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NAS CECIL FIELD, FL
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WORK PLAN REVISION 1 WORK PLAN ADDENDUM 1 MUNITIONS RESPONSE AND ONSITE CONSTRUCTION SUPPORT FOR DISCARDED MILITARY MUNITIONS WITH EMAIL OF TRANSMITTAL NAS CECIL FIELD FL

2/25/2005

CH2MHILL CONSTRUCTORS INC

Jonnet, Mark

From: Michael.Halil@CH2M.com

Sent: Tuesday, March 01, 2005 5:20 PM

To: ball.stephen@epa.gov; brittain.doyle@epa.gov; david.grabka@dep.state.fl.us; SperanzaM@ttnus.com; mark.e.davidson@navy.mil

Cc: JonnetM@ttnus.com; Amy.Wolff@CH2M.com; simcikr@ttnus.com

Subject: Munitions Response and Onsite Construction Support, NAS Cecil Field; Work Plan Addendum No. 01, Revision No. 01

Team-
I have placed our Work Plan Addendum No. 01, Revision No. 01 for Munitions Response and Onsite Construction Support, NAS Cecil Field on our ftp site at

ftp://ftp.ch2m.com/pub%5Cnavyrac%5Cnas_cecilfield/

This submittal is for documentation purposes only and requires no approval letters (except NAVFAC EFD SOUTH signature) since the original plan has already been approved. This submittal is a Revision form (2 page Tech Memo with attachments) to document the following:

1. Revising the approved plan to reflect the updated composition of the UXO Team.

2. Revising the approved plan to include the soil sampling/laboratory analyses determined at the February 2005 BCT meeting and subsequent email received from David Grabka as his follow-up action item.

3. Revising the approved plan to include Revision No. 01 to the Explosives Safety Submission/Explosives Siting Plan. The Explosives Safety Submission and Explosives Siting Plan were revised to incorporate temporary MEC storage in Building 365, an earth covered magazine located at the site; the use of engineering controls for MEC detonations; and the expansion of the MRS work area based on the quantity and distribution of MEC recovered during the completed MR field work.

4. Revising to include the Emergency Permit for Detonation Request from NAVFAC EFD SOUTH to the FDEP (dated February 4, 2005); the Emergency Permit for Detonation Order from the FDEP (dated February 14, 2005); and the Jacksonville Airport Authority Authorization (dated February 2, 2005) to perform the detonations of recovered MEC on JAA property.

If there are any questions or concerns with this submittal or if anyone needs a hard copy or CD, please let me know.

Respectfully,
Mike

Michael D. Halil, P.E.
CH2M Hill Constructors, Inc.
6219 Authority Avenue
Jacksonville, FL 32221
904/777-4812 x. 233
352/381-3916 (FAX)
904/219-6277 (CELL)
mhalil@ch2m.com

WORK PLAN REVISION

REVISION NO: 01

CONTRACT NO: N62467-01-D-0331

PROJECT NAME: Former Naval Air Station Cecil Field, Jacksonville, Florida

CTO NO: 0029

SITE/TASK: Munitions Response Site, Building 365

WORK PLAN DATE: November 2004

WORK PLAN NAME: Work Plan Addendum No. 01, Munitions Response and Onsite Construction Support for Discarded Military Munitions

DATE OF REVISION: February 25, 2005

REVISION PREPARED BY: Michael Halil

Modifications/Revisions:

Item No.	Description of Modifications/Revisions
Purpose	The purpose of this Work Plan Revision is to revise Work Plan Addendum No. 01, Munitions Response and Onsite Construction Support for Discarded Military Munitions at the former Naval Air Station Cecil Field, Jacksonville, Florida based on site conditions encountered during the munitions response (MR) field work completed December 6-17, 2004 on the initial 5-acre Munitions Response Site (MRS) work area and the necessity to expand the MRS work area to the surrounding 15 acres based on the quantity and distribution of munitions and explosives of concern (MEC) recovered during the completed MR field work. The technical approach specified in Work Plan Addendum No. 01 for the initial 5-acre MRS work area will be adhered to during the remainder of the MR and onsite construction support scope of work. This revision provides supplemental details to complete the MR and onsite construction support field work, to include MEC detonations and MRS work area expansion. Following are the modifications/revisions to Work Plan Addendum No. 01:
001	Section 4.2.3; UXO Team Composition and Roles Revise to reflect a UXO team consisting of a SUXOS, UXOSO, UXO Technician III, and up to six UXO Technicians II.
002	Section 7.0, Sampling and Analysis Plan Revise to include MEC impact to soil determination and pre- and post-MEC detonation site impact determination soil sampling and laboratory analyses. MEC impact to soil determination includes the soil sampling and laboratory analyses from four to six discrete locations where significant quantities of MEC were recovered to determine if MEC has caused an adverse impact to the surrounding soil. Pre- and post-MEC detonation site impact determination includes the soil sampling and laboratory analyses from the detonation site (before and after MEC detonations) to ensure soil impacted by MEC detonations has been sufficiently removed. The additional sampling events, sampling and analytical requirements, and required level of quality and data packages are provided on the attached Table 7-2, Revision No. 01.
003	Replace Appendix C, Explosives Safety Submission (dated October 2004) with the attached Explosives Safety Submission, Revision No. 01 (dated January 2005).
004	Replace Appendix D, Explosives Siting Plan (dated October 2004) with the attached Explosives Siting Plan, Revision No. 01 (dated January 2005).

005	Include in Appendix E, the Emergency Permit for Detonation Request from NAVFAC EFD SOUTH to the Florida Department of Environmental Protection (FDEP) (dated February 4, 2005); the Emergency Permit for Detonation Order from the FDEP (dated February 14, 2005); and the Jacksonville Airport Authority (JAA) Authorization (dated February 2, 2005) to perform the detonations of recovered MEC on JAA property.

Reasons for the Modifications/Revisions:

Item No.	Reasons for the Modifications/Revisions
001	Revised to reflect the actual UXO team composition and roles scheduled to complete the remainder of MR and onsite construction support field work.
002	Revised to include soil sampling and analytical requirements from FDEP to verify that the presence of MEC at the site and MEC detonation activities have not caused impacts to site soil.
003/004	The Explosives Safety Submission and Explosives Siting Plan were revised to incorporate temporary MEC storage in Building 365, an earth-covered magazine located at the site; the use of engineering controls for MEC detonations; and the expansion of the MRS work area based on the quantity and distribution of MEC recovered during the completed MR field work.
005	Include the actual Emergency Permit for Detonation Request, FDEP Emergency Permit for Detonation Order, and JAA Authorization, along with the example FDEP Emergency Permits for Detonation.

Michael Halil	Michael D. Halil	02/28/2005
CTO Project Manager	Signature	Date
Scott Smith	Scott M Smith	02/28/2005
Program Manager	Signature	Date
U.S. Navy Responsible Authority	Signature	Date

Document Control Distribution

Jimmy Jones, NAVFAC EFD SOUTH	Mark Davidson, NAVFAC EFD SOUTH	Larry Blackburn, EFA Southeast
David Grabka, FDEP	Stephen Ball, USEPA	Doyle Brittain, USEPA
Mark Speranza, TTNUS	CCI Project File No. 321878	

TABLE 7-2 REVISION NO. 01

Sampling and Analysis Summary Table

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx No of Samples	Sampling Method	Sampling Equipment	TAT[1]	Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
MEC Impact to Soil Determination	Locations of Large Quantity of Discrete MEC Recovery	Soil	Once	4 to 6 Samples (Approximate) + 1 DUP (10%) + 1 MS/MSD (5%) = 7 to 9	Grab	SS spoon, SS bowl	4 day	CCI Level C	Nitroaromatic Explosives	8330	14 day extr; 40 day analysis	Cool to 4°C	(2) 8oz amber glass
									8 RCRA Metals	6010A/7471	6 month; Hg 28 days		
	Pre-Equipment Blank	Water	1 per 10 samples	1 per event	Prepared in Field	Analyte-free water, SS funnel	7 days	CCI Level C	Explosives	8330	7 days ext; 40 days analysis	Cool to 4°C	(4) 1L amber glass
									8 RCRA Metals	6010B/7470A	180 days; Hg = 28 days	HNO3 pH< 2; Cool to 4°C	(1) 500ml HDPE
	Post-Equipment Blank	Water	1 per 10 samples	1 per event	Prepared in Field	Analyte-free water, SS funnel	7 days	CCI Level C	Explosives	8330	7 days ext; 40 days analysis	Cool to 4°C	(4) 1L amber glass
									8 RCRA Metals	6010B/7470A	180 days; Hg = 28 days	HNO3 pH< 2; Cool to 4°C	(1) 500ml HDPE
Pre-/Post-MEC Detonation Site Impact Determination	Discrete MEC Detonation Locations/ Composite of all MEC Detonation Locations	Soil	Twice (Pre-/Post-)	Pre-Detonation Event: 10 to 12 Samples + 1 DUP (10%) + 1 MS/MSD (5%) = 13 to 15; Post-Detonation Event: 3 Grab/1 Composite Samples + 1 DUP (10%) + 1 MS/MSD (5%) = 7; Total for both events: 20 to 22	Grab/ Composite	Hand Auger, SS spoon, SS bowl	4 day	CCI Level C	Nitroaromatic Explosives	8330	14 day extr; 40 day analysis	Cool to 4°C	(2) 8oz amber glass
									8 RCRA Metals	6010A/7471	6 month; Hg 28 days		
	Pre-Equipment Blank	Water	1 per 10 samples	1 per event	Prepared in Field	Analyte-free water, SS funnel	7 days	CCI Level C	Explosives	8330	7 days ext; 40 days analysis	Cool to 4°C	(4) 1L amber glass
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									8 RCRA Metals	6010B/7470A	180 days; Hg = 28 days	HNO3 pH< 2; Cool to 4°C	(1) 500ml HDPE

1. Calendar days
2. Equipment blanks will be collected once per day.

Revision No. 01 (Draft)

Explosives Safety Submission

for Munitions Response and On-Site Construction Support for Discarded Military Munitions Former Naval Air Station Cecil Field Jacksonville, Florida

Contract No. N62467-01-D-0331
Contract Task Order No. 0029

Prepared for

U.S. Navy Facilities Engineering Command, Engineering Field Division, Southern Division

Prepared by

CH2MHILL

115 Perimeter Center Place, N.E.
Suite 700
Atlanta, Georgia 30346

January 2005

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1 Engineering Controls Risk Assessment, Calculations, and Operational Hazard Analysis

Acronyms and Abbreviations

ARARs	Applicable or Relevant and Appropriate Requirements
CAD	cartridge actuated device
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CH2M HILL	CH2M HILL Constructors, Inc.
CFR	Code of Federal Regulations
CTO	Contract Task Order
DMM	Discarded Military Munitions
DRMO	Defense Reutilization and Marketing Office
EBS	Environmental Baseline Survey
ECA	Equipment Check Area
EO	Executive Order
EOD	Explosive Ordnance Disposal
ESQD	Explosives Safety Quantity-Distance
ESS	Explosives Safety Submission
EZ	Exclusion Zone
FAA	Federal Aviation Administration
HE	High Explosive
HERO	Hazards of Electromagnetic Radiation to Ordnance
IBD	Inhabited Building Distance
JAA	Jacksonville Airport Authority
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MGFD	Munition with the Greatest Fragmentation Distance
mm	millimeter(s)
MMRP-CX	Military Munitions Response Program Center of Expertise
MPPEH	Material Potentially Presenting an Explosive Hazard
MRS	Munitions Response Site
NAS	Naval Air Station
NAVFAC EFD SOUTH	U.S. Naval Facilities Engineering Command, Engineering Field Division South
NAVSEA	Naval Sea Systems Command
NOSSA	Naval Ordnance Safety and Security Activity
OSHA	Occupational Safety and Health Act
PTR	Public Transportation Routes
QA	Quality Assurance
QC	Quality Control
Q-D	Quantity-Distance
RPM	Remedial Project Manager
SUXOS	Senior UXO Supervisor
TCRA	Time Critical Removal Action
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering Support center, Huntsville
UXO	Unexploded Ordnance

SECTION 1

Project Summary

This Explosives Safety Submission (ESS) is in support of Munitions Response and On-Site Construction Support to locate and remove Munitions and Explosives of Concern (MEC) at the former Naval Air Station (NAS) Cecil Field, Jacksonville, Florida. The munitions response action for MEC is being implemented by CH2M HILL Constructors, Inc. (CH2M HILL) for the U.S. Naval Facilities Engineering Command, Engineering Field Division, Southern Division (NAVFAC EFD SOUTH), under Response Action Contract No. N62467-01-D-0331, Contract Task Order (CTO) No. 0029.

The purpose of this Revision No. 01 to the ESS (CH2M HILL, 2004) is to incorporate the following: 1) temporary MEC storage in Building 365, an earth covered magazine located at the site; 2) use of engineering controls for MEC detonations; and 3) expansion of the munitions response site (MRS) work area based on the quantity and distribution of MEC recovered during the mag & dig operation completed December 6 to 17, 2004. The ESS, Revision No. 00, dated October 2004, was approved by the Department of Defense Explosives Safety Board (DDESB) on November 5, 2004, and the Naval Ordnance Safety and Security Activity (NOSSA) on November 18, 2004.

1.1 Munitions and Explosives of Concern

The initial work area covered by the ESS was designated a MRS by NOSSA after receipt of a MRS Identification and Notification Report submitted by NAVFAC EFD SOUTH on September 16, 2004.

On Friday, September 10, 2004, one Discarded Military Munition (DMM) and ten expended cartridge actuated devices (CADs) were found near Building 365. The items were discovered during clearing and grubbing operations of an approximate 5-acre area in support of an ongoing Jacksonville Airport Authority (JAA) construction project to expand the north apron aircraft taxiway. The DMM consisted of one 20-millimeter (mm) round consisting of cartridge case with percussion primer, not impinged; high explosive (HE) projectile unfired with the point detonating fuze sheared off. On September 21, 2004, the CH2M HILL Munitions Response Team visited the site and talked with one of the responding Florida Air National Guard Explosive Ordnance Disposal (EOD) Technicians. The EOD Technician stated that the recovered 20-mm round was in a safe condition and had been removed from the site for disposal.

The DMM find caused a work stoppage of the JAA construction project and prompted the need for additional MEC support. The additional support is a cautionary action to ensure that the presence of the discovered DMM was unique to the area where it was found and to protect human health and safety during completion of the construction project.

1.2 Conclusions from Previous Studies and Reports of Ordnance Contamination

According to the Environmental Baseline Survey (EBS) Report, Building 365 was a former earth covered weapons storage locker built in 1957 at the former NAS Cecil Field, Jacksonville, Florida. The building is a one-story cinderblock bunker that is divided into 10 individual storage areas. Building 365 was reported to store CADs and was used as a ready service magazine to store munitions for flight operations at the former NAS Cecil Field. Building 365 is located west of Runway 18R, south of Buildings 373/104, and north of Building 366 (Figure 1-1). An access road runs along the west side of the building and a wooded area was formerly located to the west. The building and adjacent property were classified in the EBS report as "1/White," an area where no release or disposal of hazardous substances or petroleum products occurred (including any migration of these substances from adjacent areas). The building had been previously found suitable to transfer with property transfer from the Navy to the JAA completed.

The construction site was not a known or suspected MRS until discovery of DMM on September 10, 2004 and the probability of encountering MEC was determined to be low based on a risk assessment that was submitted with an ESS Waiver Request on September 27, 2004. The ESS Waiver Request was denied by NOSSA on September 28, 2004.

The ESS for the initial MRS work area was submitted on October 18, 2004, and was approved by DDESB on November 5, 2004, and NOSSA on November 18, 2004. The mag & dig operation on the initial MRS work area was completed from December 6 to 17, 2004 and based on the quantity and distribution of recovered MEC, expansion of the MRS work area boundaries became necessary. The initial MRS work area and the proposed expansions are shown on Figure 1-1.

1.3 Suspected Type and Amount of Ordnance Contamination

No munitions disposal operations are known to have taken place in or near the construction site. It is likely that the recovered DMM were discarded by person or persons unknown. Following is a summary of the items recovered during the completed mag & dig operation on the initial MRS work area:

- 77 20-mm HE projectiles (unfired/fuzed with cartridge intact)
- 191 CADs/impulse cartridges (unfired/MK2, MK14, MK18, MK19, miscellaneous small)
- 33 small arms blanks (5.56-mm and 7.62-mm)
- 8 MK4 bomb dummy unit signal cartridges
- 1 suspect aircraft part suspected to contain 2 CADs/impulse cartridges (determined to be type of actuator with two ports labeled for CAD use with caps and leads intact)
- Approximately 220 lbs of material that potentially presents an explosive hazard (MPPEH) consisting of expended CADs/impulse cartridges, 20-mm cartridges, 20-mm link belts, and 2 MK76 bomb dummy units with no signal cartridges
- Approximately 500 lbs of non-MEC related scrap metal

1.4 Planned Future Use of Property

Future use of the property is industrial. The property has already been transferred from Navy control to JAA.

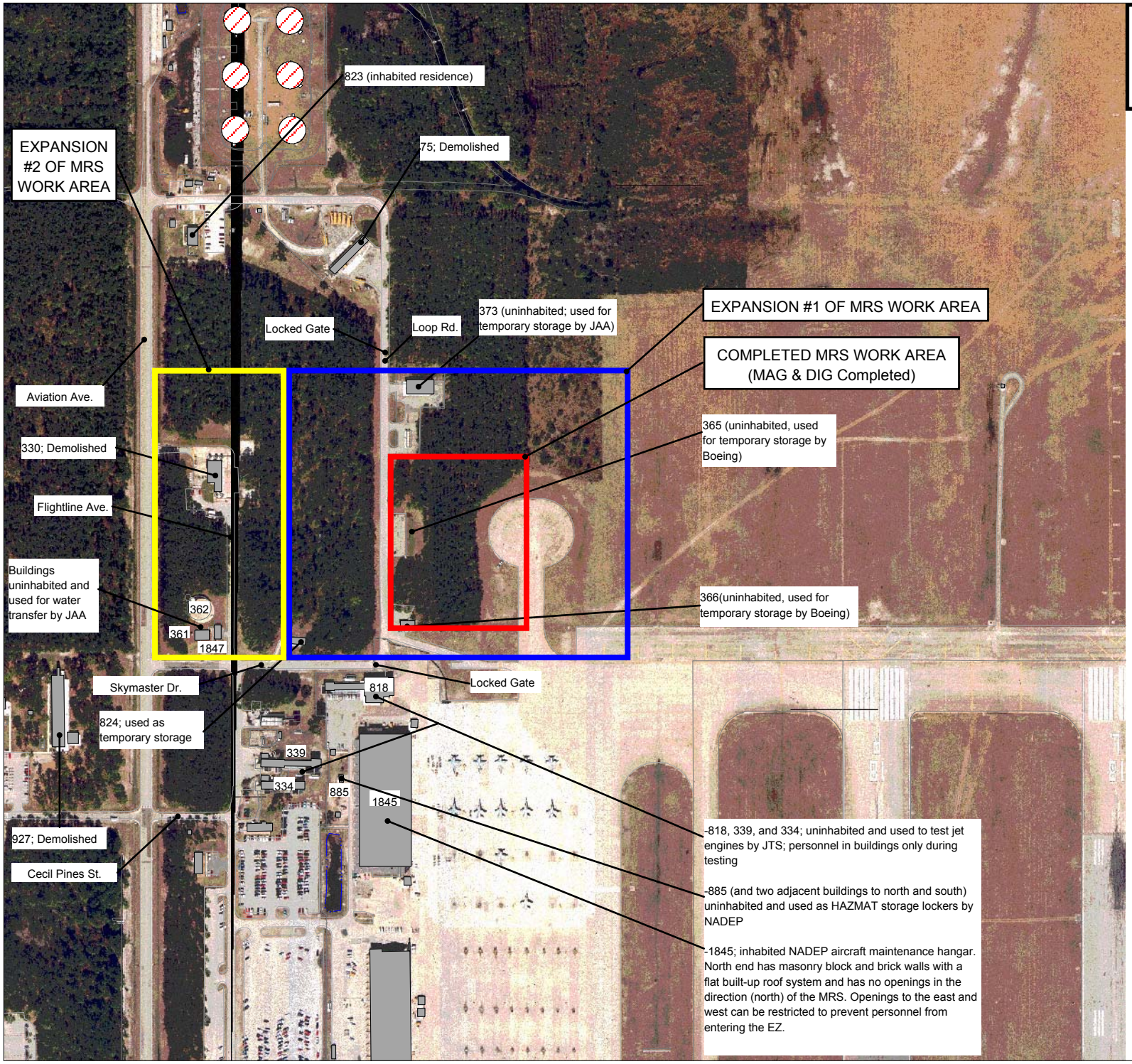
1.5 Remediation Goals

Based on site specific information, the remedial goal is to remove MEC to a depth of 1 foot. The MRS has no history of having been used as a range and only DMM have been and are expected to be encountered. No evidence has been discovered that suggest that DMM may have been buried on this site. To date, the only DMM discovered have been less than a depth of 1 foot. A continued munitions response from the ground surface to a depth of 1 foot and subsequent on-site construction support are proposed to provide assurance for construction personnel. CH2M HILL intends to perform a mag & dig operation on Expansion #1 of the MRS work area (Figure 1-1), and if necessary Expansion #2 of the MRS work area (Figure 1-1), as well as provide on-site construction support for both proposed expansion areas to reduce the risk that DMM will be encountered during construction activities. A mag & dig operation will only be completed in Expansion #2 of the MRS work area (Figure 1-1) if MEC is discovered within approximately 200 feet of the western boundary of Expansion #1 (Figure 1-1). On-site construction support will be provided for all intrusive construction activities to be performed at the site.

1.6 Munitions Response Action Planned

The munitions response action planned for this project is the detection and removal of MEC from the ground surface to a depth of 1 foot (based on site specific information) followed by on-site construction support. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, this action would be classified as a Time Critical Removal Action (TCRA).

FIGURE 1-1
VICINITY MAP



LEGEND

Structures
- PERMANENT
- DEMOLITION

Roads

Installation Area

0 200 400 600 Feet

1"= 400 feet

Naval Facilities Engineering Command • Southern Division •

Plot date: Sep 22, 2004; U:\aprs\EGIS_CecilField_NAS.apr

SECTION 2

Maps

In addition to the map presented as Figure 1-1, the maps listed below have been provided.

2.1 Regional Map

Figure 2-1 is a regional map showing the State of Florida and the location of the former NAS Cecil Field.

2.2 Activity Map

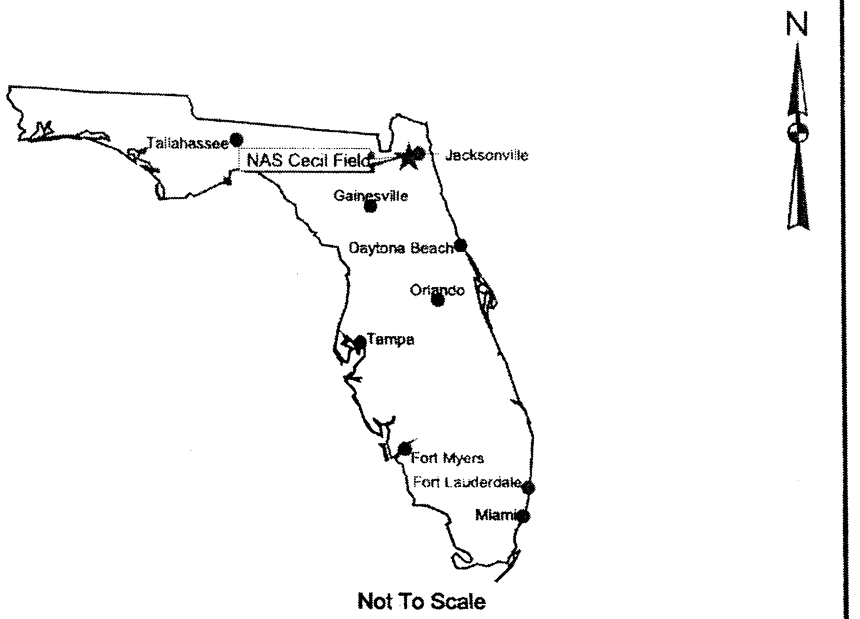
Figure 2-2 is an activity map showing the MRS covered by this submission within the former NAS Cecil Field.

