DRAFT FINAL

MOUNT HOPE QUARRY TIME CRITICAL REMOVAL ACTION ADDENDUM

TO THE

MOUNT HOPE QUARRY TIME CRITICAL REMOVAL ACTION ADDENDUM (NOVEMBER 2009) TO THE FINAL TIME CRITICAL REMOVAL ACTION WORK PLAN MOUNT HOPE QUARRY, MORRIS COUNTY, NJ DECEMBER 2006 (REVISED FEBRUARY 2007)

February 2011

Prepared for:

UNITED STATES ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT
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Submitted to:

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MOUNT HOPE QUARRY TIME CRITICAL REMOVAL ACTION ADDENDUM (NOVEMBER 2009) TO THE FINAL TIME CRITICAL REMOVAL ACTION WORK PLAN MOUNT HOPE QUARRY, MORRIS COUNTY, NJ DECEMBER 2006 (REVISED FEBRUARY 2007)

DoD Contract Number: W912DR-09-C-0086

Reviewed and Approved by:

_______________________  Shahrukh Kanga
Principal
PIKA International, Inc.

_______________________   Lisa Szegedi
Sr. Project Manager
Arcadis/Malcolm Pirnie, Inc.

This Work Plan Addendum has been prepared at the direction of the United States Army Corps of Engineers (USACE). This document should be used only with the approval of the USACE. This Addendum is based, in part, on information provided in other documents and is subject to the limitations and qualifications presented in the referenced documents.

FEBRUARY 2011
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# ACRONYMS

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1.0 INTRODUCTION

The Mount Hope Quarry (aka Tilcon Quarry) is located in Morris County New Jersey (NJ). The 833 acres of Mount Hope Quarry make up the majority of Picatinny Arsenal’s (PTA) 1926 Explosion Site – Off Post (OP) Munitions Response Site (MRS). This addendum to the November 2009 Addendum to the Time Critical Removal Action (TCRA) Work Plan (WP) has been developed to provide a description of modifications to the explosive safety procedures that will be implemented once the project is resumed in February 2011. The remaining work will be conducted on approximately 2.5 acres of the original 10 acres within the 1926 Explosion Site – OP MRS as described in the October 2009 Action Memorandum, Munitions and Explosives of Concern Time Critical Removal Action for Tilcon Quarry, Picatinny, New Jersey, AEDB-R No. (PICA-004-R-01). The work necessary under this Action Memorandum is required in compliance with the Defense Environmental Restoration Program. Two previous TCRAs were conducted at the quarry; in 2007 and 2008. The first TCRA was conducted in the winter of 2007 on approximately 28 acres on the west side of the quarry excavation pit. The quarry operations then moved to an area on the northeast side of the excavation pit and a second TCRA was conducted on approximately 22 acres in that location in 2008. The quarry operations have subsequently moved back to the west side of the quarry excavation pit and workers have encountered additional munitions and explosives of concern (MEC) in an area adjacent to where the original TCRA was done. The 2009 addendum added 10 acres to the TCRA at Mount Hope Quarry (Figure 2 of Appendix B), approximately 2.5 acres of which will be finished in 2011. Mount Hope Quarry is owned by Tilcon New York Inc.

1.1 Project Authorization

Authorization for the project can be found under contract W912DR-09-C-0086 issued by the U.S. Army Corps of Engineers (USACE) - Baltimore District and under the aforementioned Action Memorandum consistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan.

1.2 Purpose and Scope

Per the Action Memorandum the purpose of this TCRA is to significantly reduce the imminent safety hazard presented to quarry workers due to the presence of MEC at the site. This addendum provides a detailed description of the remaining TCRA activities that will take place at Tilcon Quarry as shown on Figure 1 located in Appendix B. All activities, protocols, and procedures not explicitly discussed in this addendum will be conducted in the manner described in the Final Time Critical Removal Action Work Plan, Mount Hope Quarry, Morris County, NJ, December 2006 (Revised February 2007) and Mount Hope Quarry Time Critical Removal Action Addendum to the Work Plan (Dec 2009).
1.3 Addendum Organization

The addendum contains five (5) appendices:

Appendix A: Scope of Work (No Change)
Appendix B: Site Maps
Appendix C: Points of Contact
Appendix D: Project Schedule
Appendix E: Environmental Safety and Health Procedures

1.4 Project Location

This addendum includes approximately 2.5 acres of the 10 acres added in the December 2009 TCRA Work Plan Addendum to the TCRA at Mount Hope Quarry as indicated by Figure 3 in Appendix B.
2.0 TECHNICAL MANAGEMENT PLAN

The Technical Management Plan describes in detail the activities to be conducted for this project at Mount Hope Quarry to include the approach, methods, and procedures to be implemented in order to execute the site activities per the Task Order Scope of Work and Action Memorandum.

All procedures discussed in the 2009 addendum to the 2007 TCRA work plan will be implemented in the removal action within the remaining 2.5 acres, except for the procedures that will be used when MEC are encountered.

2.1 Removal Techniques

The investigation will consist of a removal action of the remaining 2.5 acres of the original 10 acres identified in the 2009 work plan addendum. The mag and flag procedures outlined in the 2009 TCRA addendum to the work plan will be implemented, with the exception of the procedures to be taken when MEC is identified either on the surface or in the subsurface.

Suspected MEC located on the surface or in the subsurface during the mag and dig investigation will be marked with two crossed pin flags. The MEC will be further inspected by the Senior Unexploded Ordnance Supervisor (SUXOS) and UXOSO. If identified as MEC, a digital photo will be taken and positional data of the MEC will be taken using a global positioning system (GPS). The SUXOS and UXOSO will determine if the MEC is acceptable to move and for the purpose of efficiency of activity being conducted or protection of personnel, property or critical assets. If the SUXOS and UXOSO determine that the MEC is unacceptable to move, the item will be marked with red cross-hair flags until the PTA EOD unit arrives to perform blow-in-place (BIP) operations. In either case listed above if PTA EOD is unavailable PIKA and Arcadis/Pirnie personnel will be responsible for destroying MEC encountered during site activities. No consolidated shots are planned for this project.

2.2 Disposition Techniques

2.2.1 MEC Disposal

The PTA EOD unit, with support from PIKA and Arcadis/Pirnie, shall be responsible for destroying all MEC encountered during site activities. In the event that PTA EOD is unavailable then PIKA and Arcadis/Pirnie personnel will be responsible for destroying MEC encountered during site activities. Demolition operations will be conducted in accordance with Amendment 1 to the TCRA Explosive Safety Submission (ESS) and applicable Army regulations. The minimum separation distance will be 326 feet for unintentional detonations and 200 feet for intentional detonations using engineering controls. The Buried Explosion Module (BEM) will be the engineering control used during site activities.
When preparing the MEC for disposal using the BEM a 2 foot bed of dry sand will be prepared to act as the base for the disposal shot. The MEC will be placed upon the bed of dry sand and the shot prepared IAW PIKA ESHP-207, Disposal of Munitions and Explosives of Concern. Once the shot is prepared 6.5 foot of dry sand will be placed on/over the item IAW the BEM calculation sheet contained in ESS Amendment 1.

If PTA EOD is available to detonate MEC, all nonessential personnel will be evacuated from the exclusion zone (EZ). Access to the EZ will be controlled by the SUXOS. Authority to initiate demolition operations will rest solely with EOD and or the PIKA SUXOS when EOD is unavailable. Demolition operations will be coordinated by the SUXOS and will be conducted IAW the ESS, the procedures outlined in Technical Manual (TM) 60A-1-1-31, EM 385-1-97, Explosives – Safety and Health Requirements Manual, and PIKA’s ESHP-207, Disposal of Munitions and Explosives of Concern. No consolidated shots are planned for this project.

During disposal of MEC, safety is the primary concern. The most obvious requirements are to protect personnel, the general public, and the environment from fire, blast, noise, and fragmentation. Planned detonation of explosives requires more stringent safety distance requirements than those for ordnance in storage.

Physical control of the on-site disposal operations will be accomplished by blocking access roads to the site at the point of the EZ. Control of the disposal operations must be maintained to ensure no unauthorized access of the site by non-essential personnel. During disposal preparation, all non-essential personnel must evacuate to locations outside the EZ, and all essential personnel will be evacuated to a location outside the EZ prior to demolition.

The UXO Safety Officer (UXOSO) will be responsible for ensuring that all personnel have been accounted for and that the area is secure prior to authorizing the detonation of explosive charges. EOD (when conducting disposal operations) and the SUXOS will ensure that the PTA, local police, fire department, State and County Emergency Management Agencies, and NJ Department of Environmental Protection (NJDEP) are notified of an impending demolition shot. A constant state of vigilance will be maintained by all personnel to detect any intrusion into the EZ or overflight of aircraft.

2.2.2 MEC Transportation

Transportation of MEC will be done in a specially-equipped pickup truck. The truck must have the appropriate placards and a non-sparking bed liner with tie down points. The MEC will be stabilized with sandbags or placed in wooden box filled with sand and securely tied down. The driver of the transport vehicle will be followed by another similar vehicle and driver to assist him in loading and unloading the MEC, and in the event of mechanical trouble. PIKA safe vehicle operations are contained within ESHP-515 and PIKA ESHP 203 Transportation of Explosives are contained in Appendix E. Additionally transporting MEC will be conducted IAW the procedures contained in Engineering Manual (EM) 385-1-97 with Errata Sheet 5 and paragraph I.2.E.
2.2.3 MEC Safe Holding Areas

In the event that MEC disposal cannot be accomplished on the day of recovery then the item will be secured and the MSD of 326 feet maintained for non-essential personnel.

2.2.4 Collection Points

Collection points will not be used during this project.

