DRAFT

Work Plan
2008 Performance-Based Acquisition for
Environmental Investigation and Remediation
MEC Avoidance/Removal Services

Ravenna Army Ammunition Plant
Ravenna, Ohio

May 21, 2009

Contract No. W912QR-04-D-0028
Delivery Order No. 0001

Prepared For:

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Prepared For:

US Army Corps of Engineers

U.S. Army Corps of Engineers
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14. ABSTRACT

USA has prepared the following Work Plan Addendums for inclusion into the Project Work Plan; MEC Technical Management Plan, Explosive Siting Plan, Explosive Management Plan, and Supplement to the Health and Safety Plan. These final drafts have been submitted in accordance with U.S. Army Corps of Engineers (USACE) Data Item Descriptions (DID's).

The methodologies and equipment proposed in the submitted Work and Safety Plans mirror those used in previous Munitions and Explosive of Concern (MEC) support and removal efforts, and have yielded reliable results. To emphasize USA's focus and commitment to quality, we have concluded each technical approach subsection with a summary of the controls that will be implemented to ensure the quality of the data and project deliverables.

15. SUBJECT TERMS

Ravenna Army Ammunition Plant (RVAAP) Munitions and Explosives of Concern (MEC), MEC Technical Management Plan, Explosive Siting Plan, Explosive Management Plan, and Supplement to the Health and Safety Plan.

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Ravenna Army Ammunition Plant
Ravenna, Ohio

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Ohio EPA-NEDO = Ohio Environmental Protection Agency-Northeast District Office
Ohio EPA-SWDO = Ohio Environmental Protection Agency-Southwest District Office
OHARNG = Ohio Army National Guard
RVAAP = Ravenna Army Ammunition Plant
USACE = United States Army Corps of Engineers
USAEC = United States Army Environmental Command
REIMS = Ravenna Environmental Information Management System
SAIC = Science Applications International Corporation

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LIST OF ACRONYMS

AHA	Activity Hazard Analysis
amsl	above mean sea level
AOCs	Areas of Concern
AR	Army Regulation
ASR	Archive Search Report
ATF	Bureau of Alcohol, Tobacco, Firearms and Explosives
BGS	Below Ground Surface
BIP	Blow In Place
Camp Ravenna	Camp Ravenna Joint Military Training Center
CERCLA	Comprehensive Environmental Restoration, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
COPC	Chemical of Potential Concern
CQA	Certified Quality Auditor
CSP	Certified Safety Professional
CX	Center of Expertise
DA1	Demolition Area 1
DAC	Defense Ammunition Center
DDESB	Department of Defense Explosive Safety Board
DERP	Defense Environmental Restoration Program
DERR-NEDO	Ohio Division of Emergency Remedial Response Northeast District Office
DFW	Definable Features of Work
DID	Data Item Description
DMM	Discarded Military Munitions
DoD	Department of Defense
DOT	Department of Transportation
DQOs	Data Quality Objectives
E2M	Engineering Environmental Management
EPA	Environmental Protection Agency
ESS	Explosives Safety Submission
FFP	Firm Fix Price
FUDS	Formerly Utilized Defense Sites
GIS	Geographical Information System
GPO	Geophysical Prove-out
GPS	Global Positioning System
HAZWOPER	Hazardous Waste Operations
HFD	Horizontal Fragmentation Distance
HMX	octahydro-1,3,5,7- tetranitro-1,3,5,7-tetrazocine
HTRW	Hazardous, Toxic, and Radioactive Waste
IAW	In Accordance With
IDW	Investigation-Derived Waste

LIST OF ACRONYMS (CONTINUED)

IGD	Interim Guidance Document
IRP	Installation Restoration Program
LLP	Lessons Learned Program
MC	Munitions Constituents
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MFR	Memorandum for Record
MGFD	Munitions With the Greatest Fragmentation Distance
MMRP	Military Munitions Response Program
MPPEH	Material Potentially Presenting an Explosive Hazard
MRS	Munitions Response Site
MSD	Minimum Separation Distance
NACA	National Advisory Committee on Aeronautics
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEW	Net Explosive Weight
NGB	National Guard Bureau
NHPA	National Historic Preservation Act
NTA	NACA Test Area
OB/OD	Open Burn/Open Detonation
OE	Ordnance and Explosives
OFFO	Ohio Office of Federal Facilities Oversight
OHARNG	Ohio Army National Guard
OSHA	Occupational Safety and Health Administration
PBA	Performance-Based Acquisition
PDA	Personnel Data Assistant
PETN	Pentaerythritol Tetranitrate
PM	Project Manager
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
QCM	Corporate Quality Manager
QCP	Quality Control Plan
RA	Removal Action
RCWM	Recovered Chemical Warfare Material
RD	Remedial Design
RDX	Cyclotrimethylene Trinitramene
RI	Remedial Investigation
ROD	Record of Decision
RRD	Range-Related Debris
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation

LIST OF ACRONYMS (CONTINUED)

SI	Site Investigation
SOP	Standard Operating Procedure
SOW	Statement of Work
SSHP	Site Safety and Health Plan
SVOC	Semi Volatile Organic Compound
TBD	To Be Determined
TM	Technical Manual
TNT	2,4,6-trintrotoluene
TPP	Technical Project Planning
USA	USA Environmental, Incorporated
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering and Support Center, Huntsville
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer
UXOTII	UXO Technician II
UXOTIII	UXO Technician III
VOC	Volatile Organic Compounds
VSP	Vitrified Clay Sewer Pipe
WP	Work Plan

1.0 INTRODUCTION

In support of remediation services to be conducted by Science Applications International Corporation (SAIC), this Work Plan (WP) describes the goals, methods, procedures, and personnel that USA Environmental, Inc. (USA) will use to perform munitions and explosives of concern (MEC) avoidance in all 17 Areas of Concern (AOCs) listed in SAIC's Performance-Based Acquisition (PBA) 2008 contract and MEC clearance. MEC avoidance support services are required for SAIC sampling crews and during all soil excavations. MEC clearance will be required at three AOCs on the Ravenna Army Ammunition Plant (RVAAP) located in Ravenna, Ohio. USA prepared this Overall Work Plan in accordance with current U.S. Army Corps of Engineers Engineering and Support Center Huntsville (USACESCH) Data Item Descriptions (DID MR-001 Type I Work Plan) and the SAIC Statement of Work (SOW) dated May 30, 2008 (REV 1).

1.1 PROJECT AUTHORIZATION

This WP outlines the procedures USA will use to provide MEC Support Services to SAIC within RVAAP and includes: MEC avoidance, characterization, removal and detonation operations; and disposal of Munitions Debris (MD). All requirements given in the DID are implied in this plan. Should modification be required, the modification request will be submitted in writing, to the U.S. Army Corp of Engineers (USACE) Louisville District Contracting Officer for review and approval.

The work required under this SOW falls under the Defense Environmental Restoration Program - Formerly Used Defense Sites (DERP-FUDS). MEC exist on property formerly owned or leased by the Department of the Army. Work will be performed within the following regulatory framework:

- These MEC response actions are consistent with the Comprehensive Environmental Restoration, Compensation, and Liability Act (CERCLA), Section 120 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Sections 40 CFR Part 300, and are being taken to address a potential threat to public health or welfare.

- The U.S. Department of Defense (DoD) is the MEC response authority with respect to incidents involving DoD military weapons and munitions or weapons and munitions under the jurisdiction, custody or control of DoD as identified by 40 CFR Section 300.120(c) and (d) and 40 CFR Section 300.175(b)(4).

- In compliance with the 40 CFR Section 300.120(c) and (d) and 40 CFR Section 300.175(b)(4), no federal, state or local permits are required or need to be obtained for the detonation of MEC on-site per 40 CFR 300.400(e).

- The provisions of 29 CFR 1910.120 (Occupational Safety and Health Administration [OSHA] Hazardous Waste and Emergency Operation) apply to this site.

1.2 PURPOSE AND SCOPE

The objective of this task is for USA to perform MEC avoidance during the investigative phases of the 17 designated AOCs and MEC removal, and dispose of all explosive hazards within the scope-designated areas (Appendix A).

1.3 WORK PLAN ORGANIZATION

This WP is organized to follow the guidance of DID MR-001.

1.4 PROJECT LOCATION

The RVAAP is located in northeastern Ohio within Portage County and Trumbull County, approximately 3 miles east-northeast of the City of Ravenna and approximately 1 mile northwest of the City of Newton Falls. RVAAP includes a parcel of property approximately 11 miles long and 3.5 miles wide bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad on the south; Garret, McCormick, and Berry roads on the west; the Norfolk Southern Railroad on the north; and State Route 534 on the east. This parcel was transferred to the National Guard Bureau (NGB) and subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a military training site: Camp Ravenna Joint Military Training Center (Camp Ravenna). Camp Ravenna is surrounded by several communities; Windham on the north; Garrettsville 6 miles to the Northwest; Newton Falls 1 mile to the southeast; Charleston to the southwest; and Wayland 3 miles to the south (Appendix B, Figure 1).

1.5 SITE DESCRIPTION

1.5.1 Site Location

All project sites under this task order are located at RVAAP (see Appendix A, Figure 2). The RVAAP location is described in section 1.4.

1.5.2 C-Block Quarry (RVAAP-06)

C-Block Quarry is an abandoned quarry approximately 0.3 acres in size. C-Block Quarry was used as a disposal area for annealing process wastes (chromic acid), spent pickle liquors for brass finishing, fill dirt, and some construction and demolition material during the 1950s. The quarry bottom has a measured maximum depth of 25 ft below the surrounding grade and the fill material ranges in depth from 1.5 to 5 ft below grade.

1.5.3 Load Line 12 (RVAAP-12)

Load Line 12 is an 80-acre former ammonium nitrate manufacturing facility that was operational from 1941 to 1946. Explosive grade ammonium nitrate was manufactured from 1941 to 1943. Load

Line 12 was then leased by the Silas Mason Company from 1946 to 1949 to manufacture fertilizer grade ammonium nitrate. Building 904 was used for demilitarization work and bomb melt out from 1949 to 1993. A pink water treatment plant located near Building 904 was taken out of service in 2000. From 1965 to 1967, Hercules Alcor, Inc. leased Building FF-19 to produce aluminum chloride. A former steam plant located in the AOC used fuel oil and coal at various times over the years as fuel. All buildings have been demolished to grade.

1.5.4 Building 1200 (RVAAP-13)

Building 1200 was the Ammunition Sectioning Area. From 1941 to 1971, Building 1200 was used for ammunition demilitarization, which consisted of checking and steam cleaning munitions. The steam-generated pink water was discharged via a pipe, through a crushed slag gravel bed, and into a ditch connected to a 0.5 acre sedimentation pond (located approximately 415 feet northeast of the building). Overflow from the sedimentation pond discharged into Eagle Creek. All structures have been demolished. Currently the AOC consists of the former building footprints and surrounding land, a sedimentation pond, and the ditches. The drainage ditch and the sedimentation pond were not backfilled or regarded during demolition activities, and remain intact.

1.5.5 Landfill North of Winklepeck Burning Ground (RVAAP 19 and R-01)

The Landfill North of Winklepeck Burning Ground is an unlined 10-acre landfill that was used for general refuse and burning operations. The landfill is located east of George Road and north of Winklepeck Burning Ground. The landfill was in operation from 1969 to 1978. An unknown quantity of material was landfilled at the AOC, including booster cups, aluminum liners, sanitary waste, and possibly explosives, munitions waste, and ash. Debris and garbage protrude through the landfill surface in several areas. The appearance and location of the landfill suggest it was created using a trench and fill method of operation. The top of the landfill area has an elevation approximately 15 ft higher than the wetlands that are adjacent to its northern boundary.

1.5.6 Upper and Lower Cobbs Ponds (RVAAP-29)

Upper Cobbs Pond is approximately 5-acres in size and ranges from 3 to 8 feet in depth. Lower Cobbs Pond is approximately 3.5-acres and ranges from 2 to 7 feet in depth. From 1941 to 1971, the ponds were utilized as sedimentation basins for discharges from Load Lines 3 and 12 which included effluents from sawdust filtration units and building wash down activities transported via storm and surface water runoffs. These discharges may have contained explosives, propellants, metals, semi-volatile organic compounds (SVOCs), and volatile organic compounds (VOCs).

1.5.7 Load Line 6 (RVAAP-33)

Load Line 6 is approximately 51-acres in size. From 1941 to 1945, Load Line 6 operated primarily as a fuze assembly line; Building 2F-4 was used as a fulminate mixing building. The Load Line was deactivated in 1945 and all equipment was removed. In the 1950s and 1970s, a portion of Load Line 6

was utilized by Firestone Defense Research for the research and development of shaped charges for the DoD. All buildings at the AOC have since been demolished, with the exception of a former Firestone test chamber building foundation and concrete blocks around a testing pond adjacent to the building.

1.5.8 NACA Test Area (RVAAP-38)

NACA Test Area (NTA), designated as AOC-38, covers approximately 12.4 acres and is located west of Greenleaf Road at the end of Demolition Road. The test area was originally designed by the National Advisory Committee for Aeronautics (NACA) to field test explosion-proof fuel tanks and fuel for aircraft during the 1960s. During testing, airplanes were equipped with the test tanks and were loaded with fuel and attached to a catapult system. The planes were sent down the crash strip and intentionally crashed into an obstacle.

1.5.9 Load Line 5 (RVAAP-39)

Load Line 5 is a 39-acre AOC that consisted of 18 process buildings. The load line operated as a finished product assembly line from 1941 to 1945 to produce fuzes for artillery projectiles. Operations were discontinued at the end of World War II, and process equipment was removed in 1945. Load Line 5 has been inactive for more than 50 years and is overgrown with vegetation consisting of young trees and scrub vegetation. The buildings, including slabs and foundations, have since been removed.