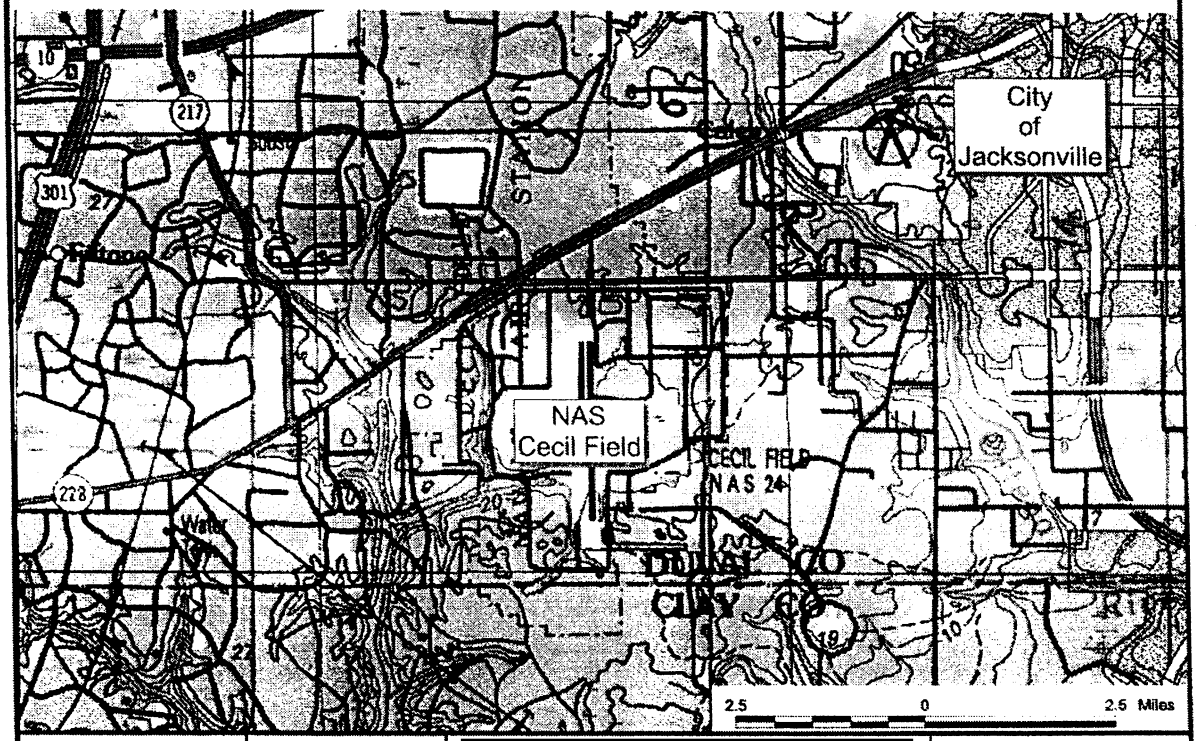
2.3 Quantity Distance (Q-D) Map

Figures 2-3 and 2-4 are maps of the site and depict the explosive safety quantity distance (ESQD) arcs for MRS work areas. Two figures are provided because work will be limited to one expansion area at a time with the respective ESQD arcs enacted while intrusive work is being completed in that area.

2.4 Soil Sampling Map

No soil sampling has been conducted; however, sampling may be required by the Florida Department of Environmental Protection. The extent of any required soil sampling has not been determined at this time.





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MJJ	30Jul02
CHECKED BY	DATE
	9/24/02
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	

FIGURE 2-1
REGIONAL MAP
NAS CECIL FIELD

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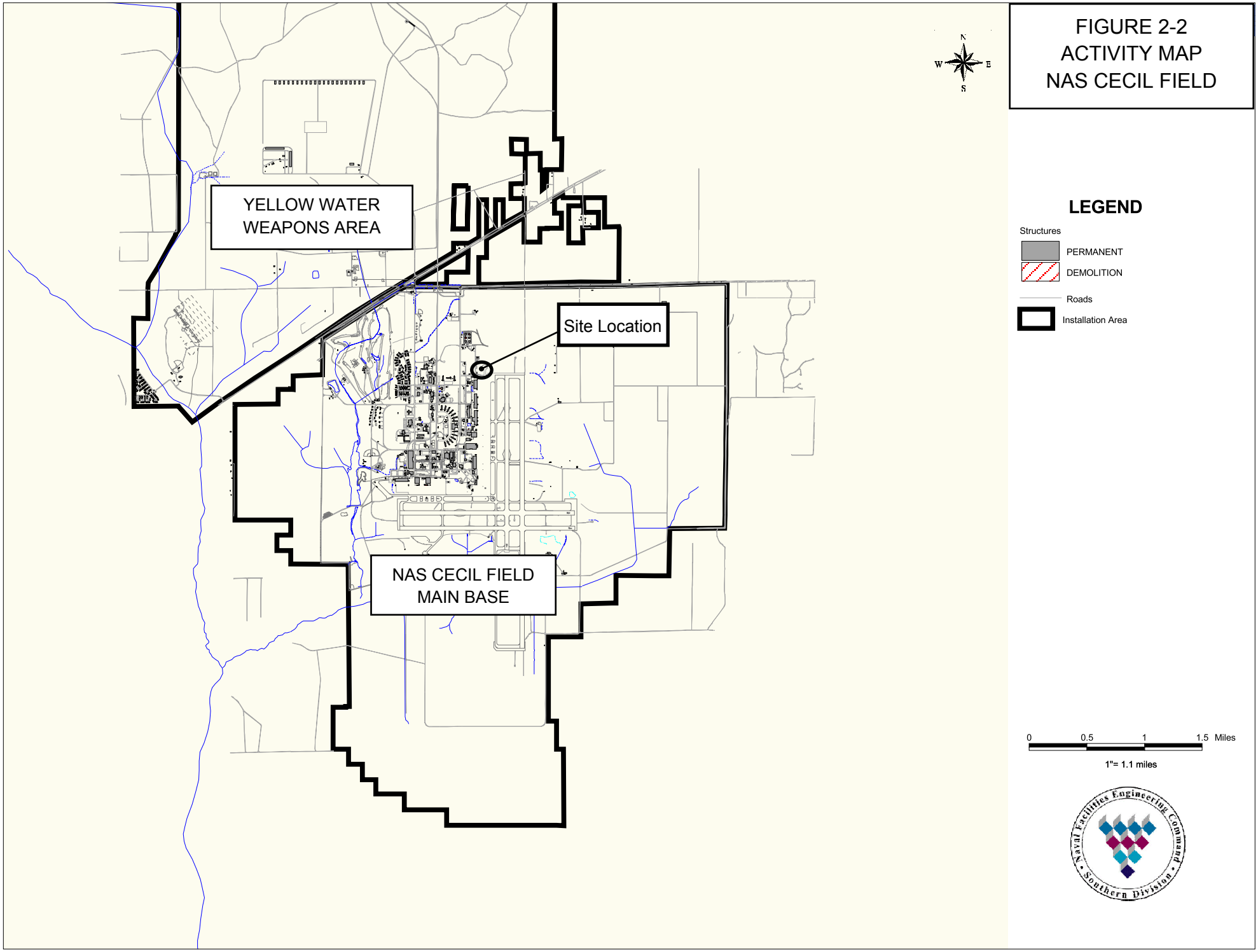
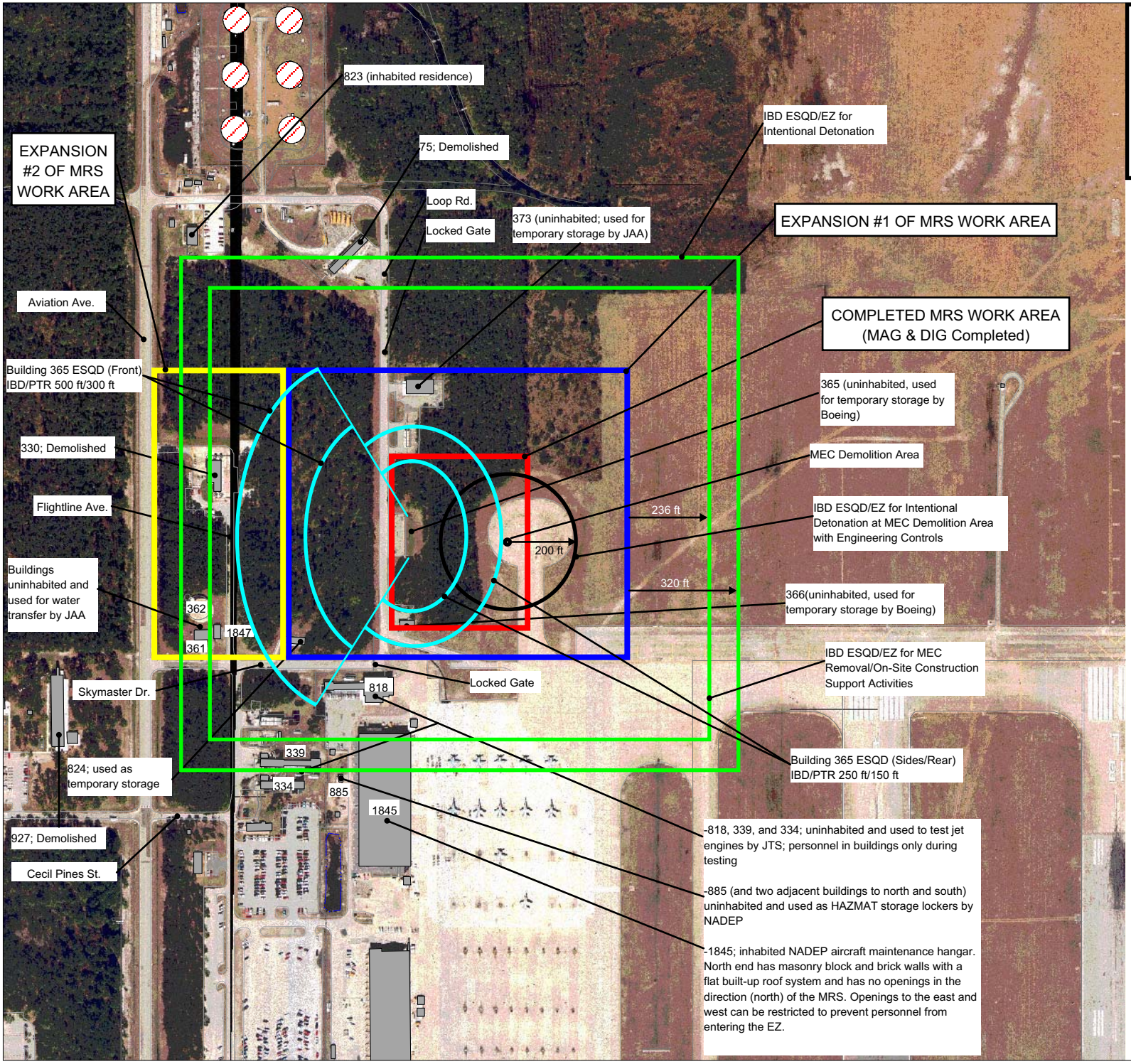


This graphic was generated using the TtNUS EGIS module

Plot date: Sep 15, 2004; U:\aprs\EGIS_CecilField_NAS.apr

FIGURE 2-3 QUANTITY-DISTANCE MAP FOR EXPANSION #1 OF MRS WORK AREA



LEGEND

Structures
- PERMANENT
- DEMOLITION

Roads

Installation Area

0 200 400 600 Feet

1"= 400 feet

Naval Facilities Engineering Command Southern Division

Plot date: Sep 22, 2004; U:\aprs\EGIS_CecilField_NAS.apr

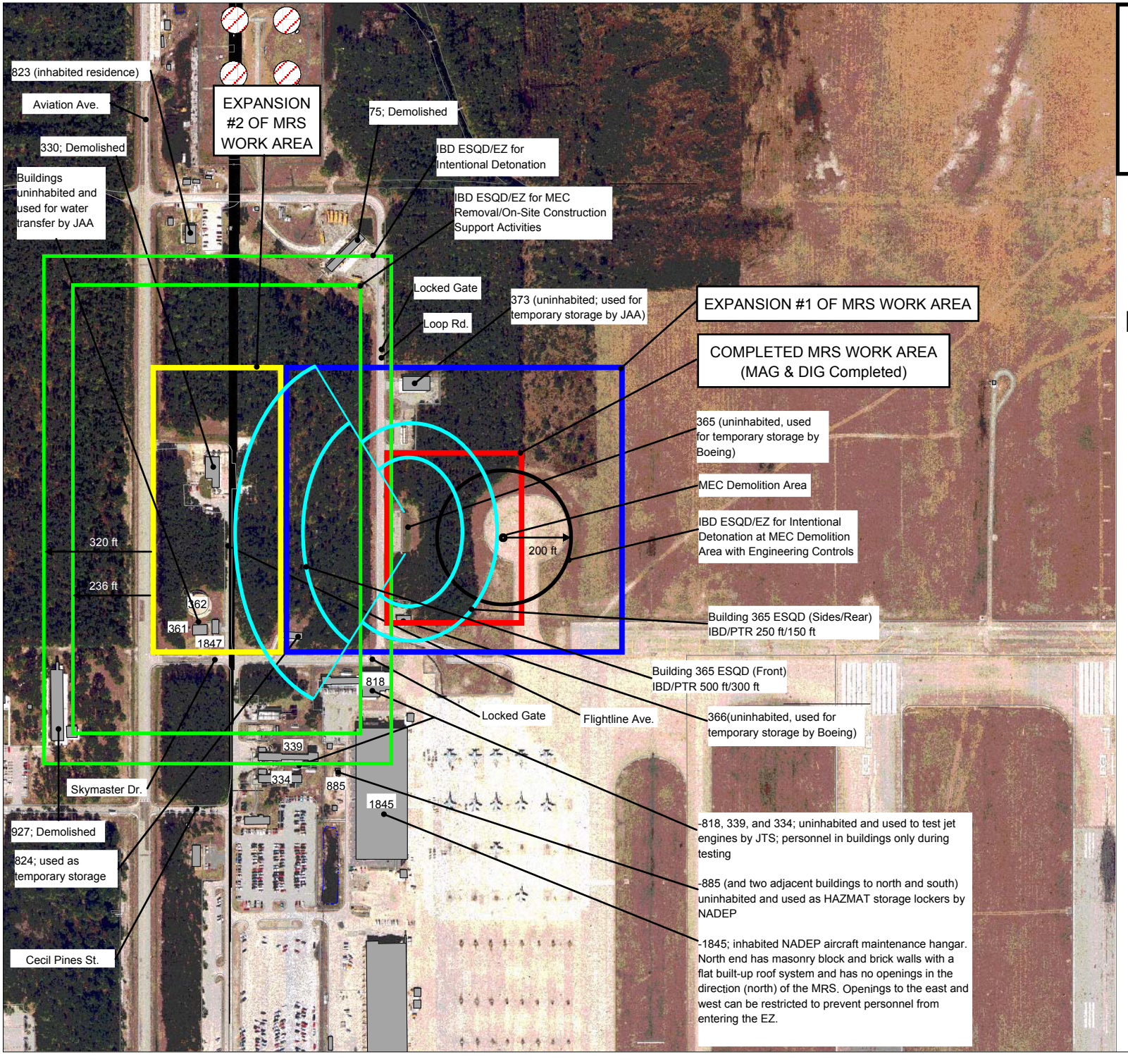


FIGURE 2-4 QUANTITY-DISTANCE MAP FOR EXPANSION #2 OF MRS WORK AREA

LEGEND

Structures
- PERMANENT
- DEMOLITION

Roads

Installation Area

0 200 400 600 Feet

1"= 400 feet

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Plot date: Sep 22, 2004; U:\aprs\EGIS_CecilField_NAS.apr

SECTION 3

Amount and Type of MEC

This section presents information about the amount and type of MEC anticipated at the site. In addition, the Munition with the Greatest Fragmentation Distance (MGFD) is identified for the site. The MGFD will be used to establish safe distances for project activities and locations based upon the amount of explosives and the anticipated fragmentation distance for the munition.

As stated in Section 1, the following items have been found at the site:

- DMM, to include
  - 20-mm HE projectiles (unfired/fuzed with cartridge intact)
  - CADs/impulse cartridges (unfired/MK2, MK14, MK18, MK19, miscellaneous small)
  - small arms blanks (5.56-mm and 7.62-mm)
  - MK4 bomb dummy unit signal cartridges
  - suspect aircraft part suspected to contain CADs/impulse cartridges (determined to be type of actuator with two ports labeled for CAD use with caps and leads intact)
- Approximately 220 lbs of MPPEH consisting of expended CADs/impulse cartridges, 20-mm cartridges, 20-mm link belts, and MK76 bomb dummy units with no signal cartridges.

3.1 Munitions Greatest Fragmentation Distance

The MGFD anticipated to be encountered at the site is a 20-mm HE round. According to Table 13-2 in OP 5 Volume 1 (NAVSEA, 2003), the maximum fragment throw range for a 20-mm projectile is 320 feet. If, during the course of this project, a live MEC item with a greater fragmentation range is encountered, the ESQD arcs will be adjusted and an amendment to this ESS will be prepared.

An initial exclusion zone (EZ) of 236 feet based on Table 7-9 in OP 5 Volume 1 (NAVSEA, 2003) will be used during MEC removal operations with an initial EZ of 320 feet based on Table 13-2 in OP 5 Volume 1 (NAVSEA, 2003) used for intentional detonations. The EZs will be modified if MEC other than 20-mm HE rounds are discovered and an amendment to this ESS will be prepared.

3.2 Maximum Credible Event for Explosive Soil

No explosive soil is suspected or known to be on this MRS.

3.3 Maximum Credible Event for Buildings

Building 365 is within this MRS and is an earth covered flat-roof magazine constructed of concrete cinderblocks that is divided into 10 individual storage areas. Five individual

storage areas are currently being utilized by a JAA tenant (Boeing) to store ejection seat assemblies, catapult assemblies, and CADs. The building is certified (Expiration Date: 06/29/2005) for storage of a maximum 150 lbs net explosives weight (NEW) of Division 1, Class 3 Explosives under DOD 4145.26M, Contractors Manual for Ammunition and Explosives. Following are the construction details for Building 365:

- The building is 130 feet (L) x 25 feet (W) x 11 feet (H).
- The building has 2 feet of soil cover on top/sides/rear.
- Each storage area has ventilation fan/lightning rod on roof.
- The front wall thickness is 1-foot.
- The top has 1.5 feet of concrete.
- Each storage area door is 1.6-inch thick steel.
- Each storage area is 12 feet deep; 9 feet wide; 7.5 feet tall.
- There are (4) fire extinguishers located on the front of the building.
- Following are the signs on the front of the building:
  - (2) "No Smoking" signs
  - Each storage area is labeled with "7-7-04, 0.2 OHMS" next to the grounding cable
  - (2) "Restricted Area" signs
  - (2) diamond "4"; triangle "3" fire symbols
- Following are the storage area details:
  - Bunker #1 (most northern) - contains recovered MEC and is labeled with Explosives 1.1D placard; 11.61 lbs NEW
  - Bunker #2 - contains MPPEH/MEC-related scrap
  - Bunker #3 - empty
  - Bunker #4 - empty
  - Bunker #5 - marked EXP CADS, NEW 0.21395 lbs, 1.3C (used by Boeing)
  - Bunker #6 - marked Bunker Seat Catapults; 0.8058 lbs (used by Boeing)
  - Bunker #7 - marked Ejection Seats; 1 lb (used by Boeing)
  - Bunker #8 - marked Ejection Seats; 21 lbs (used by Boeing)
  - Bunker #9 - marked Ejection Seats; 14 lbs (used by Boeing)
  - Bunker #10 - empty

Based on Table 7-20 in OP 5 Volume 1 (NAVSEA, 2003), the Inhabited Building Distance (IBD)/Public Transportation Routes (PTR) ESQD for Building 365 for Division 1, Class 3 Explosives is 75 feet. Based on Table 7-7 in OP 5 Volume 1 (NAVSEA, 2003), the IBD/PTR ESQD for Building 365 for Division 1, Class 1 Explosives is 500 feet/300 feet for the front and 250 feet/150 feet for the sides and rear. Because Building 365 will be utilized for temporary storage of recovered MEC, the ESQD for Division 1, Class 1 Explosives will be used. The ESQD arcs are shown on Figures 2-3 and 2-4.

There will be no access to Building 365 while intrusive work is being performed.

3.4 Description and Status of MRS Not Covered

There are no known or suspected MRS located in the vicinity covered by this submission.

SECTION 4

Start Date

Site work (mag & dig) in the initial MRS work area was conducted from December 6 to 17, 2004. Mobilization and site work for MEC detonations and the expansion of the MRS work area will be conducted as soon as approval of this ESS is received.

SECTION 5

Frostline

Because of the climatic conditions in Florida, the site does not have a frostline and has not experienced frost heave. Therefore, this section is not applicable.

SECTION 6

Response Techniques

This section describes the techniques used to detect, recover, and dispose of any MEC discovered at the site during the project, and discusses associated elements of the field work.

The proposed work approach is to determine whether additional MEC are present at the site through a mag & dig operation and then, once cleared, to recommence construction operations with on-site construction support. The following general steps will be taken:

- Spraying of site for control of heavy mosquito population
- Emplacement of a 100x100-foot grid system tied to a permanent site monument
- Removal of vegetation in wooded area of site
- Mag & dig operation to detect and investigate anomalies potentially related to MEC
- On-site construction support
- Disposal of MEC/MPPEH

CH2M HILL intends to perform the following sequence of work:

1. Mag & dig operation on Expansion #1 of the MRS work area (Figures 1-1, 2-3, and 2-4)
2. Mag & dig operation on Expansion #2 of the MRS work area (Figures 1-1, 2-3, and 2-4), only if MEC is discovered within approximately 200 feet of the western boundary of Expansion #1
3. On-site construction support for both Expansions #1 and #2 of the MRS work area (Figures 1-1, 2-3, and 2-4) (On-site construction support will be provided during all activities that involve intrusive work.)

6.1 Type of Geophysical Detection Equipment

Only handheld geophysical metal detectors will be used at the site. Because the CADs found at the site were historically constructed of both ferrous and non-ferrous metals, an all-metals detector, the White's XLT (or equivalent), will be used for the mag & dig and on-site construction support operations. The White's XLT metal detector is approved by the U.S. Army Engineering Support Center, Huntsville (USAESCH), Military Munitions Response Program Center of Expertise (MMRP-CX) for use on munitions response projects. The MMRP-CX has a program for testing geophysical instruments that meets the substantial requirements of the Navy Hazards of Electromagnetic Radiation to Ordnance (HERO) Program.

6.2 Methods to Verify Detection Capabilities

Geophysical instruments will be checked in an Equipment Check Area (ECA) prior to use each day. Two items, one inert 20-mm projectile (or surrogate), and an empty CAD (or

surrogate) will be buried at approximately 1 foot below the ground surface to ensure that these items can be detected to that depth each day prior to beginning operations. (Because the only MEC found or anticipated to be found at the site consist of DMM, it is not anticipated that individual MEC items will be found below 1 foot.).