2.2.5 Planned Demolition Site

The planned demolition site is shown in Figure 4 of Appendix B.
3.0 Explosives Management Plan

3.1 Introduction

This section is unchanged with the exception of PTA EOD (when available) responding to, and disposing of MEC, when found at the MRS.
4.0 Explosives Siting Plan

Please refer to the ESS.
5.0 GEOSPATIAL INFORMATION AND ELECTRONIC SUBMITTALS

There is no change to this section; therefore, refer to Section 5.0 of the 2009 amendment of the work plan.
6.0 WORK, DATA, AND COST MANAGEMENT PLAN

6.1 Schedule

The project schedule for the effort added by this addendum is included in Appendix C.
7.0 PROPERTY MANAGEMENT PLAN

There is no change to this section; therefore, refer to Section 7.0 of the 2009 amendment of the work plan.
Appendix A: Scope of Work (No Change)
Appendix B: Site Maps
TCRA Figure 2
Picatinny Arsenal, NJ

Munitions Response Site/TCRA

Legend
- Installation Boundary
- Mt Hope Quarry
- TCRA Area ~ 10 acres

Data Source: AERIAL: NJDEP, CIR Orthoimagery, 2002
CTT Data: AEC, CTT Range Inventory, 2005
Coordinate System: UTM Zone 18
Datum: North American Datum 1983
Units: Meters
Date: November 2009
Figure 4
Demolition Area

Legend
- Installation Boundary
- 2,703 ft MFD
- 326 ft MFD
- Mt Hope Quarry
- Proposed Shot Location

Data Source: Aerials: NJDEP, CIR Orthoimagery, 2002
CTT Data: AEC, CTT Range Inventory, 2005
Coordinate System: New Jersey State Plane
Datum: North American Datum 1983
Units: Feet
Date: February 2011
Appendix C: Points of Contact
USACE, Baltimore District:

Nancy Flaherty, Project Manager (410) 962-4256 Nancy.E.Flaherty@usace.army.mil
Travis McCoun, COR (410) 962-6728 Travis.Mccoun@usace.army.mil
Paul Greene, Explosive Safety Manager (410) 962-6741 Paul.E.Greene@usace.army.mil

Army Environmental Command:

Mary Ellen Maly, ERM (210) 424-8646 maryellen.h.maly@us.army.mil

PIKA International, Inc./Arcadis-Malcolm Pirnie, Inc.:

Lisa Szegedi, Sr. PM (201) 398-4328 Lisa.Szegedi@arcadis-us.com
Aakash Gupta, Deputy PM (281) 734-1449 agupta@pikainc.com
Shahrukh Kanga, Project Officer (281) 734-2923 skanga@pikainc.com
Heather Polinsky, Project Officer (410) 230-9961 Heather.Polinsky@arcadis-us.com
Steven Burhans, Senior UXO Supervisor (443) 804-7448 Steven.Burhans@arcadis-us.com
Don Girouard, Corporate H&S Officer (281) 667-5061 dgirouard@pikainc.com

Picatinny Arsenal (PTA):

Ted Gabel (973) 724-6748 ted.gabel@us.army.mil
JB Smith (973) 796-4236 jb.smith1@us.army.mil
Rob Hailstone (973) 975-9070 robert.hailstone@us.army.mil
Police (973) 724-6666

Mount Hope Quarry

(973) 659-3661
625 Mount Hope Road
Wharton, NJ 07885

New Jersey Department of Environmental Protection (NJDEP)

Greg Zalaskus (609) 984-2065 greg.zalaskus@dep.states.nj.us

EOD:

(973) 724-6234

Primary Emergency Facility:

Saint Claire’s Hospital (973) 989-3300
400 West Blackwell Street
Dover, New Jersey

Other Emergency Contacts:

Fire: 911
Police: 911
Ambulance: 911
Appendix D: Project Schedule
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Project: Removal Action at Mount Hope Quarry
Date: February 17, 2011
Appendix E: Environmental Safety and Health Procedures
1.0 PURPOSE
The purpose of this Environmental Safety & Health Procedure (ESHP) is to provide the procedures applicable to the transport of explosives to include demolition material and munitions and explosives of concern (MEC). This ESHP will be used in conjunction with the PIKA Corporate Environmental Safety and Health Program (CESHP) Manual, and will be implemented as part of an approved Site Safety and Health Plan (SSHP) or Accident Prevention Plan (APP).

2.0 SCOPE
This ESHP applies to PIKA site personnel involved in the transport of explosives. This ESHP is generic in nature and is not intended to cover requirements necessary for compliance at each site. It may be necessary to obtain state or local permits/licenses and even a Commercial Drivers License (CDL) in some instances. In most cases, the data contained in this ESHP and PIKA Forms ESHF-201 and ESHF-202 will be sufficient.

3.0 REGULATORY REFERENCES
Procedures and information contained in this document were obtained from the below listed references:
- Department of Transportation, 49 CFR Parts 172, 173, and 383, and applicable sections.
- OSHA 29 CFR 1926 Construction Standards.
- The PIKA CESHP (this document will be on site and available to site personnel during the project).
4.0 RESPONSIBILITIES

4.1 PROJECT MANAGER
The Project Manager (PM), in conjunction with the Senior UXO Supervisor (SUXOS) will determine the specific-site requirements for explosive licensing, permitting, and placarding. The PM will then make sure that the appropriate requirements are communicated to the Corporate Safety and Health Manager (CSHM) and that they are incorporated into the site plans or added as an attachment to this ESHP should they differ. The PM will also be responsible for making sure that the project-related manpower and personnel resources are available for the safe and effective implementation of this ESHP. Any site-specific attachments added to this ESHP will be reviewed and approved by the CSHM and the SUXOS.

4.2 SENIOR UXO SUPERVISOR
The SUXOS will be responsibility for making sure that the requirements of this ESHP, and any site-specific attachments are enforced and that the pertinent PIKA forms, ESHF-201 and ESHF-202, are properly completed and in the vehicle(s) used for explosive transportation.

4.3 EXPLOSIVE VEHICLE DRIVER
Individuals assigned to transport explosives will meet the site driver requirements, be thoroughly familiar with this ESHP, and know and understand emergency procedures in the event of an accident/incident.

5.0 EXPLOSIVES AND MEC TRANSPORTATION REQUIREMENTS

5.1 GENERAL REQUIREMENTS
Contractors transporting MEC or explosives will comply with Federal, state, and local regulations. Permits for the transportation of explosives or MEC are not required for on-site or inter-facility transportation within Federal installations. Off-site shipment of MEC and explosives will be accomplished by approved commercial carriers. For off-site shipment:

- MEC will be packaged IAW 49 Code of Federal Register (CFR) part 172 and 173;
- Drivers will have PIKA Form ESHF-201 (Special Instructions for Vehicle Drivers);
- Vehicles will be inspected using the PIKA Motor Vehicle Inspection Form, and if applicable, be properly placarded;
- Compatibility requirements will be observed;
- The load shall be well braced and, except when in closed vans, covered with a fire-resistant tarpaulin.

5.2 TRANSPORTATION ON-SITE AND ON FEDERAL INSTALLATIONS
Transportation of explosives and MEC on-site and on Federal installations will comply with the following:
• Vehicles will be inspected prior to use each day using the PIKA Weekly Vehicle Inspection Checklists and will be properly placarded;
• Vehicle engine will not be running, wheels chocked and brakes will be set when loading/unloading explosives;
• Explosives will be transported in closed vehicles whenever possible. When using an open vehicle, explosives will be covered with a flame resistant tarpaulin (except when loading/unloading);
• The area of the vehicle where the explosives are placed for transportation will have either a plastic bed liner, dunnage, or sand bags placed in the area to protect the explosives from contact with the metal bed and fittings;
• Explosive vehicles will have a first aid kit, a minimum of two fire extinguishers with a rating of at least 10-BC units, and communications capabilities;
• Initiating explosives, such as detonators, will remain separated;
• Compatibility requirements will be observed;
• Operators transporting explosives will have a valid drivers license;
• Operators will drive at a safe speed based on road conditions, but never over the speed limit. Vehicles transporting explosives off-road will not exceed 25 mph
• PIKA will also comply with any installation-specific explosives transportation procedures, to include those procedures related to drivers, equipment requirements and vehicle inspections.

5.3 GENERAL PLACARDING REQUIREMENTS
According to 49 CFR 172.504, the placarding requirements listed below will apply to PIKA explosives transportation:
(а) “Except as otherwise provided, each bulk packaging, freight container, unit load device, transport vehicle or rail car containing any quantity of a hazardous material must be placarded on each side and each end with the type of placards specified in Tables 1 and 2, in accordance with other requirements and exceptions.” (Tables 1 and 2 are presented on the following page in Table 203-1 and 203-2.)
(c) Exceptions for less than 454 kg (1,001 pounds). “Except for bulk packaging and hazardous materials subject to 49 CFR 172.505, when hazardous materials covered by Table 2 of this section are transported by highway or rail, placards are not required on:
(1) A transport vehicle or freight container which contains less than 454 kg (1,001 lbs.) aggregate gross weight of hazardous materials covered by Table 2 of paragraph (e) of this section; or
(2) A rail car loaded with transport vehicles or freight containers, none of which is required to be placarded.”
The exceptions provided in paragraph (c) provided above, do not prohibit the display of placards in the manner prescribed in this subpart, if not otherwise prohibited, on transport vehicles for freight containers that are not otherwise required to be placarded.

5.4 OFF-SITE TRANSPORTATION OF EXPLOSIVES OVER PUBLIC HIGHWAY

5.4.1 DOT Certificate of Registration

DOT certificates of registration for PIKA persons involved in the transportation of demolition materials are not required as long as only 1.4 explosives or less than 55 lbs net explosive weight (NEW) of 1.1, 1.2, or 1.3 explosives are transported by PIKA personnel.