1.5.10 Load Line 7 (RVAAP-40)

Load Line 7 is a 37-acre AOC formerly used as a booster loading and assembly line for artillery projectiles. Operations occurred from 1941 until the end of World War II; the booster process equipment was removed in 1945. In 1968, the line was modified to produce M-406 high explosive and M-407A1 practice 40 mm rounds. At total of 16,000,000 (40-mm) projectiles were assembled at Load Line 7 from 1969-1970, at which time the line was deactivated and the equipment removed. The line was reactivated for the research and development of high explosive shaped charges until 1993. From 1989 through 1993, pink water associated with TNT processing was treated at the Load Line 7 treatment plant which operated under an Ohio wastewater discharge permit. Load Line 7 has been inactive since 1993 and is overgrown with young trees and scrub vegetation. The buildings, including slabs and foundations, have since been removed.

1.5.11 Load Line 8 (RVAAP-41)

Load Line 8 is a 44-acre AOC that operated as a booster loading and assembly line from 1941 to 1945. Operations were discontinued at the end of World War II, and the process equipment was removed in 1945. The AOC consisted of 15 process buildings, which have since been removed. Load Line 8 has not been used since 1945, and is overgrown by trees and scrub vegetation.

1.5.12 Load Line 9 (RVAAP-42)

Load Line 9 is a 69-acre AOC located in the south-central portion of RVAAP. From 1941 to 1945, Load Line 9 produced detonator. In 1945, the load line was deactivated, and the equipment removed. There have been no documented activities at Load Line 9 since 1945. Infrastructure at Load Line 9 consists mainly of a gravel road following the perimeter of the main production area, and a drywell and vitrified clay sewer pipe (VSP) network. This system consists of two 6-inch VSP pipe lines that originate from former buildings DT-2 (fulminate mix house) and DT-5 (azide mix house) and run northeast where they converge at a 6-inch drywell (approximately 10 feet deep) located approximately 190 feet outside of the Load Line 9 fence line.

The buildings at Load Line 9 were thermally decontaminated and demolished to 2 feet below ground surface in 2003. The concrete and brick were crushed to maintain the roads at RVAAP. An unused water tower is the only structure remaining at Load Line 9.

1.5.13 Load Line 10 (RVAAP-43)

Load Line 10 is a 43-acre AOC, formerly known as the Percussion Element Manufacturing Line, which operated as an initiator blending and loading line from 1941 to 1945. At the end of World War II, the process equipment and production line was placed on standby status. The line was reactivated in 1951 and used to produce primers and percussion elements until it was again placed on standby status in 1956. The line was activated again in 1969 to produce primers until 1971 at which time the line was deactivated permanently and the production equipment was removed. The AOC is currently overgrown by trees and scrub vegetation. The buildings, including slabs and foundations, have since been removed.

1.5.14 Load Line 11 (RVAAP-44)

Load Line 11 is approximately 40 acres in size and was utilized primarily for the production of artillery primers and fuzes. During the period from 1941 to 1945, Load Line 11 operated at full capacity to produce primers for artillery projectiles. After being place on standby status in 1945, the load line was reactivated twice, once during the 1951 to 1957 time frame to produce primers, and again from 1969 to 1971 to produce fuzes in support of the Southeast Asia Conflict. An interim remedial action at the AOC was conducted in 2001, consisting of the removal of lead/asbestos-lined sumps, lead-contaminated sediment, and solvent-contaminated soil. Additionally, some of the sewer lines were permanently plugged with grout. The buildings, including slabs and foundations, have since been demolished.

1.5.15 Wet Storage Area (RVAAP-45)

The Wet Storage Area is a 36-acre AOC that was used from 1941 to 1945 to store primary explosives, including lead azide, mercury fulminate and tetryl. The highly explosive and shock sensitive materials were stored in water-filled drums within each of six separate igloos. Four of the igloos (WS-1, WS-

1A, WS-2, and WS-2A) located in the western portion of the AOC were decontaminated and demolished in 2004. The two remaining igloos (WS-3 and WS-3A) are located in the eastern portion of the AOC.

1.5.16 Buildings F-15 and F-16 (RVAAP-46)

Buildings F-15 and F-16 are located west of Block D and east of Slagle Road. The buildings were used during World War II, the Korean War, and the Vietnam War to test miscellaneous explosives and propellants. The number of tests conducted, quantities of materials tested, and exact dates of testing are unknown. The buildings have been demolished, but the building footers (approximately 50 feet by 120 feet) remain.

1.5.17 Anchor Test Area (RVAAP-48)

Although operational information is relatively limited regarding the Anchor Test Area, the AOC was used for research, development, and the testing of explosively-driven soil anchoring devices. The dates of use for the AOC are unknown, although it is believed activities did not occur until sometime after 1961. The Anchor Test Area encompasses approximately one acre and includes several dirt mounds with a nearby sand pit (approximately 6 feet by 30 feet). There is metal debris in the area.

1.5.18 Atlas Scrap Yard (RVAAP-50 and R-01)

Atlas Scrap Yard (AOC-050 and R-01) is a 150-acre AOC located southwest of the intersection of Newton Falls Road and Paris-Windham Road. The AOC was a construction camp built in 1940 to house workers and their families during the construction of the plant. After World War II, the facilities were demolished. Since that time, Atlas Scrap Yard has served as a storage area for non-explosive scrap materials. Currently, the area is covered by thick grass and is littered with miscellaneous non-explosive scraps, pipes, railroad ballast, railroad ties, concrete rubble, and chipped ammunition boxes. Remnants of an unimproved road can be seen.

1.5.19 Facility-Wide Sewers (RVAAP-67)

The Facility-Wide Sewers is a new AOC created in 2008 comprised of IRP-eligible storm and sanitary sewers located throughout RVAAP, including Load Lines 1-12 and the Administrative Areas. The sewers sometimes received inadvertent discharges of contaminated wastewaters from the manufacturing of munitions, and it is possible that portions of the system may contain accumulated chemical contaminants. Available historical documents do not disclose any incidents or occurrences of intentional dumping or discharging of contaminated wastewaters to the sewers. A 2007 explosive evaluation of the sewers showed no accumulations of explosive compounds that would present an explosive hazard (Lakeshore). The Lakeshore sewer effort was conducted without Ohio EPA regulatory oversight and review of the associated work plans, or resultant completion report and its conclusion. The sewer system is divided into two sewage basins – a western basin and an eastern basin. The western basin includes the combined sanitary and storm sewers draining from the

Administrative Areas, and sanitary sewers at Load Lines 5-11 that terminate at the George Road sewage treatment plant. Also, several short runs of separated storm sewer exist throughout Load Lines 5-11 in the western basin, terminating in ditches and other drainage features. The eastern basin includes the sanitary sewers draining Load Lines 1-4, Load Line 12, and RVAAP-50 Atlas Scrap Yard, and terminates at the Sand Creek sewage treatment plant. Load Lines 1-4 and Load Line 12 also have separate storm sewer systems terminating in drainage features such as ditches and retention ponds.

1.5.20 Topography

The RVAAP area is situated in Portage County, an area characterized by Glaciated Alleghany Plateaus. Terrain found in this area is rolling hills, ranging from a high elevation of approximately 1189 feet above mean sea level (amsl) to a low elevation of approximately 1068 feet amsl. The undeveloped hills within the area are forested with ash and birch trees.

1.5.21 Climate

The site gets an average 37.3 inches of rain per year, and an average snowfall of 56.2 inches. The number of days with any measurable precipitation is 142. On average, there are 165 sunny days per year in Portage County, OH. The July high is around 83°F. The January low is 19°F. The comfort index, which is based on humidity during the hot months, is a 50 out of 100, where higher is more comfortable. The estimated maximum frost penetration for the general area is 4 inches.

1.6 SITE HISTORY

When the RVAAP Installation Restoration Program (IRP) began in 1989, the RVAAP was identified as a 21,419-acre installation. The property boundary was resurveyed by the Ohio Army National Guard (OHARNG), and the actual total acreage of the property is 21,683 acres. As of February 2006, a total of 20,403 acres of the former 21,683-acre RVAAP have been transferred to the NGB and subsequently licensed to the OHARNG for use as a military training site – Camp Ravenna. The current RVAAP consists of 1,280 acres in various parcels throughout Camp Ravenna.

Prior to the establishment of the Camp Ravenna, the entire 21,683-acre parcel was an industrial facility that was government-owned and contractor-operated when the RVAAP was operational. The RVAAP IPR encompasses investigation and cleanup of past activities over the entire 21,683 acres of the former RVAAP. References to the RVAAP in this document indicate the historical extent of the RVAAP, which is inclusive of the combined acreages of the current Camp Ravenna and RVAAP, unless otherwise specifically stated.

Industrial operation at the former RVAAP consisted of 12 munitions-assembly facilities referred to as "load lines." Load Lines 1 through 4 were used to melt and load TNT and Composition B into large-caliber shells and bombs. The operations on the load lines produced explosive dust, spills, and vapors that collected on the floors and walls of each building. Periodically, the floors and walls were cleaned

with water and steam. Following cleaning, the waste water, containing TNT and Composition B, was known as "pink water" because of its characteristic color. Pink water was collected in concrete holding tanks, filtered, and pumped into unlined ditches for transport to earthen settling ponds. Load Lines 5 through 11 were used to manufacture fuzes, primers, and boosters. Potential contaminants in these load lines include lead compounds, mercury compounds, and explosives. From 1946 to 1949, Load Line 12 was used to produce ammonium nitrate for explosives and fertilizers prior to use as a weapons demilitarization facility.

In 1950, the facility was placed on standby status and operations were limited to renovation, demilitarization, normal maintenance of equipment, and storage of munitions. Production activities were resumed from July 1954 to October 1957, and again from May 1968 to August 1972. In addition to production missions, various demilitarization activities were conducted at facilities constructed at Load Lines 1, 2, 3, and 12. Demilitarization activities included disassembly of munitions and explosives melt-out and recovery operations using hot water and steam processes. Periodic demilitarization of various munitions continued through 1992.

In addition to production and demilitarization activities at the load lines, other facilities at RVAAP include AOCs that were used for the burning, demolition, and testing of munitions. These burning and demolition grounds consist of large parcels of open space or abandoned quarries. Potential contaminants at these AOCs include explosives, propellants, metals, and waste oils. Other types of AOCs present at RVAAP include landfills, an aircraft fuel tank testing facility, and various general industrial support and maintenance facilities.

1.7 CURRENT AND PROJECTED LAND USE

A total of 20,403 acres of the former 21,683 acre RVAAP was transferred to the NGB and subsequently licensed to the OHARNG for use as the Camp Ravenna. The current RVAAP consist of 1,280 acres in various parcels throughout the OHARNG Camp Ravenna.

1.8 PREVIOUS INVESTIGATIONS OF SITES

Under the DERP, in 2004 the USACE Rock Island District and the Defense Ammunition Center (DAC) prepared an Archives Search Report (ASR) to document the methodology, findings, conclusions, and recommendations of an installation-wide MEC assessment. The purpose of the assessment was to evaluate the RVAAP for potential MEC contamination and to provide recommendations for further action.

In May 2008, Engineering-Environmental Management (E2M) prepared a Final Site Inspection (SI) Report for the other-than-operational ranges and sites with known or suspected MEC. The report included UXO surveying that indicated the presence of MEC in AOCs Landfill North of Winklepeck Burning Ground (RVAAP-19-R-01) and Atlas Scrap Yard (RVAAP-50-R-01).

In December 2001, SAIC prepared a Final Phase I Remedial Investigation (RI) Report characterizing the occurrence and distribution of contamination in soil, sediment, and surface water, and evaluated potential risk to human health and the environment resulting from operations at Demolition Area 1 (DA1). The Phase I characterization area is in the southwestern quadrant of the facility, and is surrounded by the NTA (RVAAP-038). Kick-outs and shrapnel from the destruction of ammunition in DA1 are suspected within NTA. Further environmental investigation indicates that debris within the burning areas was cleared using heavy equipment to push the debris into periphery areas. As a result, MEC is potential within NTA.

1.9 SUMMARY OF RISK FROM MUNITIONS AND EXPLOSIVES OF CONCERN

Based on historical data and previous investigations, Table 1-1 summarizes the type of MEC items that may be encountered during this characterization and clearance action. The table also details the characteristic hazard presented by these items.

Table 1-1. Initial Summary of Risk from a MEC

Investigation Area	MEC Type	Characteristic Hazard
Landfill North of Winklepeck Burning Ground (RVAAP-19-R-01)	105mm Projectile	This projectile contains 5.07 lb of Comp B, with a MGFD of 1939 ft. Risk of injury or death should the projectile detonate in proximity to an individual.
NACA Test Area (RVAAP-38)	40mm MK2	40mm MK2 explosion and fragmentation hazard, capable of causing injury or death. 40mm MK2 – Contains 0.187 lb of TNT.
Atlas Scrap Yard (RVAAP-50-R-01)	40mm MK2	40mm MK2 explosion and fragmentation hazard, capable of causing injury or death. 40mm MK2 – Contains 0.187 lb of TNT.

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2.0 TECHNICAL MANAGEMENT PLAN

This chapter documents the approach, methods, and operational procedures USA will employ to execute the tasks required by SAIC's Scope of Work. This chapter is prepared in accordance with DID MR-001.

2.1 PROJECT OBJECTIVES

The objective of this task is for USA to perform MEC avoidance in support of SAIC's *2008 Performance-Based Acquisition for Environmental Investigation and Remediation*. MEC removal will only be performed to complete the RI or for future remedial actions of the listed PBA 08 AOCs.

2.2 PROJECT ORGANIZATION

For successful implementation of the UXO Avoidance/MEC Response, close coordination and cooperation between the project team members must occur. Figure 2-1 depicts the organization team for this project. The team consists of the USACE Louisville District, SAIC, and USA. The roles of these team members are described below.

2.2.1 U.S. Army Corps of Engineers Louisville District

The USACE Louisville District is the contracting agency and provides oversight. USACE responsibilities include reviewing project plans and documents, supporting SAIC in obtaining site access, working with the news media and the public, and coordinating with state and local regulatory agencies on issues pertaining to public safety and the environmental.

2.2.2 Science Applications International Corporation

SAIC is the Prime Contractor for this project. SAIC has been contracted to execute the CERCLA process and ultimately achieve an approved Record of Decision (ROD) for the specified environmental media at 17 AOCs at RVAAP in Ravenna, Ohio. This execution includes procurement of munitions response services, direction of the munitions response contractor, review and coordination of project plans and documents, and working with the news media and the public. As the technical project manager, SAIC is responsible for directing the munitions response contractor and controlling the budget and schedule.

