction of deficient conditions noted in the CAR and extraordinary resources may be required due to the deficiency's impact on continuing operations. **Normal** priority indicates that the deficiency resolution process may be accomplished without further impacting continuing operations.

(4) **CAR Requestor**: Fill in date CAR is initiated.

(5) **CAR Requestor**: Identify project name, number, CTO, and WAD.

(6) **CAR Requestor**: Identify Project Manager

(7) **CAR Requestor**: Identify CQC System Manager.

(8) **CAR Requestor**: Identify project organization, group, or discrete work environment where deficiency was first discovered.

(9) **CAR Requestor**: Identify line manager responsible for work unit where deficiency was discovered.

(10) **MEC QCS**: Identify responsible manager designated to resolve deficiency (this may not be work unit manager).

(11) **CAR Requestor**: Identify source of requirement violated in contract, work planning document, procedure, instruction, etc; use exact reference to page and, when applicable, paragraph.

(12) **CAR Requestor**: Identify problem as it relates to requirement previously stated. Identify location of work activities impacted by deficiency.

(4) **MEC QCS**: Identify if Corrective Action Plan (CAP) is required. CAP is typically required where one or more of the following conditions apply: CAR priority is **High**; deficiency requires a rigorous corrective action planning process to identify similar work product or activities affected by the deficiency; or deficiency requires extensive resources and planning to correct the deficiency and to prevent future recurrence.

(14) **MEC QCS**: Identify date by which proposed corrective action is due to QC for concurrence.

Form C-6B (continued)
CORRECTIVE ACTION REQUEST

(15) **MEC QCS**: Sign and date CAR and forward to responsible manager identified in (10) above.

(16) **Responsible Manager**: Initial to acknowledge receipt of CAR.

(17) **Responsible Manager**: Complete corrective action plan and identify date of correction. Typical corrective action response will include statement regarding how the condition occurred, what the extent of the problem is (if not readily apparent by the problem description statement in [12]), methods to be used to correct the condition, and actions to be taken to prevent the condition from recurring. If a CAP is required, refer to CAP only in this section.

(18) **Responsible Manager**: Sign and date corrective action response.

(19) **MEC QCS**: Initial to identify concurrence with corrective action response from responsible manager.

(20) **MEC QCS**: Check appropriate block to identify if corrective action process is complete so that CAR may be closed. Add close-out comments relevant to block checked.

(21) **MEC QCS**: Indicate document closeout by signing and dating.

FORM C-7b

CORRECTIVE ACTION PLAN

Attach clarifications and additional information as needed. Identify attached material in appropriate section of this form.

PART A: TO BE COMPLETED BY PROJECT MANAGER OR DESIGNEE

(1)PROJECT:		
(2)PROJECT MANAGER:	(3)MEC QCS:	
(4)CAR NO(S) AND DATE(S) ISSUED:		
(5)DEFICIENCY DESCRIPTION AND LOCATION:		
(6)PLANNED ACTIONS	(7)ASSIGNED RESPONSIBILITY	(8) COMPLETION DUE DATE
(9)PROJECT MANAGER SIGNATURE:		DATE:

PART B: TO BE COMPLETED BY MEC QCS OR DESIGNEE

(10)CAP REVIEWED BY:	DATE:
(11)REVIEWER COMMENTS:	
(12)CAP DISPOSITION: (CHECK ONLY ONE AND EXPLAIN STIPULATIONS, IF ANY) ☐ APPROVED WITHOUT STIPULATIONS ☐ APPROVED WITH STIPULATIONS ☐ APPROVAL DELAYED, FURTHER PLANNING REQUIRED COMMENTS:	
(4)MEC QCS SIGNATURE:	DATE:

FORM C-8b

DAILY QUALITY CONTROL REPORT

Contract No.: _____

Date: _____Task Order No.:_____Report No:_____

LOCATION OF WORK: _____
DESCRIPTION: _____ _____
WEATHER: (CLEAR) (FOG) (P.CLOUDY) (RAIN) (WINDY)
TEMPERATURE: MIN °F MAX °F

1. Work performed today:

_____

_____

2. Work performed today by CH2MHILL subcontractor(s):

_____

_____

3. Preparatory Phase Inspections performed today (include personnel present, specification section, drawings, plans, and submittals required for definable feature of work):