<table>
<thead>
<tr>
<th>TABLE 203 – 1: PLACARDING REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category of material (Hazard class or division number and additional description, as appropriate)</td>
</tr>
<tr>
<td>1.1</td>
</tr>
<tr>
<td>1.2</td>
</tr>
<tr>
<td>1.3</td>
</tr>
<tr>
<td>2.3</td>
</tr>
<tr>
<td>4.3</td>
</tr>
<tr>
<td>6.1 (PG I, inhalation hazard only)</td>
</tr>
<tr>
<td>7 (Radioactive Yellow III label only)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 203 – 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category of material (Hazard class or division number and additional description, as appropriate)</td>
</tr>
<tr>
<td>1.4</td>
</tr>
<tr>
<td>1.5</td>
</tr>
<tr>
<td>1.6</td>
</tr>
<tr>
<td>2.1</td>
</tr>
<tr>
<td>2.2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4.1</td>
</tr>
<tr>
<td>4.2</td>
</tr>
<tr>
<td>5.1</td>
</tr>
<tr>
<td>5.2 (Other than organic peroxide, Type B, liquid or solid, temperature controlled)</td>
</tr>
<tr>
<td>6.1 (PG I or II, other than Zone A or B inhalation hazard)</td>
</tr>
<tr>
<td>6.1 (PG III)</td>
</tr>
<tr>
<td>6.2</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>ORM-D</td>
</tr>
</tbody>
</table>
5.4.2 Definition of Commercial Motor Vehicles
The term “commercial motor vehicle” (CMV) means a motor vehicle, or combination thereof, used in commerce to transport passengers or property if the motor vehicle meets any of the following:

- It has a gross combination weight rating of 11,794 or more kilograms (kg) (26,001 pounds or more) inclusive with a towed unit with a gross vehicle weight rating of more than 4,536 kilograms (10,000 pounds); or
- It has a gross vehicle weight rating of 11,794 or more KG (26,001 pounds or more); or
- It is designed to transport 16 or more passengers, including the driver; or
- It is of any size and is used in the transportation of materials found to be hazardous for the purposes of the Hazardous Materials Transportation Act and which require the motor vehicle to be placarded under the Hazardous Materials Regulations (49 CFR part 172, subpart E).

5.4.3 CDL Requirements
If the vehicle being used does not weigh more than 26,000 pounds and the materials being transported do not require placards under the DOT Hazardous Materials Regulations (i.e., 1.4 explosives) then the vehicle being used need not be classified as a CMV and the operator of the vehicle need not have a Commercial Driver’s License (CDL). This situation is typical on PIKA project sites where only demolition materials classified as 1.4 are transported. However, if a CDL is required, the SUXOS will make sure that the requisite license/permits are obtained.

5.4.4 Mixed Packaging Requirements
Explosives of compatibility Group S may be packed with explosives of other explosive compatibility groups except A and L. To determine the compatibility of the materials typically transported by PIKA, check the Material Data Sheets presented in Attachment 1 to this ESHP.

6.0 DOCUMENTATION
6.1 PIKA FORMS
Any time explosives are being transported this entire ESHP to include the completed copies of supporting forms ESHF-201 and ESHF-202, will be in the vehicle. A brief description of the relevant forms is included below and shall be used for proper completion of the forms.

1. PIKA FORM ESHF-201
   Only those items that are being transported will be entered in the form with the applicable qty/units and weight columns completed. It is imperative that the NEW limitations of 55 lbs. not be exceeded. Required data will be entered on the front and the Guide 50 block should be checked on the back of the form.
2. PIKA FORM ESHF-202
   The form will be completed making sure the pertinent data for those transporting explosives is included on the form. As with the other required form, this one will also be part of the transport paperwork. Only the route shown will be used unless there is an emergency or the route is blocked. Any deviation from the planned route will be reported to and coordinated with the SUXOS.

6.2 BATF PERMIT/LICENSE
   A copy of the current BATF license will accompany the vehicle and will be readily available for inspection. A copy of the BATF license will also remain at the project site whenever explosives transportation is being conducted as a requirement of the clients Statement of Work.

7.0 ATTACHMENTS
   The following attachment is included with this ESHP:
   - Attachment 1 - Material Data Sheets
ATTACHMENT 1

MATERIAL DATA SHEETS
CORD, DETONATING - 1.4D - UN0289

NET EXPLOSIVE WEIGHT (NEW):

0.00229 OZ = 1 Grain
80 gr. x 0.00229 = .1832 oz.
0.1832 oz. Per ft. x 100' = 18.32 oz. Total Net Explosive Weight per 100 feet

HAZARDOUS CLASS OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name:
CORD DETONATING, FLEXIBLE UN0289 1.4D

49 CFR 172.101 - TABLE OF HAZMAT MATERIAL
CORD DETONATING, FLEXIBLE UN0289 1.4D

49 CFR 173.63 (a)

Packaging Exceptions

(a) Cord, Detonating (UN0065), having an explosive content not exceeding 6.5g (0.23 ounces) per 30 centimeter length (one linear foot) may be offered for transportation domestically and transported as Cord, detonating (UN0289), Division 1.4 Compatibility Group D (1.4D) explosives, if the gross weight of all packages containing Cord, detonating (UN0065), does not exceed 45 kg (99 pounds) per:

(1) Transport vehicle, freight container, or cargo-only aircraft;

UN0065 and UN0289 Use Packaging Instruction #139

<table>
<thead>
<tr>
<th>Packing Instruction</th>
<th>Inner Packaging</th>
<th>Intermediate Packaging</th>
<th>Outer Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>139..................</td>
<td>Bags............</td>
<td>Not necessary ..........</td>
<td>Boxes.</td>
</tr>
<tr>
<td>Particular Packing</td>
<td>Plastics</td>
<td></td>
<td>Steel (4A).</td>
</tr>
<tr>
<td>Requirements Or</td>
<td>Receptacles....</td>
<td></td>
<td>Aluminum (4B).</td>
</tr>
<tr>
<td>Exceptions:</td>
<td>Fiberboard</td>
<td></td>
<td>Wood, natural, ordinary (4C1).</td>
</tr>
<tr>
<td>1. For UN 0065, 0102, 0104, 0289 and 0290, the ends of the detonating cord must be sealed, for example, by a plug firmly fixed so that the explosive cannot escape. The ends of CORD DETONATING flexible must be fastened securely.</td>
<td>Metal</td>
<td>Wood, natural, sft proof walls (4C2).</td>
<td></td>
</tr>
<tr>
<td>2. For UN 0065 and UN 0289, inner Packaging are not required when they are fastened securely in coils.</td>
<td>Plastics</td>
<td>Plywood (4D).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wood</td>
<td></td>
<td>Reconstituted wood (4F).</td>
</tr>
<tr>
<td></td>
<td>Reels ..........</td>
<td></td>
<td>Fiberboard (4G).</td>
</tr>
<tr>
<td></td>
<td>Sheets.........</td>
<td></td>
<td>Plastics, solid (4H2).</td>
</tr>
<tr>
<td></td>
<td>Paper</td>
<td></td>
<td>Drums.</td>
</tr>
<tr>
<td></td>
<td>Plastics</td>
<td></td>
<td>Steel, removable head (1A2).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aluminum, removable head (1B2).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Plywood (1D).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fiber (1G).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Plastics, removable head (1H2).</td>
</tr>
</tbody>
</table>
SHAPE CHARGE (1.4S) (UN0441)

HAZARDOUS CLASS OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name:

CHARGES, SHAPED, COMMERCIAL W/O DETONATOR UN04411.4S

49 CFR 172.101 TABLE OF HAZMAT MATERIAL

CHARGERS, SHAPED, COMMERCIAL WITHOUT DETONATOR UN04411.4S

49 CFR 173.62

Packaging & Instructions #137

137..................................................
PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS:
For UN 0059, 0439, 0440, and 0441, when the shaped charges are packed singly, the conical cavity must face downwards and the package marked "This Side Up." When the shaped charges are packed in pairs, the conical cavities must face inwards to minimize the jetting effect in the event of accidental initiation.
2. For UN 0065 and UN 0289, inner Packaging are not required when they are fastened securely in coils.

<table>
<thead>
<tr>
<th>Packing Instruction</th>
<th>Inner Packaging</th>
<th>Intermediate Packaging</th>
<th>Outer Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>137..........................</td>
<td>Bags..............</td>
<td>Not necessary....</td>
<td>Boxes.</td>
</tr>
<tr>
<td></td>
<td>Plastics</td>
<td></td>
<td>Steel (4A).</td>
</tr>
<tr>
<td></td>
<td>Boxes.............</td>
<td></td>
<td>Aluminum (4B).</td>
</tr>
<tr>
<td></td>
<td>Fiberboard</td>
<td></td>
<td>Wood, natural, ordinary (4C1).</td>
</tr>
<tr>
<td></td>
<td>Tubes.............</td>
<td></td>
<td>Wood, natural, sift proof walls (4C2).</td>
</tr>
<tr>
<td></td>
<td>Fiberboard</td>
<td></td>
<td>Plywood (4D).</td>
</tr>
<tr>
<td></td>
<td>Metal</td>
<td></td>
<td>Reconstituted wood (4F).</td>
</tr>
<tr>
<td></td>
<td>Plastics</td>
<td></td>
<td>Fiberboard (4G).</td>
</tr>
<tr>
<td></td>
<td>Dividing partitions in the outer Packaging.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DETONATOR, NON-ELECTRIC (1.4B) (UN0267)

HAZARD CLASSIFICATION OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name
DETONATOR, NON-ELECTRIC UN0267 1.4B

CFR 49 172.101 TABLE OF HAZARDOUS MATERIALS
DETONATOR, NON-ELECTRIC UN0267 1.4B

Special Provisions (column #7)
#103 Detonators which will not mass detonate and undergo only limited propagation in the shipping package may be assigned to 1.4B classification code. Mass detonate means that more than 90 percent of the devices tested in a package explode practically simultaneously.

49 CFR 173.63 (g)
Packaging Exceptions
(g) Detonators that are classed as 1.4B or 1.4S and contain no more than 1 g of explosive (excluding ignition and delay charges) may be packed as follows in which case they are excepted from the packaging requirements of 173.62:
(1) No more than 50 detonators in one inner packaging;
(2) IME Standard 22 container is used as the outer packaging;
(3) No more than 1000 detonators in one outer packaging; and
(4) Each inner packaging is marked 1.4B Detonators or 1.4S Detonators, as appropriate.
DETONATOR, ELECTRIC (1.4B) (UN0244)

HAZARDOUS CLASSIFICATION OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name
DETONATOR, ELECTRIC UN0244 1.4B

49 CFR 172.101 TABLE OF HAZARDOUS MATERIALS
DETONATOR, ELECTRIC UN0255 1.4B

Special Provisions (column #7)
#103 Detonators which will not mass detonate and undergo only limited propagation in the shipping package may be assigned to 1.4B classification code. Mass detonate means that more than 90 percent of the devices tested in a package explode practically simultaneously. Limited propagation means that if one detonator near the center of a shipping package is exploded, the aggregate weight of explosives, excluding ignition and delay charges, in this and additional detonators in the outside packaging that explode may not exceed 25 grams.