2.2.3 USA Environmental, Inc.

USA is the MEC Support Services contractor to SAIC for this project. USA provides project management, MEC Avoidance services, and MEC Investigation and Removal in support of this Environmental Investigation Remediation project. USA will provide qualified Unexploded Ordnance (UXO) Technicians and other personnel as necessary for the safe conduct of support activities. The

mix of UXO Technician positions will vary, depending on Task Order modifications, and will be included in any addendums to this WP. The SAIC Contracting Officer will direct all work performed by USA. Resumes of key USA personnel are provided in Appendix H.

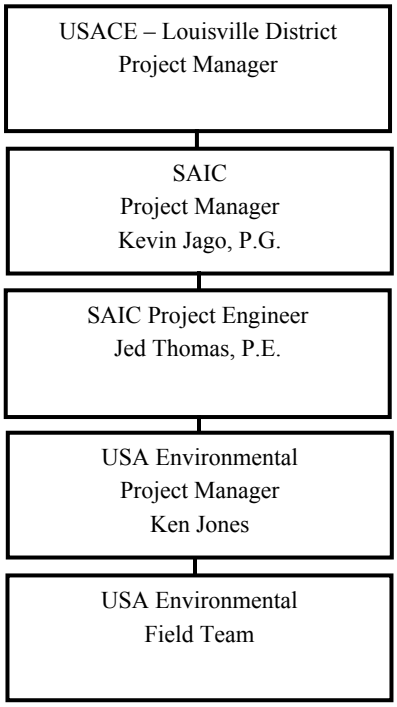


Figure 2-1. Project Team Structure

2.3 PROJECT PERSONNEL

USA project UXO personnel will meet the requirements set forth in the Department of Defense Explosives Safety Board (DDESB) Technical Paper TP-18, Minimum Qualifications for UXO Technicians and Personnel, dated December 20, 2004.

USA field personnel on this project have completed the training requirements outlined in Table 2-1. Additional site-specific training, in accordance with 29 CFR 1910.120, EM 385-1-1 (USACE Safety and Health Requirements Manual), and ER 385-1-92 (Safety and Occupational Health Document Requirements for hazardous, toxic, and radioactive waste [HTRW] and Ordnance and Explosive Waste activities) will be provided to all personnel upon their initial mobilization. Additionally, all USA field personnel will participate in a Medical Surveillance Program, In Accordance With (IAW) 29 CFR 1910.120(f), with the latest exam within 12 months of field operations.

2.3.1 USA Project Manager

The USA Project Manager (PM) is responsible for managing the overall progress of the Task Order, ensuring timely submittal of project deliverables, and ensuring that resources are available to field personnel. The PM will maintain close communication with SAIC's Project Manager to assess client satisfaction with USA performance on this subcontract.

Table 2-1. Personnel Training

Training Course	Personnel Attending
40-Hour Hazardous Waste Site Operations and Emergency Response (HAZWOPER) Training	All personnel who have not previously received this training or who do not qualify for certification through documented experience or training equivalent to that in paragraphs (e)(1) through (e)(4) of 29 CFR 1910.120. (Reference: Paragraph (e)(9) 29 CFR 1910.120)
10-Hour OSHA approved Construction Safety Course	The UXO Safety Officers
HAZWOPER 8-Hour Supervisor Course	All USA management and supervisory personnel. This includes the UXO Safety Officers, Senior UXO Supervisors, UXO Q/C Specialists, and all UXO Technicians III.
HAZWOPER 8-Hour Refresher Course	All site personnel, except those that have completed their initial 40-Hour HAZWOPER training within the past 1-year.
First Aid and CPR Training	At least two site personnel will have current first aid and CPR training.

2.3.2 USA Quality Manager

The Quality Manager is responsible for reviewing and updating the Quality Control Plan and verifying compliance with the plan. The Quality Manager will verify compliance through audits/inspections of project activities and will document and review corrective actions.

2.3.3 USA Safety Manager

The Safety Manager coordinates the development of the Site Safety and Health Plan (SSHP). The Safety Manager is the contact for regulatory agencies on matters of health and safety.

2.4 UXO PERSONNEL AND QUALIFICATIONS

The USA team will consist of a mix of UXO Technicians depending on the specific SOW Area. Tasks will include MEC Avoidance; and disposal of MEC and Material Potentially Presenting an Explosive Hazard (MPPEH). Team(s) will consist of a UXO Quality Control Specialist/UXO Safety Officer (UXOQCS/UXOSO), UXO Technicians III (UXOTIII), and UXO Technicians II (UXOTII).

2.5 PROJECT COMMUNICATION AND REPORTING

2.5.1 Project Communications

Communications for this project will generally flow along the lines established by the organization depicted in Figure 2-1. All communications between USA and the USAESCH will be through the SAIC Project Manager. Communication directly between USA and other government entities associated with this project will only occur when directed by SAIC.

2.5.2 On-Site Communications

The USA team(s) will use radio and cellular telephone communications while at RVAAP. Backup emergency communications will be by cellular telephone. If at any time both means of communications are unavailable, the team will exit the AOC and return to a staging area until communications are available.

2.5.3 Project Reporting

Reporting for this project is only required during MEC services support of the field activity phases. Section 2.7 of this WP describes the report. USA will be responsible for the following reporting activities:

- Preparing and submitting the Project Status Report as required in accordance with DID MR-085.
- Tracking the costs of Firm Fixed Price (FFP) tasks by percentage completed.
- Forwarding the Project Status Report by regular mail by the 10th day of the following month. USA will prepare and submit minutes of all meetings attended, to the SAIC Project Manager, within 10 calendar days.
- Maintaining a record of phone conversations and written correspondence affecting decisions relating to the performance of this Task Order.
- Submitting a summary of the phone conversations, e-mails, and written correspondence with the Project Status Report. USA will document substantive phone conversations and written correspondence related to the performance of the Task Order in accordance with DID MR-055.

2.5.4 Project Deliverables

USA will prepare a Report of Findings within 21 business days after completion of the RI, MEC surveys, and at the conclusion of remedial action (RA) field activities. USA will submit a Draft Report of Findings to SAIC for review and comment. USA will address all comments and update the

Report of Findings for submittal of the final version within six business days following receipt of comments. All deliverables are submitted in hard and electronic copy.

Throughout the execution of this Task Order, USA will collect data that will be incorporated into the Report of Findings, and will prepare Weekly Reports as operations are completed at each work area. During demobilization, this data will be assembled into the Report of Findings for this subcontract. as At a minimum, the Report of Findings will contain the following information:

- Description of the project;
- Qualifications of the UXO project personnel involved;
- Description of the findings at each of the AOCs;
- Safety logs;
- Daily status worksheets;
- Site plans showing the location of identified MEC;
- Salvage material turn-in documentation; and
- Color photographs depicting major action items (e.g., MEC, MPPEH, and MD discoveries).

2.6 PROJECT SCHEDULE

The Project Schedule is outlined in the *Project Management Plan for 2008 Performance-Based Acquisition for Environmental Investigation and Remediation at Ravenna Army Ammunition Plant Ravenna, Ohio*. December 19, 2008.

2.7 PERIODIC REPORTING

USA will prepare and submit Project Status Reports during the active field phases of MEC Avoidance for the RI and MEC clearance RA phases. These reports will contain a compilation of all data pertaining to the specific work areas (e.g., man-hours, grid sheets, and any other pertinent information). Upon completion of the work associated with field activity phase, the project status reports will be combined for inclusion in the Report of Finding for the AOC.

2.8 COSTING AND BILLING

USA will submit invoices to the SAIC PM. Along with the invoice, the USA PM is responsible for submitting the reports that document the work performed during the corresponding billing period.

2.9 PROJECT PUBLIC RELATIONS SUPPORT

Public relations support is not required under this task order. USA will not publicly disclose any data generated or reviewed under this contract. USA will refer all requests for information concerning site conditions to SAIC.

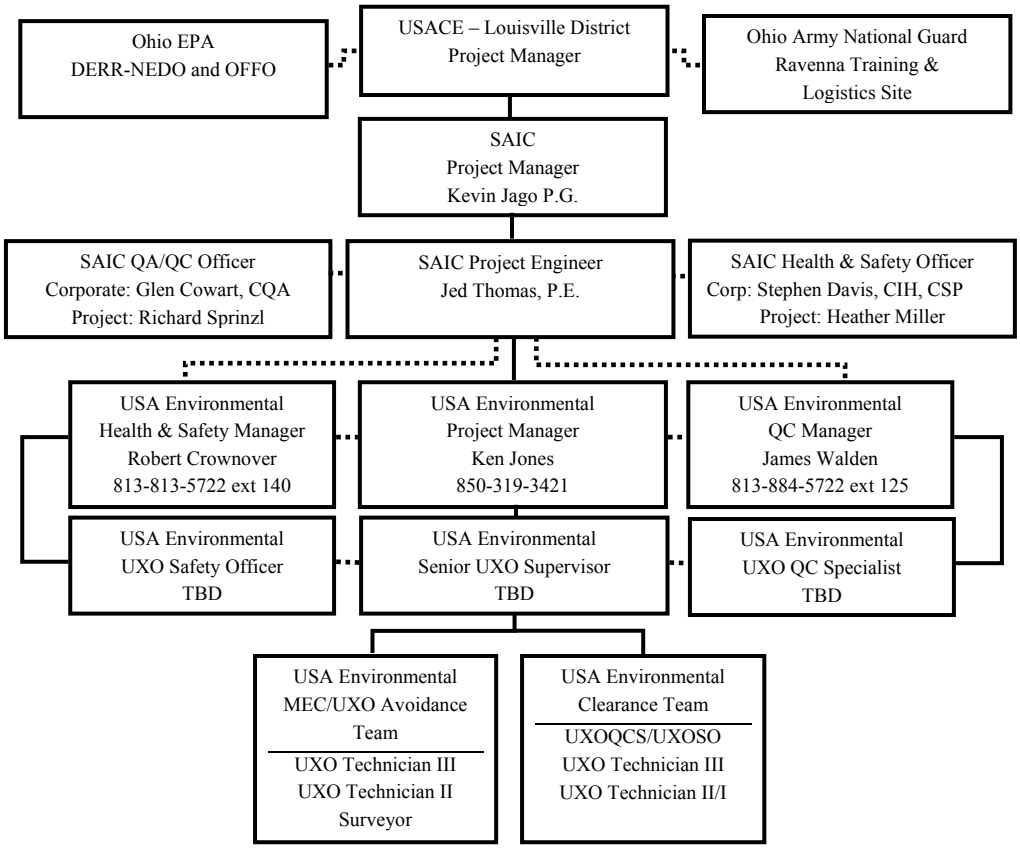
2.10 SUBCONTRACT MANAGEMENT

Second-tier subcontractor support to USA for MEC avoidance and clearance activities is not anticipated.

2.11 MANAGEMENT OF FIELD OPERATIONS

SAIC's Site Supervisor will manage all field operations of the project site. For public safety, USA personnel will prevent access of unauthorized personnel to work areas, and ensure all residents within the exclusion zone of intrusive operations are evacuated prior to the start of intrusive operations. The USA UXOSO/UXOQCS will be on site during intrusive field activities to ensure all activities comply with the SSHP. The USA PM, who is responsible for control of data included in and used as part of the project, will be available in the Oldsmar, FL office for consultation by telephone (see Figure 2-2).

Figure 2-2. PBA 2008 Field Organization for MEC Support



3.0 FIELD INVESTIGATION PLAN

3.1 OVERALL APPROACH TO MUNITIONS RESPONSE ACTIVITIES

3.1.1 Site Characterizations Goals

The goal of site characterization is to define the nature and extent of Chemicals of Potential Concern (COPCs) in the 17 AOCs. MEC items within the AOC will be removed if they cannot be avoided.

3.1.2 Data Quality Objectives

Data Quality Objectives (DQOs) for the MEC Characterization and Clearance at the RVAAP are detailed in chapter 4 of this WP.

3.1.3 Data Incorporation

Field data and geographical information system (GIS) data collected during the MEC surface clearance and removal will be incorporated in the Report of Findings for the specific AOC. Maps will be submitted which show the significant findings of intrusive investigations. Personal Digital Assistant (PDA) global positioning system (GPS)/Data Collection equipment (Trimble GeoXT) will be used to record location, terrain, and vegetation data. A waypoint, brief description, and digital photograph will be electronically recorded for any MEC-related items and significant metal detector responses. A tabulated list of MEC/MPPEH and munitions debris items located in the field will be provided.

3.2 IDENTIFICATION OF AREAS OF CONCERN

3.2.1 Description

The three AOCs listed below have the highest likelihood of MEC discovery of any of the 17 included in this scope of investigation. A brief description of the remaining 14 AOCs is located in section 1.5 of this, while a detailed discussion is located in the *Project Management Plan for the 2008 Performance-Based Acquisition for Environmental Investigation and Remediation* (December 19, 2008).

The following was reported in *Final MMRP RVAAP SI* (May 2008).

- (RVAAP-19-R-01) Landfill North of Winklepeck; during magnetometer assisted UXO Survey no MEC was discovered, although munitions debris was found. One empty 105mm projectile was discovered on the hillside adjacent to the former landfill.

- (RVAAP-50-R-01) Atlas Scrap Yard; No MEC or munitions debris was found on the ground surface. However multiple subsurface anomalies were detected in three piles located in the north-central section of the scrap yard. As noted in the report disclosure of a 40mm burial site came after completion of the SI filed work and was not included in the survey.

The following was reported in the *Phase I Remedial Investigation Report for Demolition Area 1* (December 2001):

- (RVAAP-38) The NTA is an approximately 12.4-acre AOC used to field test explosion-proof fuel tanks and fuel for aircraft during the 1960s. Due to the proximity of the AOC to Disposal Area 1 (RVAAP-3), MEC kick-outs are suspected within NTA.

3.3 GEOPHYSICAL INVESTIGATION PLAN

This section is not applicable to this WP.