6.3 Anomaly Discrimination

Because of the site limitations, no digital geophysical mapping or anomaly discrimination is proposed.

6.4 Detection Method

6.4.1 Detection Procedures

Vegetation Removal Detection

Vegetation removal will be accomplished with gas-powered string trimmers with saw blade attachments and ditch axes or, where appropriate, using a tractor equipped with a bush hog mower. The brush will be cut to a height of approximately 6 inches above ground surface to allow Unexploded Ordnance (UXO) Technicians to visually observe the ground surface during the mag & dig operations. MEC avoidance will be performed during vegetation removal. This includes visual observation of the ground surface by UXO Technicians prior to and during vegetation removal and instrument-assisted detection using a White's XLT all metals detector (or equivalent). The instrument will be used to check inside heavy vegetation (e.g., a thick bush) where it is not possible for the Technician to visually check the area.

Mag & Dig

The MRS will be divided into lanes five feet wide marked by string. A UXO Technician will use the White's XLT all metals detector (or equivalent) for surveying within the survey lane. When a subsurface anomaly is detected, another UXO Technician will mark and later excavate the anomaly to determine if it presents a MEC hazard.

6.4.2 Selection Criteria and Rationale

As discussed above, CADs found at the site were historically constructed of both ferrous and non-ferrous metals, thus an instrument having the ability to detect both ferrous and non-ferrous metals is required. A digital geophysical mapping survey of the site is not appropriate because the presence of large piles of vegetation across the site (from grubbing activities prior to finding the DMM) makes a full-coverage survey impractical. All existing vegetation piles at the site will be carefully inspected to ensure that MEC are not present prior to moving the vegetation onto trucks for removal from the site. The inspection will include visual observation of the piles and instrument-assisted detection using a White's XLT all metals detector (or equivalent) where visual observation is not possible.

6.4.3 Quality Assurance and Quality Control (QA/QC)

QA/QC for the field activities on this project will include two primary elements: 1) field observation/audits of personnel and procedures and 2) checking equipment and instruments (e.g., geophysical sensors, 2-way radios) for functioning and appropriate response prior to use.

As described in Section 6.2, geophysical instruments will be checked in an ECA prior to use each day.

6.4.4 Personnel Qualifications

All MEC operations personnel will be qualified in accordance with terms outlined by U.S. Department of Labor Employment Standards Administration Wage Hour Division for UXO Personnel and U.S. Army Corps of Engineers (USACE), 2004, Data Item Description OE-025.02, "Personnel/Work Standards."

6.5 Disposition of MEC and Related Scrap

In the event an MEC item is identified at the site, the Senior UXO Supervisor (SUXOS) will secure the site and notify the CH2M HILL Project Manager, who in turn will notify the NAVFAC EFD SOUTH Remedial Project Manager (RPM). If the SUXOS and one other qualified UXO Technician determines the MEC item(s) safe to move, the MEC item(s) will be placed in Building 365, an earth covered magazine located within the work area, and secured for disposal by detonation at the end of the TCRA. If the SUXOS determines the MEC item(s) not safe to move, the site will remain secured until disposal operations can be performed.

Arrangements for delivery of explosives to countercharge discovered MEC have been made with a local explosives distributor and the explosives will be delivered within 24 hours. The SUXOS and a UXO Technician III will evaluate the recovered MEC and existing ESQD arcs to ensure that that disposal by detonation can be safely effected. If insufficient ESQD arcs exist, a plan using engineering controls will be developed and expeditiously submitted by email to NOSSA for review and approval prior to executing disposal by detonation operations. Based on the MGFD and distances to the nearest IBD/PTR, it is anticipated that the only engineering controls that will be needed are sandbags. Disposal will be conducted in accordance with EODB 60A 1-1-31, OP 5 Volume I, and NAVSEA SW060-AA-MMA-010 Volumes I and II. Engineering controls will conform with DDESB TP-16 Revision 1 and USAESCH, Use of Sandbags for Mitigation of Fragment and Blast Effects Due to Intentional Detonation of Munitions, HNC-ED-CS-S-98-7 dated August 1998 and approved by DDESB February 23, 1999.

MPPEH and Munitions Debris (MD) will be inspected, demilitarized if necessary, certified, and verified as free of explosive hazards prior to being transported to the nearest Defense Reutilization and Marketing Office (DRMO) for disposition. Discussions are underway with DRMO to establish protocols for disposition of munitions related scrap metal.

SECTION 7

Explosives Safety Quantity-Distance

This section contains information about the minimum ESQD requirements for the site. Each MRS work area where mag & dig operations are to be performed will have an EZ established based on the MGFD prior to operations beginning in the area. The MRS work areas are shown on the ESQD maps (Figures 2-3 and 2-4).

CH2M HILL intends to perform the following sequence of work:

1. Mag & dig operation on Expansion #1 of the MRS work area (Figures 1-1, 2-3, and 2-4)
2. Mag & dig operation on Expansion #2 of the MRS work area (Figures 1-1, 2-3, and 2-4), only if MEC is discovered within approximately 200 feet of the western boundary of Expansion #1
3. On-site construction support for both Expansions #1 and #2 of the MRS work area (Figures 1-1, 2-3, and 2-4) (On-site construction support will be provided during all activities that involve intrusive work.)

Intrusive work will only be completed in one expansion area at a time with the respective ESQD arcs enacted during operations in that area.

Coordination of all work activities at the MRS with the JAA and Federal Aviation Authority (FAA) air traffic controller, NAVFAC EFD SOUTH, and the Resident Officer in Charge of Construction (ROICC) Project Office will be the responsibility of the CH2M HILL Project Manager and SUXOS. In addition, any required intentional detonations, including approach, timing, and required public notification, will be coordinated by the CH2M HILL Project Manager and SUXOS through the JAA and FAA air traffic controller, NAVFAC EFD SOUTH, and ROICC Project Office.

7.1 Munitions Response Sites

No MRS other than the one in this submission (shown on Figures 1-1, 2-2, 2-3, and 2-4) is known. Only one UXO Team conducting mag & dig operations and providing on-site construction support will be employed inside the EZ.

7.1.1 IBD

Several buildings are located near the MRS. Inhabited buildings are discussed below:

- Building 373: Located within the EZ is uninhabited and used for temporary storage by JAA of non-hazardous materials.
- Building 365: Located within the EZ is an earth covered ready service magazine used by Boeing. Building 365 is discussed in Section 3.3.

- Building 366: Located within the EZ is uninhabited and used for temporary storage by Boeing of non-hazardous materials.
- Building 818: Located within the EZ is uninhabited except when used for testing jet engines.
- Building 339: Located within the EZ is uninhabited except when used for testing jet engines.
- Building 824: Located within the EZ is uninhabited and used for temporary storage by a contractor.
- Buildings 361, 362, and 1847: Located within the EZ are uninhabited and used for water supply transfer by JAA.
- Building 1845: Located partially within the southern edge of the EZ is an inhabited aircraft maintenance hanger. The north end of the hangar has masonry block and brick walls with a flat built-up roof system and no openings in the direction (north) of the MRS. Openings to the east and west can be restricted to prevent personnel from entering the EZ. Enacted restrictions will not adversely impact personnel should an emergency exist within the building because no exits are located on the north side of the building.

7.1.2 PTR Distance

Several roads and aircraft taxiways are located near and within the EZ of the MRS. These are discussed below:

- Loop Road: Runs north and south within the EZ. The road is secured from the north by two locked gates. The southern end of Loop Road intersects with Skymaster Drive and the aircraft parking apron next to Building 1845. A locked gate at the intersection of Loop Road and Skymaster Drive prevents access from the west. Access from the aircraft parking apron and taxiway will be secured by barriers and access restricted by air traffic control.
- Skymaster Drive: Runs east and west from Aviation Avenue to Loop Road and extends into the EZ of the MRS in the southwest corner. Barriers and signs will be used to restrict access to the MRS.
- Flightline Avenue: Runs north and south parallel to Aviation Avenue; intersects Skymaster Drive; and extends into the EZ of the MRS from the south. Barriers and signs will be used to restrict access to the MRS.
- Aviation Avenue: Runs north and south and is currently the main entry road for the Cecil Commerce Center. Aviation Avenue is within the EZ of Expansion #2 of the MRS work area. If necessary, coordination with the City of Jacksonville to re-route traffic flow around the EZ will be completed.

7.2 Magazines

MEC which has been determined safe to move by the SUXOS and one other qualified UXO Technician will be temporarily stored in Building 365, an earth covered magazine located

within the work area. A maximum MEC NEW of 15 lbs will be stored at one time. The building is certified (Expiration Date: 06/29/2005) for a maximum 150 lbs NEW of Division 1, Class 3 Explosives under DOD 4145.26M, Contractors Manual for Ammunition and Explosives. Details for Building 365 are provided in Section 3.3. Based on Table 7-20 in OP 5 Volume 1 (NAVSEA, 2003), the IBD/PTR ESQD for Building 365 for Division 1, Class 3 Explosives is 75 feet. Based on Table 7-7 in OP 5 Volume 1 (NAVSEA, 2003), the IBD/PTR ESQD for Building 365 for Division 1, Class 1 Explosives is 500 feet/300 feet for the front and 250 feet/150 feet for the sides and rear. Because Building 365 will be utilized for temporary storage of recovered MEC, the ESQD for Division 1, Class 1 Explosives will be used. The ESQD arcs are shown on Figures 2-3 and 2-4.

No inhabited buildings are located within the IBD ESQD for Building 365. The only road within the PTR ESQD is Loop Road. Loop Road is a secured road and is discussed in Section 7.1.2.

Arrangements for delivery of explosives to countercharge discovered MEC have been made with a local explosives distributor and the explosives will be delivered within 24 hours. Once onsite, explosives materials will immediately be prepared and used without storage.

7.3 Planned or Established Treatment Areas

In the event an MEC item is identified at the site, the SUXOS will secure the site and notify the CH2M HILL Project Manager, who in turn will notify the NAVFAC EFD SOUTH RPM. If the SUXOS determines the MEC item(s) safe to move but not safe to transport for offsite disposal, the MEC item(s) will be placed in Building 365, an earth covered magazine located within the work area, and secured for disposal by detonation at the end of the TCRA. If the SUXOS determines the MEC item(s) not safe to move, the site will remain secured until disposal operations can be performed.

7.3.1 Planned or Established Demolition Area

MEC item(s) which have been moved for temporary storage in Building 365 will be disposed of by detonation at the MEC demolition location shown on Figures 2-3 and 2-4. Engineering controls which conform to the standards of HNC-ED-CS-S-98-7 (USAESCH, 1998) will be used to maintain the IBD ESQD of 200 feet. Calculations for the engineering controls are discussed in detail in Section 7.3.3.

The MEC demolition location will not be utilized as an overnight or longer-term staging area with MEC moved to the location for demolition only.

7.3.2 Exclusion Zone

Table 7-1 provides the basis of determining the EZ for the expected munitions response operations at the former NAS Cecil Field.

TABLE 7-1
Determining Sizes of Exclusion Zones

Operation	Basis for Determining Size of Exclusion Zone	Minimum Separation Distance (for Nonessential Personnel)	Safe Separation Distance (for Other UXO Teams)
Excavation Activities	Unintentional Detonation	236 feet (IBD for ESQD*), 142 feet (PTR for ESQD*) (Safe Separation Distance)	200 feet*
Detonation of MEC at MRS (Max. <1 lb NEW)	Intentional Detonation	320 feet (IBD for ESQD**)	320 feet**
Detonation of MEC at Planned Demolition Area (Max. <6 lbs NEW)	Intentional Detonation	200 feet (IBD for ESQD***)	200 feet***

*Based on OP 5 Volume 1, Table 7-9.

**Based on OP 5 Volume 1, Table 13-2.

***Based on calculations from TP-16 and HNC-ED-CS-S-98-7 as described in Section 7.3.3.

The SUXOS and a UXO Technician III will evaluate the recovered MEC and existing ESQD arcs to ensure that disposal by detonation can be safely effected. If insufficient ESQD arcs exist, a plan using engineering controls will be developed and expeditiously submitted by email to NOSSA for review and approval prior to executing disposal by detonation operations. Based on the MGFD and distances to the nearest IBD/PTR, it is anticipated that the only engineering controls that will be needed are sandbags. Disposal will be conducted in accordance with EODB 60A 1-1-31, OP 5 Volume I, and NAVSEA SW060-AA-MMA-010 Volumes I and II. Engineering controls will conform with DDESB TP-16 Revision 1 and USAESCH, Use of Sandbags for Mitigation of Fragment and Blast Effects Due to Intentional Detonation of Munitions, HNC-ED-CS-S-98-7 dated August 1998 and approved by DDESB February 23, 1999.

7.3.3 Calculations for Engineering Controls and ESQD

Recovery of multiple DMM has generated a need for their safe disposal. To safely perform planned detonation of recovered DMM at the MEC demolition location shown on Figures 2-3 and 2-4, it is necessary to utilize engineering controls to reduce the blast effects to acceptable levels. To develop the appropriate level of engineering controls, the fragment velocity and mass must be determined for comparison with tested engineering controls that effectively reduce the blast effects to an acceptable distance. Table B-1 and the calculation from Chapter 5 of DDESB TP-16, Revision 1, were utilized to determine the expected maximum fragmentation weight and velocity from a planned detonation of (10) each, 20-mm projectiles laid side by side.

Based on the engineering controls calculations and referencing Table 7, HNC-ED-CS-S-98-7, an enclosure which has 24 inches of sandbags on the roof and walls would have a maximum sandbag throw of 135 feet and would require an ESQD arc of 200 feet. The IBD ESQD arc is shown on Figures 2-3 and 2-4.

Attachment 1 provides the detailed engineering controls and ESQD calculations, risk assessment, and operational hazard analysis, as well as sand bag construction examples.

This approach and calculations were collaborated with Michelle Crull, Ph.D., PE, USAESCH.

SECTION 8

Offsite Disposal

No offsite disposal of MEC is expected.

SECTION 9

Environmental Considerations

9.1 Environmental Regulatory Considerations

The Navy will conduct this MEC response action under the CERCLA framework, as is consistent with Department of Defense policy. OPNAVINST 8020.14, *Department of the Navy Explosives Safety Policy* (OPNAV, 1999), requires that all response actions involving real property known or suspected to contain military munitions have approved plans and/or appropriate documentation in accordance with an established process.

In addition, the response action is taken under the delegated authority of the Office of the President of United States by Executive Order (EO) 12580. This EO authorizes the Navy to conduct and finance removal actions. This removal action is also appropriate based on several of the applicable factors under 40 Code of Federal Regulations (CFR) Part 300.415(b)(2). The Navy is the lead agency for this action, and NAVFAC EFD SOUTH is the contracting agency responsible for completing the response action.

The response action will be conducted in accordance with the following health and safety regulations and requirements, in addition to the MEC-specific regulations and requirements provided in *Work Plan Addendum No. 01 for Munitions Response and Onsite Construction Support for Discarded Military Munitions at the former NAS Cecil Field, Jacksonville, Florida* (CH2M HILL, 2004):

- 29 CFR, Occupational Safety and Health Act (OSHA) Regulations: Construction (29 CFR 1926) and General Industry (29 CFR 1910), applicable sections
- USACE, 2003, EM 385-1-1, *Safety – Safety and Health Requirements*

Section 121(d) of CERCLA requires that remedial actions implemented at CERCLA sites attain any federal or more stringent state environmental standards, requirements, criteria, or limitations that are determined to be Applicable or Relevant and Appropriate Requirements (ARARs). Potential ARARs for the MEC response action at the site have been developed as part of the planning process and are discussed in detail in *Work Plan Addendum No. 01 for Munitions Response and Onsite Construction Support for Discarded Military Munitions at the former NAS Cecil Field, Jacksonville, Florida* (CH2M HILL, 2004).

9.2 Ecological and Cultural Environmental Conditions

USACE Conceptual Permit No. 199801374 (IP-BL), June 2002, indicates that a protection plan is in place for the Eastern Indigo Snake.

No cultural sites are known or suspected to be on the MRS.

SECTION 10

Technical Support

CH2M HILL is the MEC contractor for this submission. The nearest EOD Team that is available for technical support and/or emergency response is the Navy EOD Detachment at Mayport, Florida.

SECTION 11

Land Use Restrictions

Proposed land use is unrestricted use with no land use controls.

SECTION 12

Public Involvement

The NAS Cecil Field Restoration Advisory Board, consisting of public citizens from the local community and impacted stakeholders, will be kept updated by the NAVFAC EFD SOUTH RPM of the site conditions, proposed removal plan, and progress of the removal action.

ATTACHMENT 1

Engineering Controls Risk Assessment, Calculations, and Operational Hazard Analysis

Risk Assessment
for
Detonation of Multiple Munitions with Engineering Controls
Area Adjacent to Building 365
Cecil Field, Florida

Background: Recovery of multiple discarded military munitions (DMM) has generated a need for their safe disposal. To safely detonate recovered DMM within the work area for Cecil Field it is necessary to utilize engineering controls to reduce the blast effects to acceptable levels. To develop the appropriate level of engineering controls the fragment velocity and mass must be determine for comparison with tested engineering controls that effectively reduce the blast effects to an acceptable distance. Reference (a) has the current approved explosive safety quantity distance (ESQD) arcs for Cecil Field is 320-ft for an intentional detonation based on the munition with the greatest fragment distance (MGFD), a M56A4, 20mm HE projectile.

Based on the attached Operational Hazard Analysis and evaluation of the hazards on site, a Risk Assessment was conducted in accordance with OPNAVINST 3500.39A, Operational Risk Management and Management Guidance for the Defense Environmental Restoration Program dated September 28, 2001. The ***recommended Risk Assessment Code (RAC) for this site is RAC 4 – Minor Risk***. A review of the risk evaluation process is provided in the following paragraphs.

Hazard Severity assessment of the worst credible consequence which can result as a result of the hazard posed by a 20mm High Explosive projectile was judged to be a "***Category II***" - hazard may cause severe injury or property damage.

While a 20mm High Explosive projectile, if detonated in close proximity to an individual, could cause death or severe injury, the 20mm rounds recovered have not been fired and are not armed. For these reasons the "Hazard Severity" recommended is "Category II" – hazard may cause severe injury or property damage.

Mishap Probability that a hazard will result in a mishap or loss for this site is judged to be "***Sub-category D***" - unlikely to occur.

The attached Operational Hazard Analysis, engineering controls, standard operating procedures, and highly experienced and trained UXO Technicians provide controls that reduce the hazard to an acceptable risk. If items with a explosive risk greater then the 20mm HE projectile are encountered this risk analysis and attached documents will be updated and submitted for further review by NOSSA and DDESB if necessary.

Calculations for Engineering Controls and ESQD

References: (a) Explosive Safety Submission (ESS) for Munitions Response and On-Site Construction Support for Discarded Military Munitions, Former Naval Air Station, Cecil Field Jacksonville, Florida, Contract No. N62467-01-D-0331, Contract Task Order No. 0029, dated October 2004

(b) Department of Defense Explosive Safety Board (DDESB) Technical Publication 16, Revision 1, Methodologies for Calculating Primary Fragment Characteristics, dated December 1 , 2003

(c) Department of the Army Technical Manual 43-0001-27, Army Ammunition Data Sheets – Small Caliber Ammunition, dated April 29, 1994

(d) U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville, Use of Sandbags for Mitigation of Fragment and Blast Effects Due to Intentional Detonation of Munitions, HNC-ED-CS-S-98-7 dated August 1998 and approved by DDESB February 23, 1999

Recovery of multiple discarded military munitions (DMM) has generated a need for their safe disposal. To safely detonate recovered DMM within the work area for Cecil Field it is necessary to utilize engineering controls to reduce the blast effects to acceptable levels. To develop the appropriate level of engineering controls the fragment velocity and mass must be determine for comparison with tested engineering controls that effectively reduce the blast effects to an acceptable distance. Reference (a) has the current approved explosive safety quantity distance (ESQD) arcs for Cecil Field is 320-ft for an intentional detonation based on the munition with the greatest fragment distance (MGFD), a M56A4, 20mm HE projectile.

To determine the specifications for engineering controls for planned detonation activities, Table B-1 and the calculation from Chapter 5, reference (b) were utilized to determine the expected maximum fragmentation weight and velocity from a detonation of (10) each, 20mm projectiles laid side by side.

The following is an excerpt from Chapter 5, of reference (b) for calculating maximum fragment ranges for multiple round detonations:

> "**Maximum Fragment Ranges**
> As indicated above, the effect of detonating stacks of munitions is to increase the fragment initial velocity by as much as a factor of 2 and to increase the fragment mass by as much as 50%."

Table B-1 in reference (b) provides the following data for a M56A4, 20mm HE projectile:

- Explosive Weight: 0.026 lbs.
- Max Fragment Weight: 0.0006 lbs.
- Fragment Initial Velocity: 3,183 feet/second

Reference (c) identifies the explosive filler for the M56A4, 20mm projectile as H761 explosives as the explosive filler. H761 explosives is a member of the A-3 explosives family which has an explosives equivalent of 1.09 of the TNT standard of 1.00 as listed in Table A-2, of reference (b).

The donor charge will consist of .75-lb PETN boosters with a total explosive weight 3.75 lbs. PETN has an explosive equivalent of 1.27 of the TNT standard of 1.00 as listed in Table A-2 of reference (b).

Therefore the calculations for maximum fragment weight, expected initial velocity, and NEW are:

- The **maximum fragment weight** = 1.5 x weight from Table B-1 (1.5 x 0.0006 lbs. = **0.0009 lbs.**)
- The **expected initial velocity** = 2.0 x velocity from Table B-1 (2.0 x 3,183 feet/second = **6,366 feet/second**)
- **NEW** = NEW Donor (TNT Eq) + NEW Projectiles (TNT Eq.) (3.75 (1.27) + 10(0.026)(1.09) = **5.1 lbs. of TNT Eq**)

Reference (d) has the following directions for determining the thickness of sand bags for protection:

> "To determine the minimum wall and roof thickness for a particular shell other than those found in Table 5, the approach is as follows:
>
> (1) Determine the initial fragment velocity (V_F) in ft/s, the maximum fragment weight (W_F) in pounds, and the kinetic energy ($W_F V_F^2/2$) in lb-ft^2/s^2 for the particular munition.
> (2) Identify the munition with the next largest kinetic energy, from Table 6.
> (3) Use the sandbag wall and roof thickness from Table 5 for the munition with the next largest kinetic energy shown in Table 6."

Therefore the calculations for a M56A4, 20mm HE projectile are:

Kinetic Energy ($W_F V_F^2/2$) = (0.0009 x 6,366^2 / 2) = 18,236.6802 or 0.018236 x 10^6 lb-ft^2/s^2

Take into account for the total NEW of the planned detonation (**5.1 lbs. of TNT Eq**) and use Table 7 of reference (d) for the NEW and the closest Kinetic Energy to determine the wall and roof thickness for sand bags, sandbag throw, and withdrawal distances. This would be either the 105mm M1 or the 4.2 inch M39A2.

A withdrawal zone is necessary for any detonation. This withdrawal zone applies to everyone, both public and operational personnel. The **withdrawal zone is the maximum of the sandbag throw distance, the distance to a sound level of 140 decibels, or 200 feet**. For all munitions tested, the sound level at 100 feet was substantially less than 140 decibels. At 200 feet, the sound level will be even less. The withdrawal zones are also listed in Table 7 of reference (d).

According to Table 7, reference (d), an enclosure which has **24 inches of sandbags on the roof and walls**, would have a **maximum sandbag throw of 135 feet**, and would require a **ESQD arc of 200 feet**. The IBD ESQD arc is shown on Figure 2-3.

This approach and calculations were collaborated with Michelle Crull, Ph.D., PE, USAESCH.