49 CFR 173.63 (f) & (g)
Packaging exceptions:
(f) Detonators containing no more than 1g explosive (excluding ignition and deadly charges) that are electric blasting caps with leg wires four feet long or longer, delay connectors in plastic sheaths, or blasting caps with empty plastic tubing twelve feet long or longer, may be packed as follows, in which case they are excepted from the packaging requirements of 173.62:
(1) No more than 50 detonators in one inner packaging;
(2) IME Standard 22 container or compartment is used as the outer packaging;
(3) No more than 1,000 detonators in one outer packaging; and
(4) No material may be loaded on top of the IME Standard 22 container and no material may be loaded against the outside door of the IME standard 22 compartment.

(g) Detonators that are classed as 1.4B or 1.4S and contain no more than 1g of explosive (excluding) ignition and delay charges) may be packed as follows in which case they are excepted from the packaging requirements of 173.62:
(1) No more than 50 detonators in one inner packaging;
(2) IME Standard 22 container is used as the outer packaging;
(3) No more than 1,000 detonators in one outer packaging; and
(4) Each inner packaging is marked □1.4B Detonators□ or □1.4S Detonators□, as appropriate.

49 CFR 173.62 SPECIAL PACKING REQUIREMENTS FOR EXPLOSIVES
(Explosives Table) UN0267 PI # 131
## Table of Packing Methods - Continued

<table>
<thead>
<tr>
<th>Packing Instruction</th>
<th>Inner Packaging</th>
<th>Intermediate Packaging</th>
<th>Outer Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. For UN 0029, 0267, and 0455, bags and reels may not be used as inner packagings.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. For UN 0030, 0255, and 0455,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inner packagings are not required when detonators are packed in pasteboard tubes, or when their leg wires are wound on spools with the caps either placed inside the spool or securely taped to the wire on the spool, so as to restrict freedom of movement of the caps and to protect them from impact forces.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. For UN 0360, 0361, and 0500, detonators are not required to be attached to the safety fuse, metal-clad mild detonating cord, detonating cord, or shock tube, inner packagings are not required if the packing configuration restricts freedom of movement of the caps and protects them from impact forces.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

49 CFR 173.63 PA PACKAGING EXCEPTIONS (Enclosure 1)

(g) (2) IME Standard 22 container
Publication: Institute of Makers of Explosives SLP #22 May 1993
Publication: Guide for the Use of the IME 22 Container Oct. 1, 1993
IGNITER, M2/ M60 F/ TIME BLASTING FUSE (1.4S) (UN0131)

HAZARD CLASSIFICATION OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name:
LIGHTERS, FUSE 1.4S UN0131

49 CFR 172.101 TABLE OF HAZARDOUS MATERIALS

LIGHTER, FUSE 1.4S UN0131

49 CFR 173.62

Packaging Instruction #142


Table of Packing Methods - Continued

<table>
<thead>
<tr>
<th>Packing Instruction</th>
<th>Inner Packagings</th>
<th>Intermediate Packagings</th>
<th>Outer Packagings</th>
</tr>
</thead>
<tbody>
<tr>
<td>142</td>
<td>Bags.................................</td>
<td>Not necessary...........</td>
<td>Boxes.</td>
</tr>
<tr>
<td></td>
<td>Paper</td>
<td></td>
<td>Steel (4A).</td>
</tr>
<tr>
<td></td>
<td>Plastics</td>
<td></td>
<td>Aluminum (4B).</td>
</tr>
<tr>
<td></td>
<td>Receptacles ......</td>
<td></td>
<td>Wood, natural, ordinary (4C1).</td>
</tr>
<tr>
<td></td>
<td>Fiberboard</td>
<td></td>
<td>Wood, natural, sift proof walls (4C2).</td>
</tr>
<tr>
<td></td>
<td>Metal</td>
<td></td>
<td>Plywood (4D).</td>
</tr>
<tr>
<td></td>
<td>Plastics</td>
<td></td>
<td>Reconstituted wood (4F).</td>
</tr>
<tr>
<td></td>
<td>Wood</td>
<td></td>
<td>Fiberboard (4G).</td>
</tr>
<tr>
<td></td>
<td>Sheets...............................</td>
<td></td>
<td>Plastics, solid (4H2).</td>
</tr>
<tr>
<td></td>
<td>Paper</td>
<td></td>
<td>Drums.</td>
</tr>
<tr>
<td></td>
<td>Trays, fitted with dividing partitions plas...</td>
<td></td>
<td>Steel, removable head (1A2).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aluminum, removable head (1B2).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fiber (1G).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Plastics, removable head (1H2).</td>
</tr>
</tbody>
</table>
FUSE, BLASTING TIME M700 (1.4S) (UN0105)

HAZARD CLASSIFICATION OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name:
FUSE, SAFETY UN0105 1.4S

49 CFR 49 172.101 TABLE OF HAZARDOUS MATERIALS
FUSE, SAFETY UN0105 1.4S

49 CFR 173.62
Packing Instructions #140

Research and Special Programs Administration, DOT . 173.62

Table of Packing Methods - Continued

<table>
<thead>
<tr>
<th>Packing Instruction</th>
<th>Inner Packagings</th>
<th>Intermediate Packagings</th>
<th>Outer Packagings</th>
</tr>
</thead>
<tbody>
<tr>
<td>140</td>
<td>Bags.................</td>
<td>Not necessary...</td>
<td>Boxes.</td>
</tr>
<tr>
<td></td>
<td>Plastics</td>
<td></td>
<td>Steel (4A).</td>
</tr>
<tr>
<td></td>
<td>Reels..................</td>
<td></td>
<td>Aluminum (4B).</td>
</tr>
<tr>
<td></td>
<td>Sheets...............</td>
<td></td>
<td>Wood, natural, ordinary (4C1).</td>
</tr>
<tr>
<td></td>
<td>Paper, Kraft</td>
<td></td>
<td>Wood, natural, sift proof walls (4C2).</td>
</tr>
<tr>
<td></td>
<td>Plastics</td>
<td></td>
<td>Plywood (4D).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Reconstituted wood (4F).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fiberboard (4G).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Plastics, solid (4H2).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Drums.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steel, removable head (1A2).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aluminum, removable head (1B2).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fiber (1G).</td>
</tr>
</tbody>
</table>
1.0 PURPOSE
The purpose of this Environmental Safety & Health Procedure (ESHP) is to provide the minimum procedures and safety and health requirements applicable to the conduct of demolition/disposal operations on sites contaminated with munitions and explosives of concern (MEC). This ESHP will be used in conjunction with the PIKA Corporate Environmental Safety and Health Program (CESHP) Manual, Corporate Quality Management System (QMS) and will be implemented as part of an approved Site Safety and Health Plan (SSHP) or Accident Prevention Plan (APP).

2.0 SCOPE
This ESHP applies to site personnel, including contractor and subcontractor personnel, involved in the conduct of MEC demolition/disposal operations on a MEC contaminated site. This ESHP is not intended to contain all of the requirements needed for complete compliance, and should be used in conjunction with project plans and applicable Federal, state and local regulations. Consult the documents listed in section 3.0 of this ESHP for additional compliance issues.

3.0 REGULATORY REFERENCES
Applicable sections and paragraphs in the documents listed below will be used as references for the conduct of MEC demolition/disposal operations:
- DoD 6055.9-M, DoD Ammunition and Explosive Safety Standards American conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs®) and Biological Exposure Indices (BEIs®)
- Applicable sections of DOT, 49 CFR Parts 100 to 199.
- Bureau of Alcohol Tobacco Firearms and Explosives (BATFE) 5400.7, Alcohol Tobacco and Firearms Explosives Laws and Regulations.
- DoD 4145.26-M, DoD Contractor’s Safety Manual for Ammunition and Explosives
- Department of Defense Explosive Safety Board (DDESB) Technical Paper (TP) 16, Methodologies for Calculating Primary Fragment Characteristics
- DDESB TP 18, Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel
- DA-Pam 385-64, Ammunition and Explosives Safety Standards
USACE Engineering Regulation (ER) 385-1-92, Safety and Occupational Health Requirements for Hazardous, Toxic and Radioactive Waste (HTRW) Activities


USACE EP 1110-1-18, Ordnance and Explosives Response

USACE EM 1110-1-4009, Military Munitions Response Actions

USACE EM 385-1-1, Safety and Health Requirements Manual

USACE ER 385-1-95, Safety and Health Requirements for Munitions and Explosives of Concern (MEC) Operations

The PIKA CESHP and QMS, ESHP’s and ESHF’s (these documents will be on site and available to site personnel during the project).

4.0 RESPONSIBILITIES

4.1 PROJECT MANAGER

The PIKA Project Manager (PM) shall be responsible for making sure of the availability of the personnel and equipment resources needed to implement this ESHP, and shall also make sure that this ESHP is incorporated in plans, procedures and training for sites where this ESHP is to be implemented.

4.2 CORPORATE ENVIRONMENTAL SAFETY AND HEALTH MANAGER

The Corporate Environmental Safety and Health Manager (CESHM) is responsible for the continued development, improvement, and implementation of the PIKA CESHP, and factors relative to this ESHP. To accomplish this end, the CESHM will be responsible for:

- Conducting an annual review of this ESHP and making modifications as necessary.
- Developing or reviewing site plans that specify the personal protective equipment (PPE) and other hazard controls that apply to the implementation of this ESHP for proper protection of personnel.
- Providing the UXOSO with consultation related to MEC protective measures.
- Periodically auditing PIKA work sites for compliance with this ESHP.

4.3 CORPORATE QUALITY MANAGER

The Corporate Quality Manager (CQM) is responsible for the continued development, improvement, and implementation of the PIKA Corporate Quality Management System (QMS) and factors relative to this ESHP. To accomplish this end, the CQM will be responsible for:

- Conducting an annual review of this ESHP and making modifications as necessary.
Developing or reviewing site plans that specify the performance Quality objectives and response measures

Providing the UXOQCS with consultation related to project activities.

Periodically auditing PIKA work sites for compliance with this ESHP.