3.3.1 Establishment of Investigation and Clearance Grids

If geophysical surveys are needed, specifications will be addressed separately by SAIC as part of the remedial design (RD). SAIC will prepare a geophysical WP to be included in the RD. The WP will address geophysical prove-out (GPO) and grid dimensions based on the expected density of the UXO.

3.3.2 Setting Control Monuments

Existing site monuments will be used.

3.3.3 Location surveys

SAIC will perform location surveys.

3.3.4 Vegetation Removal

Only limited vegetation removal is anticipated for the purposes of surface clearance or acquisition of geophysical data. Where vegetation removal is required as part of remedial actions, the USA field team will perform a visual and instrument survey in non-munitions response site (MRS) areas, and will perform surface clearance within MRS boundaries, as appropriate.

3.3.5 Anomaly Avoidance

Throughout this operation, the UXOTIII will closely monitor performance to ensure these procedures are being performed with due diligence and attention to detail. Avoidance operations will be conducted by a UXOTIII. The UXOTIII will not destroy any MEC encountered. All MEC and UXO

encountered will be marked and avoided, and will be reported to the on-site SAIC Supervisor, who will initiate the appropriate response actions.

Prior to the start of field operations, and during daily safety briefings, the UXOTIII will provide MEC/UXO awareness, identification, safety, and avoidance procedures to all SAIC field crews and visitors.

3.3.6 Access Routes

Using visual and magnetometer surveys, all soil boring locations and access routes will be surveyed for potential MEC/UXO, and clearly defined prior to entry. Access routes will be at least twice as wide as the widest vehicle that will use the route. Any identified subsurface magnetic anomaly will be clearly marked, and the anomaly will be avoided. The cleared approach paths and existing roads will be the only ingress/egress routes. Investigation personnel will be escorted by the UXO Technician at all times in areas potentially contaminated with MEC/UXO until the UXOTIII has completed the access surveys and the cleared areas are marked. Escorted personnel will follow behind the UXOTIII escort. If anomalies or MEC/UXO are detected, the UXO Technician will halt escorted personnel in place, mark the item(s), select a course around the item, and instruct escorted personnel to follow.

3.3.7 Soil Sampling

The UXO Technician will clear work sites for soil samples and clearly mark the boundaries of any areas contaminated with MEC/UXO. The area will be large enough to accommodate equipment and provide a work area for the crews. At minimum, the cleared area will be a square, with a side dimension equal to twice the length of the largest vehicle or piece of equipment for use on site. If a pre-selected sampling point indicates magnetic subsurface anomalies, a new sampling point will be chosen. Sampling locations will be checked for subsurface anomalies at every 2 ft of depth down to a maximum depth of 15 ft. If a subsurface anomaly is detected after the initial 2 ft of soil boring, it will be assumed to be MEC, the location will be abandoned, and a new sampling location will be chosen.

3.3.8 Equipment

The equipment requirements for this activity include:

- Whites XLT magnetometers or other appropriate instruments;
- A Forster Ferex, MK 26 ordnance locator or Schonstedt-down-hole instrument for down-hole monitoring;
- Miscellaneous common hand tools (e.g., shovels, garden trowels);
- Forms and logbooks to record activities and UXO encountered;
- Pin Flags and Marking Material; and
- Team vehicle.

3.3.9 Live, Suspect MEC, or Related Material

There will be no handling of any MEC/UXO, suspect MEC item(s), or MEC-related material at any time during soil sampling operations. The UXO Technician III will report all MEC items encountered to SAIC, and these items will be avoided.

3.3.10 Geophysical Prove-out (GPO) Plan and Letter Report

While not part of the USA scope, geophysical surveys may be required as part of anomaly investigations. Specifications for geophysical surveys, including GPO will be addressed as part of the RD once any areas requiring remediation are identified

3.3.11 GPO Test Plot Design

If required, GPO design specifications will be addressed as part of the RD.

3.4 GEOSPATIAL INFORMATION AND ELECTRONIC SUBMITTALS

Geophysical surveys may be required as part of anomaly investigations. Specifications for geophysical surveys, including geospatial information collection, will be addressed as part of the RD once any areas requiring remediation are identified.

3.5 INTRUSIVE INVESTIGATION

3.5.1 General Methodology

All anomalies discovered by SAIC that cannot be avoided will be intrusively investigated. The MEC Team will provide a description of the item to include recovery depth and item orientation using the Trimble GeoXT data collector. Intrusive investigation excavations will continue until the anomaly source has been positively identified, or to a depth of 4 ft. The MEC Team will clear the anomaly up to an 18-inch radius to the depth of detection around the flagged anomaly location. The MEC Team will perform excavation of selected anomalies in accordance with the procedures outlined in Section 3.5.5.

3.5.2 Accountability and Records Management for MEC

During field activities, USA will maintain records in the project field office, with copies sent weekly to the project files in Oldsmar, Florida. Following completion of the fieldwork, USA will deliver all files to the project files in Oldsmar, Florida. Such records will include daily summary sheets and related field logs.

USA will maintain a detailed digital account of MEC items encountered during operations. This accounting will include the following:

- Date and time operations began;
- Date and time operations were completed;
- Location, depth, number, type, orientation, and description of MEC items encountered, including model/mark number and classification (i.e., UXO, discarded military munitions [DMM], or munitions constituents [MC] with enough explosives to be explosive hazard);
- Location and number of subsurface anomalies flagged for investigation; and
- Estimated weight, in pounds, of the MPPEH and munitions debris removed from the site.

USA's Team Leader will maintain a field logbook to record site activities and field data in a neat and legible manner. Logbooks will be bound and pages consecutively numbered. USA personnel will make logbook entries in indelible ink. USA will enter the following information during the course of the safety support activities:

- Date and team location;
- Personnel and work performed;
- Equipment and instrument checks;
- Injuries and/or illnesses;
- Changes to work instructions;
- Work stoppage;
- Visitors;
- Other relevant events; and
- Signature of Team Leader.

USA personnel may supplement logbooks and records by using preprinted forms (e.g., safety inspection forms, tailgate safety briefings). These forms help to ensure uniformity of activities being conducted, inspected, and reviewed. Forms are located in Appendix F. All handwritten records and logbook entries will be scanned into an acceptable digital form and submitted as part of the digital data package.

3.5.3 Personnel Qualifications

All USA UXO personnel will have met the requirements set forth in the DDESB Technical Paper 18 (TP-18), *Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel*, dated December 20, 2004.

USA field personnel on this project will have also completed the training requirements found in Table 2-1 as required for their specific responsibilities. Additional site-specific training in accordance with OSHA 29 CFR 1910.120 for Hazardous Waste Operations and Emergency Response (HAZWOPER), as well as Engineer Manual 385-1-1 (U.S. Army Corps of Engineers Safety and Health Requirements

Manual), will be provided to all personnel upon their initial mobilization. Additionally, all USA field personnel will participate in a Medical Surveillance Program, with the latest exam occurring within 12 months of field operations (see Table 2-1).

3.5.4 MEC Sampling Locations

The MEC sampling locations will be identified by SAIC during the geophysical anomaly selection process, and provided to USA for investigation.

3.5.5 MEC Sampling Procedures

USA will excavate selected anomalies using hand tools, but may utilize mechanized excavation if the MEC Team encounters numerous subsurface anomalies at depths greater than 2 ft below ground surface. Prior to use of mechanized equipment, approval will be required from SAIC. These anomalies will be excavated by carefully removing the earth overburden using a hand shovel/trowel or other small digging instrument. Throughout the excavation, the UXO Technicians will use a hand-held Eagle Spectrum XLT (Whites) all-metals detector to check and verify the proximity of the anomaly.

USA will document anomaly sources evaluated at depths greater than 2 ft below ground surface (BGS) to establish the need for mechanized excavation. Excavations requiring mechanized excavation will be reported to the USA PM for future consolidated mechanized excavation. For these excavations, a UXO Technician III will coordinate equipment requirements with the SAIC Site Supervisor. Prior to the arrival of the heavy equipment, the UXO Technician III will ensure that a cleared entrance and egress path is available for the heavy equipment. The UXO Technician III will designate one person to direct the heavy equipment operator. Heavy equipment (operated by a qualified UXO Technician) or manual digging tools will be used to excavate the earth overburden in 6-inch lifts. After each lift, the anomaly location will be redefined with appropriate instrumentation and the anomaly source investigated using hand tools. This process will continue until the source of the anomaly has been uncovered and identified.

Before entering an excavation, the UXO Technician must make eye contact with the backhoe operator. When a UXO Technician is checking backhoe excavations for suspected MEC source proximity, the backhoe bucket will be placed on the ground and the operator will keep his/her hands clear of the operating controls. The backhoe operator will resume excavation operations only after visually verifying that all personnel are clear of the excavation and outside of the bucket swing area.

3.5.6 Munitions with the Greatest Fragmentation Distance (MGFD)

Table 3-1 lists the munitions and their associated fragmentation distances that records indicate may be found at the project AOCs based on historical information regarding known or suspected occurrences of MEC/UXO.

Table 3-1. MGFD by Area of Concern

Area of Concern	Recorded Munitions	MGFD
RVAAP-19-R-01 Landfill North of Winklepeck Burning Ground	40 mm Projectile	40mm MK2 Projectile
RVAAP-38 NACA Test Area	40 mm Projectile	40mm MK2 Projectile
RVAAP-50-R-01 Atlas Scrap Yard	105 mm Projectile	105mm M1 Projectile

3.5.7 Minimum Separation Distances

Table 3-2 lists the minimum separation distances (MSDs) for both unintentional detonation (intrusive work) and intentional detonations based on the MGFD for each area of concern. Chapter 6 of the munitions response (MR) WP provides additional information on the MSD for each area of concern.

Table 3-2. MSD by Area of Concern

Site	Unintentional Detonation				Intentional Detonation	
	MGFD	MFR (ft)	HFD (ft)	K40 (ft)	MFR (ft)	K328 (ft)
RVAAP-19-R-01 Landfill North of Winklepeck Burning Ground	105mm Projectile	1939	341	78	1939	636
RVAAP-38 NACA Test Area	40mm MK2 Projectile	1095	131	24	1095	199
RVAAP-50-R-01 Atlas Scrap Yard	40mm MK2 Projectile	1095	131	24	1095	199

3.5.8 MEC Identification

Any suspected or known MEC item encountered during excavation will be clearly marked and its position will be annotated using the Trimble GeoXT and other appropriate site maps. The UXO Technician III will evaluate the item found and immediately report the condition of the item to the SAIC Site Manager. No UXO will be moved without positive identification of the UXO item, an evaluation of its condition, and approval from the USACE OE Safety Specialist, unless the item has been determined to be free of explosives.

3.5.9 MEC Removal

If an excavated item is considered a MEC, it shall be uncovered sufficiently to obtain a positive identification of the item, and to determine whether or not it is acceptable to move. Items deemed acceptable to move will be removed to the designated igloo magazine for consolidated disposal at the

open burn/open detonation (OB/OD) area. A separate determination on disposal may be made by the Team Leader with concurrence of the USACE OE Safety Specialist.

A fuzed UXO will not be moved unless special approval is granted by the USACE OE Safety Specialist. The Team Leader will make a determination in each case on how best to dispose of the UXO. If the UXO cannot be safely disposed of under the existing conditions, the USACE OE Safety Specialist will be notified. In no case shall the Team Leader authorize or undertake destruction of UXO when there is sufficient reason to believe that the disposal action will result in personnel casualties or property damage.

All excavations will be filled in and tamped to the approximate consistency of the surrounding soil. The excavation site shall be returned as nearly as feasible to an undisturbed condition.

3.5.10 MEC Storage

MEC items that are deemed acceptable to move will be moved to igloo 1501, located at ODA #2, for subsequent consolidated disposal at the ODA #2. Chapter 5 of this WP provides information on the acquisition, storage, and inventory of donor explosives.

3.5.11 MEC Disposal

3.5.11.1 Material Potentially Presenting an Explosive Hazard

USA UXO technicians will inspect all MPPEH to determine if the items present an explosive hazard. USA UXO technicians will classify these MPPEH items as a MEC or as munitions debris. USA will classify items of undetermined explosive hazard as MEC and will dispose of and/or vent the item with other demolition shots. All MEC will be disposed of by detonation, utilizing the standard demolition procedures outlined in Technical Manual (TM) 60A-1-1-31. USA will use non-electric firing procedures for this project.

3.5.11.2 Munitions and Explosives of Concern

When MEC/MPPEH disposals are scheduled at the OB/OD area and when a blow in place (BIP) is required, the UXOTIII will notify the on-site USACE representative of the location and approximate times prior to detonation. USA will not notify local authority off post. Each time a demolition shot occurs, whether at the OB/OD facility or from a BIP, USA will issue a written memo recording the net explosive weight (NEW) of the MEC items destroyed and the donor charges used. USA will coordinate with the RVAAP POC prior to all intentional detonations.

MEC items that are determined not acceptable to move will be disposed of on the day they are located unless unforeseen events preclude its disposal. In the event that this occurs, the Team Leader will make arrangements to secure the item during non-work hours. Demolition operations will not begin until all nonessential personnel are outside the MSD of the MEC being detonated. A MEC item that is

acceptable to move may be removed for consolidated disposal at the OB/OD area to reduce the number of shots.

The UXOQCS/UXOSO will be on site at all times during disposal operations. These operations will be performed under the direction and supervision of the Team Leader UXOTIII, who is responsible for ensuring that procedures contained in this operations work plan and referenced documents are followed. The UXOSO/UXOQCS will monitor compliance with the safety measures contained in the SSHP and associated documents (Appendix D). In the event of noncompliance, the UXOQCS/UXOSO is authorized to stop or suspend operations. Disposal activities are inherently hazardous and require strict adherence to approved safety and operational procedures. Violations of procedures may result in immediate removal from this project.