Operational Hazard Analysis – Destruction of MEC (20-mm projectiles and Misc. Cartridge Actuated Devices (CADs) at former NAS Cecil Field

2.1 Process:

The MEC items will be disposed of by electrically initiated detonation utilizing engineering controls designed in compliance with DDESB TP-16, Chapter 5, Multiple Round Detonations, and HNC-ED-CS-S-98-7, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions.

2.2 Process Outline

I – Movement of MEC from Storage to Detonation Area

Step 1: Inspect MEC to insure they are safe to move
Step 2: Place MEC items into a proper container for Transportation
Step 3: Use appropriate materials to ensure MEC will not have excess movement during transportation
Step 4: Secure container in a proper transport vehicle
Step 5: Drive vehicle to Detonation area

II – Construction of Engineering Controls

Step 1: Place appropriate amount of sandbags on the ground, connecting them to make a complete enclosure which is at least 24 inches thick. A 6-inch clearance (air gap) is required between the MEC items and the sandbags.
Step 2: Place the MEC and Detonation materials into the center IAW Process III
Step 3: Place the ¾ inch thick plywood sheet across the top of the sandbag wall
Step 4: Place sandbags on top of the plywood to finish the enclosure which will be at least 24 inches thick on top and the sides.

III – Preparation of the MEC for detonation

Step 1: Remove the MEC container from the Transport vehicle
Step 2: Place no more than 10 each 20 MM projectiles or CADs in a single layer, side to side in the center of the sandbag enclosure
Step 3: Place the Appropriate amount of Donor explosives (not to exceed 4 lbs.) onto the MEC items
Step 4: Prime the Charge IAW applicable demolition procedures

IV – Receive Ammunition and Explosives

Step 1: Prepare staging areas
Step 2: Note any discrepancies prior to signing for receipt

Step 3: Place ammunition and explosives in staging areas

V – Detonation of MEC

Step 1: Ensure the Evacuation area is cleared and secured
Step 2: Receive clearance to perform detonation IAW local policies and procedures
Step 3: Prime the Explosive Package IAW applicable Demolition Procedures
Step 4: Sound an audible alarm within 1 minute of the Detonation
Step 5: Function the primed explosive package IAW applicable Demolition Procedures
Step 6: Disconnect the firing device and make notifications as required

VI – Misfire Procedures

WARNING

All personnel must observe the OSHA mandatory 30-minute wait time for all electrical demolition misfires.

Step 1: Immediately notify all personnel in operational area.
Step 2: Disconnect the firing device from the circuit
Step 3: Follow applicable demolition mis-fire procedures
Step 4: If it still does not fire, record time, and begin 30-minute wait time
Step 5: After 30- minute wait, SUXOS will approach and investigate miss-fire
Step 6: Remove detonator from explosive train.
Step 7: Attach another detonator to the explosive train and follow applicable demolition procedures outlined in Process Step V

VII – Post Detonation Procedures

Step 1: Carefully uncover the engineering controls
Step 2: Check for any MEC items which may still be intact
Step 3: If any MEC items are discovered intact- determine if they are safe to move IAW applicable procedures
Step 4: Separate and remove all MEC related scrap for inspection
Step 5: Remove all other debris and fill in any disturbed ground

2.3 Preliminary Hazards List

I – Movement of MEC from Storage to Detonation Area

Step 1: Inspect MEC to insure they are safe to Move
a) Functioning of Ordnance from Heat/Shock/Friction
b) Hand injuries from sharp metal edges

Step 2: Place MEC items into a proper container for Transportation
a) Functioning of Ordnance from Heat/Shock/Friction
b) Hand injuries from sharp metal edges

Step 3: Use appropriate materials to ensure MEC will not have excess movement during transportation

Step 4: Secure container in a proper transport vehicle
a) Functioning of Ordnance from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling

Step 5: Drive vehicle to Detonation area
a) Functioning of Ordnance from Heat/Shock/Friction
b) Accidents from improper vehicle operations

II – Construction of Engineering Controls

Step 1: Place appropriate amount of sandbags on the ground, connecting them to make a complete enclosure which is at least 24 inches thick.
a) Lifting sandbags up to 50 pounds in weight
b) Walking across uneven surfaces, tripping/falling

Step 2: Place the MEC and Detonation materials into the center IAW Process III
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling

Step 3: Place the ¾ inch thick plywood sheet across the top of the sandbag wall
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling
c) Hand injuries from splinters and uneven wooden edges

Step 4: Place sandbags on top of the plywood to finish the enclosure which will be at least 24 inches thick on top and the sides.
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling
c) Hand injuries from splinters and uneven wooden edges

III – Preparation of the MEC for detonation

Step 1: Remove the MEC container from the Transport vehicle
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling

Step 2: Place no more than 10 each 20 MM projectiles or CADs in a single layer, side to side in the center of the sandbag enclosure.
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling
c) Hand injuries from sharp metal edges

Step 3: Place the Appropriate amount of Donor explosives (not to exceed 4 lbs.) onto the MEC items.
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling

Step 4: Prime the Charge IAW applicable demolition procedures
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling
c) Electro-Static Discharge (ESD) functioning of electric detonators

IV – Receive Ammunition and Explosives

Step 1: Prepare staging areas

Step 2: Note any discrepancies prior to signing for receipt
a) Initiation of explosives from heat/shock or friction
b) Hand/eye injuries from removal of banding materials

Step 3: Place ammunition and explosives in staging areas
a) Initiation of explosives from heat/shock or friction
b) Lifting heavy items
c) Walking across uneven surfaces
d) Receiving incorrect amount of explosives or ammunition
e) Receiving damaged or deteriorated explosive or ammunition

V – Detonation of MEC

Step 1: Ensure the Evacuation area is cleared and secured
Step 2: Receive clearance to perform detonation IAW local policies and procedures
Step 3: Prime the Explosive Package IAW applicable Demolition Procedures
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces/tripping/falling
c) Electro-Static Discharge (ESD) functioning of electric detonators.

Step 4: Sound an audible alarm within 1 minute of the Detonation

Step 5: Function the primed explosive package IAW applicable Demolition Procedures.

a) Flying debris from detonation
b) Blast wave from detonation

Step 6: Disconnect the firing device and make notifications as required

VI – Misfire Procedures

WARNING

All personnel must observe the OSHA mandatory 30-minute wait time for all electrical demolition misfires.

Step 1: Immediately notify all personnel in operational area.

Step 2: Disconnect the firing device from the circuit

Step 3: Follow applicable demolition miss-fire procedures

a) Flying debris from detonation
b) Blast wave from detonation

Step 4: If it still does not fire, Record time, and begin 30-minute wait time

Step 5: After 30- minute wait, SUXOS will approach and investigate miss-fire

Step 6: Remove detonator from explosive train.

a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces/tripping/falling
c) Electro-Static Discharge (ESD) functioning of electric detonators.

Step 7: Attach another detonator to the explosive train and follow applicable demolition procedures outlined in Process Step V.

a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces/tripping/falling
c) Electro-Static Discharge (ESD) functioning of electric detonators.

VII – Post Detonation Procedures

Step 1: Carefully uncover the engineering controls

a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Hand injuries from damaged wood and sharp metal edges
c) Eye hazards from detonation debris
d) Walking across uneven surfaces/tripping/falling

Step 2: Check for any MEC items which may still be intact

a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
B) Hand injuries from damaged wood and sharp metal edges
c) Eye hazards from detonation debris
D) Walking across uneven surfaces/tripping/falling

Step 3: If any MEC items are discovered intact- determine if they are safe to move IAW applicable procedures

a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Hand injuries from damaged wood and sharp metal edges
c) Eye hazards from detonation debris
d) Walking across uneven surfaces/tripping/falling

Step 4: Separate and remove all MEC related scrap for inspection

a) Hand injuries from damaged wood and sharp metal edges
b) Eye hazards from detonation debris
c) Walking across uneven surfaces/tripping/falling

Step 5: Remove all other debris and fill in any disturbed ground

a) Lifting heavy object up to 50 pounds
b) Hand injuries from damaged wood and sharp metal edges
c) Eye hazards from detonation debris
d) Walking across uneven surfaces/tripping /falling

2.4 Operations Hazard Analysis

OPERATION HAZARD ANALYSIS							
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PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIM RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY / PREVENTATIVE ACTIONS**
I – Movement of MEC Items from Storage							
Step 1	Functioning of Ordnance	• Dropping of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
		• MEC Items not safe to move	• Initiation of ammunition and/or explosives	I B	• MEC Items will be determined safe to move IAW approved work plan and SSHP	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
		• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	Hand Injuries	• Handling MEC items with sharp metal edges	• Cuts and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
Step 2	Functioning of Ordnance	• Dropping of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
		• MEC Items not safe to move	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC

OPERATION HAZARD ANALYSIS							
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		• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges	• Cuts and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
Step 3	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges	• Cuts and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
Step 4	• Walking across uneven ground	Tripping while walking across uneven surfaces	Disabling knee, leg or ankle injury	III B	Keep operational area free from debris and tripping hazards	IV C	Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Dropping of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
		• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
Step 5	• Functioning of Ordnance	• Dropping of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety

OPERATION HAZARD ANALYSIS							
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					handling MEC Items		Briefing for the type and hazards of MEC
		• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Vehicle Accident	• Improper vehicle operations or vehicle malfunction	• Injuries to vehicle operators, pedestrians or property	III C	• Only licensed operators can operate vehicle • Performance of daily inspections and maintenance	IV C	• Document daily safety inspections and maintenance • Conduct daily safety briefings for operators
II Construct Engineering Controls							
Step 1	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Lifting & Carrying Heavy Loads	• Bending to lift heavy items • Turning while lifting heavy items	• Disabling back injury • Disabling back injury • Disabling leg, knee and ankle injury	III B	• Keep operational area free to debris or unnecessary objects that could create tripping hazards • Limit single person lifting to below 40 pounds	IV B	• All personnel will receive back safety and proper lifting technique training • Operations personnel will be certified IAW local command directives
Step 2	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC

OPERATION HAZARD ANALYSIS							
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Step 3	• Functioning of Ordnance	• Dropping plywood on MEC and Explosives	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Hand Injuries	• Handling plywood with rough edges	• Minor Cuts , splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
Step 4	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Dropping sandbags on MEC and Explosives	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling plywood with rough edges	• Minor Cuts , splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
III Preparation of MEC for Detonation							
Step 1	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and

OPERATION HAZARD ANALYSIS							
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							hazards of MEC
Step 2	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges	• Cuts and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
Step 3	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
Step 4	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Functioning of Electric Detonators	• Electro-static discharge	• Initiation of explosive	II B	• Proper grounding techniques	II D	• Conduct Daily safety briefing on hazards of EMR

OPERATION HAZARD ANALYSIS							
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			detonators		• Enforcement of approved EMR procedures		and proper grounding techniques • Training of personnel on approved EMR procedures
V – Receive Ammunition and Explosives							
Step 1	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
Step 2	• Initiation of explosives from shock or friction	• Dropping or mishandling ammunition and explosives	• Initiation of ammunition and/or explosives	I B	• Allow only qualified and certified personnel to handle ammunition and explosives	II D	• Operations personnel will be certified IAW local command directives
	• Sharp banding under tension	• Cutting banding without PPE or using a non-standard cutting device	• Hand, arm, head or eye injury from banding when cut and hits operator	III B	• Provide PPE and standard band cutting device	IV B	•
Step 3	• Initiation of explosives from shock or friction	• Dropping or mishandling ammunition and explosives	• Initiation of ammunition and/or explosives	I B	• Allow only qualified and certified personnel to handle ammunition and explosives	II D	• Operations personnel will be certified IAW local command directives
	• Lifting Heavy Items	• Bending to lift heavy items • Turning while lifting heavy items • Tripping while carrying explosives • Dropping	• Disabling back injury • Disabling back injury • Disabling leg, knee and ankle injury • Initiation of	III B	• Place explosives storage boxes on elevated platforms to prevent having to bend • Keep operational area free to debris or unnecessary objects that could create tripping hazards • Allow only certified	IV B	• All personnel will receive back safety and proper lifting technique training • Operations personnel will be certified IAW local command directives

OPERATION HAZARD ANALYSIS							
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		ammunition and explosive items	explosives from shock and friction		personnel to handle ammunition and explosives		
	• Walking across uneven surfaces	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Receiving incorrect amount of explosives	• Contract carrier having incorrect amount of explosives	• Exceeding explosive limits and requiring work stoppage	IV B	• Do not accept delivery of more explosives than required	IV D	• Verify amount of explosives ordered with amount of explosives delivered.
	• Receiving damaged or deteriorated explosives or ammunition	• Contract Carrier delivering damaged or deteriorated explosives	• Hazardous explosives which requires evacuation	IV B	• SUXOS will inspect all explosives prior to accepting delivery from contract carrier	IV D	• Document the condition of explosives prior to accepting delivery
V- Detonation of MEC							
Step 1	• Walking across uneven surfaces	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
Step 2	NO HAZARDS						
Step 3	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Functioning of Electric Detonators	• Electro-static discharge	• Initiation of explosive detonators	II B	• Proper grounding techniques • Enforcement of approved EMR procedures	II D	• Conduct Daily safety briefing on hazards of EMR and proper grounding techniques • Training of personnel on approved EMR procedures

OPERATION HAZARD ANALYSIS							
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Step 4	NO HAZARDS						
Step 5	• Flying debris	• Intentional Detonation of MEC and Explosives	• Injury from flying debris	II B	• All personnel will be out to the established ESQD Distance	IV D	• Brief personnel on the ESQD distances • Visual check of area for personnel prior to the detonation
	• Blast wave	• Intentional Detonation of MEC and Explosives	• Injury from blast wave	II B	• All personnel will be out to the established ESQD Distance	IV D	• Brief personnel on the ESQD distances • Visual check of area for personnel prior to the detonation
Step 6	NO HAZARDS						
VI- Miss-Fire Procedures							
Step 1	NO HAZARDS						
Step 2	NO HAZARDS						
Step 3	• Flying debris	• Intentional Detonation of MEC and Explosives	• Injury from flying debris	II B	• All personnel will be out to the established ESQD Distance	IV D	• Brief personnel on the ESQD distances • Visual check of area for personnel prior to the detonation
	• Blast wave	• Intentional Detonation of MEC and Explosives	• Injury from blast wave	II B	• All personnel will be out to the established ESQD Distance	IV D	• Brief personnel on the ESQD distances • Visual check of area for personnel prior to the detonation
Step 4	NO HAZARDS						

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
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Step 5	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
Step 6	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Functioning of Electric Detonators	• Electro-static discharge	• Initiation of explosive detonators	I B	• Proper grounding techniques • Enforcement of approved EMR procedures	II D	• Conduct Daily safety briefing on hazards of EMR and proper grounding techniques • Training of personnel on approved EMR procedures
Step 7	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Functioning of Electric Detonators	• Electro-static discharge	• Initiation of explosive detonators	II B	• Proper grounding techniques • Enforcement of approved EMR procedures	II D	• Conduct Daily safety briefing on hazards of EMR and proper grounding techniques • Training of personnel on approved EMR procedures
VII- Post							

OPERATION HAZARD ANALYSIS							
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Detonation Procedures							
Step 1	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges, demolition debris	• Cuts, splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
	• Flying debris	• Moving demolition debris	• Eye hazards	III B	• Personnel will be required to wear ANSI approved safety glasses.	IV C	• Personnel will be required to wear appropriate eye protection while performing operations
	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
Step 2	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges, demolition debris	• Cuts, splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
	• Flying debris	• Moving demolition debris	• Eye hazards	III B	• Personnel will be required to wear ANSI approved safety glasses.	IV C	• Personnel will be required to wear appropriate eye protection while performing operations
	• Walking across	• Tripping while	• Disabling knee,	III B	• Keep operational area free	IV C	• Remind operational

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	HAZARD	MISHAP TRIGGERING EVENT	POTENTIAL MISHAP	PRELIM RISK INDEX	HAZARD MITIGATION REQTS	FINAL RISK INDEX	EMERGENCY / PREVENTATIVE ACTIONS
	uneven ground	walking across uneven surfaces	leg or ankle injury		from debris and tripping hazards		personnel to remove debris as it is generated
Step 3	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges, demolition debris	• Cuts, splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
	• Flying debris	• Moving demolition debris	• Eye hazards	III B	• Personnel will be required to wear ANSI approved safety glasses.	IV C	• Personnel will be required to wear appropriate eye protection while performing operations
	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
Step 4	• Hand Injuries	• Handling MEC items with sharp metal edges, demolition debris	• Cuts, splinters and abrasions	I B	• Wearing of Leather work gloves	II D	• Personnel will be required to wear appropriate hand protection while performing operations
	• Flying debris	• Moving demolition debris	• Eye hazards	III B	• Personnel will be required to wear ANSI approved safety glasses.	IV B	• Personnel will be required to wear appropriate eye protection while performing operations
	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	HAZARD	MISHAP TRIGGERING EVENT	POTENTIAL MISHAP	PRELIM RISK INDEX	HAZARD MITIGATION REQTS	FINAL RISK INDEX	EMERGENCY / PREVENTATIVE ACTIONS
Step 5	• Lifting & Carrying Heavy Loads	• Bending to lift heavy items • Turning while lifting heavy items • Tripping while carrying explosives • Dropping ammunition and explosive items	• Disabling back injury • Disabling back injury • Disabling leg, knee and ankle injury • Initiation of explosives from shock and friction	I B	• Place explosives storage boxes on elevated platforms to prevent having to bend • Keep operational area free to debris or unnecessary objects that could create tripping hazards • Allow only certified personnel to handle ammunition and explosives	II D	• All personnel will receive back safety and proper lifting technique training • Operations personnel will be certified IAW local command directives
	• Hand Injuries	• Handling MEC items with sharp metal edges, demolition debris	• Cuts, splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
	• Flying debris	• Moving demolition debris	• Eye hazards	III B	• Personnel will be required to wear ANSI approved safety glasses.	IV C	• Personnel will be required to wear appropriate eye protection while performing operations
	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated

Sand Bag Construction Examples

* Obtained from U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville, Use of Sandbags for Mitigation of Fragment and Blast Effects Due to Intentional Detonation of Munitions, HNC-ED-CS-S-98-7 dated August 1998 and approved by DDESB February 23, 1999

Figure 5 – Sandbag Enclosure for an 81 mm M374A2 mortar.

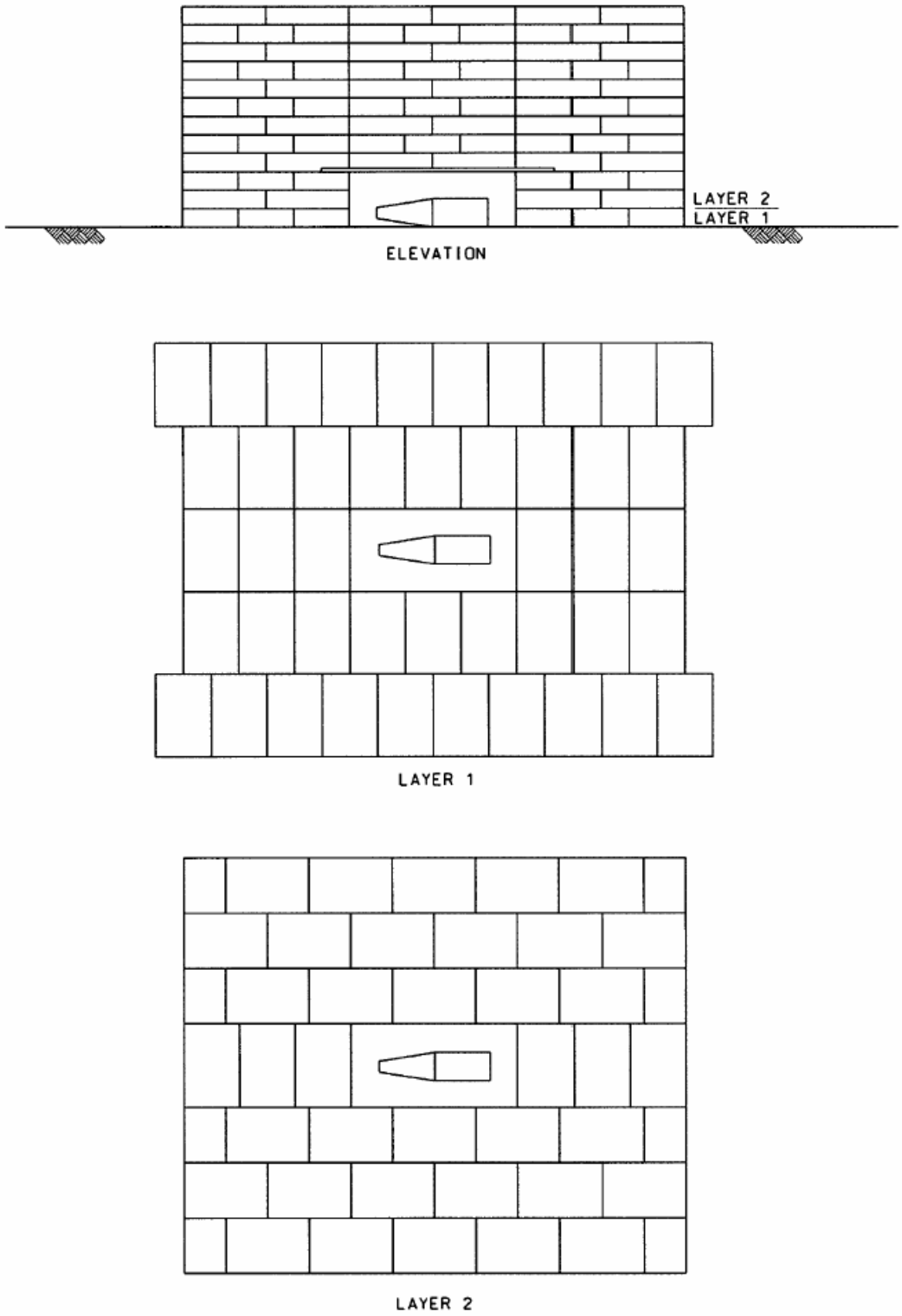

Figure 6 - Interlocking Alternate Layers of Sandbags

Revision No. 01 (Draft)

Explosives Siting Plan

for Munitions Response and On-Site Construction Support for Discarded Military Munitions Former Naval Air Station Cecil Field, Jacksonville, Florida

Contract No. N62467-01-D-0331
Contract Task Order No. 0029

Prepared for

U. S. Navy Facilities Engineering Command
Engineering Field Division, Southern Division

Prepared by

CH2MHILL
115 Perimeter Center Place, NE.
Suite 700
Atlanta, GA 30346

January 2005

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Acronyms and Abbreviations

ATF	U.S. Bureau of Alcohol, Tobacco, and Firearms
BIP	blow(n)-in-place
CH2M HILL	CH2M HILL Constructors, Inc.
CAD	cartridge actuated device
CTO	Contract Task Order
DDESB	U.S. Department of Defense Explosives Safety Board
DMM	Discarded Military Munitions
DoD	U.S. Department of Defense
EOD	Explosive Ordnance Disposal
EBS	Environmental Baseline Survey
ESP	Explosives Siting Plan
ESQD	Explosives Safety Quantity-Distance
EZ	Exclusion Zone
FAA	Federal Aviation Authority
HE	high explosives
IBD	Inhabited Building Distance
JAA	Jacksonville Airport Authority
lb	pound(s)
MEC	Munitions and Explosives of Concern
MGFD	Munition with the Greatest Fragmentation Distance
mm	millimeter(s)
MPPEH	Material Potentially Presenting an Explosive Hazard
MRS	Munitions Response Site
NAS	Naval Air Station
NAVFAC EFD SOUTH	U.S. Naval Facilities Engineering Command, Engineering Field Division, Southern Division
NAVSEA	U.S. Naval Sea Systems Command
NEW	Net Explosives Weight
NOSSA	Naval Ordnance Safety and Security Activity
OP 5	Ordnance Publication 5
psi	pounds per square inch
PTR	Public Transportation Routes
Q-D	Quantity-Distance
ROICC	Resident Officer in Charge of Construction
SUXOS	Senior UXO Supervisor
TCRA	Time Critical Removal Action
USAESCH	U.S. Army Engineering Support Center, Huntsville
UXO	Unexploded Ordnance

SECTION 1

Introduction

This Explosives Siting Plan (ESP) is prepared in support of Munitions Response and On-Site Construction Support to locate and remove Munitions and Explosives of Concern (MEC) and materials that may present a potential explosive hazard (MPPEH) at the former Naval Air Station (NAS) Cecil Field, Jacksonville, Florida. This ESP is also included as Appendix D in the *Work Plan Addendum No. 01 for Munitions Response and Onsite Construction Support for Discarded Military Munitions at the former NAS Cecil Field, Jacksonville, Florida* (CH2M HILL Constructors, Inc. [CH2M HILL], 2004b) and is supplemented by the project Explosives Safety Submission. The munitions response action for MEC is being implemented by CH2M HILL for the U.S. Naval Facilities Engineering Command, Engineering Field Division, Southern Division (NAVFAC EFD SOUTH), under Response Action Contract No. N62467-01-D-0331, Contract Task Order (CTO) No. 0029.