4.4 SENIOR UXO SUPERVISOR
The Senior Unexploded Ordnance (UXO) Supervisor (SUXOS) will be responsible for making sure that adequate safety measures and housekeeping are taken during each phase of site operation, to include demolition activities, and shall visit site demolition locations as deemed necessary to make sure that demolition operations are carried out in a safe, clean, efficient and economical manner.

4.5 DEMOLITION SUPERVISOR
Prior to initiation of demolition operations, the SUXOS shall designate an experienced and trained UXO Supervisor to act as the Demolition Supervisor (DS). The DS shall be present during demolition operations or designate a competent, qualified person to be in charge during any absences. The demolition activities shall then be conducted under the direct control of the DS, who will have the responsibility of supervising demolition operations within the area. The DS shall be responsible for providing a pre-demolition briefing as outlined in this ESHP. The DS will also make sure that applicable forms, documentation, and records required by this ESHP are completed and signed by appropriate project personnel. The DS will make sure that the logs and records accurately reflect the demolition events conducted and the demolition materials used during that day's operations.

4.6 SITE SAFETY AND HEALTH OFFICER
The UXO Safety Officer (UXOSO) for the site is responsible for making sure that demolition operations are being conducted in a safe and healthful manner. As such, a PIKA employee designated as the demolition UXOSO will be present on-site during MEC demolition operations and the UXOSO will meet the requirements for a UXO Safety Officer as expressed in DDESB TP 18 listed above in paragraph 3.0 or this ESHP. However, in the event that a given project has multiple sites where varying types of MEC investigation and remediation operations are being conducted concurrently, it may be necessary to assign an additional, temporary UXOSO to monitor the demolition operations. The temporary demolition UXOSO will make sure of the compliance of the demolition team while the primary UXOSO attends to the remaining project teams. If there is no temporary UXOSO assigned strictly to demolition operations, the primary site UXOSO will be the one responsible for monitoring demolition operations.
4.7 QUALITY CONTROL SPECIALIST
The UXO Quality Control Specialist (UXOQCS) is responsible for making sure of the completeness of demolition operations and for weekly inspecting the Explosives Accountability Record/Magazine Data Card (DD Form 3020-R), the PIKA Demolition Shot Record (ESHF-205B), and the inventory of MEC and demolition material. The UXOQCS, assisted by demolition team personnel, will inspect each demolition pit and an area of up to 250 feet in radius after each demolition shot to make sure there are no kick outs, hazardous MEC components or other hazardous items remaining after the demolition shot. The pit will be checked with a magnetometer and large metal fragments, and any hazardous debris will be removed on a per use basis IAW the SOW. Any MEC discovered during the QC check will be properly disposed of using the demolition procedures in the WP. MEC items that have been exposed to the forces of demolition detonations will not be moved and will be disposed of in place using the approved procedures in the project WP.

MEC items that have been exposed to the forces of demolition detonations but not destroyed/vented to the appropriate standard for completeness will be inspected by qualified UXO Personnel prior to handling or movement. If the item is found to be unacceptable to move, the item will be disposed of in place using the approved procedures in the project WP.

5.0 GENERAL OPERATIONAL AND SAFETY PROCEDURES
Personnel, including contractor and subcontractor personnel, involved in operations on MEC contaminated sites shall be familiar with the potential safety and health hazards associated with the conduct of demolition/disposal operations, and with the work practices and control techniques used to reduce or eliminate these hazards. During demolition operations, the general safety provisions listed below shall be followed by demolition personnel. Non-compliance with the general safety provisions listed may result in positive discipline, to include termination of employment. The safety provisions for demolition operations include:

- Demolition operations shall be conducted IAW this ESHP and any approved changes outlined in the approved WP.
- Complying with safety regulations applicable to demolition range activities, demolition materials, and MEC materials.
- Demolition of any kind is prohibited without the express permission from the client.
- The quantity of MEC to be destroyed during any single shot will be determined by the range limit net explosive weight (NEW) and other considerations outlined in the project WP.
• For projects where MEC items may be consolidated for demolition, the US Army Engineering and Support Center, Huntsville (CEHNC), document entitled, Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites, will be located on-site and followed when destroying multiple munitions by detonation on site.

• In the event of an electrical storm, or heavy snow or dust storms, immediate action will be taken to cease demolition range operations and evacuate the area.

• In the event of a fire or unplanned explosion, if possible, put out the fire, if unable to do so, notify fire department and evacuate the area. If injuries are involved, remove victims from danger, administer first aid and seek medical attention.

• The DS is responsible for reporting to the SSHO injuries, accidents or near misses that occur during demolition operations.

• Employees will not tamper with any safety devices or protective equipment.

• Any defect or unusual condition noted that is not covered by this ESHP will be reported immediately to the DS or SSHO, and operations will be halted until the condition is addressed and resolved.

• Adequate fire protection and first aid equipment shall be provided.

• Personnel engaged in the destruction of MEC shall wear under and outer garments made of natural fiber, close-weave clothes, such as cotton. Synthetic material such as nylon is not authorized unless treated with anti-static material.

• Consistent with PIKA’s operational policies, exposures to demolition hazards shall be maintained to the fewest number of personnel, for the shortest time, and to the least amount of hazard.

• Work locations will be maintained in a neat and orderly condition.

• Hand tools shall be inspected prior to use, and maintained in a good state of repair.

• Heavy equipment use in support of the demolition operations and heavy operators will meet the requirements of PIKA ESHP-518.

• Equipment and other lifting devices designed and used for lifting will have the load rating and date of next inspection marked on them. The load rating will not be exceeded and the equipment will not be used without a current inspection date.

• Leather or leather-palmed gloves will be worn when handling wooden boxes, munitions or MEC.

• Lifting and carrying require care. Improper methods cause unnecessary strains. Observe the following preliminaries before attempting to lift or carry:
  – When lifting, keep your arms and back as straight as possible, bend your knees and lift with your leg muscles, and
- Be sure you have good footing and hold, and lift with a smooth, even motion.

- Telephone and/or radio communications with off-site resources shall be available and maintained throughout demolition operations.

- Motor vehicles and material handling equipment (MHE) used for transporting MEC or demolition materials must be IAW ESHP 203 Transportation of Explosives.

- Employees are required to wear leather or rubber gloves when handling demolition materials. The type of glove worn is dependent on the type of demolition material.

- If required and if a designated demolition range is established and used, a red warning flag, such as a “Bravo Flag” or a windsock, will be displayed at the entrance to the demolition range during demolition operations. If a gate is available, the entrance gate shall be either guarded or locked when demolition work is in process.

- Demolition shots will be performed IAW with any engineering controls (i.e., soil tamping or sandbags) outlined in the project WP.

- An observer will be stationed at a location where there is a good view of the air and surface approaches to the demolition range before material is detonated. It shall be the responsibility of the observer to order the DS to suspend firing if any aircraft, vehicles or personnel are sighted approaching the general demolition area.

- Two-way radios shall not be operated inside the restriction zones of potential EMR effect to the shot being or having been primed. The charts shown in Tables 207-2 and 207-3 (located at the end of this document) shall be used to calculate minimum safe distances as they relate to mobile RF, television and FM broadcasting transmitters when electric detonators are in use.

- No demolition operation will be left unattended during the active portion of the operation (i.e., during the burn or once any explosives or MEC are brought to the range).

- For established demolition ranges, a minimum area of 200 feet in diameter around the demolition pit shall be cleared of dry grass, leaves, and other combustible materials.

- No demolition activities will be conducted if there is less than a 2,000-foot ceiling or if wind velocity is in excess of 20 mph.

- Demolition shots must be fired during daylight hours (i.e., between 30 minutes after sunrise and 30 minutes before sunset).

- No more than two persons shall ride in a truck transporting demolition material or MEC, and no person shall be allowed to ride in the trailer/bed.
• Vehicles shall not be refueled when carrying demolition material or MEC, and if they must be refueled near such materials, the vehicle will be a minimum of 100 feet from magazines or trailers containing such items before refueling can occur.
• Explosive vehicles will be cleaned of visible explosive and other contamination before releasing the vehicles for other tasks.
• Prior to conducting any other task, personnel shall wash their face and hands after handling demolition material or MEC.
• For established demolition ranges, demolition pits shall be spaced at least 50 feet apart, with no more than 10 pits prepared for a series of shots at any one time.

6.0 SPECIAL REQUIREMENTS FOR DEMOLITION ACTIVITIES
The following safety and operational requirements shall be followed during demolition range operations. Any deviations from this procedure shall be allowed only after receipt of written approval from the PIKA PM and the client. Failure to adhere to the requirements and procedures listed in the paragraphs below could result in serious injury or death; therefore, complete compliance with these requirements and procedures will be strictly enforced.

6.1 GENERAL REQUIREMENTS
The general demolition range requirements listed below shall be followed:
• Demolition operations will comply with Attachment 1 of this ESHP, Explosive Hazards Tables.
• Material awaiting destruction shall be stored at not less than intra-line distance, based on the largest quantity involved, from adjacent explosive materials and from explosives being destroyed. The material shall be protected against accidental ignition or explosion from fragments, grass fires, burning embers or detonating impulses originating in materials being destroyed.
• MEC items or bulk explosives to be destroyed by detonation shall, whenever feasible or required by the project WP, be detonated in a pit not less than three feet deep and covered with earth which protrudes not less than two feet above existing ground level. The components should be placed on their sides or in a position to expose the largest area to the influence of the demolition material. The demolition material should be placed in intimate contact with the item to be detonated and held in place by tape or earth packed over the demolition materials. The total quantity to be destroyed at one time shall not exceed the range limit.
• Detonations will be counted to make sure of detonation of pits. After each series of detonations, a search shall be made of the surrounding area for unexploded MEC and MEC. When deemed safe, items such as lumps of explosives or unfuzed ammunition may be picked up and prepared for the next shot. Fuzed
ammunition or items, which may have internally damaged components, will be detonated in place, if possible.