Prior to the start of disposal activities, the UXOQCS/UXOSO will verify that the area around the operating site is clear of all nonessential personnel and MSDs are established and maintained. Depending on the type of munitions being destroyed, the MSD may be decreased (with USACE approval) based on the MSD calculation sheets in Appendix G. Personnel remaining on site will be limited to those needed to safely and efficiently prepare the item(s) for destruction. Engineering controls for blast and fragment mitigation may be necessary for disposal of the MEC items in close proximity to buildings, structures, and roads to reduce MSD requirements. At minimum, the MEC disposal team will consist of the UXOQCS/UXOSO, a UXO Technician III and UXO Technician II.

Prior to initiation of demolition operations, all non-essential personnel will be evacuated outside the MSD. For items not previously identified, the MSD will be established and maintained in accordance with DDESB Technical Paper 16 and DoD 6055.9-STD. Prior to priming the demolition charges, all avenues of ingress will be physically blocked by UXO personnel. Radio communications will be maintained among all concerned parties. Avenues of ingress will not be opened without the express permission of the UXOQCS/UXOSO. A constant state of vigilance will be maintained by all personnel to detect any intrusion within the MSD.

USA will obtain and provide internal accountability for all explosives utilized for the disposal of MEC items in accordance with the Explosive Management Plan (Section 5). Upon completion of disposal operations, the UXOTIII and another UXO Technician will visually inspect each disposal site for signs of fire or smoke caused by detonation. If fire or smoke is visible in the disposal site area, the UXOTIII will direct emergency procedures to extinguish fires. Caution must be taken to ensure burning explosives or items are not present. If these are present, the demolition team will exit the site and call for assistance. Upon completion of this inspection, and assuming there are no residual hazards, the UXOTIII will authorize the resumption of site operations.

The UXOTIII is responsible for ensuring the completeness of demolition operations and for weekly inspection of the Ordnance Accountability Log, the Daily Operational Log, the Demolition Shot Record, and the inventory of MEC items and demolition material. The UXOTIII, assisted by demolition team personnel, will inspect each demolition pit and an area up to 250 feet in radius after each demolition shot to ensure there are no kick-outs, hazardous MEC components, or other

hazardous items. In addition, the pit will be checked with a metal detector and any hazardous debris will be removed. Any MEC items discovered during the post-shot check will be secured and disposed of as soon as this can be safely accomplished. Extreme caution must be exercised when handling a MEC item that has been exposed to the forces of detonation.

3.5.11.3 Munitions Debris

Within or adjacent to each grid, the UXOTIII will establish temporary, non-hazardous munitions debris collection points. During operations, munitions debris that is free of explosive contamination will be placed at these collection points. Upon completion of operations in that grid, the material in these temporary collection points will be transported to a designated temporary storage. Prior to storage in the designated area, the UXOTIII will perform a second inspection of the material to ensure that it is free of explosives and other hazardous materials. All inert/empty munitions debris items will be vented if necessary. The first inspection of the munitions debris will be by the UXO Technician II, the second by the UXOTIII.

The UXOQCS/UXOSO shall perform a final inspection of the munitions debris at the collection point to certify it to be free of any explosive hazard. The UXOQCS/UXOSO shall sign a letter or DD Form 1348-1A (Release/Receipt Document) annotated with the following statement: "This certifies that the material listed has been 100 percent properly inspected, and to the best of our knowledge and belief, are free of explosive hazards, engine fluids, illuminating dials and other visible liquid HTRW materials."

USA, in coordination with the USACE, will arrange final disposition of the certified and verified material to an organization that will ensure continued chain of custody and provide documentation stating the materials will not be sold, traded or otherwise given to another party until the contents have been smelted and are only identifiable by their basic content.

3.5.12 Disposal Alternatives

In areas where an acceptable fragmentation distance cannot be achieved, other methods of mitigation, such as berms, tamping, or sandbag barricades (in accordance with HNC-ED-CS-S-98-7), will be employed to reduce the fragmentation hazard. The appropriate USAESCH report for any engineering control used will be made available on-site for reference. If these methods of disposal are determined to be impractical, USA will consult with the USAESCH for guidance.

3.6 INVESTIGATION-DERIVED WASTE PLAN

This section is not applicable to this project. Other than the MEC, USA will not handle any investigation-derived waste (e.g., Recovered Chemical Warfare Material contaminated media, hazardous waste, or decontamination wastes).

3.7 RISK CHARACTERIZATION AND ANALYSIS

This section is not applicable to this project.

3.8 DISCUSSION OF THE ANALYSIS OF INSTITUTIONAL CONTROLS

This section is not applicable to this project.

3.9 DISCUSSION ON THE PREPARATION OF THE RECURRING REVIEW PLAN

This section is not applicable to this project.

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4.0 QUALITY CONTROL PLAN

4.1 INTRODUCTION

The USA quality control (QC) process starts with USA's commitment to quality. The process provides a permanent and workable system that allows each employee to understand and adhere to the job performance and standards expected. The USA QC process ensures that all project actions, procedures, tools, and employee training are in accordance with the project's requirements. Checklists have been developed to ensure that critical elements are addressed and that QC checks are documented. By promoting teamwork and by focusing attention on the solutions, the quality of work can be increased and assured throughout the project.

This Quality Control Plan (QCP) provides the procedures and methods to be used for the MEC avoidance, surface clearance, and subsurface anomaly investigations within the selected work areas at the RVAAP, Ravenna, OH. This plan addresses organization and responsibilities, DQOs, QC test methods and procedures, equipment testing and calibration, QC inspections, and reporting procedures.

USA will use the data collected during the overall MEC response for inclusion in MEC avoidance or clearance reports produced during the project.

4.2 QUALITY MANAGEMENT STRUCTURE

The following paragraphs describe the organizational structure of the USA Quality Management Team during operations at the project site. Names and qualifications of site personnel will be provided prior to mobilization.

4.2.1 Corporate Quality Control Manager (QCM)

The USA Corporate QCM is responsible for USA's QC program. The Corporate QCM reports directly to the President of USA Environmental, Inc. on matters of effectiveness, adequacy, and status of QC methods and procedures. The Corporate QCM has the following responsibilities:

- Preparing USA QC policies and procedures;
- Ensuring timely submission of contract deliverables;
- Providing training and assistance to the site UXOQCS;
- Reviewing employee qualification records to ensure accuracy; and
- Conducting periodic field audits of sites, programs, and projects to ensure QC compliance.

4.2.2 UXO Technician III (UXOTIII)

The UXOTIII is responsible for the day-to-day field operations at the project site. The UXOTIII reports directly to the USA PM and has the following responsibilities:

- Implementing the WP and QC policies and procedures;
- Reporting to the PM on effectiveness, adequacy, and status of the project;
- Ensuring the timely submission of contract deliverables;
- Coordinating with project personnel for site tasking and schedules;
- Reviewing any failures and implementing corrective actions; and
- Implementing additional guidelines used to assist in the development of site-specific and task-specific policies and procedures.

4.2.3 USA UXO Quality Control Specialist/UXO Safety Officer (UXOQCS/UXOSO)

The UXOQCS/UXOSO is a dual-role position responsible for the enforcement of the site QCP. The UXOQCS coordinates with the UXOTIII for daily operations and reports directly to the Corporate QCM. The UXOQCS has Stop Work authority for issues regarding QC at the project site, and has the following responsibilities:

- Conducting a formal, systematic audit throughout the project. The audit will be prepared in accordance with the project DQOs, the Definable Features of Work (DFW) in Table 4-1, and the WP. The audit will be developed in coordination with the Corporate QCM.

- Reviewing, implementing, and enforcing the QCP.

- Coordinating with project personnel to ensure QC procedures are demonstrating validity sufficient to meet QC objectives.

- Conducting QC inspections of the DFWs listed in Table 4-1 (audits of documents, work in progress, work performed, and monitoring work practices, and recording and reporting the results to the appropriate personnel).

- Ensuring classification of the MEC-related items is accurate and consistent.

- Inspecting a minimum 15% of scrap material for proper classification.

- Conducting analysis to determine the root cause of process failures as they occur.

- Recommending to the PM and UXOTIII any actions to be taken in the event of a QC failure.

- Advising the MEC Team on all QC-related site matters.

- Reporting non-compliance with QC criteria to the project personnel.

4.3 DATA QUALITY OBJECTIVES (DQOs)

Data obtained during MEC operations must support the decision-making process. Consequently, data must be of a sufficient quantity and quality to make defensible decisions to provide an acceptable level of certainty for the decision maker(s).

4.3.1 Data Quality Objectives Process

The DQO process, as defined in EPA QA/G-4W, Data Quality Objectives Process for Hazardous Waste Site Investigations, is iterative and is normally applied to operations requiring the application of data gathered as a result of the conduct of analytic sampling. The output from one step may lead to the reconsideration of prior steps. This iteration leads to more efficient design of data collection operations. Data users, relevant technical experts, and members of the QC staff will participate in the DQO process planning to ensure that their specific needs are included prior to the data collection.

DQOs provide the objective basis for quantitative definition of project requirements. DQOs will be developed and used to ensure that the amount, type, and quality of data obtained during a field sampling project are adequate to support project decisions with a known level of confidence. The DQO process will include the following steps:

- State the problem;
- Identify the decision;
- Identify inputs to the decision;
- Define the study boundaries;
- Develop a decision rule;
- Specify limits of decision errors; and
- Optimize the design for obtaining data.

4.3.2 Specific Analytical or Statistical DQOs

The following DQOs have been developed for the MEC support at the RVAAP, Ravenna, OH:

4.3.2.1 DQO for Operational Verification of Investigation/Location Equipment

1. State the Problem – Identify methodologies with which to verify that investigation/location equipment is operable.

2. Identify the Decision – Determine appropriate testing to verify that data collection equipment is functioning properly prior to daily deployment.

3. Identify Inputs to the Decision – Operational parameters for instrumentation.

4. Define the Study Boundaries – The investigation/location acquisition equipment includes the Whites Eagle Spectrum XLT all-metals detector, the Forester MK 26 hand held all-metals locator with a down-hole probe capability, and GPS.

5. Develop a Decision Rule –

   a. Analog Equipment

   The analog instrument will be walked over a stationary metallic target to ensure that an audible/detection signal is produced.

   b. Location Acquisition Equipment

   The GPS equipment shall be tested weekly to verify that that it is operating properly. Testing shall consist of placing the positioning equipment directly on the survey monument and comparing the location reading obtained to the known coordinates for that monument. This equipment must reacquire the position of the known monument within 15 ft (4.57 m). In addition, field staff will check available readouts daily prior to equipment deployment to verify that the equipment is physically functioning.

6. Specify Limits to Decision Errors – Equipment found to be functioning improperly or outside of the stated performance criteria will not be utilized for data collection until it has been reset, re-calibrated, repaired, or otherwise modified to correct noted inconsistencies in performance or operation.

7. Optimize the Design for Obtaining Data – Design elements of this process will be evaluated on a continuing basis with field data for review, analysis, design improvement, acceptance, and implementation.

4.3.2.2 DQO for MEC Identification

1. State the Problem –

   a. Identify MEC/UXO found during the investigation with sufficient accuracy to support the removal action and safe procedures/disposal.

   b. Secondarily, identify MPPEH, MD, and range-related debris (RRD) (if practicably possible) with sufficient accuracy to support the removal action.

2. Identify the Decision –

   a. Determine in the field the type, size, state (fired, unfired, fuzed, unfuzed), fuzing (point detonating, timed), and general filler type for MEC/UXO found.

b. Determine during data processing the exact filler type, net explosive weight, and exact nomenclature for MEC/UXO found.

c. Determine the same information for MPPEH, MD, or RRD where practical.

3. Identify Inputs to the Decision –

   a. Field observations, photos, and measurements.

   b. Knowledge of MEC materials and military operations.

   c. Characteristic MEC present or suspected of being present.

   d. Appropriate references for determination of filler type, probable net weight explosive and nomenclature.

4. Define the Study Boundaries –

   a. MEC discovered in removal action areas, surface and subsurface as required.

   b. Ability/potential to identify items despite physical deterioration, physical damage or other factors that may impede the identification process.

5. Develop a Decision Rule –

   a. Efforts will be made to identify all MEC/UXO in the field using visual indicators and knowledge/training. Identification will be performed by two fully qualified UXO personnel, one of whom must be a UXOTIII.

   b. If items cannot be identified in the field, photos will be taken. The length and width of these items will be recorded to the nearest 0.125 inch (0.32 cm) using a tape measure or ruler and efforts will be made to identify the items using reference materials (e.g., OP 1664, TM 43 Series Publications, DoD or Ord Data II [NAVEOD technical database] or Ord Data Online.

6. Specify Limits to Decision Errors – No quantified tolerable limits apply to this process. The UXOTIII will supervise the performance of MEC/UXO identification in order to provide the largest base of experience and knowledge to this process.

7. Optimize the Design for Obtaining Data – Design elements of this process will be evaluated on a continuing basis with field data for review, analysis, design improvement, acceptance, and implementation.

4.4 QUALITY CONTROL TEST METHODS AND PROCEDURES

This section discusses QC methods and procedures used during project operations.

USA will conduct inspections to verify whether quality-related activities comply with this QC Plan. A list of inspections based on the DFW provided in Table 4-1. Internal inspections will address activities performed by the project team. The inspection program is established to provide the following:

- An objective and independent evaluation of compliance with established policies and procedures (e.g., Work Plan, activity hazardous analyses [AHAs], Explosives Safety Submission [ESS]); and

- A mechanism for verifying the implementation of corrective actions recommended as the result of inspections.

The UXOQCS is knowledgeable of and has received training in the QC techniques and methodologies, contained in this QC Plan and applicable regulations. The UXOQCS is also technically knowledgeable of the process being inspected. Inspections will be performed in accordance with written procedures or checklists. The UXOQCS will not have direct responsibilities in the production effort of the areas he/she will be assessing.

System and performance inspections will be undertaken. System inspections will evaluate the components of the QC system, including evaluating items such as approach and adequacy of the preparation steps, inspection of the schedules and planned delivery dates, and tracking systems for QC activities. Performance inspections evaluate actual QC activities such as design control, on-site data gathering, inspection and testing activities, and documentation.