The ESP presents the site-specific requirements for establishing Explosives Safety Quantity-Distance (ESQD) arcs for the following:

- Removal and disposal of MEC items that may be discovered during the Time Critical Removal Action (TCRA) at the former NAS Cecil Field
- Detonation of discovered Discarded Military Munitions (DMM) on the project site

The purpose of this Revision No. 01 to the ESP is to incorporate the following: 1) temporary MEC storage in Building 365, an earth covered magazine located at the site; 2) use engineering controls for MEC detonations; and 3) expansion of the munitions response site (MRS) work area based on the quantity and distribution of MEC recovered during the mag & dig operation completed December 6 to 17, 2004. The ESP, Revision No. 00, dated October 2004, was approved by the Department of Defense Explosives Safety Board (DDESB) on November 5, 2004, and the Naval Ordnance Safety and Security Activity (NOSSA) on November 18, 2004.

1.1 Site Description, Background, and History

According to the Environmental Baseline Survey (EBS) Report, Building 365 was a former earth covered weapons storage locker built in 1957 at the former NAS Cecil Field, Jacksonville, Florida. The building is a one-story cinderblock bunker that is divided into 10 individual storage areas. Building 365 was reported to store cartridge actuated devices (CADs) and was used as a ready service magazine to store munitions for flight operations at the former NAS Cecil Field. Building 365 is located west of Runway 18R, south of Buildings 373/104, and north of Building 366 (Figure 1-1). An access road runs along the west side of the building and a wooded area was formerly located to the west. The building and adjacent property were classified in the EBS report as "1/White," an area where no release or disposal of hazardous substances or petroleum products occurred (including any migration of these substances from adjacent areas). The building had been previously found suitable to transfer with property transfer from the Navy to the Jacksonville Aviation Authority (JAA) completed.

On Friday, September 10, 2004, a single DMM item and 10 MPPEH items were found near Building 365. The items were found during clearing and grubbing operations of an approximate 5-acre area in support of an ongoing JAA construction project to expand the north apron aircraft taxiway. The DMM was a single 20-millimeter (mm) round consisting of cartridge case with percussion primer, not impinged and high explosive (HE) projectile, unfired with the point detonating fuze sheared off. The MPPEH were expended CADs. On September 21, 2004, the CH2M HILL Munitions Response Team visited the site and talked with one of the responding Florida Air National Guard Explosive Ordnance Disposal (EOD) Technicians. The EOD Technician stated that the recovered 20-mm round was in a safe condition and had been removed from the site for disposal. The DMM find caused a work stoppage of the JAA construction project and prompted the need for additional MEC support. The additional support is a cautionary action to ensure that the presence of the discovered DMM was unique to the area where it was found and to protect human health and safety during completion of the construction project.

The ESP for the initial MRS work area was submitted on October 18, 2004, and was approved by DDESB on November 5, 2004, and NOSSA on November 18, 2004. The mag & dig operation on the initial MRS work area was completed from December 6 to 17, 2004, and based on the quantity and distribution of recovered MEC, expansion of the MRS work area boundaries became necessary. The initial MRS work area and the proposed expansions are shown on Figure 1-1.

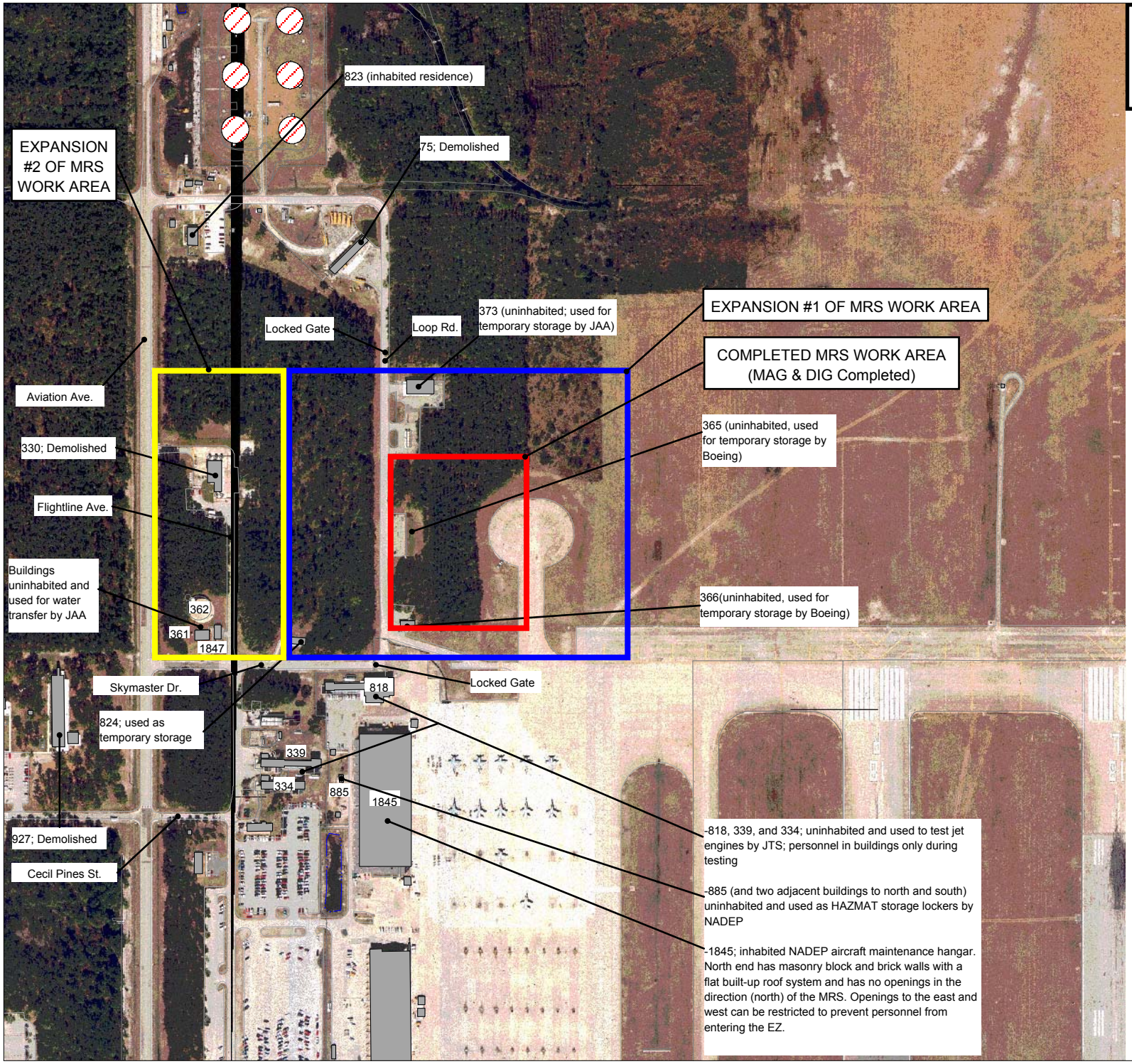
Following is a summary of the items recovered during the completed mag & dig operation on the initial MRS work area:

- 77 20-mm HE projectiles (unfired/fuzed with cartridge intact)
- 191 CADs/impulse cartridges (unfired/MK2, MK14, MK18, MK19, miscellaneous small)
- 33 small arms blanks (5.56-mm and 7.62-mm)
- 8 MK4 bomb dummy unit signal cartridges
- 1 suspect aircraft part suspected to contain 2 CADs/impulse cartridges (determined to be type of actuator with two ports labeled for CAD use with caps and leads intact)
- Approximately 220 lbs of MPPEH consisting of expended CADs/impulse cartridges, 20-mm cartridges, 20-mm link belts, and 2 MK76 bomb dummy units with no signal cartridges
- Approximately 500 lbs of non-MEC related scrap metal

1.2 Purpose of this Plan

This ESP provides explosives safety criteria for planning and siting explosives operations that will be performed by CH2M HILL and its subcontractors during the munitions response and on-site construction support to locate and remove MEC and MPPEH that may be discovered during the TCRA at the MRS located at the former NAS Cecil Field. The purpose of this ESP is to obtain DDESB site approval for the inhabited building distance (IBD) excavation exclusion zone (EZ) for the explosives removal action in the vicinity of Building 365 and for the IBD deliberate detonation exclusion zone for this work area.

FIGURE 1-1
VICINITY MAP



LEGEND

Structures
- PERMANENT
- DEMOLITION

Roads

Installation Area

0 200 400 600 Feet

1"= 400 feet

Naval Facilities Engineering Command • Southern Division •

Plot date: Sep 22, 2004; U:\aprs\EGIS_CecilField_NAS.apr

SECTION 2

Explosives Siting Plan

This section presents the site-specific requirements for siting the munitions response and on-site construction support for locating and removing and MEC that is discovered. Safety criteria for planning and siting explosives operations were developed in accordance with the following:

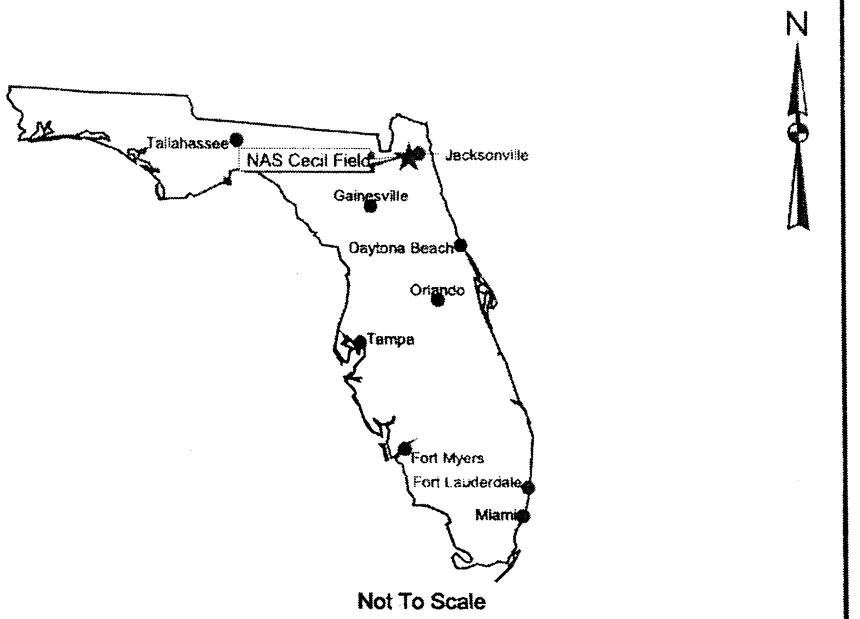
- U.S. Department of Defense (DoD), 1991, 4160.21-M-1, *Defense Demilitarization Manual*
- DoD, 1997, 4165.26M, *Contractors Safety Manual for Ammunition and Explosives*
- DoD, 2004, 6055.9-STD, *DoD Ammunition and Explosives Safety Standards,*
- Naval Sea Systems Command (NAVSEA), 2003, Ordnance Publication 5 (OP 5) Volume 1, *Ammunition and Explosives Ashore: Safety Regulations for Handling, Storing, Production, Renovation, and Shipping of Ammunition and Explosives Ashore, Seventh Revision, Change 2*
- NAVSEA, 2001, SWO20-AF-ABK-010, *Motor Vehicle Driver and Shipping Inspector's Manual for Ammunition, Explosives, and Related Hazardous Materials*
- U.S. Department of the Navy, Chief of Naval Operations, 1999, OPNAVINST 8020.14, *Department of the Navy Explosives Safety Policy*
- DDESB, 2003, Technical Paper 16, Revision 1, *Methodologies for Calculating Primary Fragment Distances*
- NOSSA, 2004, Instruction 8020.15, *Military Munitions Response Oversight Program*
- U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville, 1998, *Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions* (HNC-ED-CS-S-98-7)

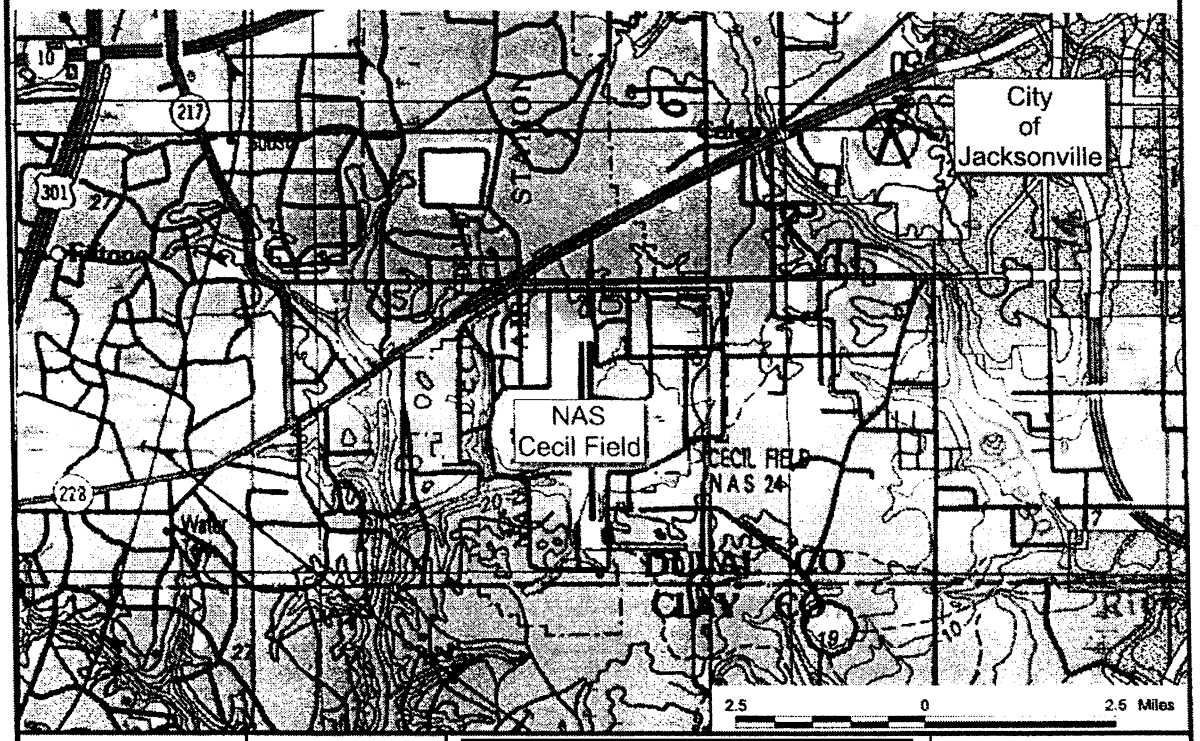
Detailed descriptions of the determination of minimum separation distances (ESQD arcs), EZs, and the establishment of explosives operations areas are presented in this ESP.

2.1 Explosives Operations Areas

During the TCRA, work will be conducted at the following areas where MEC, MPPEH, and explosives may be exposed to the public:

- The construction work area, where vegetation removal and soil excavation may unearth abandoned or discarded MEC and MPPEH (Figures 1-1, 2-1, 2-2, 2-3, and 2-4)
- Detonation Area for Blow-In-Place (BIP) disposal operations of recovered live MEC for a maximum net explosives weight (NEW) of <1 lb (Figures 2-3 and 2-4)
- Planned MEC Demolition/Detonation Area for disposal operations of recovered live MEC for a maximum NEW of <6 lbs (Figures 2-3 and 2-4)

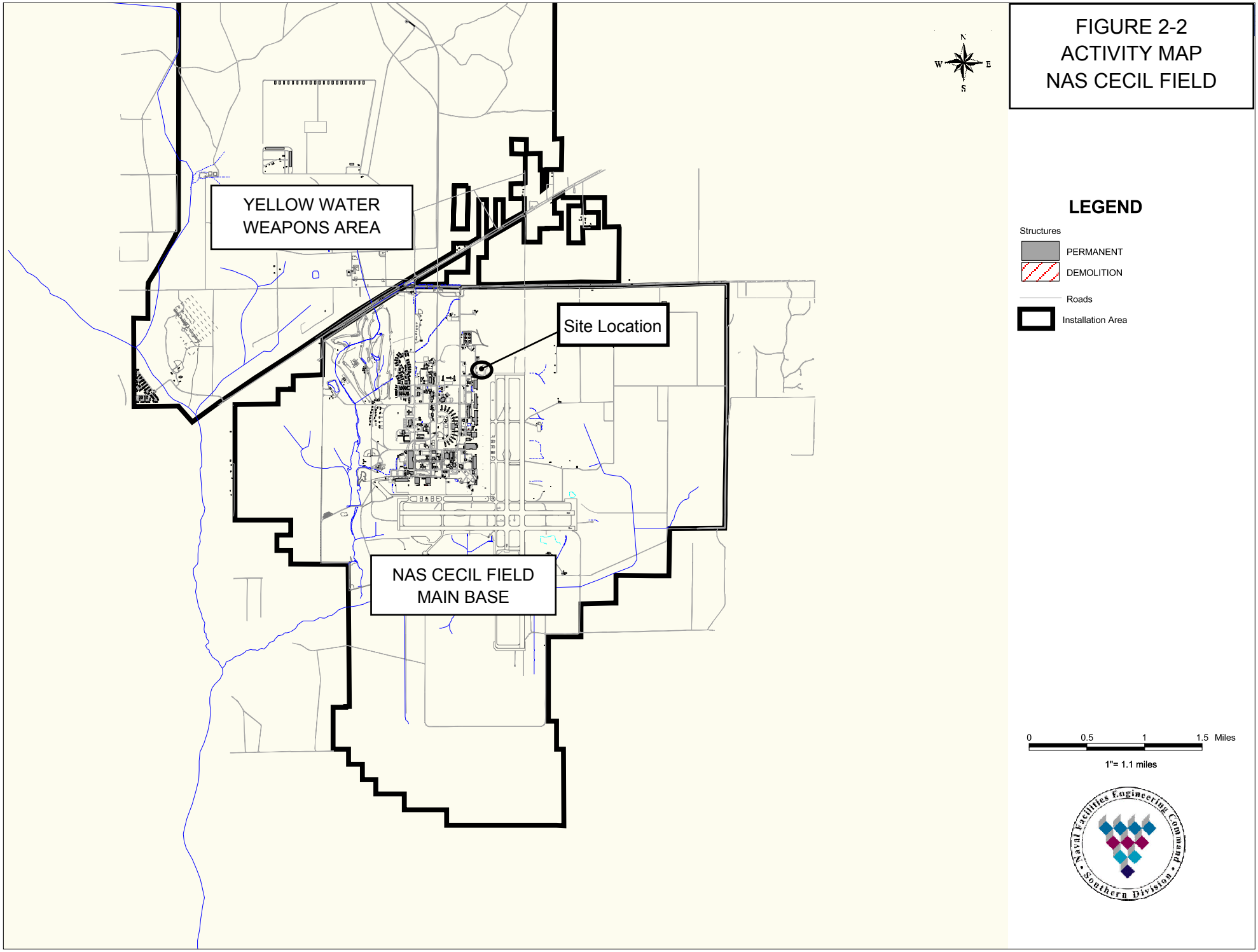




DRAWN BY	DATE
MJJ	30Jul02
CHECKED BY	DATE
	9/24/02
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	

FIGURE 2-1
REGIONAL MAP
NAS CECIL FIELD

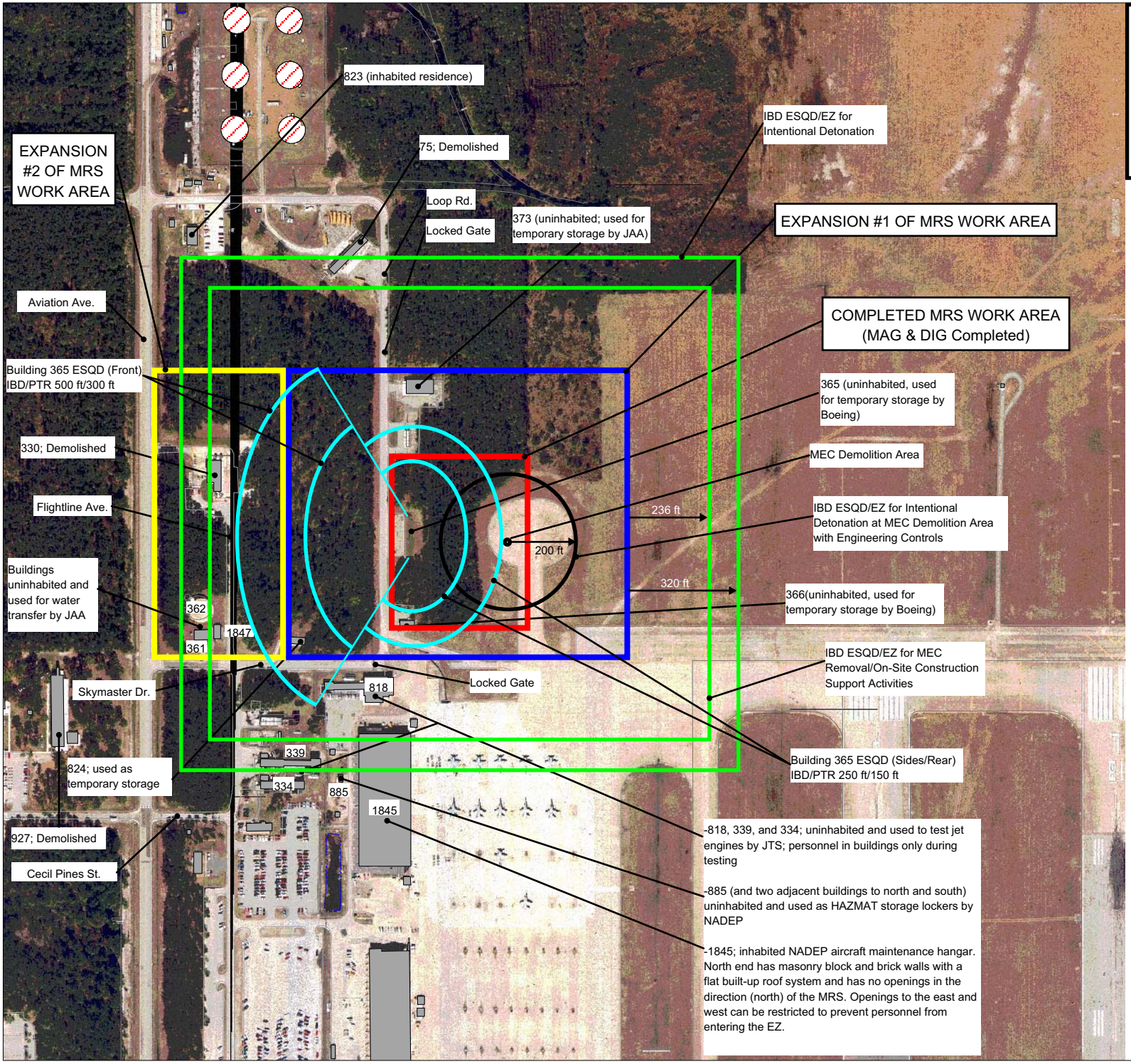
P:\GIS\NAS_CecilField\JETC02-RAP.apr 30Jul02 MJJ Layout01