- Prevailing weather condition information will be obtained from the U.S. Weather Service and the data logged in the Demolition Shot Log (ESHF-205B) before explosive operations begin.
- Shots shall be dual primed.
- A minimum of 30 seconds will be maintained between each detonation.
- After each detonation and at the end of each day's operations, surface exposed scrap metal, casings, fragments, and related items shall be recovered from the demolition range and disposed of IAW contractual procedures, as well as applicable environmental regulations. Collected scrap metal will be 100% inspected for absence of explosive materials by demolition range personnel and the DS.
- When operated in accordance with the conditions of this procedure the demolition range should not present a noise problem to the surrounding community. However, if a noise complaint is received, the name, address and phone number of the complainant should be recorded and reported to the SUXOS, who in turn, will report it to the client.
- Whenever possible, during excavation of the demolition pits, contour the ground so that runoff water is channeled away from the pits. If demolition operations are discontinued for more than two weeks, the pits should be back filled until operations resume.
- Upon completion of the project, disturbed demolition areas will be thoroughly inspected for MEC. Depending upon contract requirements, the site may have to be leveled, seeded and mulched to establish a permanent vegetative cover to inhibit erosion. If necessary, this will be coordinated with the contractor representative. At a minimum, the holes/pits will be filled in and contoured.
- Prior to and after each shot, the PIKA Demolition Shot Record (ESHF-205B) is to be filled out by the DS with applicable information. This record will be kept with the Explosives Accountability Record/Magazine Data Card (DD 3020-R) and reflect the data for each shot.

### 6.2 ELECTRIC DETONATOR USE

The following requirements are necessary when using electric detonators and blasting circuits:

- Electric detonators and electric blasting circuits may be energized to dangerous levels from outside sources such as static electricity, induced electric currents and radio communication equipment. Safety precautions will be taken to reduce the possibility of a premature detonation of the electric detonator and explosive
charges of which they form a part. Radios will not be operated in the affected range while the pit is primed or during the priming process.

- The shunt shall not be removed from the leg wires of the detonator until the continuity check of the detonator.

- When uncoiling or straightening the detonator leg wires, keep the explosive end of the detonator pointing away from the body and away from other personnel. When straightening the leg wires, do not hold the detonator itself, rather hold the detonator leg wires approximately one inch from the detonator body. Straighten the leg wires by hand, do not throw or wave the wires through the air to loosen them.

- Prior to use, the detonators shall be tested for continuity. To conduct the test, place the detonators in a pre-bored hole in the ground or place them in or under a sand bag and walk facing away from the detonators and stretch the wires to their full length, being sure to not pull the detonators from the hole or sand bag. With the leg wires stretched to their full length, test the continuity of the detonators one at a time by un-shunting the leg wires and attaching them to the galvanometer and checking for continuity. After the test, re-shunt the wires by twisting the two ends together. Repeat this process for each detonator until detonators have been tested. This process shall be accomplished at least 50 feet and downwind from any MEC or demolition materials and out of the demolition range, personnel and vehicle traffic flow pattern.

**NOTE:** When testing the detonator, prior to connecting the detonator to the firing circuit, the leg wires of the detonator must be shunted by twisting the bare ends of the wires together immediately after testing. The wires shall remain short circuited until time to connect them to the firing line.

- At the power source end of the blasting circuit, the ends of the wires shall be shorted or twisted together (shunted), except when actually testing the circuit or firing the charge. The connection between the detonator and the circuit firing wires must not be made unless the power end of the firing wires are shorted and grounded or the firing panel is off and locked.

- The firing line will be checked using pre-arranged hand signals or using two-way radios if the demolition pit is not visible from the firing point. If radios are used, communication shall be accomplished a minimum of 50 feet from the demolition pit and detonators. The firing line will be checked for electrical continuity in both the open and closed positions, and will be closed/shunted prior to connecting the detonator leg wires.

- MEC to be detonated/vented shall be placed in the demolition pit and the demolition material placed/attached in such a manner as to make sure of the total detonation/venting of the MEC. Once the MEC and demolition material are in place and the shot has been tamped (if required), the detonators will be
connected to the demolition material. Prior to handling any detonators that are connected to the firing line, personnel shall make sure that they are grounded. The detonators will then be carried to the demolition pit with the end of the detonators pointed away from the individual. The detonators are then connected to the detonation cord, Non-El, etc., making sure that the detonator is not covered with tamping material to allow for ease of recovery/investigation in the event of a miss-fire.

- Prior to making connections to the blasting machine, the entire firing circuit shall be tested with a galvanometer for electrical continuity and ohm resistance to make sure the blasting machine has the capacity to initiate the shot.
- The individual assigned to make the connections at the blasting machine or panel will not complete the circuit at the blasting machine or panel and will not give the signal for detonation until satisfied that personnel in the vicinity have been evacuated to a safe distance. When in use, the blasting machine or its actuating device shall be in the blaster's possession. When using the panel, the switch must be locked in the open position until ready to fire, and the single key must be in the blaster's possession.
- Prior to initiating a demolition shot(s), a warning will be given, the type and duration of such will be determined by the prevailing conditions at the demolition range. At a minimum, this should be an audible signal using a siren, air horn, or megaphone, five minutes prior to the shot and again one minute prior to the shot. Radio communications may be substituted when in a secured area.

6.3 DETONATING CORD USE

The following procedures are required when using detonating cord (det cord):

- Det cord should be cut using approved crimpers and only the amount required should be removed from inventory.
- When cutting det cord, the task should be performed outside the magazine.
- For ease of inventory control, only remove det cord in one-foot increments eg. 10’ or 11’ not 10’ 6”.
- Det cord should not be placed in clothing pockets or around the neck, arm or waist, and should be transported to the demolition location in either an approved "day box" or a cloth satchel, depending upon the magazine location and proximity to the demolition area.
- Det cord should be placed at least 50 feet away from detonators and demolition materials until ready for use. For consistent safe handling, each classification of demolition material shall be separated by at least 50 feet until ready for use.
- When ready to "tie in" either the det cord to demolition materials, or det cord to detonator, the det cord will be connected to the demolition material and secured.
to the MEC. The cord is then strung out of the hole and secured in place with soil, being sure to leave a minimum tail of 1 foot exposed outside the hole.

- Once the hole is filled, make a loop in the det cord large enough to accommodate the detonator, place the detonator in the loop and secure it with tape. The detonators explosive end will face down the det cord toward the demolition material or parallel to the main line.
- Make sure there is sufficient det cord extending out of the hole to allow for ease of detonator attachment and detonator inspection/replacement should a misfire occur.
- If the det cord detonators are electric, they will be checked, tied in to the firing line and shunted prior to being taped to the loop. If the det cord detonators are non-electric, the time/safety fuse will be prepared with the igniter in place prior to taping the detonators to the det cord loop. If the det cord detonators are Non-El, simply tape the detonators into the loop as described above.
- In the event that a time/safety fuse is used, and an igniter is not available and a field expedient initiation system is used (i.e., matches), do not split the safety fuse until the detonator is taped into the det cord loop.

6.4 TIME/SAFETY FUSE USE

The following procedures are required when using a time/safety fuse:

- Prior to each daily use, the burn rate for the time/safety fuse must be tested to make sure the accurate determination of the length of time/safety fuse needed to achieve the minimum burn time of five minutes needed to conduct demolition operations.
- To make sure both ends of the time/safety fuse are moisture free, use approved crimpers to cut six inches off the end of the time/safety fuse roll and place the six inch piece in the time/safety fuse container.
- If quantity allows, accurately measure and cut off a six foot long piece of the time/safety fuse from the roll.
- Take the six-foot section out of the magazine and attach a fuse igniter.
- In a safe location, removed from demolition materials and MEC, ignite the time/safety fuse, measure the burn time from the point of initiation to the "spit" at the end, and record the burn time in the DS's Log.
- To measure the burn time, use a watch with a second hand or chronograph.
- To calculate the burn rate in seconds per foot, divide the total burn time (in seconds) by the length (in feet) of the test fuse.
- Whenever using time/safety fuse, for demolition operations, the minimum amount of fuse to be used for each shot will be the amount needed to permit a safe return of all personnel to the firing and/or security points and a burn time of no less than six minutes.
6.5 **PERFORATOR USE**
The following procedures are required when using perforators:

- Only remove from inventory the number of perforators required to perform the task.
- Transport perforators in an approved “day box,” or original container.
- Keep perforators stored at the demolition site at least 50 feet away from detonators and demolition materials until ready for use.
- When ready to use, affix the det cord to the perforator and knot the det cord after the last perforator in line, making sure the cord fits securely and has good continuity with the perforator.
- Once the det cord is secure, place the perforator in the desired location and secure it in place with tape or soils.
- Proceed from this point as described in paragraph 6.3.

6.6 **USE OF TWO-COMPONENT EXPLOSIVES**
The following procedures are required when using two-component demolition materials:

- Only remove from inventory the amount of two-component required to perform the task.
- When transporting the solid and liquid, they need only be placed apart in the bed of a truck and in appropriate containers.
- Do not mix the solid and liquid components until certain that it will be used, since the resulting mixture is classified as a Class 1.1 explosive by Department of Transportation.
- When mixing the solid and liquids components, follow the manufacturer's instructions, while being sure to wear rubber gloves and goggles. Mix components in an area 50’ downwind from other demolition materials, the MEC, and if possible, sheltered from the wind.
- Once the components have been mixed, it is essential that the lid to the solid bottle is put on securely as soon as possible after mixing to prevent evaporation of the liquid.
- Attach the det cord as recommended by the manufacturer, place the assembled unit in the desired location in the hole and secure the unit.
- Proceed from this point as described in paragraph 6.3.

6.7 **USE OF THE MILITARY-HARDENED REMOTE FIRING DEVICE (MHRFD)**

The following short step procedures should be used when using the MHRFD during field operations. A complete review of the operations instructions and maintenance
procedures is required prior to testing or firing the MHRFD in the General Dynamics Ordnance and Tactical Systems Manual.

**WARNING**

Hazardous voltage exist inside the receiver unit. Do not strike, tamper with, or attempt to remove or investigate the contents. Tampering with this equipment may damage the MHRFD and can cause serious bodily injury or death.

**WARNING**

The Stinger shock tube adapter should never be attached while the receiver is armed.