The UXOQCS will document inspection results, which will be reviewed by USA's corporate QCM and PM. When unsatisfactory or nonconforming conditions or items are found, the UXOQCS will enter them on the Deficiency Log until corrective actions are completed. The UXOTIII will implement corrective actions in a timely manner. Previously unsatisfactory areas will be re-inspected to ensure that satisfactory corrective actions have been completed. The results of the inspections will be shared with the team with regard to needed rework and lessons learned. Records of all inspections will be maintained and controlled as QC records.

Table 4-1. Definable Features of Work Checklist

DFW	Inspection	Frequency	Comments
1. Pre-mobilization	Ensure that the work to be performed is coordinated with RVAAP, USACE, and the prime contractor's requirements and quality objectives.	Once and Follow-up as Required	Verified by the PM
	Verify that all submittals have been approved by the proper authorities.	Once and Follow-up as Required	Verified by the PM
	Verify that personnel required for the work activities have been identified, are available, and meet the requirements and qualifications for the positions, or that waivers from the USAESCH have been obtained.	Once and Follow-up as Required	Verified by the PM
	Confirm that personnel are properly trained and certified to operate equipment and machinery.	Once	Verified by the PM
	Verify that all field personnel have reviewed the Project Work Plan and the Site Safety and Health Plan.	Once	Verified by the PM
	Confirm that the appropriate Material Safety Data Sheets have been identified and properly submitted.	Once	Verified by the UXOQCS
	Confirm that required equipment is functional and properly calibrated, and that it complies with contract specifications.	Once	Verified by the PM
2. Mobilization of Equipment, Supplies, and Personnel	Confirm all equipment is properly packaged and shipped to arrive as needed to support the project schedule.	Once and Follow-up as Required	Verified by the PM and the UXOQCS on the project site
	Confirm that personnel are recruited and mobilized to arrive on site as required by the project schedule.	Once and Follow-up as Required	Verified by the PM

1 **Table 4-1. Definable Features of Work Checklist (continued)**

DFW	Inspection	Frequency	Comments
3. Preparation of the Work Areas, Staging Areas	Review coordination with stakeholder organizations and support facilities.	Once and Follow-up as Required	Reviewed and verified by the UXOQCS
	Verify that work zones and exclusion zones have been properly established.	Daily	Verified by the UXOQCS
	Inspect up-staging areas for equipment and materials.	Once and Follow-up as Required	Inspected by the UXOQCS
	Inspect the break and rest areas.	Weekly	Inspected by the UXOQCS/ UXOSO
4. Site Specific Training	Ensure all personnel are proficient in the use of the instruments and equipment they have been assigned to operate prior to commencing the field tasks.	Once and Follow-up as Required	Verified by the UXOQCS
	Ensure that all personnel have signed the Employee Sign-off Forms for the Site Safety and Health Plan and the Certificate of PPE training, and that all Activity Hazard Analyses have been completed.	Once and Follow-up as Required	Verified by the UXOQCS
5. Explosives Management	Ensure that explosives are properly transported in accordance with DOT regulations.	Once and Follow-up as Required	Inspected by the UXOQCS
	Verify that the required fire extinguishers are present in the magazine area and that the land surrounding the magazines is clear of combustible materials for a distance of at least 50 ft.	Once and Follow-up as Required	Inspected by the UXOQCS
	Verify that manifests are correct and the proper explosives are delivered.	Once and Follow-up as Required	Inspected by the UXOQCS
	Confirm the explosives routes to/from the storage magazine (if utilized).	Once and Follow-up as Required	Inspected by the UXOQCS

1 **Table 4-1. Definable Features of Work Checklist (continued)**

DFW	Inspection	Frequency	Comments
	Ensure that storage magazines (if used) have been inspected for storing explosives.	Once	Inspected by the UXOQCS
	Ensure that explosives are properly stored in accordance with applicable ATF regulations.	Once and Follow-up as Required	Inspected by the UXOQCS
	Verify that stocking and inventory procedures for explosive materials are followed.	Weekly	Inspected by the UXOQCS
	Ensure that proper techniques are employed during demolition operations.	Per Demolition Operation	Inspected by the UXOQCS
6. Removal Operations	Ensure that site security features and Exclusion Zones around work area to be excavated have been erected and are maintained.	Daily	Inspected by the UXOQCS
	Ensure that all health and safety equipment and supplies are complete and all personnel are aware of its location in the operations area.	Daily	Inspected by the UXOQCS
	Verify team safe separation distances.	Daily	Inspected by the UXOQCS
	Verify that all MEC, MPPEH and metallic debris 4 inches square and larger have been removed in those areas designated for a surface clearance.	Once upon completion of the task	Inspected by the UXOQCS
	Observe the excavation of the selected anomalies for compliance with the investigation metrics (investigate out to an 18-inch radius around the flag and to a depth of 4 ft as necessary).	Daily, as Required	Inspected by the UXOQCS
	Verify that all excavations are properly backfilled.	Daily	Inspected by the UXOQCS
7. MEC and MPPEH Disposal	Verify that the determination as to whether the “acceptable to move” process is applied to the encountered MEC items	As Required	Audited by the UXOQCS

1 **Table 4-1. Definable Features of Work Checklist (continued)**

DFW	Inspection	Frequency	Comments
	Verify that the MEC items are determined safe to move to a designated on-site storage location for later disposal.	As Required	Audited by the UXOQCS
	Verify that coordination and notifications are conducted prior to commencing disposal operations	As Required	Audited by the UXOQCS
	Verify that the blaster possesses a valid license	Once	Audited by the UXOQCS
	Verify that disposal procedures are in accordance with the WP and SOP	As Required	Audited by the UXOQCS
8. MEC and MPPEH Accountability	Verify that a detailed accounting of all MEC and MPPEH encountered is maintained.	Daily as Required	Inspected by the UXOQCS
	Conduct periodic inspections of the photographs of recovered MEC and MPPEH for focus, lighting and size reference.	Periodic	Inspected by the UXOQCS
	Ensure procedures for inspecting, storing and securing munitions debris are followed.	Daily as Required	Inspected by the UXOQCS
	Conduct and document random sampling of all MPPEH collected to ensure no items contain an explosive hazard, engine fluids, illuminating dials or other visible liquid HTRW materials.	Daily as Required	Inspected by the UXOQCS
	Ensure all documents for shipment of munitions debris are properly completed.	Prior to Shipment	Inspected by the UXOQCS
	Maintain the chain of custody and final disposition of munitions debris documentation and incorporated into the SSFR.	Prior to Shipment	Inspected by the UXOQCS

Table 4-1. Definable Features of Work Checklist (continued)

DFW	Inspection	Frequency	Comments
9. Demobilization	Confirm that all temporary site features and equipment and debris have been removed for the purpose of restoring disturbed areas.	Prior to demobilization	Inspected by the UXOQCS
	Ensure that a joint review of work performed with the prime contractor/USAESCH personnel is scheduled and conducted.	Prior to demobilization	Inspected by the UXOQCS
10. Project Reporting and Submittals	Review Project Status Reports for accuracy and thoroughness in accordance with the PWS	Weekly	Inspected by the UXOQCS
	Ensure that the Site Specific Final Report is prepared, reviewed, and distributed in accordance with the PWS	Prior to submittal of report	Inspected by the UXOQCS

4.5 CONTRACT SUBMITTAL QUALITY CONTROL PROCESS

Documents required under this contract will be developed by the project field team, and reviewed and maintained by the USA PM, the GIS Manager and Corporate QCM. The management team contributes their corporate knowledge and experience to the documents to ensure technical quality.

- The USA PM will take the lead in development of contract documents, and will schedule a peer review and a QC review in sufficient time to meet project milestones for delivery of submittals.

- The PM will review and supply information and documents to ensure accuracy and completeness of procedures and reports.

- The GIS Manager will develop digital database and maps, overlays of exclusion zones, and other spatial data. The GIS Manager will prepare all drawings or maps needed for submittals.

After the management team has performed a review of documents, the Corporate QC Manager and UXOQCS will perform a QC review to ensure overall quality and completeness.

Comments on submitted documents will be directed by project personnel to the appropriate subject matter expert for resolution.

Changes to final work plans will be submitted to the PM immediately upon approval. The PM will be responsible for ensuring that the changes are posted to the hard copy on file, and that all field personnel are made aware of the changes.

4.6 FIELD QUALITY CONTROL INSPECTIONS, AUDITS, AND REPORTS

The UXOQCS is responsible for the inspections, reviews, corrections, and reports identified in the following sections. Additionally, the UXOQCS is responsible for verifying the accomplishment of operational checks of instruments and equipment by site personnel. The appropriate log entries will be made. Inspections will be performed daily at random, with unscheduled checks of the site in general to ensure personnel accomplish all work as specified in the Work Plan. The UXOQCS will utilize the process outlined in Figure 4-1 to ensure all field tasks meet quality standards prior to submittal for the Quality Assurance process. The UXOQCS will submit a report to the UXOTIII detailing the results of these checks.

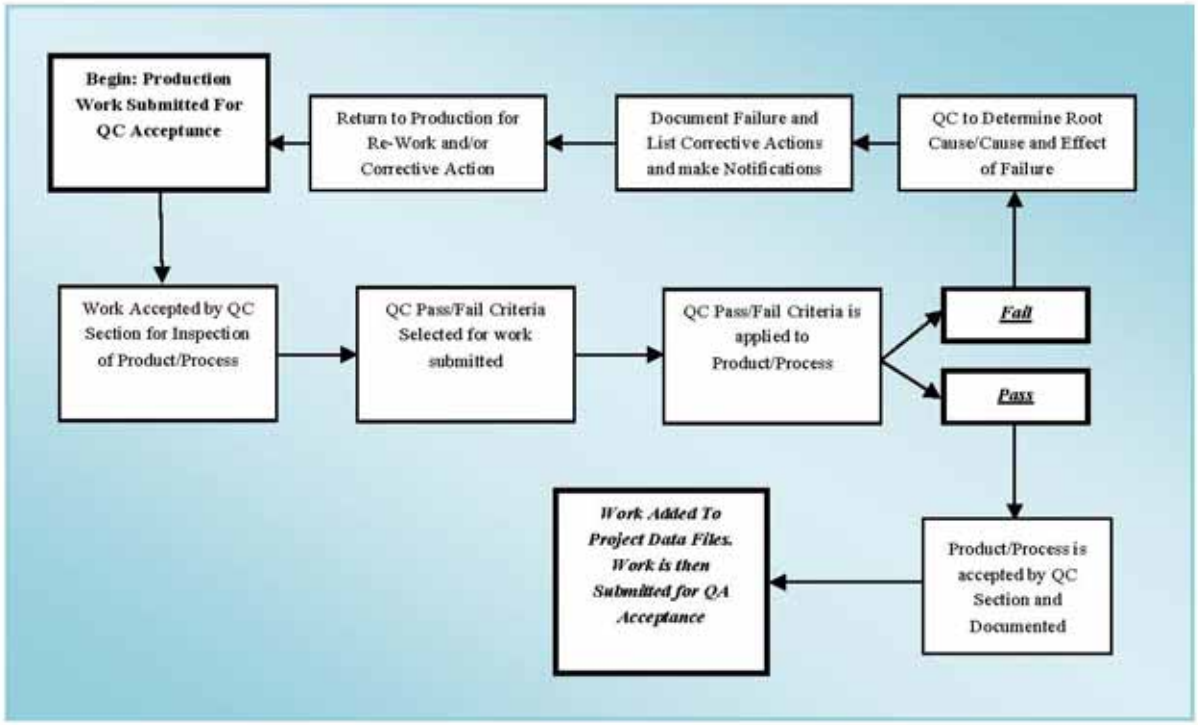


Figure 4-1. Quality Control Process

4.6.1 UXO Quality Control Report

The UXOQCS prepares a daily and weekly QC Report. These reports are kept on-site. The weekly QC report is submitted to the PM for distribution to the appropriate personnel. This report includes the following information:

- The periodic assessment of work performed;
- Significant QA/QC problems and corrective actions taken;
- Work progress;
- Lessons learned, and change recommendations; and
- Signature of the UXOQCS.

4.6.2 Logs and Records

Activity Logs will be maintained daily, as applicable; all entries will be in ink. Logbooks will be bound and pages consecutively numbered. Logbooks and records may be supplemented by the use of preprinted forms (e.g., safety inspection forms, tailgate safety briefings). These forms help to ensure uniformity of activities being conducted, inspected, and reviewed. Forms are located in Appendix F of this work plan. The following logbooks and records will be maintained on site and are subject to inspection.

4.6.2.1 Daily Journal

The Daily Journal will be maintained by the UXOTIII. This journal provides a summary of all operations conducted on site, and includes:

- Date and recorder of information;
- Start and end time of work activities, including lunch, breaks, and down time;
- Work stoppage;
- Visitors and escorts;
- Weather conditions.
- Changes to the Work Plan, SSHP, policies, or procedures;
- Injuries and /or illnesses;
- Safety briefings;
- OE/UXO encountered;
- Relevant events and training; and
- Signature of the UXOTIII.

4.6.2.2 Field Logbooks

The Field Logbooks are maintained by the Supervisory Personnel. These logbooks are used to record site activities and field data. Logbooks are maintained in a neat and legible manner, provide an historic record of site activities, and include:

- Date and team location;
- Personnel and work performed;
- Equipment and instrument checks;
- Injuries and/or illnesses;
- Changes to work instructions;
- Work stoppage;
- Visitors;
- Other relevant events; and
- Signature of Supervisor.

4.6.2.3 Safety Logbook

The site UXOQCS/UXOSO will maintain the Safety Logbook. This logbook is used to record all safety matters associated with the project site, including:

- Safety briefings and/or meetings;
- Training;
- Safety inspections and audits performed;
- Work stoppage due to safety issues;
- Visitors;

- Accidents, incidents, and near misses, with corrective action taken;
- Site control measures;
- Other relevant events;
- Date and teams checked; and
- Signature of the UXOQCS/UXOSO.

4.6.2.4 Quality Control Logbook

The Quality Control Logbook will be maintained by the UXOQCS/UXOSO. This logbook is used to record all QC matters associated with the project site, including:

- Equipment testing and results;
- QC inspections performed;
- Work stoppage due to QC issues;
- Equipment monitoring results;
- Non-conformance reporting;
- Other relevant events;
- Date and teams checked; and
- Signature of UXOQCS.