This graphic was generated using the TtNUS EGIS module

Plot date: Sep 15, 2004; U:\aprs\EGIS_CecilField_NAS.apr

FIGURE 2-3 QUANTITY-DISTANCE MAP FOR EXPANSION #1 OF MRS WORK AREA



LEGEND

Structures
- PERMANENT
- DEMOLITION

Roads

Installation Area

0 200 400 600 Feet

1"= 400 feet

Naval Facilities Engineering Command Southern Division

Plot date: Sep 22, 2004; U:\aprs\EGIS_CecilField_NAS.apr

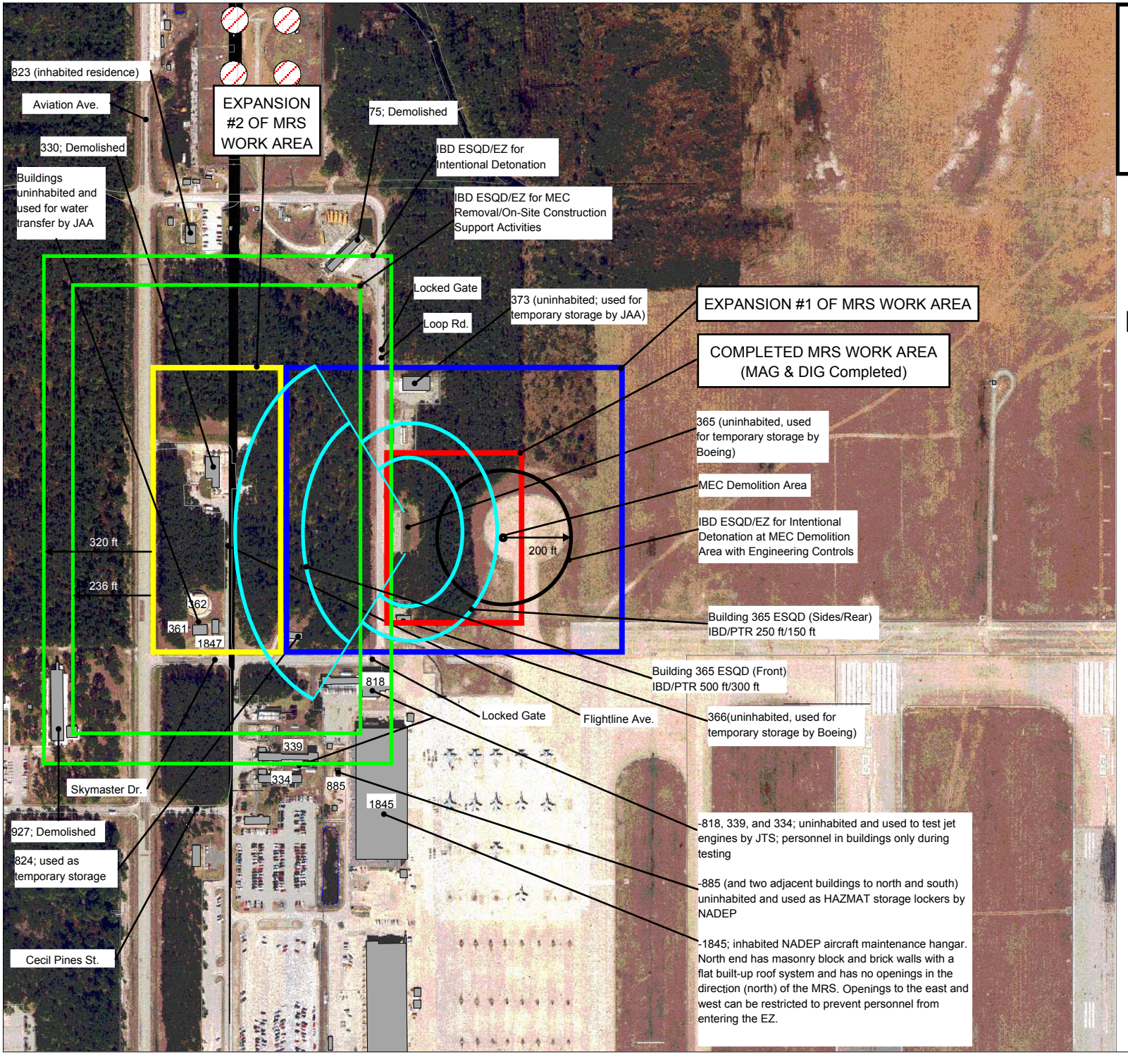


FIGURE 2-4 QUANTITY-DISTANCE MAP FOR EXPANSION #2 OF MRS WORK AREA

LEGEND

Structures
- PERMANENT
- DEMOLITION

Roads

Installation Area

0 200 400 600 Feet

1"= 400 feet

Naval Facilities Engineering Command • Southern Division •

Plot date: Sep 22, 2004; U:\aprs\EGIS_CecilField_NAS.apr

In each of these areas, an EZ with a minimum separation distance based on an ESQD arc will be established to protect the public in the event of intentional and/or unintentional detonation. Only personnel essential to the project will be permitted in each EZ. Essential personnel are generally considered to be Unexploded Ordnance (UXO)-qualified personnel.

Other personnel such as heavy equipment operators or technicians needed to support specialized equipment, if their presence is essential to a project task, will be allowed in an EZ while conducting their work under the supervision of UXO-qualified personnel.

Minimum separation distances for non-detonation activities and for unintentional and intentional detonation activities are discussed below. Safe separation distances for qualified UXO teams can be reduced based on the Munition with the Greatest Fragmentation Distance (MGFD) and the K40 overpressure distance. Table 2-1 summarizes basic activities that will be conducted in MEC-related areas and the basis for determining the appropriate EZ minimum separation distances.

TABLE 2-1
Determining Sizes of Exclusion Zones

Operation	Basis for Determining Size of Exclusion Zone	Minimum Separation Distance (for Nonessential Personnel)	Safe Separation Distance (for Other UXO Teams)
Excavation Activities	Unintentional Detonation	236 feet (IBD for ESQD*), 142 feet (PTR for ESQD*) (Safe Separation Distance)	200 feet*
Detonation of MEC at MRS (Max. <1 lb NEW)	Intentional Detonation	320 feet (IBD for ESQD**)	320 feet**
Detonation of MEC at Planned Demolition Area (Max. <6 lbs NEW)	Intentional Detonation	200 feet (IBD for ESQD***)	200 feet***

*Based on OP 5 Volume 1, Table 7-9.

**Based on OP 5 Volume 1, Table 13-2.

***Based on calculations from DDESB Technical Paper 16 and HNC-ED-CS-S-98-7 as described in Section 2.2.6.1.

2.1.1 Minimum Separation Distances for Non-Detonation Activities

Certain activities in work areas will require EZs even although no explosive detonation is planned. For example, unintentional detonation of ordnance items could potentially occur during soil excavation or vegetation removal. Although this situation is unlikely because of the rigorous use of safety procedures, an EZ is required as a precaution to protect nonessential personnel. Minimum separation distances for nonessential personnel during operations onsite will be determined based on the MGFD and the guidance published in DDESB Technical Paper 16, Revision 1 (DDESB, 2003) and OP 5 Volume 1 (NAVSEA, 2003), or the K40 distance as calculated in accordance with OP 5 Volume 1 (when engineering controls are used).

The MGFD for the former NAS Cecil Field MRS is the 20-mm HE projectile. The calculated fragment distance for the 20-mm projectile without engineering controls is presented in Table 2-2.

TABLE 2-2
Calculated Fragment Distance for the 20-mm Projectile

Munition[a]	Hazardous Fragment Distance[b] (feet)	Maximum Fragment Distance[c] (feet)	K40 Overpressure Distance[d] (feet)
20-mm projectile	320	320	200

[a] Fragment hazard distances will be recalculated based on the NEW, in the event that different munitions items are found.

[b] OP 5 Volume 1, Table 13-2 (NAVSEA, 2003), and DDESB Technical Paper 16 (DDESB, 2003): the distance at which fragments do not exceed a hazardous fragment density of one hazardous fragment per 600 square feet, where a hazardous fragment is defined as a fragment having an impact energy of 58 ft-lb or greater.

[c] OP 5 Volume 1, Table 13-2, and DDESB Technical Paper 16: the maximum distance at which a fragment of the munition may travel based on munition design specifications and maximum trajectories.

[d] As calculated in accordance with OP 5 Volume 1, Table 13.2, and DDESB Technical Paper 16: the distance at which blast overpressure exposure from Hazard Division 1.1 explosives is less than 0.90 pound per square inch (psi)—the lower end of the permissible exposure level for inhabited buildings and administrative and housing areas per DoD, 2004, 6055.9-STD, *DoD Ammunition and Explosives Safety Standards*, Rewrite Version, Revision 4. Determined from the formula: $40 \times NEW^{1/3}$.

2.1.2 Planned or Established MEC Demolition Areas

MEC item(s) determined by the Senior UXO Supervisor (SUXOS) and one other qualified UXO Technician as safe to move but not safe to transport for offsite disposal and have been moved for temporary storage in Building 365 will be disposed of by detonation at the MEC demolition location shown on Figures 2-3 and 2-4. Engineering controls which conform to the standards of HNC-ED-CS-S-98-7 (U.S. Army Engineering Support Center, Huntsville [USAESCH], 1998) will be used to maintain the IBD ESQD of 200 feet. Calculations for the engineering controls are discussed in Section 2.2.6.1.

The MEC demolition location will not be utilized as an overnight or longer-term staging area with MEC moved to the location for demolition only.

2.2 Footprint Operating Areas

The location of the MRS work areas and the safety arcs are shown on Figures 2-3 and 2-4. CH2M HILL intends to perform the following sequence of work:

1. Mag & dig operation on Expansion #1 of the MRS work area (Figures 1-1, 2-3, and 2-4)
2. Mag & dig operation on Expansion #2 of the MRS work area (Figures 1-1, 2-3, and 2-4), only if MEC is discovered within approximately 200 feet of the western boundary of Expansion #1
3. On-site construction support for both Expansions #1 and #2 of the MRS work area (Figures 1-1, 2-3, and 2-4) (On-site construction support will be provided during all activities that involve intrusive work.)

Intrusive work will only be completed in one expansion area at a time with the respective ESQD arcs enacted during operations in that area.

2.2.1 Blow-in-Place Areas

When MEC and/or MPPEH are discovered and are not safe to transport, and the area can withstand a high-order detonation, these materials will be disposed of by detonation where found, or BIP. Engineering controls for blast/fragment mitigation may be required, including the evacuation of personnel and protection of property; construction of protective works such as trenching, barricades, or buttresses to protect fixed facilities; and/or tamping the shot with earth and sand to reduce fragmentation. The UXO personnel will follow the protection procedures for personnel and property and determine the best methods to be used, and will advise the SUXOS of any coordination or assistance required to effect final disposal. Only pre-approved DDESB-approved engineering controls will be used.

The danger area will be marked off and evacuated. Any required BIP, including approach, timing, and required public notification, will be coordinated through the JAA and Federal Aviation Authority (FAA) air traffic controller, NAVFAC EFD SOUTH, and the Resident Officer in Charge of Construction (ROICC) Project Office.

2.2.2 In-Grid Consolidated Shots

Recovered MEC and MPPEH that are safe to move may be relocated within the MRS work area to provide additional ESQD if needed.

2.2.3 MRS Work Areas

MEC-related activities within the MRS work area have the potential for an unintended detonation and require the placement of engineering controls for mitigation of potential blasts and fragmentation.

2.2.4 Collection Points

Collection points will be areas within the MRS work area where recovered MEC and MPPEH that are safe to move are temporarily accumulated pending disposal by detonation. Collection points will contain a sand-filled wooden box with a lockable lid.

2.2.5 Explosives Storage Magazines

Building 365 is within this MRS and is an earth covered flat-roof magazine constructed of concrete cinderblocks; it is divided into 10 individual storage areas. Five individual storage areas are currently being utilized by a JAA tenant (Boeing) to store ejection seat assemblies, catapult assemblies, and CADs. The building is certified (Expiration Date: 06/29/2005) for storage of a maximum 150 lbs NEW of Division 1, Class 3 Explosives under DOD 4145.26M, Contractors Manual for Ammunition and Explosives. Following are the construction details for Building 365:

- The building is 130 feet (L) x 25 feet (W) x 11 feet (H).
- The building has 2 feet of soil cover on top/sides/rear.
- Each storage area has ventilation fan/lightning rod on roof.
- The front wall thickness is 1-foot.

- The top has 1.5 feet of concrete.
- Each storage area door is 1.6-inch thick steel.
- Each storage area is 12 feet deep, 9 feet wide, and 7.5 feet tall.
- Four fire extinguishers are located on the front of the building.
- Following are the signs on the front of the building:
  - (2) "No Smoking" signs
  - Each storage area is labeled with "7-7-04, 0.2 OHMS" next to the grounding cable
  - (2) "Restricted Area" signs
  - (2) diamond "4"; triangle "3" fire symbols
- Following are the storage area details:
  - Bunker #1 (most northern) - contains recovered MEC and is labeled with Explosives 1.1D placard; 11.61 lbs NEW
  - Bunker #2 - contains MPPEH/MEC-related scrap
  - Bunker #3 - empty
  - Bunker #4 - empty
  - Bunker #5 - marked EXP CADS; NEW 0.21395 lbs, 1.3C (used by Boeing)
  - Bunker #6 - marked Bunker Seat Catapults; 0.8058 lbs (used by Boeing)
  - Bunker #7 - marked Ejection Seats; 1 lb (used by Boeing)
  - Bunker #8 - marked Ejection Seats; 21 lbs (used by Boeing)
  - Bunker #9 - marked Ejection Seats; 14 lbs (used by Boeing)
  - Bunker #10 - empty

Based on Table 7-20 in OP 5 Volume 1 (NAVSEA, 2003), the IBD/Public Transportation Routes (PTR) ESQD for Building 365 for Division 1, Class 3 Explosives is 75 feet. Based on Table 7-7 in OP 5 Volume 1 (NAVSEA, 2003), the IBD/PTR ESQD for Building 365 for Division 1, Class 1 Explosives is 500 feet/300 feet for the front and 250 feet/150 feet for the sides and rear. Because Building 365 will be utilized for temporary storage of recovered MEC, the ESQD for Division 1, Class 1 Explosives will be used. The ESQD arcs are shown on Figures 2-3 and 2-4.

There will be no access to Building 365 while intrusive work is being performed.

If the SUXOS and one other qualified UXO Technician determines the MEC item(s) safe to move but not safe to transport for offsite disposal, the MEC item(s) will be placed in Building 365 and secured for disposal by detonation at the end of the TCRA. A maximum MEC NEW of 15 lbs will be stored at one time. Arrangements for delivery of explosives to countercharge discovered MEC have been made with a local explosives distributor and the explosives will be delivered within 24 hours. Once onsite, the explosives materials will immediately be prepared and used without storage.

2.2.6 Explosives Safety Quantity-Distance

The applicable ESQD criteria for siting explosives operations areas at the site are specified in Chapter 7 of OP 5 Volume 1 (NAVSEA, 2003), and are listed in Table 2-3. The location of the site is shown on Figures 2-3 and 2-4, with the appropriate ESQD arcs included. Security measures will be implemented until all ordnance has been disposed of or demilitarized.

TABLE 2-3
Explosives Safety Quantity-Distance Criteria

Facility Number/Type	Personnel	Maximum NEW	Class/ Division	Distance Actual/Required
MRS Work Area	5	<1 lb	1.1	400 feet/320 feet
BIP Detonation Area	4	<1 lb	1.1	400 feet/320 feet
Planned MEC Demolition Area	4	<6 lbs	1.1	400 feet/200 feet*
Building 365	0	<15 lbs	1.1	Front: IBD/PTR 500 feet/300 feet; Sides and Rear: IBD/PTR 250 feet/150 feet

* Based on Engineering Controls described in Section 2.2.6.1.

2.2.6.1 Calculations for Engineering Controls and ESQD

Recovery of multiple DMM has generated a need for their safe disposal. To safely perform planned detonation of recovered DMM at the MEC demolition location shown on Figures 2-3 and 2-4, it is necessary to utilize engineering controls to reduce the blast effects to acceptable levels. To develop the appropriate level of engineering controls, the fragment velocity and mass must be determined for comparison with tested engineering controls that effectively reduce the blast effects to an acceptable distance. Table B-1 and the calculation from Chapter 5 of DDESB Technical Paper 16, Revision 1, were utilized to determine the expected maximum fragmentation weight and velocity from a planned detonation of ten 20-mm projectiles laid side by side.

Based on the engineering controls calculations and referencing Table 7, HNC-ED-CS-S-98-7, an enclosure which has 24 inches of sandbags on the roof and walls would have a maximum sandbag throw of 135 feet and would require an ESQD arc of 200 feet. The IBD ESQD arc is shown on Figures 2-3 and 2-4.

Engineering controls will conform with DDESB Technical Paper 16, Revision 1 and U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville, Use of Sandbags for Mitigation of Fragment and Blast Effects Due to Intentional Detonation of Munitions, HNC-ED-CS-S-98-7 dated August 1998 and approved by DDESB February 23, 1999.

Attachment 1 provides the detailed engineering controls and ESQD calculations, risk assessment, and operational hazard analysis, as well as sand bag construction examples.

This approach and calculations were collaborated with Michelle Crull, Ph.D., PE, USAESCH.

2.2.7 Physical Security

Access to the MRS will be controlled by use of locked gates, barriers, and security guards (if necessary) to prevent entry of unauthorized personnel during munitions response operations.

2.3 Transportation

2.3.1 Onsite Transportation Procedures

Explosives will be delivered by a local and licensed explosives distributor to the MRS work area as needed and will be immediately prepared and used to perform detonation of recovered MEC.

2.3.2 Vehicle Requirements

Vehicles transporting explosives on the project site must comply with the following requirements:

- Vehicles transporting explosives must be marked with appropriate placards when carrying all Class 1 explosives.
- All vehicles transporting explosives must be equipped with reliable communications, a first-aid kit, and two 10-lb type-BC fire extinguishers.
- Vehicles transporting explosives must be inspected daily when in use, and the inspections must be documented using a Motor Vehicle Inspection Form.
- A vehicle used to transport explosives must have a non-sparking bed liner, and all explosive loads must be covered prior to departure.

SECTION 3

References

The following references were consulted during the preparation of this ESP. Not all are cited in the text.

CH2M HILL. October 2004. *Explosives Safety Submission for Munitions Response and On-Site Construction Support for Discarded Military Munitions at the Former Naval Air Station Cecil Field, Jacksonville, Florida*. Prepared for NAVFAC EFD SOUTH.

CH2M HILL. November 2004. *Work Plan Addendum No. 01 for Munitions Response and Onsite Construction Support for Discarded Military Munitions at the Former Naval Air Station Cecil Field, Jacksonville, Florida.* Prepared for NAVFAC EFD SOUTH.

CH2M HILL. January 2005. *Explosives Safety Submission for Munitions Response and On-Site Construction Support for Discarded Military Munitions at the Former Naval Air Station Cecil Field, Jacksonville, Florida*. Revision No. 01. Prepared for NAVFAC EFD SOUTH.

NAVSEA. January 15, 2001. SWO20-AF-ABK-010, *Motor Vehicle Driver and Shipping Inspector's Manual for Ammunition, Explosives, and Related Hazardous Materials*.

NAVSEA. March 1, 2003. Ordnance Publication 5 Volume 1, *Ammunition and Explosives Ashore: Safety Regulations for Handling, Storing, Production, Renovation, and Shipping of Ammunition and Explosives Ashore, Seventh Revision, Change 2*.

NAVFAC. 1990. P-397, *Structures to Resist the Effects of Accidental Explosions.*

NOSSA. 2004 (2004a). Instruction 8020.15, *Military Munitions Response Oversight Program*.

U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville. August 1998. *Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions* (HNC-ED-CS-S-98-7).

U.S. Bureau of Alcohol, Tobacco, and Firearms (ATF) and U.S. Department of the Treasury. 1990. ATF P 5400.7, *ATF Explosives Laws and Regulations.*

DoD. October 21, 1991. DoD 4160.21-M-1, *Defense Demilitarization Manual*.

DoD. August 1997. DoD 4145.26-M, *Contractors Safety Manual for Ammunition and Explosives.*

DoD. January 5, 2004. DoD 6055.9-STD, *DoD Ammunition and Explosives Safety Standards*, Rewrite Version, Revision 4.

DDESB. December 1, 2003. Technical Paper 16, Revision 1, *Methodologies for Calculating Primary Fragment Distances.*

U.S. Department of the Navy, Chief of Naval Operations. 1999. OPNAVINST 8020.14, *Department of the Navy Explosives Safety Policy*.

ATTACHMENT 1

Engineering Controls Risk Assessment, Calculations, and Operational Hazard Analysis

Risk Assessment
for
Detonation of Multiple Munitions with Engineering Controls
Area Adjacent to Building 365
Cecil Field, Florida

Background: Recovery of multiple discarded military munitions (DMM) has generated a need for their safe disposal. To safely detonate recovered DMM within the work area for Cecil Field it is necessary to utilize engineering controls to reduce the blast effects to acceptable levels. To develop the appropriate level of engineering controls the fragment velocity and mass must be determine for comparison with tested engineering controls that effectively reduce the blast effects to an acceptable distance. Reference (a) has the current approved explosive safety quantity distance (ESQD) arcs for Cecil Field is 320-ft for an intentional detonation based on the munition with the greatest fragment distance (MGFD), a M56A4, 20mm HE projectile.

Based on the attached Operational Hazard Analysis and evaluation of the hazards on site, a Risk Assessment was conducted in accordance with OPNAVINST 3500.39A, Operational Risk Management and Management Guidance for the Defense Environmental Restoration Program dated September 28, 2001. The ***recommended Risk Assessment Code (RAC) for this site is RAC 4 – Minor Risk***. A review of the risk evaluation process is provided in the following paragraphs.

Hazard Severity assessment of the worst credible consequence which can result as a result of the hazard posed by a 20mm High Explosive projectile was judged to be a "***Category II***" - hazard may cause severe injury or property damage.

While a 20mm High Explosive projectile, if detonated in close proximity to an individual, could cause death or severe injury, the 20mm rounds recovered have not been fired and are not armed. For these reasons the "Hazard Severity" recommended is "Category II" – hazard may cause severe injury or property damage.

Mishap Probability that a hazard will result in a mishap or loss for this site is judged to be "***Sub-category D***" - unlikely to occur.

The attached Operational Hazard Analysis, engineering controls, standard operating procedures, and highly experienced and trained UXO Technicians provide controls that reduce the hazard to an acceptable risk. If items with a explosive risk greater then the 20mm HE projectile are encountered this risk analysis and attached documents will be updated and submitted for further review by NOSSA and DDESB if necessary.