**WARNING**

Hazardous, potentially fatal voltages exist on the metal binding posts when the MHRFD receiver is fired. Contact with the posts may result in serious bodily injury or death. The binding posts are shunted and electronically isolated from the high voltage circuitry prior to firing and again one second after firing.

**WARNING**

In the event of a misfire, follow misfire and troubleshooting procedures in section 4.5 and Appendix B to determine the cause of the misfire. Do not use failed receivers with live explosives.

**WARNING**

The MHRFD should always be test fired, following local agency procedures, before using live explosives. An MHRFD which has not been test fired may malfunction, resulting in serious bodily injury or death. A typical test firing procedure is provided in section 4.3.1. of the General Dynamics Ordnance and Tactical Systems Manual.

**WARNING**

Hazardous voltage exist inside the receiver unit. Do not strike, tamper with, or attempt to remove or investigate the contents. Tampering with this equipment may damage the MHRFD and can cause serious bodily injury or death.

Live Fire procedures

Follow these procedures when using the MHRFD in live fire.
Perform a site survey to determine positioning of the transmitter, receiver, detonator/cap and explosives. Test Fire the MHRFD according to paragraph 4.3.1 of the General Dynamics Ordnance and Tactical Systems Manual.

**WARNING**

The MHRFD should always be test fired, following local agency procedures, before using live explosives. An MHRFD which has not been test fired may malfunction, resulting in serious bodily injury or death.

- Ensure the transmitter power is off by observing that the ON LED is extinguished and the safe-arm key card is removed. The operator may elect to take the safe-arm key card downrange while preparing the receiver.
- While following all local agency setup procedures, secure detonator/cap by placing it in a hole in the ground or covering it with a sandbag. Ensure the detonator/cap or any tool being used is not in contact with explosive materials.

**CAUTION**

Protect the MHRFD from potential blast damage by distance, shielding, and cover. Units not adequately protected from blast may malfunction or fail completely.

At each receiver unit;

- Ensure the power is turned off. Rotate antenna into vertical position.
- Press and hold ON/OFF touch pad until the ON LED illuminates. Wait until the unit completes its self-diagnostic check.
- Attach the shock tube or electric wire from the detonator/cap
- Press the CHANNEL SELECT button until the channel ID LED indicates the desired channel ID.
- Start the receiver arming sequence by pressing and holding the ARM touch pad until the ARM LED begins to flash. Record the start time and start a stopwatch to determine when the safe separation period has elapsed (5 minutes). The transmitter gives no indication of when the safe separation period is over.
- The ARM status LED will begin flashing and will continue to do so for 5 minutes. This indicates that the unit is operating in the 5-minute safe separation period.

*Ignore all radio link communications at this time.* The ARM status LED will stop blinking upon completion of the safe separation period. At any time before firing, the ARM touch pad may be pressed and held for at least 2 seconds to return
the receiver unit to the arm condition, which starts a new 5-minute safe separation period.

- As soon as the arm sequence is started, attached the detonator/cap to the explosive charge according to agency procedures. Ensure all personnel are in safe positions before the expiration of the 5-minute safe separation period.

**WARNING**

*Do not touch the MHRFD receiver after the explosive charge has been attached to the detonator/cap.*

**CAUTION**

*The MHRFD should not be relied on to fire properly if left in an armed state for more than ten hours. However, low batteries can only cause it to fail to a safe state.*

**At the transmitter unit;**

- Ensure all personnel are at a safe distance from the detonation area.
- Rotate antenna into vertical position. Press and hold the POWER touch pad until the ON LED lights. Wait until the unit completes its self-diagnostic check.
- Press the CHANNEL SELECT touch pad until the LED indicator adjacent to the desired channel ID is on.
- Insert the safe-arm key card into the slot at the base of the transmitter. The FIRE LED will light.

When ready to fire, press and hold the fire touch pad on the transmitter until the FIRE LED flashes, indicating the fire command has been transmitted.

- When ready to fire, give three loud directional “Fire In The Holes”, wait for the FIRE LED to stop flashing before pressing and holding the FIRE touch pad again.

**WARNING**

*In the event of a misfire, safe procedures must be followed. See paragraph 10.0 for misfire procedures.*
6.8 DEMOLITION RANGE INSPECTION SCHEDULE

The demolition range inspection schedule outlined in Table 207-1 will be followed at sites where demolition operations are being conducted. This inspection shall be conducted by the UXOSO and will be documented in the Site Safety Log. If any deficiencies are noted, demolition operations shall be suspended and the deficiency reported to the SUXOS and DS. Once the deficiencies are corrected, demolition operations may be resumed.

Table 207-1: Demolition Range Inspection Schedule

<table>
<thead>
<tr>
<th>Check List Item</th>
<th>Inspection Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Vehicles</td>
<td>Weekly or Prior to Use</td>
</tr>
<tr>
<td>Explosive Carrier Vehicle</td>
<td>Weekly and Prior to Use</td>
</tr>
<tr>
<td>Range Access/Egress Route</td>
<td>Weekly or Prior to Use</td>
</tr>
<tr>
<td>Entrance Gate/Lock</td>
<td>Daily, Prior to Use and After Use</td>
</tr>
<tr>
<td>Storage Trailer/Magazine</td>
<td>Daily, Prior to Use and After Use</td>
</tr>
<tr>
<td>Fire Extinguishers</td>
<td>Monthly and Prior to Use</td>
</tr>
<tr>
<td>Personal Protective Equipment</td>
<td>Prior to Use</td>
</tr>
<tr>
<td>Circuit Testing Device</td>
<td>Prior to Use</td>
</tr>
<tr>
<td>Demolition Site</td>
<td>Prior to Use</td>
</tr>
<tr>
<td>Operating Equipment</td>
<td>Prior to Use</td>
</tr>
<tr>
<td>Hospital Route</td>
<td>Prior to Use</td>
</tr>
</tbody>
</table>

7.0 METEOROLOGICAL CONDITIONS

In order to control the effects of demolition operations and to make sure of the safety of site personnel, the following meteorological limitations and requirements shall apply to demolition operations:

- Demolition operations will not be conducted during electrical storms or thunderstorms.
- No demolition operations shall be conducted if the surface wind speed is greater than 20 miles per hour.
- Demolition operations will not be conducted during periods of visibility of less than one mile caused by, but not limited to, dense fog, blowing snow, rain, sand or dust storms.
- Demolition shall not be carried out on extremely cloudy days that are defined as: overcast (more than 80% cloud cover) with a ceiling of less than 2,000 feet.
- Demolition operations will not be conducted during any atmospheric inversion condition (low or high altitude).
- Demolition operations will not be conducted during periods of local air quality advisories.
- Demolition operations will not be initiated until 30 minutes after sunrise, and will be secured at least 30 minutes prior to sunset.

8.0 PRE-DEMOLITION/DISPOSAL PROCEDURES
8.1 PRE-DEMO/DISPOSAL OPERATIONAL BRIEFING
The success of any operation is dependent upon a thorough brief, covering phases of the task, which is presented to affected personnel. The DS will brief personnel involved in range operations in the following areas:
- Type of MEC being destroyed.
- Type, placement and quantity of demolition material being used.
- Method of initiation (electric, non-electric or Non-EI).
- Means of transporting and packaging MEC.
- Route to the disposal site.
- Equipment being used (i.e., galvanometer, blasting machine, firing wire, etc.).
- Misfire procedures.
- Post shot cleanup of range.

8.2 PRE-DEMO/DISPOSAL SAFETY BRIEFING
The PIKA UXOSO will conduct a safety brief for personnel involved in range operations in the following areas:
- Care and handling of explosive materials.
- Personal hygiene.
- Two man rule and approved exceptions.
- Potential trip/fall hazards.
- Horse play on the range.
- Stay alert for any explosive hazards on the range.
- Location of emergency shelter (if available).
- Parking area for vehicles (vehicles must be positioned for immediate departure, with the keys in the ignition).
- Location of range emergency vehicle (keep engine running).
- Wind direction (to assess potential toxic fumes).
- Location of first aid kit and fire extinguisher.
- Route to nearest hospital or emergency aid station.
- Type of communications in event of an emergency.
- Storage location of demolition materials and MEC awaiting disposal.
- Demolition schedule.
8.3 TASK ASSIGNMENTS
Individuals with assigned tasks will report the completion of the task to the DS. The types of tasks that may be required are:

- Contact the local Police, Fire personnel, USCG and FAA as required.
- Contact hospital/emergency response personnel if applicable.
- Secure access roads to the range area.
- Visually check range for any unauthorized personnel.
- Check firing wire for continuity and shunt.
- Prepare designated pits as required.
- Check continuity of detonators.
- Check time/safety fuse and its burn rate.
- Designate a custodian of the blasting machine, fuse igniters, or Non-El initiator.
- Secure detonators in a safe location.
- Place MEC in pit and place charge in desired location.

8.4 PREPARING EXPLOSIVE CHARGE FOR INITIATION
To prepare the explosive charge for initiation, the procedures listed below will be followed:

- Make sure firing wire is shunted.
- Connect detonator to the firing wire.
- Isolate or insulate connections.
- Prime the demolition charge.
- Place the demolition charge on MEC.
- Depart to firing point (if using non electric firing system, obtain head count, pull igniters and depart to designated safe area).
- Obtain a head count.
- Give one-minute warning signal, using a bullhorn or siren, five minutes prior to detonation, and again at one minute prior to detonation.
- Check the firing circuit.
- Yell "fire in the hole" three times (or an equivalent warning) and take cover.
- If using electric firing system connect firing wires to blasting machine and initiate charge.
- Remove firing wires from blasting machine and shunt.
- Remain in designated safe area until DS announces "All Clear". This will occur after a post-shot waiting period of 5-minutes and the DS has and inspected the pit(s).

9.0 POST DEMOLITION/ DISPOSAL PROCEDURES
Do not approach a smoking hole or allow personnel out of the designated safe area until cleared to do so, and follow the below listed procedures:
After the "All Clear" signal, check pit for low orders or kick outs.
Conduct a magnetometer check of the pit and remove any large fragmentation.
Back fill hole as necessary.
Police up equipment.
Notify police, fire, etc. that the operation is complete.

10.0 MISFIRE PROCEDURES
A thorough check of equipment, firing wire and detonators will prevent most misfires. However, if a misfire does occur, the procedures outlined below shall be followed.