4.6.2.5 Training Records

Training records will be maintained by the PM. These records contain any licenses, permits, certificates, or other qualifying data, and include:

- Date and nature of training;
- Personnel attending and instructor(s);
- Visitor training and briefings; and
- Signature of instructor and UXOTIII or UXOQCS/UXOSO.

4.6.2.6 UXO and Anomaly Excavation Records

The UXO and anomaly records are individually prepared records for each operating team. These records are prepared by the team supervisor, and are used to record data on anomaly excavations and UXO encountered. These records also include:

- Date of intrusive sampling;
- Grid/transect identification number;
- UTM, NAD83 coordinate;
- Actual depth of item;
- Accuracy of anomaly reacquisition (distance from marked target location);
- Length, width and depth of final excavation;

- Depth to ground water (if encountered);
- Orientation;
- Inclination;
- Object length;
- Object width;
- Object weight;
- Condition of rotating band, if present;
- Classification (e.g. fired, kick-out);
- Photograph of anomalous feature;
- BIP soil sample identification number, coordinates and parameters (if applicable); and
- Signature of Supervisor.

4.6.2.7 Photographic Logbook

The Photographic Logbook will be maintained by the UXOTIII. This logbook is used to record all photographs taken on the project site. These photographs are used to document the MEC, MPPEH, and munitions debris items encountered, and before, during, and after work and/or site conditions. Photographs will include:

- Date and time taken;
- Unique identifying number(s) relating to the Photographic Logbook;
- Location photograph was taken; and
- Brief description of the subject matter.

4.6.3 Daily Review of Field Data

During daily field activities or at least once daily, the UXOQCS will review field data to ensure accurate classification and documentation of the recovered MEC-related items. This review will allow for reconstruction of what an item was and whether or not its classification is correct.

4.7 QUALIFICATIONS AND TRAINING

4.7.1 Introduction

This section outlines the qualifications and training of personnel selected for conducting the MEC support of this project.

4.7.2 Employee Qualifications

The PM will maintain personnel files on each employee at the project site. These files include copies of necessary licenses, permits, training records, certificates of qualifications, and resumes that support the employee's placement and position. Prior to an employee's initial assignment or before any

change in duties or assignment, the PM will review the employee's files to ensure necessary qualifications are met. All site records and documentation are subject to inspection and review by the UXOQCS. Site personnel must meet the minimal qualifications as outlined in DDESB TP-18, dated December 20, 2004.

4.7.3 Employee Training and Site-Specific Requirements

USA ensures that only qualified and properly trained personnel are assigned to positions on project sites. Prior to mobilization of personnel, USA ensures that training required by USA, OSHA 29 CFR 1910.120, and the USACE has been completed for all personnel assigned to the project. In addition, prior to the start of operations all personnel will receive the following as a minimum:

- Familiarization with the WP, and its policies and procedures;
- SSHP orientation and person protective equipment (PPE) training;
- Environmental considerations specific to the operations on the project site;
- Instruction and training on equipment usage and safe work practices; and
- Daily safety training outlining the day's activities.

Training is conducted by the UXOTIII, UXOQCS/UXOSO, or other designated personnel, and records of attendance are maintained on site. Certificates of Training are issued when applicable.

4.8 EQUIPMENT TESTS, FUNCTIONAL CHECKS, AND MAINTENANCE

4.8.1 Testing Procedures and Frequency

Instruments and equipment, such as the analog detectors and GPS used to generate site-specific data and to support the removal action, will be tested with sufficient frequency and in such a manner as to ensure that accuracy of results are consistent with the manufacturer's specifications. Instruments or equipment failing to meet the standard will be repaired or replaced. Replaced instruments or equipment must meet the same specifications for accuracy and precision as the item removed from service. Operator proficiency will also be evaluated regularly for proper instrument setup, and operation. The UXOTIII or the UXOQCS will conduct training refreshers, if necessary.

Items such as cellular telephones and radios will be tested for serviceability at the start of each work day. Results of these tests will be recorded in the Daily Log. Items failing these tests will be repaired or replaced prior to operations commencing.

4.8.2 Routine Functional Equipment Checks

Routine equipment tests include:

- Analog sensors will be tested over a known object each day they are used. The known anomaly will be a seed item that meets the size and depth requirements necessary to determine the serviceability of the instrument.

- Weekly testing of the GPS shall consist of placing the positioning equipment directly on the survey monument and comparing the location reading obtained to the known coordinates for that monument. This equipment must reacquire the position of the known monument within 15 ft (4.57 m).

4.8.3 Maintenance

The UXOQCS will check field logbooks to ensure that maintenance of vehicles and equipment is performed on a regular schedule and in accordance with the manufacturer's recommendation or owner's manual for equipment requiring regular upkeep. USA will coordinate scheduled maintenance of the following equipment in accordance with manufacturer's recommendations or the owner's manual:

- Vehicles;
- PPE;
- Communications equipment;
- Navigational equipment; and
- Emergency equipment.

Replacement equipment will meet the same specifications for accuracy and sensitivity as the equipment removed from service. Analog detectors will be checked on the test strip daily and after any repairs. The detectors will be required to demonstrate a consistent detection rate for all seed items and any identified background anomalies. Repair or replacement of parts will meet the manufacturer specifications and recommendations. The UXOQCS will document and maintain records pertaining to the testing, repair, and/or replacement of equipment on site.

Repair or replacement parts will meet the manufacturer's requirements and will be installed by personnel authorized to replace parts or make repairs. Records pertaining to the testing, repair, or replacement of instruments and equipment will be maintained on site by the UXOQCS.

4.9 QUALITY CONTROL OF FIELD PROCEDURES

4.9.1 Intrusive Investigation Requirements and Failure Criteria

The UXOQCS will perform a QC Inspection of the anomalies selected for clearance and will conduct an instrument-assisted visual inspection the surface swept areas to ensure all MEC, MPPEH and any metallic debris 4 inches square or larger have been removed or destroyed in place. For QC inspections, the UXOQCS will use a Whites XLT as appropriate. All QC inspections will be

documented for acceptance or non-acceptance of the work performed. Criteria for failure is outlined as follows:

- MEC Failure Criteria: A MEC failure criteria is defined as failing to detect, investigate and remove/dispose of MEC or MPPEH items.

- Anomaly Failure Criteria: Clearance of the selected anomaly up to an 18-inch radius around the flagged anomaly location and to a depth of 4 ft.

Any unexcavated anomaly, within the selected location (within 18 inches of the flagged anomaly), identified by the UXOQCS as meeting selection criteria, will trigger an analysis of the process to determine the cause as to why the anomaly was not detected and removed by the UXO Team. The anomaly will be addressed for identification and removal. The UXOQCS will conduct a Root Cause Analysis if the anomaly meets the established failure criteria (MEC or MPPEH). Additionally, the UXOQCS will conduct inspections of recovered MD (after MPPEH inspection) to ensure there are no explosive contaminants.

Figure 4-2 illustrates the flow of the root cause and effect process that the UXOQCS will use to determine failure causes:

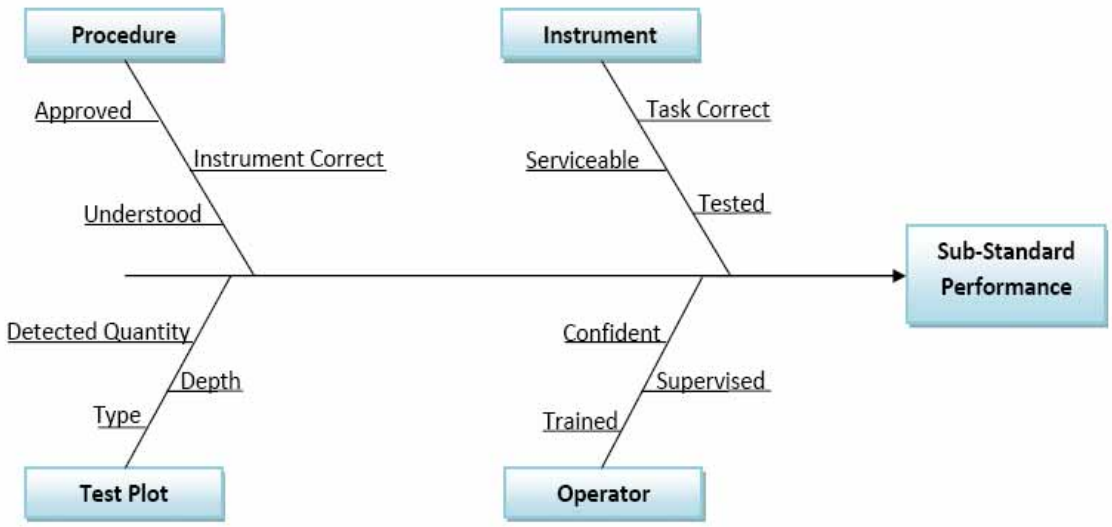


Figure 4-2. Cause and Effect Process

4.9.2 Corrective Action

The UXOQCS will conduct a Root Cause Analysis to determine if the failure is the result of the process, procedures, equipment and/or personnel and to what extent previously performed work may have been affected by the failure. The UXOQCS will provide his findings to the PM, Corporate QC Manager and UXOTIII with suggested or required corrective actions. Once approved by

management, the UXO Teams will implement the corrective actions. The Root Cause Analysis and corrective actions will be attached to the weekly QC reports.

USA will correct the quality deficiency, re-sweep and perform team and QC re-inspection on the affected anomaly location(s) before submitting to the prime contractor/Government for verification and acceptance.

All intrusive quality control measures and metrics will be documented, with copies sent to the appropriate personnel for review and inclusion into other documents, as deemed necessary.

4.10 LESSONS LEARNED PROGRAM

As required by ER 1110-1-12, USA will develop a Lessons Learned Program (LLP) to provide for the exchange of information regarding problems that may occur during the munitions response (MR) activities on this project site.

4.10.1 Lessons Learned Objective

The objective of the LLP is to capture and share experience or recognized potential problems or better business practices to:

- Prevent the recurrence of repetitive design/execution deficiency;
- Clarify interpretation of regulations or standards;
- Reduce the potential for mistakes in high risk/probability areas of concern;
- Pass on information specific to an installation or project;
- Promote a good work practice that should be ingrained for repeat application; and
- Promote efficient and cost-effective business practice.

4.10.2 Team Responsibilities

The USA project team will be responsible for identifying and submitting lessons learned for review and approval. Throughout this MEC response activity, USA project team members will consider how their experiences might be appropriate for the LLP.

5.0 EXPLOSIVE MANAGEMENT PLAN

This plan outlines the explosives management procedures USA will use to perform the MEC Characterization and Clearance at the RVAAP. The procedures listed herein are in accordance with DID MR-005-03 and the following documents:

- DoD 4145.26-M, Contractor's Safety Manual for Ammunition and Explosives;
- DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards;
- Applicable Sections of DOT, 49 CFR Parts 100-199;
- Army Regulation (AR) 385-64, Ammunition and Explosives Safety;
- AR 190-11, Physical Security of Arms, Ammunition and Explosives;
- EM 1110-1-4009 Engineer Manual, Ordnance and Explosives;
- EP1110-1-18 Engineer Pamphlet, Ordnance and Explosives Response;
- Local and state laws and regulations;
- USACE EM 385-1-95a, Basic Safety Concepts and Considerations for Unexploded Ordnance;
- USACE EM 385-1-1, Safety and Health Requirements Manual; and
- ATF Publication 5400.7 Bureau of Alcohol, Tobacco, Firearms and Explosives, Federal Explosives Laws and Regulations.

5.1 ACQUISITION

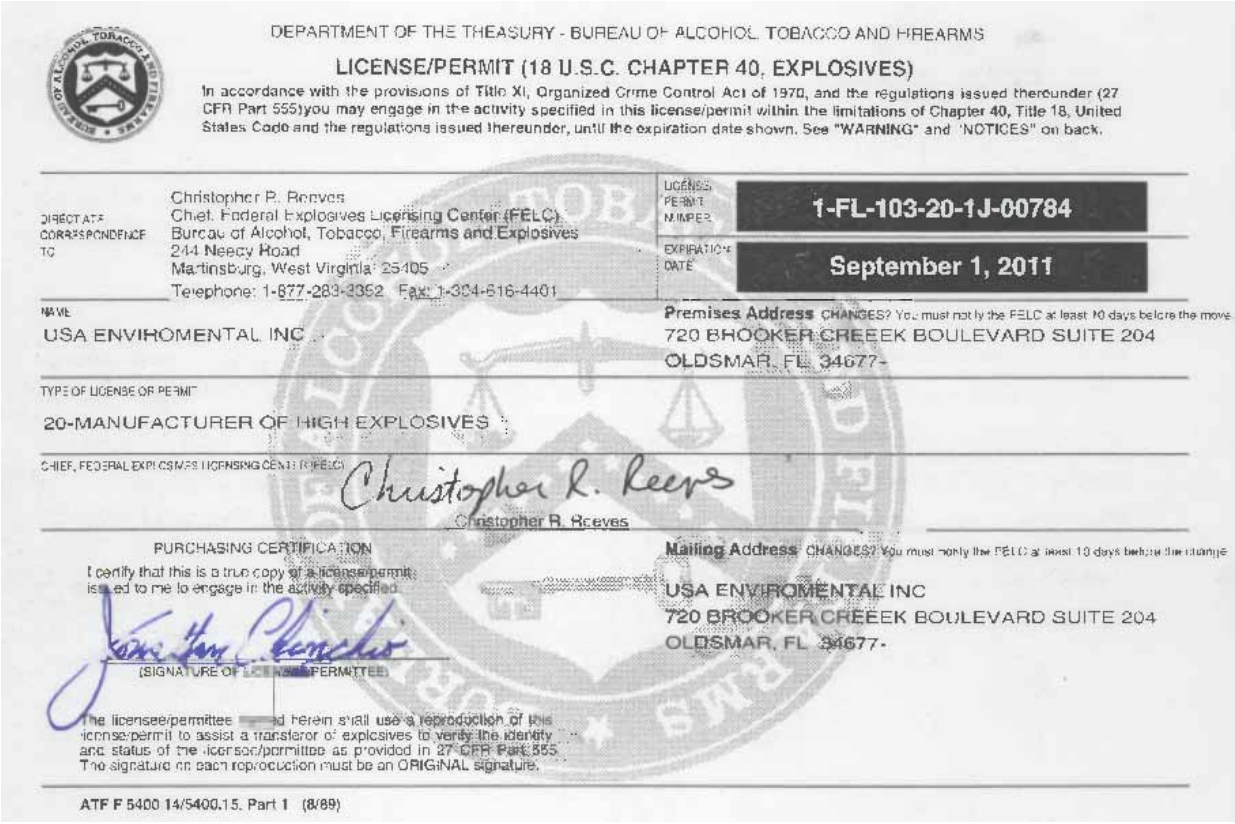
USA will use commercial explosives obtained through a local explosives supplier for disposal and venting of MEC items. USA has a Type 20 ATF license (see Figure 5-1) which allows USA to purchase, store, and use explosives and will supply commercial demolition material for disposal and venting operations. The ATF permit will be posted on site and will be available for Federal, state, or local inspection. As required by the State of Ohio, all USA personnel involved in the handling of explosives will have a Blaster's License. USA will provide the explosives distributor a certified statement of the intended use of the explosive material.