Calculations for Engineering Controls and ESQD

References: (a) Explosive Safety Submission (ESS) for Munitions Response and On-Site Construction Support for Discarded Military Munitions, Former Naval Air Station, Cecil Field Jacksonville, Florida, Contract No. N62467-01-D-0331, Contract Task Order No. 0029, dated October 2004

(b) Department of Defense Explosive Safety Board (DDESB) Technical Publication 16, Revision 1, Methodologies for Calculating Primary Fragment Characteristics, dated December 1 , 2003

(c) Department of the Army Technical Manual 43-0001-27, Army Ammunition Data Sheets – Small Caliber Ammunition, dated April 29, 1994

(d) U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville, Use of Sandbags for Mitigation of Fragment and Blast Effects Due to Intentional Detonation of Munitions, HNC-ED-CS-S-98-7 dated August 1998 and approved by DDESB February 23, 1999

Recovery of multiple discarded military munitions (DMM) has generated a need for their safe disposal. To safely detonate recovered DMM within the work area for Cecil Field it is necessary to utilize engineering controls to reduce the blast effects to acceptable levels. To develop the appropriate level of engineering controls the fragment velocity and mass must be determine for comparison with tested engineering controls that effectively reduce the blast effects to an acceptable distance. Reference (a) has the current approved explosive safety quantity distance (ESQD) arcs for Cecil Field is 320-ft for an intentional detonation based on the munition with the greatest fragment distance (MGFD), a M56A4, 20mm HE projectile.

To determine the specifications for engineering controls for planned detonation activities, Table B-1 and the calculation from Chapter 5, reference (b) were utilized to determine the expected maximum fragmentation weight and velocity from a detonation of (10) each, 20mm projectiles laid side by side.

The following is an excerpt from Chapter 5, of reference (b) for calculating maximum fragment ranges for multiple round detonations:

> "**Maximum Fragment Ranges**
> As indicated above, the effect of detonating stacks of munitions is to increase the fragment initial velocity by as much as a factor of 2 and to increase the fragment mass by as much as 50%."

Table B-1 in reference (b) provides the following data for a M56A4, 20mm HE projectile:

- Explosive Weight: 0.026 lbs.
- Max Fragment Weight: 0.0006 lbs.
- Fragment Initial Velocity: 3,183 feet/second

Reference (c) identifies the explosive filler for the M56A4, 20mm projectile as H761 explosives as the explosive filler. H761 explosives is a member of the A-3 explosives family which has an explosives equivalent of 1.09 of the TNT standard of 1.00 as listed in Table A-2, of reference (b).

The donor charge will consist of .75-lb PETN boosters with a total explosive weight 3.75 lbs. PETN has an explosive equivalent of 1.27 of the TNT standard of 1.00 as listed in Table A-2 of reference (b).

Therefore the calculations for maximum fragment weight, expected initial velocity, and NEW are:

- The **maximum fragment weight** = 1.5 x weight from Table B-1 (1.5 x 0.0006 lbs. = **0.0009 lbs.**)
- The **expected initial velocity** = 2.0 x velocity from Table B-1 (2.0 x 3,183 feet/second = **6,366 feet/second**)
- **NEW** = NEW Donor (TNT Eq) + NEW Projectiles (TNT Eq.) (3.75 (1.27) + 10(0.026)(1.09) = **5.1 lbs. of TNT Eq**)

Reference (d) has the following directions for determining the thickness of sand bags for protection:

> "To determine the minimum wall and roof thickness for a particular shell other than those found in Table 5, the approach is as follows:
>
> (1) Determine the initial fragment velocity (V_F) in ft/s, the maximum fragment weight (W_F) in pounds, and the kinetic energy ($W_F V_F^2/2$) in lb-ft^2/s^2 for the particular munition.
> (2) Identify the munition with the next largest kinetic energy, from Table 6.
> (3) Use the sandbag wall and roof thickness from Table 5 for the munition with the next largest kinetic energy shown in Table 6."

Therefore the calculations for a M56A4, 20mm HE projectile are:

Kinetic Energy ($W_F V_F^2/2$) = (0.0009 x 6,366^2 / 2) = 18,236.6802 or 0.018236 x 10^6 lb-ft^2/s^2

Take into account for the total NEW of the planned detonation (**5.1 lbs. of TNT Eq**) and use Table 7 of reference (d) for the NEW and the closest Kinetic Energy to determine the wall and roof thickness for sand bags, sandbag throw, and withdrawal distances. This would be either the 105mm M1 or the 4.2 inch M39A2.

A withdrawal zone is necessary for any detonation. This withdrawal zone applies to everyone, both public and operational personnel. The **withdrawal zone is the maximum of the sandbag throw distance, the distance to a sound level of 140 decibels, or 200 feet**. For all munitions tested, the sound level at 100 feet was substantially less than 140 decibels. At 200 feet, the sound level will be even less. The withdrawal zones are also listed in Table 7 of reference (d).

According to Table 7, reference (d), an enclosure which has **24 inches of sandbags on the roof and walls**, would have a **maximum sandbag throw of 135 feet**, and would require a **ESQD arc of 200 feet**. The IBD ESQD arc is shown on Figure 2-3.

This approach and calculations were collaborated with Michelle Crull, Ph.D., PE, USAESCH**.**

Operational Hazard Analysis – Destruction of MEC (20-mm projectiles and Misc. Cartridge Actuated Devices (CADs) at former NAS Cecil Field

2.1 Process:

The MEC items will be disposed of by electrically initiated detonation utilizing engineering controls designed in compliance with DDESB TP-16, Chapter 5, Multiple Round Detonations, and HNC-ED-CS-S-98-7, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions.

2.2 Process Outline

I – Movement of MEC from Storage to Detonation Area

Step 1: Inspect MEC to insure they are safe to Move
Step 2: Place MEC items into a proper container for Transportation
Step 3: Use appropriate materials to ensure MEC will not have excess movement during transportation
Step 4: Secure container in a proper transport vehicle
Step 5: Drive vehicle to Detonation area

II – Construction of Engineering Controls

Step 1: Place appropriate amount of sandbags on the ground, connecting them to make a complete enclosure which is at least 24 inches thick. A 6-inch clearance (air gap) is required between the MEC items and the sandbags.
Step 2: Place the MEC and Detonation materials into the center IAW Process III
Step 3: Place the ¾ inch thick plywood sheet across the top of the sandbag wall
Step 4: Place sandbags on top of the plywood to finish the enclosure which will be at least 24 inches thick on top and the sides.

III – Preparation of the MEC for detonation

Step 1: Remove the MEC container from the Transport vehicle
Step 2: Place no more than 10 each 20 MM projectiles or CAD's in a single layer, side to side in the center of the sandbag enclosure.
Step 3: Place the Appropriate amount of Donor explosives (not to exceed 4 lbs.) onto the MEC items.
Step 4: Prime the Charge IAW applicable demolition procedures

IV – Receive Ammunition and Explosives

Step 1: Prepare staging areas
Step 2: Note any discrepancies prior to signing for receipt

Step 3: Place ammunition and explosives in staging areas

V – Detonation of MEC

Step 1: Ensure the Evacuation area is cleared and secured
Step 2: Receive clearance to perform detonation IAW local policies and procedures
Step 3: Prime the Explosive Package IAW applicable Demolition Procedures
Step 4: Sound an audible alarm within 1 minute of the Detonation
Step 5: Function the primed explosive package IAW applicable Demolition Procedures
Step 6: Disconnect the firing device and make notifications as required

VI – Misfire Procedures

WARNING

All personnel must observe the OSHA mandatory 30-minute wait time for all electrical demolition misfires.

Step 1: Immediately notify all personnel in operational area.
Step 2: Disconnect the firing device from the circuit
Step 3: Follow applicable demolition mis-fire procedures
Step 4: If it still does not fire, Record time, and begin 30-minute wait time
Step 5: After 30-minute wait, SUXOS will approach and investigate miss-fire
Step 6: Remove detonator from explosive train.
Step 7: Attach another detonator to the explosive train and follow applicable demolition procedures outlined in Process Step V.

VII – Post Detonation Procedures

Step 1: Carefully uncover the engineering controls
Step 2: Check for any MEC items which may still be intact
Step 3: If any MEC items are discovered intact- determine if they are safe to move IAW applicable procedures
Step 4: Separate and remove all MEC related scrap for inspection
Step 5: Remove all other debris and fill in any disturbed ground

2.3 Preliminary Hazards List

I – Movement of MEC from Storage to Detonation Area

Step 1: Inspect MEC to insure they are safe to move
a) Functioning of Ordnance from Heat/Shock/Friction
b) Hand injuries from sharp metal edges

Step 2: Place MEC items into a proper container for Transportation
a) Functioning of Ordnance from Heat/ Shock/Friction
b) Hand injuries from sharp metal edges

Step 3: Use appropriate materials to ensure MEC will not have excess movement during transportation

Step 4: Secure container in a proper transport vehicle
a) Functioning of Ordnance from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling

Step 5: Drive vehicle to Detonation area
a) Functioning of Ordnance from Heat/Shock/Friction
b) Accidents from improper vehicle operations

II – Construction of Engineering Controls

Step 1: Place appropriate amount of sandbags on the ground, connecting them to make a complete enclosure which is at least 24 inches thick.
a) Lifting sandbags up to 50 pounds in weight
b) Walking across uneven surfaces, tripping/falling

Step 2: Place the MEC and Detonation materials into the center IAW Process III
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling

Step 3: Place the ¾ inch thick plywood sheet across the top of the sandbag wall
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/ falling
c) Hand injuries from splinters and uneven wooden edges

Step 4: Place sandbags on top of the plywood to finish the enclosure which will be at least 24 inches thick on top and the sides.
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling
c) Hand injuries from splinters and uneven wooden edges

III – Preparation of the MEC for detonation

Step 1: Remove the MEC container from the Transport vehicle
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling

Step 2: Place no more than 10 each 20 MM projectiles or CAD's in a single layer, side to side in the center of the sandbag enclosure.
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling
c) Hand injuries from sharp metal edges

Step 3: Place the Appropriate amount of Donor explosives (not to exceed 4 lbs.) onto the MEC items.
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling

Step 4: Prime the Charge IAW applicable demolition procedures
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling
c) Electro-Static Discharge (ESD) functioning of electric detonators

IV – Receive Ammunition and Explosives

Step 1: Prepare staging areas

Step 2: Note any discrepancies prior to signing for receipt
a) Initiation of explosives from heat / shock or friction
b) Hand/eye injuries from removal of banding materials

Step 3: Place ammunition and explosives in staging areas
a) Initiation of explosives from heat / shock or friction
b) Lifting heavy items
c) Walking across uneven surfaces
d) Receiving incorrect amount of explosives or ammunition
e) Receiving damaged or deteriorated explosive or ammunition

V – Detonation of MEC

Step 1: Ensure the Evacuation area is cleared and secured
Step 2: Receive clearance to perform detonation IAW local policies and procedures
Step 3: Prime the Explosive Package IAW applicable Demolition Procedures
a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling
c) Electro-Static Discharge (ESD) functioning of electric detonators.

Step 4: Sound an audible alarm within 1 minute of the Detonation

Step 5: Function the primed explosive package IAW applicable Demolition Procedures.

a) Flying debris from detonation
b) Blast wave from detonation

Step 6: Disconnect the firing device and make notifications as required

VI – Misfire Procedures

WARNING

All personnel must observe the OSHA mandatory 30-minute wait time for all electrical demolition misfires.

Step 1: Immediately notify all personnel in operational area.

Step 2: Disconnect the firing device from the circuit

Step 3: Follow applicable demolition miss-fire procedures

a) Flying debris from detonation
b) Blast wave from detonation

Step 4: If it still does not fire, Record time, and begin 30-minute wait time

Step 5: After 30- minute wait, SUXOS will approach and investigate miss-fire

Step 6: Remove detonator from explosive train.

a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/falling
c) Electro-Static Discharge (ESD) functioning of electric detonators.

Step 7: Attach another detonator to the explosive train and follow applicable demolition procedures outlined in Process Step V.

a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Walking across uneven surfaces, tripping/ falling
c) Electro-Static Discharge (ESD) functioning of electric detonators.

VII – Post Detonation Procedures

Step 1: Carefully uncover the engineering controls

a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Hand injuries from damaged wood and sharp metal edges
c) Eye hazards from detonation debris
d) Walking across uneven surfaces/tripping/falling

Step 2: Check for any MEC items which may still be intact

a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
B) Hand injuries from damaged wood and sharp metal edges
c) Eye hazards from detonation debris
D) Walking across uneven surfaces / tripping / falling

Step 3: If any MEC items are discovered intact- determine if they are safe to move IAW applicable procedures

a) Functioning of Ordnance and Explosives from Heat/Shock/Friction
b) Hand injuries from damaged wood and sharp metal edges
c) Eye hazards from detonation debris
d) Walking across uneven surfaces/tripping/falling

Step 4: Separate and remove all MEC related scrap for inspection

a) Hand injuries from damaged wood and sharp metal edges
b) Eye hazards from detonation debris
c) Walking across uneven surfaces/tripping/falling

Step 5: Remove all other debris and fill in any disturbed ground

a) Lifting heavy object up to 50 pounds
b) Hand injuries from damaged wood and sharp metal edges
c) Eye hazards from detonation debris
d) Walking across uneven surfaces/tripping/falling

2.4 Operations Hazard Analysis

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIM RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY / PREVENTATIVE ACTIONS**
I – Movement of MEC Items from Storage							
Step 1	Functioning of Ordnance	• Dropping of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
		• MEC Items not safe to move	• Initiation of ammunition and/or explosives	I B	• MEC Items will be determined safe to move IAW approved work plan and SSHP	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
		• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	Hand Injuries	• Handling MEC items with sharp metal edges	• Cuts and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
Step 2	Functioning of Ordnance	• Dropping of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
		• MEC Items not safe to move	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	HAZARD	MISHAP TRIGGERING EVENT	POTENTIAL MISHAP	PRELIM RISK INDEX	HAZARD MITIGATION REQTS	FINAL RISK INDEX	EMERGENCY / PREVENTATIVE ACTIONS
		• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges	• Cuts and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
Step 3	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges	• Cuts and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
Step 4	• Walking across uneven ground	Tripping while walking across uneven surfaces	Disabling knee, leg or ankle injury	III B	Keep operational area free from debris and tripping hazards	IV C	Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Dropping of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
		• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
Step 5	• Functioning of Ordnance	• Dropping of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIM RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY / PREVENTATIVE ACTIONS**
					handling MEC Items		Briefing for the type and hazards of MEC
		• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Vehicle Accident	• Improper vehicle operations or vehicle malfunction	• Injuries to vehicle operators, pedestrians or property	III C	• Only licensed operators can operate vehicle • Performance of daily inspections and maintenance	IV C	• Document daily safety inspections and maintenance • Conduct daily safety briefings for operators
II Construct Engineering Controls							
Step 1	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Lifting & Carrying Heavy Loads	• Bending to lift heavy items • Turning while lifting heavy items	• Disabling back injury • Disabling back injury • Disabling leg, knee and ankle injury	III B	• Keep operational area free to debris or unnecessary objects that could create tripping hazards • Limit single person lifting to below 40 pounds	IV B	• All personnel will receive back safety and proper lifting technique training • Operations personnel will be certified IAW local command directives
Step 2	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIM RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY / PREVENTATIVE ACTIONS**
Step 3	• Functioning of Ordnance	• Dropping plywood on MEC and Explosives	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Hand Injuries	• Handling plywood with rough edges	• Minor Cuts , splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
Step 4	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Dropping sandbags on MEC and Explosives	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling plywood with rough edges	• Minor Cuts , splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
III Preparation of MEC for Detonation							
Step 1	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	HAZARD	MISHAP TRIGGERING EVENT	POTENTIAL MISHAP	PRELIM RISK INDEX	HAZARD MITIGATION REQTS	FINAL RISK INDEX	EMERGENCY / PREVENTATIVE ACTIONS
							hazards of MEC
Step 2	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges	• Cuts and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
Step 3	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
Step 4	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Functioning of Electric Detonators	• Electro-static discharge	• Initiation of explosive	II B	• Proper grounding techniques	II D	• Conduct Daily safety briefing on hazards of EMR

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIM RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY / PREVENTATIVE ACTIONS**
			detonators		• Enforcement of approved EMR procedures		and proper grounding techniques • Training of personnel on approved EMR procedures
V – Receive Ammunition and Explosives							
Step 1	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
Step 2	• Initiation of explosives from shock or friction	• Dropping or mishandling ammunition and explosives	• Initiation of ammunition and/or explosives	I B	• Allow only qualified and certified personnel to handle ammunition and explosives	II D	• Operations personnel will be certified IAW local command directives
	• Sharp banding under tension	• Cutting banding without PPE or using a non-standard cutting device	• Hand, arm, head or eye injury from banding when cut and hits operator	III B	• Provide PPE and standard band cutting device	IV B	•
Step 3	• Initiation of explosives from shock or friction	• Dropping or mishandling ammunition and explosives	• Initiation of ammunition and/or explosives	I B	• Allow only qualified and certified personnel to handle ammunition and explosives	II D	• Operations personnel will be certified IAW local command directives
	• Lifting Heavy Items	• Bending to lift heavy items • Turning while lifting heavy items • Tripping while carrying explosives • Dropping	• Disabling back injury • Disabling back injury • Disabling leg, knee and ankle injury • Initiation of	III B	• Place explosives storage boxes on elevated platforms to prevent having to bend • Keep operational area free to debris or unnecessary objects that could create tripping hazards • Allow only certified	IV B	• All personnel will receive back safety and proper lifting technique training • Operations personnel will be certified IAW local command directives

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIM RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY / PREVENTATIVE ACTIONS**
		ammunition and explosive items	explosives from shock and friction		personnel to handle ammunition and explosives		
	• Walking across uneven surfaces	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Receiving incorrect amount of explosives	• Contract carrier having incorrect amount of explosives	• Exceeding explosive limits and requiring work stoppage	IV B	• Do not accept delivery of more explosives than required	IV D	• Verify amount of explosives ordered with amount of explosives delivered.
	• Receiving damaged or deteriorated explosives or ammunition	• Contract Carrier delivering damaged or deteriorated explosives	• Hazardous explosives which requires evacuation	IV B	• SUXOS will inspect all explosives prior to accepting delivery from contract carrier	IV D	• Document the condition of explosives prior to accepting delivery
V- Detonation of MEC							
Step 1	• Walking across uneven surfaces	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
Step 2	NO HAZARDS						
Step 3	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Functioning of Electric Detonators	• Electro-static discharge	• Initiation of explosive detonators	II B	• Proper grounding techniques • Enforcement of approved EMR procedures	II D	• Conduct Daily safety briefing on hazards of EMR and proper grounding techniques • Training of personnel on approved EMR procedures

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIM RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY / PREVENTATIVE ACTIONS**
Step 4	NO HAZARDS						
Step 5	• Flying debris	• Intentional Detonation of MEC and Explosives	• Injury from flying debris	II B	• All personnel will be out to the established ESQD Distance	IV D	• Brief personnel on the ESQD distances • Visual check of area for personnel prior to the detonation
	• Blast wave	• Intentional Detonation of MEC and Explosives	• Injury from blast wave	II B	• All personnel will be out to the established ESQD Distance	IV D	• Brief personnel on the ESQD distances • Visual check of area for personnel prior to the detonation
Step 6	NO HAZARDS						
VI- Miss-Fire Procedures							
Step 1	NO HAZARDS						
Step 2	NO HAZARDS						
Step 3	• Flying debris	• Intentional Detonation of MEC and Explosives	• Injury from flying debris	II B	• All personnel will be out to the established ESQD Distance	IV D	• Brief personnel on the ESQD distances • Visual check of area for personnel prior to the detonation
	• Blast wave	• Intentional Detonation of MEC and Explosives	• Injury from blast wave	II B	• All personnel will be out to the established ESQD Distance	IV D	• Brief personnel on the ESQD distances • Visual check of area for personnel prior to the detonation
Step 4	NO HAZARDS						

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIM RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY / PREVENTATIVE ACTIONS**
Step 5	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
Step 6	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Functioning of Electric Detonators	• Electro-static discharge	• Initiation of explosive detonators	I B	• Proper grounding techniques • Enforcement of approved EMR procedures	II D	• Conduct Daily safety briefing on hazards of EMR and proper grounding techniques • Training of personnel on approved EMR procedures
Step 7	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Functioning of Electric Detonators	• Electro-static discharge	• Initiation of explosive detonators	II B	• Proper grounding techniques • Enforcement of approved EMR procedures	II D	• Conduct Daily safety briefing on hazards of EMR and proper grounding techniques • Training of personnel on approved EMR procedures
VII- Post							

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	**HAZARD**	**MISHAP TRIGGERING EVENT**	**POTENTIAL MISHAP**	**PRELIM RISK INDEX**	**HAZARD MITIGATION REQTS**	**FINAL RISK INDEX**	**EMERGENCY / PREVENTATIVE ACTIONS**
Detonation Procedures							
Step 1	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges, demolition debris	• Cuts, splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
	• Flying debris	• Moving demolition debris	• Eye hazards	III B	• Personnel will be required to wear ANSI approved safety glasses.	IV C	• Personnel will be required to wear appropriate eye protection while performing operations
	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
Step 2	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges, demolition debris	• Cuts, splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
	• Flying debris	• Moving demolition debris	• Eye hazards	III B	• Personnel will be required to wear ANSI approved safety glasses.	IV C	• Personnel will be required to wear appropriate eye protection while performing operations
	• Walking across	• Tripping while	• Disabling knee,	III B	• Keep operational area free	IV C	• Remind operational

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	HAZARD	MISHAP TRIGGERING EVENT	POTENTIAL MISHAP	PRELIM RISK INDEX	HAZARD MITIGATION REQTS	FINAL RISK INDEX	EMERGENCY / PREVENTATIVE ACTIONS
	uneven ground	walking across uneven surfaces	leg or ankle injury		from debris and tripping hazards		personnel to remove debris as it is generated
Step 3	• Functioning of Ordnance/ Explosives	• Mishandling of MEC items	• Initiation of ammunition and/or explosives	I B	• Only qualified UXO personnel will handle MEC • Limit number of personnel handling MEC Items	II D	• UXO personnel will be certified IAW DOD Policy • Conduct Daily Safety Briefing for the type and hazards of MEC
	• Hand Injuries	• Handling MEC items with sharp metal edges, demolition debris	• Cuts, splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
	• Flying debris	• Moving demolition debris	• Eye hazards	III B	• Personnel will be required to wear ANSI approved safety glasses.	IV C	• Personnel will be required to wear appropriate eye protection while performing operations
	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated
Step 4	• Hand Injuries	• Handling MEC items with sharp metal edges, demolition debris	• Cuts, splinters and abrasions	I B	• Wearing of Leather work gloves	II D	• Personnel will be required to wear appropriate hand protection while performing operations
	• Flying debris	• Moving demolition debris	• Eye hazards	III B	• Personnel will be required to wear ANSI approved safety glasses.	IV B	• Personnel will be required to wear appropriate eye protection while performing operations
	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated

OPERATION HAZARD ANALYSIS							
	PROCEDURE		BRANCH		REVISION NUMBER		Page __ of __
PROCESS STEP NUMBER	HAZARD	MISHAP TRIGGERING EVENT	POTENTIAL MISHAP	PRELIM RISK INDEX	HAZARD MITIGATION REQTS	FINAL RISK INDEX	EMERGENCY / PREVENTATIVE ACTIONS
Step 5	• Lifting & Carrying Heavy Loads	• Bending to lift heavy items • Turning while lifting heavy items • Tripping while carrying explosives • Dropping ammunition and explosive items	• Disabling back injury • Disabling back injury • Disabling leg, knee and ankle injury • Initiation of explosives from shock and friction	I B	• Place explosives storage boxes on elevated platforms to prevent having to bend • Keep operational area free to debris or unnecessary objects that could create tripping hazards • Allow only certified personnel to handle ammunition and explosives	II D	• All personnel will receive back safety and proper lifting technique training • Operations personnel will be certified IAW local command directives
	• Hand Injuries	• Handling MEC items with sharp metal edges, demolition debris	• Cuts, splinters and abrasions	III B	• Wearing of Leather work gloves	IV B	• Personnel will be required to wear appropriate hand protection while performing operations
	• Flying debris	• Moving demolition debris	• Eye hazards	III B	• Personnel will be required to wear ANSI approved safety glasses.	IV C	• Personnel will be required to wear appropriate eye protection while performing operations
	• Walking across uneven ground	• Tripping while walking across uneven surfaces	• Disabling knee, leg or ankle injury	III B	• Keep operational area free from debris and tripping hazards	IV C	• Remind operational personnel to remove debris as it is generated

Sand Bag Construction Examples

* Obtained from U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville, Use of Sandbags for Mitigation of Fragment and Blast Effects Due to Intentional Detonation of Munitions, HNC-ED-CS-S-98-7 dated August 1998 and approved by DDESB February 23, 1999

Figure 5 – Sandbag Enclosure for an 81 mm M374A2 mortar.