10.1 ELECTRIC MISFIRES
To prevent electric misfires, one technician will be responsible for electrical wiring in the circuit. If a misfire does occur, it must be cleared with extreme caution, and the responsible technician will investigate and correct the situation, using the steps outlined below:

- Check firing line and blasting machine connections and make a second initiation attempt.
- If unsuccessful, disconnect and connect to another blasting machine (if available) and attempt to initiate charge.
- If unsuccessful, commence a 30-minute wait period.
- After the maximum delay predicted for any part of the shot has passed, the designated technician will proceed down range to inspect the firing system, and a safety observer must watch from a protected area.
- Disconnect and shunt the detonator wires, connect a new detonator to the firing circuit, check the replacement detonator for continuity, and prime the charge without disturbing the original detonator.
- Follow normal procedures for effecting initiation of the charge.

10.2 NON-ELECTRIC MISFIRES
Working on a non-electric misfire is the most hazardous of operations. Occasionally, despite painstaking efforts, a misfire will occur. Investigation and corrective action should be undertaken only by the technician that placed the charge, using the following procedure:

- If charge fails to detonate at the determined time, initiate a 60-minute wait period plus the time of the safety fuse, i.e., 6-minute safety fuse plus 60 minutes for a total of 66 minutes.
- After the wait period has expired, a designated technician will proceed down range to inspect the firing system. A safety observer must watch from a protected area.
• Prime the shot with a new non-electric firing system and install a new fuse igniter.
• Follow normal procedures for initiation of the charge.

10.3 NON-EL MISFIRE
The use of a shock tube for blast initiation can present misfires that require the following actions:

• If charge fails to detonate, it could be the result of the shock tube not firing. Visually inspect the shock tube, if it is not discolored (i.e., slightly black), it has not fired.
• If it has not fired, cut a one-foot piece off the end of the tube, re-insert the tube in the firing device and attempt to fire again.
• If the device still does not fire, wait 60 minutes and proceed down range to replace the shock tube per instructions outlined below.
• If the tube is slightly black, then a "Black Tube" misfire has occurred, and the shock tube will have to be replaced. When replacing the shock tube, be sure to remove the tube with the detonator in place. Without removing the detonator from the end of the tube, repackage the defective tube and return it to the supplier for credit.

10.4 DETONATING CORD MISFIRE
PIKA uses det cord to tie in multiple demolition shots and to make sure that electric detonators are not buried. Since det cord initiation will be either electrical or non-electrical, the procedures presented in paragraphs 10.1, 10.2, or 10.3, as appropriate to the type of detonator used, will be used to clear a det cord misfire. In addition, the following will be conducted:

• If there is no problem with the initiating system, wait the prescribed time and inspect the initiator to the cord connection to make sure it is properly connected. If it was a bad connection, simply attach a new initiator and follow the appropriate procedures in paragraph 6.0.
• If the initiator detonated and the cord did not, inspect the cord to make sure it is det cord and not time fuze. Also, check to make sure there is PETN in the cord at the connection to the initiator.
• It may be necessary to uncover the det cord and replace it. This must be accomplished carefully to make sure that the demolition charge and the MEC item are not disturbed.

10.5 PERFORATOR MISFIRE
The use of perforators is considerably safer than the use of many other demolition materials. If the perforator is not initiated properly, it could malfunction. Since the
perforator is covered with tamping material, det cord is used as the initiator. Therefore, in the event of a misfire, the procedures presented in paragraph 10.4 will be followed, along with the items presented below.

- If everything went but the perforator, one of four things has occurred:
  1. Det cord grain size was insufficient to initiate the perforator.
  2. The det cord was dislodged from the perforator when placing tamping materials.
  3. The perforator was defective.
  4. The perforator was moved during the placement of tamping materials.

- Check to make sure the grain size of the det cord is sufficient, with 80 grain size or greater being the recommended size.
- If the det cord connection to the perforator was the problem, make sure that the next connection is secure (use duct tape if necessary).
- If it is evident that the perforator was moved, make sure it is properly secured for the next shot.
- If cord size and connection are sufficient, replace the perforator, leaving the defective one.

11.0 RECORD KEEPING REQUIREMENT

To document the demolition operations procedures and the completeness of the demolition of MEC, the following record keeping requirements shall be met:

- The client or PIKA (as directed) will obtain and maintain required permits.
- The DS will make sure of the accurate completion of the logs, and the SUXOS and UXOQCS will monitor the entries in the log for completeness, accuracy and compliance with meteorological conditions.
- The DS shall enter the appropriate data on the Demolition Shot Record (ESHF-205B) to reflect the MEC destroyed, and shall complete the appropriate information on the Explosives Accountability Record/Magazine Data Card (DD Form 3020-R) that indicates the demolition materials used to destroy the MEC.
- The quantities of MEC recovered must also be the quantities of MEC destroyed or disposed.
- PIKA will retain a permanent file of demolition records, including permits, magazine data cards, training and inspection records, waste manifests if applicable, and operating logs.
- Copies of ATF License and any state or local permits must be on hand.

12.0 SAFETY AND PPE REQUIREMENTS

The following safety measures and personal protective equipment shall be used in preventing or reducing exposure to the hazards associated with MEC
demolition/disposal operations. These requirements will be implemented unless superseded by site specific requirements stated in the SSHP.

1. Hard hats are required only when working around heavy equipment or when an overhead or head impact hazards exist.
2. Steel toe/shank boots will not be worn during surface/subsurface clearances using geophysical instruments in the location of anomalies unless a serious toe hazard exists, whereupon a fiber safety toe will be used.
3. Safety glasses will be required an eye hazard exists, for example when working around flying dirt/debris, using hand tools, etc. Safety glasses will provide protection from impact hazards, and, if necessary, ultraviolet (UV) radiation (i.e., sunlight).
4. Positive means shall be required to secure the PPE and prevent it from falling and causing an accidental detonation.

13.0 AUDIT CRITERIA
The following items related to demolition/disposal operations on a MEC contaminated site will be audited for compliance with this ESHP:

1. The PIKA Demolition Shot Record (ESHF-205B).
2. The Daily Task and Safety Briefing Logs (ESHF-502).
3. The Safety Training Attendance Forms, for the initial and daily site hazard training (ESHF-504).
5. Explosives Accountability Record/Magazine Data Card (DD Form 3020-R).

14.0 ATTACHMENTS
None.
### TABLE 207-2: MINIMUM SAFE DISTANCE FROM TRANSMITTER ANTENNAS

<table>
<thead>
<tr>
<th>Average or Peak Transmitter Power in Watts</th>
<th>Minimum Distance to Transmitter in Meters / Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 30</td>
<td>30 / 98.4</td>
</tr>
<tr>
<td>31 – 50</td>
<td>50 / 164.1</td>
</tr>
<tr>
<td>51 – 100</td>
<td>110 / 360</td>
</tr>
<tr>
<td>101 – 250</td>
<td>160 / 525</td>
</tr>
<tr>
<td>251 – 500</td>
<td>230 / 755</td>
</tr>
<tr>
<td>501 - 1,000</td>
<td>305 / 1,000</td>
</tr>
<tr>
<td>1,001 - 3,000</td>
<td>480 / 1,575</td>
</tr>
<tr>
<td>3,001 - 5,000</td>
<td>610 / 2,001</td>
</tr>
<tr>
<td>5,001 - 20,000</td>
<td>915 / 3,002</td>
</tr>
<tr>
<td>20,001 - 50,000</td>
<td>1,530 / 5,020</td>
</tr>
<tr>
<td>50,001 - 100,000</td>
<td>3,050 / 10,007</td>
</tr>
<tr>
<td>100,001 - 400,000</td>
<td>6,100 / 20,014</td>
</tr>
<tr>
<td>400,001 - 1,600,000</td>
<td>12,200 / 40,028</td>
</tr>
<tr>
<td>1,600,001 - 6,400,000</td>
<td>24,400 / 80,056</td>
</tr>
</tbody>
</table>

Note: When the transmission is a pulsed or pulsed continuous wave type and its pulse width is less than 10 microseconds, the power column indicates average power. For other transmissions, including those with pulse widths greater than 10 microseconds, the power column indicates peak power.

Source: DA PAM 385-64
TABLE 207-3: MINIMUM SAFE SEPARATION FORMULAS

<table>
<thead>
<tr>
<th>Unknown (Worst Case)</th>
<th>Un-shielded Munitions</th>
<th>Shielded Munitions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Formula</td>
</tr>
<tr>
<td>Use Table 41-1-1</td>
<td>Up to 2.3 KHz</td>
<td>$D = 0.093 x (PG)^{0.5}$</td>
</tr>
<tr>
<td></td>
<td>2.3 KHz - 450 KHz</td>
<td>$D = 39.7 x F x (PG)^{0.5}$</td>
</tr>
<tr>
<td></td>
<td>450 KHz - 400 MHz</td>
<td>$D = 18 x (PG)^{0.5}$</td>
</tr>
<tr>
<td></td>
<td>400 MHz - 75 GHz</td>
<td>$D = (7137/F) x (PG)^{0.5}$</td>
</tr>
<tr>
<td></td>
<td>&gt;75 GHz</td>
<td>$D = 0.093 x (PG)^{0.5}$</td>
</tr>
</tbody>
</table>

Where:

- $D = \text{Safe distance to the transmitter in feet (multiply feet by 0.305 to obtain meters)}$
- $P = \text{Output power of the transmitter in watts}$
- $G = \text{Numerical gain of transmitter antenna}$
- $F = \text{Frequency in MHz (divide KHz by 1,000 to obtain MHz, and multiply GHz by 1,000 to obtain MHz)}$

To properly use this table, the following assumptions are made:

1. No-fire Current of the EED = 10 mA
2. Safety Factor = At least 10 dB below the no-fire current in EED (or 3.16 numerical)
   - EED’s Leads = Tuned to match the transmitter’s frequency
   - Shielding = If metallic, it provides a minimum of 30 dB or 32 times (numerical) of shielding.
     - Non-metal packs provide no shielding
3. At no time should personnel or munitions be exposed to more than 200 volts / meter

Source: DA PAM 385-64