_____

_____

4. Initial phase Inspections performed today (include personnel present, workmanship standard established, material certifications/test are completed, plans and drawings are reviewed):

_____

_____

5. Follow-up Phase Inspections performed today (include locations, feature of work and level of compliance with plans and procedures):

_____

_____

_____

6. List tests performed, samples collected, and results received:

_____

_____

_____

7. Verbal instructions received (instructions given by Government representative and actions taken):

_____

_____

_____

8. Non-conformances/deficiencies reported:

_____

_____

_____

9. Site safety monitoring activities performed today:

_____

_____

10. Remarks:

_____

_____

_____

_____

CERTIFICATION: *I certify that the above report is complete and correct and that I, or my representative, have inspected all work identified on this report performed by CH2M HILL and our subcontractor(s) and have determined to the best of my knowledge and belief that noted work activities are in compliance with the plans and specifications, except as may be noted above.*

MEC QCS (or designee) Signature: _____

Form C-9b

Document Release and Review

Client:	Author:	Submittal Register Item No.:	Date:
Document Title:		Revision: D.O.#	WAD#

Reviewer (*print*)	Reviewer initial & date	Technical	Project Manager	CQC System Mgr.	Health & Safety	Editorial	Chemistry	Construction	Reviewer Comments Resolved (*Signature & Date)*
Same as Technical Reviewer Above		X	Topic outline with objectives for each section submitted prior to Rev. A						

Program Reviewer's Acceptance for Document Submittal	Signature	Yes	No
1) A 4025 (as applicable) prepared and submitted with document?			
2) Technical Conclusions adequately supported by text and data?			
3) Tables and Figures are in the proper format and checked and approved?			
4) The Table of Contents consistent with text information?			
5) Technical Reviewers are qualified and accepted by Technical Manager?			
6) A document Distribution List been prepared and submitted with document?			

Approval: _____
Project Manager

Approval: _____
MEC QCS

Recommended
4025 Code _____

Appendix D
Applicable or Relevant and Appropriate Requirements

Contents

Tables

D-1 Federal Location-Specific Applicable or Relevant and Appropriate Requirements

D-2 North Carolina Chemical--Specific Applicable or Relevant and Appropriate Requirements

D-3 North Carolina Action-Specific Applicable or Relevant and Appropriate Requirements

D-4 Federal Action-Specific Applicable or Relevant and Appropriate Requirements

Table D-1
Federal Location-Specific ARARs
For the Former Cat Island Bomb Target BT-2, MCAS Cherry Point, North Carolina

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comment
Protection of Floodplain					
Within floodplain	Actions taken should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.	Action that will occur in a floodplain (i.e., lowlands and relatively flat areas adjoining inland and coastal waters and other flood-prone areas).	40 CFR Part 6, Appendix A; excluding Sections 6(a)(2), 6(a)(4), 6(a)(6); 40 CFR 6.302	Applicable	Surface debris removal activities may require compliance with this order. Measures required may include erosion control.
Protection of Wetlands					
Wetland	Action to minimize the destruction, loss, or degradation of wetlands.	Wetland as defined by 33 CFR § 328.3(b).	40 CFR 6, Appendix A; excluding Sections 6(a)(2), 6(a)(4), 6(a)(6); 40 CFR 6.302 40 C.F.R 230.93, .94(a), .94(c), .95-.98 and 33 C.F.R. 320.4, 328.2, 330.1(c), 330.4, 332.3, 332.4(a), 332.4(c), 332.5-.8.	Relevant and Appropriate	Activities undertaken entirely on a site by authority of CERCLA, as approved or required by EPA, are not required to obtain permits under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act, although the substantive requirements of these permits shall be met.
Endangered Species Act of 1978					
Endanger-ed species	Action to ensure that any action is not likely to jeopardize the continued existence of endangered or threatened species or adversely affect its critical habitat.	Applies to actions that affect endangered or threatened species or their habitat.	16 USC 1531 50 CFR § 402.01 - .03, .05	Relevant and Appropriate	One federally listed or proposed endangered species listed as potentially being present on Wood Island. An Environmental Protection Plan to address protection of such species will be included in the project work plan.