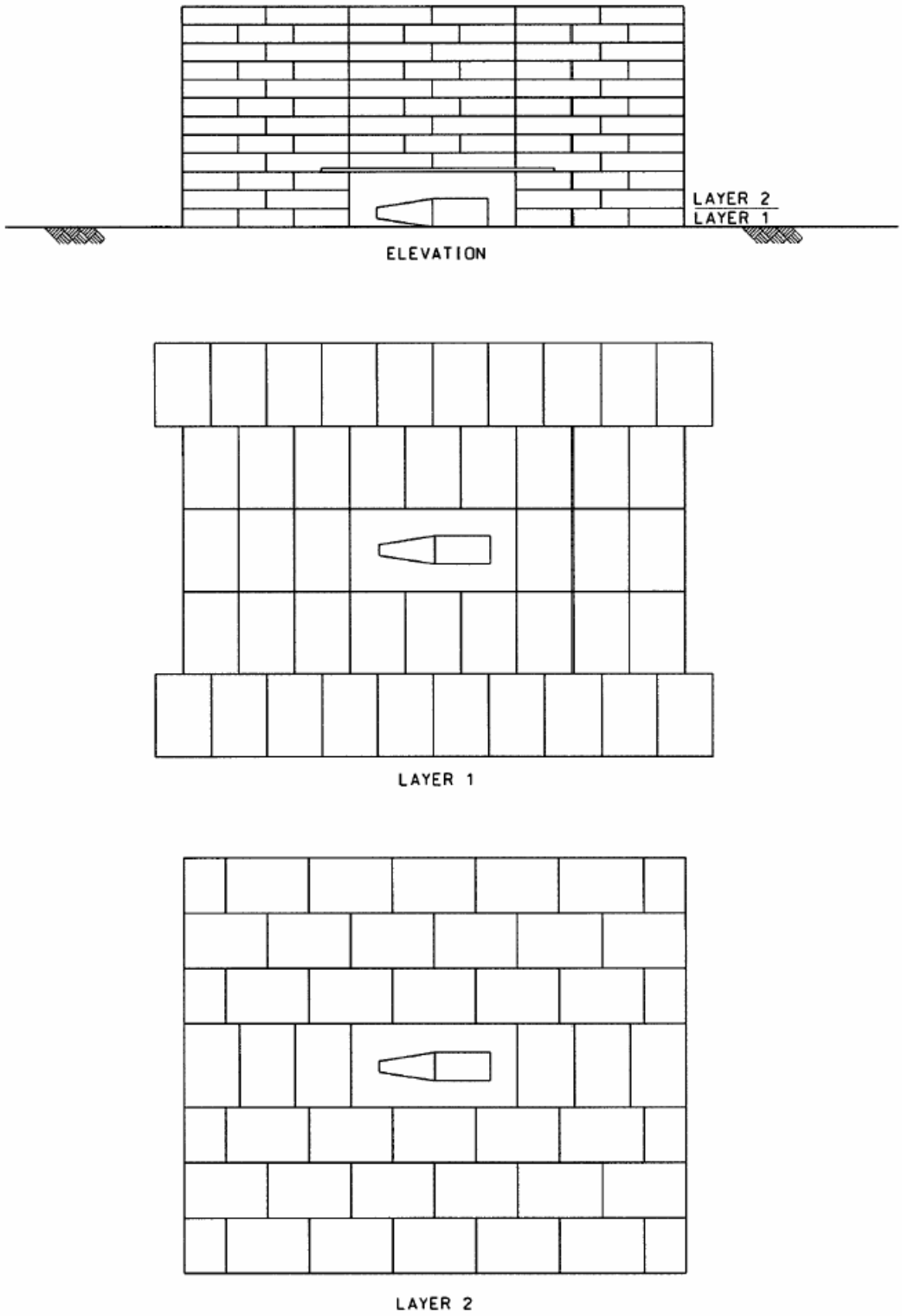


Figure 6 - Interlocking Alternate Layers of Sandbags

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 190010
2155 EAGLE DRIVE
NORTH CHARLESTON, S.C. 29419-9010

ES32MD
4 Feb 2005

Florida Department of Environmental Protection
ATTN: Mr. Douglas Outlaw
2600 Blairstone Road, Twin Towers
Mail Stop 4560
Tallahassee, Florida 32399

Request by Naval Facilities Engineering Command, Engineering Field Division South (NAVFAC EFD SOUTH) for an emergency permit from the Florida Department of Environmental Protection (FDEP) to allow the thermal treatment/destruction of hazardous waste. The treatment will be carried out by the Naval Ordnance Safety and Security Activity (NOSSA), NAVFAC EFD SOUTH, and the NAVFAC EFD SOUTH Munitions Response/Explosive Ordnance Disposal (EOD) Contractor (CH2M HILL Constructors, Inc. [CH2M HILL] with USA Environmental, Inc. [USA]) at the munitions response site located at the intersection of Loop Road and Skymaster Drive, former Naval Air Station Cecil Field, Jacksonville, Florida. The treatment involves deactivation or destruction of a reactive waste, (i.e., recovered munitions and explosives of concern that present an unacceptable hazard for transportation to a disposal site). This permit is for the detonation of munitions and explosives of concern (MEC) found during the initial, or Phase I, five-acre investigation completed on December 17, 2004. A Phase II MEC investigation is currently being planned for an additional 15 acres. Please recognize that after the completion of the Phase II investigation that an additional detonation, and permit, will likely be required.

FINDINGS OF FACT

1. The specific waste to be thermally treated/destroyed by detonation is the following:

   - (77) each 20-mm high explosive projectiles (unfired/fuzed with cartridge intact) consisting of a primer which initiates the smokeless powder (approx. 0.07 lbs.) contained in a steel or brass cartridge case, which in turn propels a projectile constructed of steel; copper in the rotating band and an aluminum ogive.

   - (191) each Cartridge Actuated Devices (CADs) consisting of a primer which initiates a nitro cellulose (black powder) (0.0021 - 0.01014 lbs.) charge that is contained in an aluminum cartridge.

   - (33) each Small Arms Blanks (5.56-mm and 7.62-mm) consisting of a primer which initiates a smokeless powder charge that is contained in a brass cartridge case.

   - (8) each Spotting Charges consisting of a primer which initiates smokeless powder charge (10 gauge shotgun) that in turns expels a smoke mixture, all of which is contained in a cardboard or aluminum case.

- (1) each suspect aircraft part suspected to contain (2) each CADs/impulse cartridges (determined to be type of actuator with two ports labeled for CAD use with caps and leads intact).

CH2M HILL and USA have determined the above waste to be unsafe to transport for disposal. Because of the flammable, shock-sensitive, reactive, and explosive nature of this hazardous waste, there is a potential danger to the health and welfare of those persons coming in contact with this waste if the waste is not handled in the proper manner. Based on the above, the hazardous waste presents an imminent hazard to persons and property in its proximity.

2. NOSSA, NAVFAC EFD SOUTH, CH2M HILL, and USA will abate the imminent hazard identified in Findings of Fact #1 by thermal destruction of the unstable, flammable, shock-sensitive, and potentially explosive hazardous waste.

3. Only the waste specified in Findings of Fact #1 will be thermally treated to deactivate or destroy the hazardous nature of the waste. The treatment operation will be accomplished in accordance with this request; "Work Plan Addendum No. 01 Munitions Response and Onsite Construction Support for Discarded Military Munitions," dated November 30, 2004; and Revision No. 01 to the project Explosives Safety Submission and Explosives Siting Plan, dated January 2005.

4. All other local, state, and federal approvals and licenses will be obtained prior to conducting thermal treatment activities.

5. The hazardous waste will be treated/destroyed via detonation in a field (latitude: 30.2350° North; longitude: 81.8808° West) within the munitions response site located at the intersection of Loop Road and Skymaster Drive, former Naval Air Station Cecil Field, Jacksonville, Florida. The treatment site is owned by:

   Jacksonville Airport Authority – Cecil Field
   ATTN: Russel Chandler, Cecil Field Airport Manager
   13365 Aeronautical Circle
   Jacksonville, Florida 32221
   (904) 573-1630

   Written permission to use the treatment site will be received from the Jacksonville Airport Authority prior to thermal treatment/destruction.

   The closest permanent residences are the Cecil Pines senior housing complex that is located approximately 3,300 feet from the treatment site. Additionally, a Jacksonville Sheriff's Office Duty Officer for Cecil Field is currently using Building 823 as his temporary residence. Building 823 is approximately 1,250 feet from the treatment site

6. Thermal treatment/destruction will be accomplished according to the procedures specified in the "Work Plan Addendum No. 01 Munitions Response and Onsite Construction Support for Discarded Military Munitions," dated November 30, 2004 and Revision No. 01 to the project Explosives Safety Submission and Explosives Siting Plan, dated January 2005. The general procedure will be to use 0.75-lb PETN boosters to thermally treat and destroy the items listed in Findings of Fact #1. Multiple items listed in Findings of Fact #1 will be secured around

the boosters. The boosters will then be segregated into treatment/detonation events not to exceed 6 lbs. Net Explosives Weight. The boosters will be initiated with a detonation cord and/or blasting caps depending on the composition of the treatment/detonation event. All treatment/detonation events will be done with protective works/engineering controls by surrounding with an enclosure which has 24 inches of sand bags on the roof and walls.

7. The hazardous waste will be thermally treated under the supervision and control of NOSSA, NAVFAC EFD SOUTH, CH2M HILL, and USA. These officials are experienced in the handling and disposal of explosives.

8. Any visible residue or debris resulting from the treatment process will be removed and properly disposed of offsite by approved methods. Post-treatment soil sampling will be completed to ensure no contamination remains following residue/debris removal. Collection and laboratory analysis of one soil sample from the treatment site for metals and nitro aromatics (explosives) only are planned.

9. Adequate fire and personal protection to assure confinement and control of any fire resulting from the operation, and to prevent injuries of personnel present, will be provided.

10. Prior to the thermal treatment, the treatment site in Findings of Fact #5 will be secured and access restricted except to authorized personnel. Additionally, prior to the treatment operation, a visual inspection will be performed within a minimum 200-foot radius of the treatment site described in Findings of Fact #5 to assure that no unauthorized personnel are on site. Based on the engineering controls calculations provided in Revision No. 01 to the project Explosives Safety Submission and Explosives Siting Plan, dated January 2005, an enclosure which has 24 inches of sand bags on the roof and walls would have a maximum sandbag throw of 135 feet and would require a safety arc of 200 feet. Revision No. 01 to the project Explosives Safety Submission and Explosives Siting Plan, dated January 2005 provides the detailed engineering controls and calculations, risk assessment, and operational hazard analysis, as well as sand bag construction examples.

11. A detailed written summary of the actual procedures used for treatment, details on the reasons for any deviations from the plans and information submitted for this request, the disposition of any residues from the treatment process, as well as any additional pertinent information will be submitted within 60 days of field work completion to both:

    Florida Department of Environmental Protection, Northeast District
    ATTN: Waste Program Administrator
    7825 Baymeadows Way, Suite B200
    Jacksonville, Florida 32256

    and

    Florida Department of Environmental Protection
    ATTN: Mr. Douglas Outlaw
    2600 Blairstone Road, Twin Towers
    Mail Stop 4560
    Tallahassee, Florida 32399

12. Thermal treatment of the waste as specified above in Findings of Fact #1 will occur in an open field as described in Findings of Fact #5 within the next 120 days.

13. FDEP Northeast District will be notified at least 5 days before the beginning of the disposal operation.

Sincerely,

MARK E. DAVIDSON
Restoration II Branch

Copy to:
CH2M Hill (Michael Halil)
EPA Region IV (Doyle Brittain)
FDEP (Dave Grabka)

Department of
Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Colleen M. Castille
Secretary

February 14, 2005

CERTIFIED – RETURN RECEIPT

Mark E. Davidson, Environmental Engineer
U. S. Naval Facilities Engineering Command
Engineering Field Division South
P. O. Box 190010
North Charleston, S.C. 29419-9010

SUBJECT: Naval Facilities Engineering Command – Cecil Field
EPA ID No. FL5 170 022 474
Emergency Permit 13526-HE-005
Duval County

Dear Mr. Davidson:

Enclosed you will find a Department Emergency Permit Order, along with the public notice. Please ensure publication is within the time allotted.

Please contact John Griffin at (850)245-8785 if you have any questions.

Sincerely,

Tim Bahr, Administrator
Hazardous Waste Regulation Section

TJB/jeg

Enclosure

cc (with enclosure):

Don Webster, EPA/Region 4
Ashwin B. Patel, DEP/Jacksonville
David Grabka, DEP/Federal Facilities

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Colleen M. Castille
Secretary

BEFORE THE STATE OF
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

In Re:
Request for an Emergency Permit by
U. S. Naval Facilities Engineering Command
Engineering Field Division South
P.O. Box 190010
2155 Eagle Drive
North Charleston, S.C. 29419-9010

Date: February 14, 2005

Permit Number: 13526-HE-005

FINAL ORDER

BY THE DEPARTMENT:

On January 31, 2005, the Department received a request from Mark E. Davidson of the U. S. Naval Facilities Engineering Command for an emergency permit to allow the thermal treatment and disposal of waste. The treatment of the waste will be carried out by the Naval Ordnance Safety and Security Activity (NOSSA), NAVFAC EFD SOUTH, and the NAVFAC EFD SOUTH Munitions Response/Explosive Ordnance Disposal (EOD) Contractor (CH2M HILL Constructors, Inc. (CH2M HILL) with USA Environmental, Inc. (USA) at the munitions response site located at the intersection of Loop Road and Skymaster Drive, Former Naval Air Station Cecil Field, Jacksonville, Florida. The treatment involves deactivation or destruction of reactive waste, (i.e., recovered munitions and explosives of concern (MEC)) that present a shock-sensitive characteristic, which could create an imminent danger to persons handling the waste and to the general public. This permit is for the detonation of MEC found during the initial, or Phase I, five-acre investigation completed on December 17, 2004. A Phase II MEC investigation is currently being planned for an additional 15 acres. After completion of the Phase II investigation an additional detonation, and permit, will likely be required.

FINDINGS OF FACT

The waste came into the possession of the Department of Navy. Because of the flammable, shock-sensitive, reactive, and explosive nature of the material, there was a potential danger to the

health and welfare of those persons coming in contact with this waste if the waste was not handled in a proper manner.

1. The specific waste to be thermally treated/destroyed by detonation is the following:

77 - 20-mm high explosive projectiles
191 – Cartridge Actuated Devices (CADs)
33 – Small Arms Blanks
8- Spotting Charges
1 – Suspect aircraft part
2- CADs/impulse cartridges

Based on the above-stated facts, the Department finds that the hazardous waste presents an imminent hazard to persons and property in proximity to it.

2. NOSSA, NAVFAC EFD SOUTH, CH2M HILL, and USA will abate the imminent hazard identified in Findings of Fact #1 of this permit by thermal destruction of the unstable, flammable, shock-sensitive, and potentially explosive hazardous waste.

3. Thermal treatment/destruction will be accomplished according to the procedures specified in the "Work Plan Addendum No. 01 Munitions Response and Onsite Construction Support for Discarded Military Munitions," dated November 30, 2004,("Work Plan") and Revision No. 01 to the project Explosives Safety Submission and Explosives Siting Plan, dated January 2005 ("Revision No. 01"). The general procedure will be to use 0.75-lb PETN boosters to thermally treat and destroy the items listed in Finding of Fact #1. Multiple items listed in Finding of Fact #1 will be secured around the boosters. The boosters will then be segregated into treatment/detonation events not to exceed 6 lbs. Net Explosives Weight. The boosters will be initiated with a detonation cord and /or blasting caps depending on the composition of the treatment/detonation event. All treatment/detonation events will be done with protective works/engineering controls by surrounding with an enclosure which has 24 inches of sand bags on the roof and walls.

4. Based on the engineering controls calculations provided in Revision No. 01, an enclosure which has 24 inches of sand bags on the roof and walls would have a maximum sandbag throw of 135 feet and would require a safety arc of 200 feet. Revision No. 01 provides the detailed engineering controls and calculations, risk assessment, and operational hazard analysis, as well as sand bag construction examples.

5. The hazardous waste will be thermally treated under the supervision and control of personnel from NOSSA, NAVFAC EFD SOUTH, CH2M HILL and USA. These officials are experienced in the handling and disposal of explosives.

CONCLUSION

NOSSA, NAVFAC EFD SOUTH, CH2M HILL, and USA will conduct this thermal treatment operation in an environmentally sound and a Department-approved manner. Therefore, pursuant to Sections 403.726(5) and 120.59(3), Florida Statutes, it is

ORDERED

1. This Permit authorizes thermal treatment of the waste as specified above in Findings of Fact #1, in accordance with the Work Plan and Revision No. 01.

2. The hazardous waste will be treated/destroyed via detonation in a field (latitude: 30^0 23' 50''North; longitude: 81^0 88' 08''West) within the munitions response site located at the intersection of Loop Road and Skymaster Drive, former Naval Air Station Cecil Field, Jacksonville, Florida ("the treatment site") between February 20 through March 11, 2005.

3. Any visible material resulting from the treatment process will be removed within 24 hours of detonation and properly disposed of by approved methods. Post-treatment soil sampling will be completed to ensure no contamination remains following residue/debris removal, by collection and laboratory analysis of one surface soil sample from the center of the treatment site for metals and nitro aromatics (explosives) only.

4. Adequate fire and personal protection to assure confinement and control of any fire resulting from the operation, and to prevent injuries of personnel present will be provided.

5. Prior to the thermal treatment, the treatment site will be secured and access restricted except to authorized personnel. Additionally, prior to the treatment operation, a visual inspection will be performed within a minimum 200-foot radius of the treatment site to assure that no unauthorized personnel are on site.

6. The Permittee will notify the local FDEP Northeast District representative or its designee to offer the option of being present to observe the thermal treatment operation.

7. The Permittee is required to obtain all other local, state and federal approvals and licenses required for conducting the activities in this permit.

8. Within 60 days of completion of the thermal treatment authorized by this permit, the Permittee shall submit a detailed written summary of the specific description of the actual procedures used for treatment, and the disposition of any residues from the treatment process, as well as any additional pertinent information shall be submitted to the Waste Program Administrator, Department of Environmental Protection, Northeast District Office, 7825 Baymeadows Way, Suite B200, Jacksonville, Florida 32256; Environmental Administrator, Federal Facilities Group, Bureau of Waste Cleanup, M.S. 4535, Department of Environmental

Protection, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400 and to the Environmental Administrator, Hazardous Waste Regulation Section, M.S. 4560, Bureau of Solid and Hazardous Waste, Department of Environmental Protection, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

The Permittee shall undertake whatever action necessary to comply with Rule 62-730.320, F.A.C.

Issued this 4th day of February

DOTTY DILTZ, ASSISTANT DIRECTOR
DIVISION OF WASTE MANAGEMENT

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true copy of the foregoing FINAL ORDER has been furnished by U.S. Mail to:

1. Mark E. Davidson, NAVFAC EFD SOUTH
2. Ashin Patel, DEP/Jacksonville
3. David Grabka, DEP/Federal Facilities
4. Don Webster, EPA/Atlanta

on this _____ day of _____, _____ in Tallahassee, Florida.

Filing and Acknowledgment
Filed on this date, pursuant to
Section 120.52, Florida Statutes,
with the designated Clerk, receipt
of which is acknowledged.

_____ _____
CLERK DATE

STATE OF FLORIDA
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
TWIN TOWERS OFFICE BUILDING
2700 BLAIRSTONE RD
TALLAHASSEE, FLORIDA 32399

PERMIT NO. 13526/HE/005

NOTICE OF ISSUANCE OF AN EMERGENCY PERMIT UNDER
THE RESOURCE CONSERVATION AND RECOVERY ACT
AND THE FLORIDA RESOURCE RECOVERY AND MANAGEMENT ACT.

On February 14, 2005, the Department of Environmental Protection (DEP) issued an Emergency Permit to U. S. Naval Facilities Engineering Command.

The treatment site is in an open field, now owned by Jacksonville Airport Authority – Cecil Field, located at the intersection of Loop Road and Skymaster Drive, former Naval Air Station Cecil Field, Jacksonville, Florida.

The permit authorized detonation and treatment of unstable, reactive, flammable, shock-sensitive or explosive materials.

An emergency permit pursuant to Sections 403.726(5) and 120.59(3), F.S., and Rule 62-730.320, F.A.C., was warranted because there was an imminent and substantial endangerment to human health and the environment. The issuance of this permit resulted in environmental benefits as compared with the previous storage conditions of the waste. The permit was drafted in accordance with the provisions of the Resource Conservation and Recovery Act and the Florida Resource Recovery and Management Act, and were designed to protect human health and the environment.

The permit files are available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at Department of Environmental Protection, Northeast District, 7825 Baymeadows Way, Suite B200, Jacksonville, Florida 32256.

Persons wishing to comment upon the permit issuance or to the permit conditions are invited to submit same in writing within forty-five (45) days of the date of this notice to the address given in above paragraph, Attention: Ashwin Patel (Northeast District). The public notice number should be included in the first page of the comment.

All comments received within the 45-day period will be considered in the formulation of future emergency permits.

JACKSONVILLE
AIRPORT AUTHORITY

13365 Aeronautical Cir.

Jacksonville, FL

32221-8105

www.jaxairports.org

February 2, 2005

Mr. Mark E. Davidson
Commander
NAVFAC EFD SOUTH
P.O. Box 190010
North Charleston, SC 29419-9010

Dear Mr. Davidson:

As the legal property owner of the area currently undergoing investigation and removal of munitions and explosives of concern (MEC) by the Navy at Cecil Field Airport (formally NAS Cecil Field), the Jacksonville Airport Authority (JAA) hereby grants NAVFAC EFD SOUTH, and it's contractors, permission to perform the emergency detonations of all MEC items recovered from the aforementioned parcel on JAA property. Please perform all detonations from current and future investigations within the secured area currently undergoing the investigation.

In addition, please coordinate all detonations with the Cecil Field Operations Department, David Dollarhide at 573-1610. This coordination is crucial to ensure helicopter and other low altitude flight operations are restricted from the airspace immediately above the area with the Air Traffic Control Tower.

If you should require additional information or our assistance, please don't hesitate to call me at 573-1613.

Sincerely,

Rusty Chandler
Cecil Field Airport,
Jacksonville Airport Authority

Cc: Bob Simpson, Director of General Aviation, JAA
David Dollarhide, Cecil Field Airport Operations Supervisor, JAA