Table D-1
Federal Location-Specific ARARs
For the Former Cat Island Bomb Target BT-2, MCAS Cherry Point, North Carolina

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comment
Federal Fish and Wildlife Conservation Act					
Wildlife	Migratory Bird Treaty Act	Applies to actions involving the taking, killing, or possessing of migratory birds	16 U.S.C. § 703	Applicable	Surface debris removal activities will be conducted during winter months in order to avoid potentially impacting migratory birds.
Coastal Zone and Management Act					
Coastal Zone	Requires that activities conducted within a coastal zone be consistent to the maximum extent practicable with an approved state management program.	Applies to sites located within a coastal zone.	16 U.S.C. § 1456(c), 15 CFR. §930.30 - .33, .36(a), .39(b-d)	Relevant and Appropriate	Wood Island is located within the coastal zone. Activities will be conducted in accordance with applicable management programs.
National Historical Preservation Act (NHPA) of 1966 and Archaeological Resources Protection Act of 1979					
Historical Locations and Archaeolo-gical Artifacts	Provides for the recovery and preservation of historical and archaeological significant artifacts.	Applies to historical properties and landmarks, and archaeological artifacts.	NHPA: 16 USC §470; 36 CFR Part 65. Archaeological Resources Protection Act.	Relevant and Appropriate	No evidence of historical or archeological locations has been identified on Wood Island.

* Statutes and policies, and their citations are provided as headings to identify general categories of potential ARARs for the convenience of the reader. Listing the statutes and policies does not indicate that Navy accepts the entire statues or policies as potential ARARs. Specific potential ARARs are addressed in the table below each general heading; only substantive requirements of the specific citations are considered potential ARARs.

ARARs - Applicable or relevant and appropriate requirements

CERCLA – Comprehensive Environmental Response Compensation and Liability Act

CFR - Code of Federal Regulations

MCAS – Marine Corps Air Station

NHPA – National Historical Presevation Act

USC - United States Code

Table D-2
North Carolina Chemical-Specific ARARs
For the Former Cat Island Bomb Target BT-2, MCAS Cherry Point, North Carolina

Location	Requirement	Prerequisite	Citation	ARAR Determination	Comment
NC Surface Water Quality Standards					
Surface water	Establishes a series of classifications and water quality standards for surface water.	Standards are used to protect the public health or welfare and enhance water quality	15A NCAC 02B .0101(d), .0103, 0106, .0108, .0110, .0201, .0202, .0205, .0208(a), .0220 & .0231	Applicable	These standards will be applied to site media during the surface debris removal effort. NC surface water standards for explosives residues, perchlorate and metals apply.

* Statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader. Listing the statutes and policies does not indicate that Navy accepts the entire statutes or policies as potential ARARs. Specific potential ARARs are addressed in the table below each general heading; only substantive requirements of the specific citations are considered potential ARARs.

ARARs - Applicable or relevant and appropriate requirements

NCAC – North Carolina Administrative Code

Table D-3
North Carolina Action-Specific ARARs
For the Former Cat Island Bomb Target BT-2, MCAS Cherry Point, North Carolina

Requirement	Prerequisite	Citation	ARAR Determination	Comment
NC Solid Waste Management Act				
Solid waste shall be stored, collected, transported, separated, and disposed of in a manner consistent with these rules.	Management of wastes that meet the definition of solid waste	15A NCAC 13B.0103 and .0106	Applicable.	Site activities include the demilitarization and disposal of military munitions. All solid waste will be disposed of within the requirements of this regulation.
Sedimentation Pollution Control Act of 1973				
Establishes minimal mandatory sediment and erosion control standards	Actions which could result in the unreasonable degradation of properties, stream channels, waters, and other natural resources	NCGS 113A: 51, 52, 52.01, 57(1)-(3), (5). Article 4	Relevant and Appropriate	Surface debris removal activities may require compliance with this order. Measures required may include erosion control.
Non-hazardous solid waste	Management of wastes that meet the definition of solid	NCGS 130A-294(h)(6), 294.1, 303, 309.02	Applicable	Nonhazardous solid waste will be managed within the requirements of this regulation during the surface debris removal effort.

Table D-3
North Carolina Action-Specific ARARs
For the Former Cat Island Bomb Target BT-2, MCAS Cherry Point, North Carolina

Requirement	Prerequisite	Citation	ARAR Determination	Comment
Air Quality Emission Control Standards				
Requires plan outlining actions to control fugitive dust emissions from the site that could travel beyond the site boundary	Fugitive dust emissions that cause or contribute to substantive complaints	15A NCAC 2D .0540(a), (c), and (f)	Relevant and Appropriate.	Engineering controls will be implemented during the surface debris removal effort to minimize fugitive dust.

* Statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader. Listing the statutes and policies does not indicate that Navy accepts the entire statutes or policies as potential ARARs. Specific potential ARARs are addressed in the table below each general heading; only substantive requirements of the specific citations are considered potential ARARs.

ARAR - Applicable or relevant and appropriate requirement

NCAC – North Carolina Administrative Code

NCGS – North Carolina General Statute

Table D-4 Federal Action-Specific ARARs For the Former Cat Island Bomb Target BT-2, MCAS Cherry Point, North Carolina				
Requirement	**Prerequisite**	**Citation**	**ARAR Determination**	**Comment**
Solid Waste Disposal Act				
Establishes procedures and minimum requirements for land disposal of solid waste.	Solid wastes stored or disposed offsite requiring compliance with RCRA permitting regulations	Solid Waste Disposal Act, 42 USC §6901 et Seq. Subtitle D	Applicable	This regulation is appicable to Alternative 3 which includes removal of MPPEH from Wood Island for processing. A temporary RCRA permit will be obtained for removal of MPPEH from the site as required.
United States Code of Federal Regulations				
Characterization of wastes generated during surface debris removal would be conducted to determine if such wastes are hazardous (e.g. contaminated PPE, equipment, wastewater) or excluded under 40 CFR 261.4.	Generation of solid wastes as defined in 40 CFR 261.2	40 CFR 262.11	Applicable	Solid waste in the former of investigative-derived waste will be generated during the surface removal effort and will be characterized and managed accordingly.
Explosives and Blasting Agents	Storage and use of explosives	29 CFR Part 1910 §H.109(a) through .109(e)	Applicable	The storage and use of donor explosives during the surface debris removal effort will be performed in accordance with this regulation.
EPA Final Military Munitions Rule	Remedial actions generate munitions that are subject to RCRA requirements.	40 CFR 260, et al.	Applicable	This regulation is appicable to Alternative 3 which includes removal of MPPEH from Wood Island for processing. A temporary RCRA permit will be obtained for removal of MPPEH from the site as required.
Hazardous Waste Management, National Contingency Plan	Waste handling and military munitions activities	40 CFR Parts 266, 300	Applicable	These regulations will be implemented during the surface debris removal effort.

Table D-4
Federal Action-Specific ARARs
For the Former Cat Island Bomb Target BT-2, MCAS Cherry Point, North Carolina

Requirement	Prerequisite	Citation	ARAR Determination	Comment
USEPA Guidance				
Hazardous waste management	Waste handling activities	42 USC Section 9602 and 9603	Applicable	These regulations will be implemented during the surface debris removal effort.

* Statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader. Listing the statutes and policies does not indicate that Navy accepts the entire statutes or policies as potential ARARs. Specific potential ARARs are addressed in the table below each general heading; only substantive requirements of the specific citations are considered potential ARARs.

ARAR - Applicable or relevant and appropriate requirement

CFR – Code of Federal Regulations

DDESB – Department of Defense Explosives Safety Board

DOD – Department of Defense

DOT – Department of Transportation

EPA – Environmental Protection Agency

ER – Engineer Regulation

HTRW – Hazardous, Toxic, and Radioactive Waste

MCAS – Marine Corps Air Station

MPPEH – Material Potentially Presenting an Explosive Hazard

NAVSEA – Naval Sea Systems Command

NAVSEAINST – Naval Sea Systems Command Instruction

NOSSA – Naval Ordnance Safety and Security Activity

OE – Ordnance and Explosives

OP – Ordnance Publication

OPNAVINST – Office of the Chief of Naval Operations Instruction

PPE – Personal Protective Equipment

RCRA – Resource Conservation and Recovery Act

USC – United States Code

UXO – Unexploded Ordnance