5.1.1 Description and Estimated Quantities

USA will store donor explosives on-site in two existing igloo magazines located inside ODA #2. USA will store less than 100 lbs NEW of bulk and initiating explosives on site.

5.1.2 Acquisition Source

USA will purchase explosives from a licensed commercial supplier, Austin Powder. The UXOQCS/UXOSO and UXOTIII will be authorized to request and receive explosives from the commercial supplier.



DEPARTMENT OF THE THEASURY - BUREAU OF ALCOHOL, TOBACCO AND FIREARMS

LICENSE/PERMIT (18 U.S.C. CHAPTER 40, EXPLOSIVES)

In accordance with the provisions of Title XI, Organized Crime Control Act of 1970, and the regulations issued thereunder (27 CFR Part 555)you may engage in the activity specified in this license/permit within the limitations of Chapter 40, Title 18, United States Code and the regulations issued thereunder, until the expiration date shown. See "WARNING" and "NOTICES" on back.

DIRECT ATF CORRESPONDENCE TO: Christopher R. Reeves
Chief, Federal Explosives Licensing Center (FELC)
Bureau of Alcohol, Tobacco, Firearms and Explosives
244 Needy Road
Martinsburg, West Virginia 25405
Telephone: 1-877-283-3352 Fax: 1-304-616-4401

LICENSE/PERMIT NUMBER: 1-FL-103-20-1J-00784

EXPIRATION DATE: September 1, 2011

NAME: USA ENVIROMENTAL INC

Premises Address CHANGES? You must notify the FELC at least 10 days before the move
720 BROOKER CREEEK BOULEVARD SUITE 204
OLDSMAR, FL 34677-

TYPE OF LICENSE OR PERMIT: 20-MANUFACTURER OF HIGH EXPLOSIVES

CHIEF, FEDERAL EXPLOSIVES LICENSING CENTER (FELC): Christopher R. Reeves
Christopher R. Reeves

PURCHASING CERTIFICATION
I certify that this is a true copy of a license/permit issued to me to engage in the activity specified.
(SIGNATURE OF LICENSEE/PERMITTEE)

Mailing Address CHANGES? You must notify the FELC at least 10 days before the change
USA ENVIROMENTAL INC
720 BROOKER CREEEK BOULEVARD SUITE 204
OLDSMAR, FL 34677-

The licensee/permittee named herein shall use a reproduction of this license/permit to assist a transferor of explosives to verify the identity and status of the licensee/permittee as provided in 27 CFR Part 555. The signature on each reproduction must be an ORIGINAL signature.

ATF F 5400.14/5400.15, Part 1 (8/89)

Figure 5-1. USA's ATF License

5.1.3 Listing of Proposed Explosives

The types of explosives that may be used include:

- Cast Booster – (Hazard Classification/Compatibility Group 1.1D); TNT and Pentaerythritol Tetranitrate (PETN);
- Jet Perforators – (Hazard Classification/Compatibility Group 1.4S), 19.5 gram shape charge, Cyclotrimethylene trinitramene (RDX);
- Detonating Cord – (Hazard Classification/Compatibility Group 1.1D); 50 or 80 grain per foot, PETN;
- Blasting Caps – (Hazard Classification/Compatibility Group 1.4B) electric, Lead Azide, Lead Styphnate, PETN;
- Blasting Caps – (Hazard Classification/Compatibility Group 1.4B) non-electric, Lead Azide, Lead Styphnate, PETN with Non-El lead in; and
- Non-El Shock Tube – (Hazard Classification/Compatibility Group 1.4S), octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) and aluminum powder.

Shipments of explosives will be by commercial carrier from the explosives supplier. The explosive supplier is responsible for all permits and documentation required by Federal, state, and local regulations.

5.2 STORAGE

On-site storage of explosives is anticipated.

5.2.1 Establishment of Storage Facilities

USA will not establish storage facilities, but will use two existing earth-covered igloos for storage of bulk explosives, initiating explosives, and recovered MPPEH. USA will comply with ATF, Federal, and local storage and compatibility criteria and procedures, including RVAAP requirements.

5.2.2 Physical Security of Storage Facilities

USA will maintain physical security of the magazines in accordance with RVAAP requirements. At a minimum, the magazines will be locked with high security locks that meet the requirements of ATFP 5400.7 Section 55.208 (a). The keys for the storage magazine and fence surrounding it will be maintained IAW Key and Lock Control SOP in Appendix J of this WP. The magazine storage area will be inspected each work week (or daily if required by the RVAAP) by the UXOQCS/UXOSO and UXOTIII to ensure the integrity of the enclosure.

5.3 TRANSPORTATION

Transportation of MEC items and explosives will comply with all Federal, state, and local regulations. Permits are not required under CERCLA for on-site or on Federal installations for transportation of explosives or conventional military munitions.

5.3.1 Procedures for Transportation from Storage to Disposal Location

In accordance with DOT regulations, USA will transport explosives in IME-22 containers for transportation of explosives to the disposal sites. USA will comply with the following:

- Initiating explosives, such as blasting caps, will remain separated at all times. Blasting caps may be transported in the same vehicle as long as they are in a separate IME-22 container (49 CFR 173.63) and secured away from other items.

- Compatibility requirements will be observed.

- Only UXOTIIIs and above may be issued and may transport explosive materials. The receiving party will sign the receipt documents for accountability.

- Operators transporting Hazard Division (49 CFR 173.50) 1.1 explosives will have a valid driver's license.

- Drivers will comply with posted speed limits but will not exceed a safe and reasonable speed for conditions. Vehicles transporting explosives off-road will not exceed 25 mph.

- Personnel will not ride in the cargo compartment with the explosives or MEC items.

5.3.2 Explosive Transportation Vehicle Requirements

At minimum, the following is required for the transportation of explosives:

- Explosives will be transported in closed containers in the beds of vehicles whenever possible. The load will be well braced and, except when in closed vehicles, covered with a fire-resistant tarpaulin or placed in an appropriate shipping container.

- Vehicles transporting of the explosives or MEC items will be inspected prior to load out using the USA Explosive Vehicle Inspection form (Appendix F), and will be properly placarded.

- Vehicle engine will not be running and the wheels will be chocked when personnel are loading/unloading explosives.

- Beds of vehicles will have a bed liner, dunnage, or sand bags to protect the explosives from contact with the metal bed and fittings.

- Vehicles transporting explosives will have a first aid kit, two 10-BC rated fire extinguishers, and a means of communications.

5.4 RECEIPT PROCEDURES

The UXOTIII will strictly control access to all explosives. All receipts, issues, turn-ins, and inventories of explosives will be properly documented and verified, through physical count, by the UXOQCS/UXOSO and UXOTIII.

5.4.1 Records Management And Accountability

Upon receipt, the type, quantity, and lot number of each explosive item will be checked against the manifest and recorded on the Explosives Usage Form (Appendix F). The original receipt documents and an inventory will be maintained on file by the UXOTIII. All original explosive records will be forwarded to the USA Corporate Office for retention in accordance with ATF regulations and requirements. Copies of all records will be maintained on site by the site UXOTIII and will be available for inspection by authorized agencies. Their respective lot number will track explosive items until the item is expended or transferred to Government control and accountability.

5.4.2 Authorized Individuals

USA is required to provide explosives distributors with documentation of individuals authorized to request and receive explosives. The individuals authorized to receive and issue explosives are the USA UXOTIII and, in some cases, if the UXOTIII is not available, the UXOQCS/UXOSO. The UXOTIII will designate in writing the individual who is authorized to transport and use explosives.

5.4.3 Certification

The UXOTIII and UXOQCS/UXOSO performing demolition will sign and date the explosives usage form, certifying that the explosives were used for their intended purpose.

5.4.4 Procedures for Reconciling Receipt Documents

The UXOTIII will reconcile the delivery and shipping documentation with the requested amounts ordered and received. Any shortages or overages will be reported to the USA PM, who will contact the explosives distributor and reconcile any differences. In addition, the USA PM will notify the on-site USACE OE Safety Specialist.

5.4.5 Inventory Procedures

The UXOTIII or approved designee and the UXOQCS/UXOSO will inventory explosives after any issues/turn-ins of demolition material.

5.4.6 Storage Facility Physical Inventory Procedures

The UXOTIII will strictly control access to all explosives. All issues and turn-ins of explosives will be properly documented and verified, through physical count, by the UXOTIII or his approved designee. On receipt, the type, quantity, and lot number of each explosive item will be recorded on the Magazine Data Card (see Appendix F).

The UXOTIII will review all requests for explosives from the individual operating sites, and only sufficient explosives for the day's operations will be requested and issued. Issues of explosives will be recorded on Explosives Usage Records, deducted from the Magazine Data Cards, and annotated in the Daily Report. This procedure will ensure that the issued explosives are accounted for while they are in the possession of individual users. The end user of explosives will certify on the Explosives Usage Record that the explosives were used for their intended purpose. Entries made on the Explosives Usage Records and Magazine Data Cards will be verified through physical count by the UXOTIII when drawing or turning-in the explosives and certified by the UXOQCS/UXOSO.

At the end of each disposal operation the UXOSO/UXOQCS and the UXOTIII will reconcile the entries on each Explosives Usage Record. The record of ordnance items destroyed with the explosives consumed will be kept in the UXOTIII Daily Report.

Entries made on the Explosives Usage Records and Magazine Data Cards will be verified through physical count by the UXOTIII when drawing or turning-in the explosives and the UXOSO/UXOQCS will verify the record.

5.4.7 Procedures for Reconciling Inventory Discrepancies

The UXOTIII and UXOQCS/UXOSO will be responsible for performing an inventory of all issued and turned-in explosives. If there is a discrepancy between the inventory and the volume of explosives, then they will review the Magazine Data Cards and Explosives Usage Record to see if the inventory records are current. If the records review does not reconcile the discrepancy, then it will be reported to the on-site USACE OE Safety Specialist, Contracting Officer, USA PM and USA Security Officer for investigation.

5.4.8 Inventory Scheduling

The UXOTIII and UXOQCS/UXOSO will perform weekly inventories of the explosives within the magazines.

5.4.9 Reporting Loss or Theft of Explosive Materials

If it is confirmed that ordnance or explosives are missing, then the USA PM will contact the Contracting Officer immediately by telephone and in writing within 24 hours. USA will notify the ATF and immediately begin an investigation. Local authorities will be notified and a written report will be issued within 24 hours.

5.4.10 Procedures for Return to Storage of Explosives Not Expended

Explosives that were issued for use, but were not expended will be returned daily to the magazines at the completion of disposal operations. The UXOTIII will return the unused explosives to the storage magazine and record the items on the Magazine Data Card and Explosives Use Record.

5.5 DISPOSAL OF REMAINING EXPLOSIVES

The ATF requires an account of all explosives purchased and used. Therefore, at project completion, either all unused explosives will be disposed of by detonation, custody and accountability will be transferred to an incoming contractor or a Government agency, or the explosives will be returned to the distributor.

6.0 EXPLOSIVES SITING PLAN

The requirement for an Explosives Siting Plan within this WP is deleted by Interim Guidance Document (IGD) 08-01, dated April 16, 2008, which provides the requirement for a separate stand alone document.

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7.0 ENVIRONMENTAL PROTECTION PLAN

Applicable environmental protection requirements will be addressed under separate CERCLA remedial design documents.

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8.0 PROPERTY MANAGEMENT PLAN

Explosive storage, if required, at igloo facilities within ODA #2 will conform to all RVAAP requirements. Use of additional U.S. Government issued property or equipment is not anticipated

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9.0 INTERIM HOLDING FACILITY SITING PLAN

RVAAP is not a Recovered Chemical Warfare Material (RCWM) project site, and therefore an interim holding facility will not be utilized during this project.

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10.0 PHYSICAL SECURITY PLAN

RVAAP is not a RCWM project site, and therefore a physical security plan is not required for this WP.

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11.0 REFERENCES

11.1 FEDERAL REGULATIONS

ATF Publication 5400.7 Bureau of Alcohol, Tobacco, Firearms and Explosives, Federal Explosives Laws and Regulations.

Code of Federal Regulations (CFR)

- 33 CFR 320 Wetlands Protection Act
- 40 CFR 300.430 National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 1993
- 43 CFR 7.4 Protection of Archeological Resources
- 43 CFR 10.4 Native American Graves Protection and Repatriation Act

DOT Regulations, 49 CFR Parts 100-199

Endangered Species Act 16 U.S.C. 1531-1544

National Historic Preservation Act (NHPA), Public Law 93-91

11.2 OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

NIOSH/OSHA/USCG/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985. (DHHS (NIOSH) Publication No. 85-95).

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCT/EPA, October 1985.

OSHA Regulations, 29 CFR 1910, Hazardous Waste Operations and Emergency Response, March 1989.

OSHA Construction Industry Standards, 29 CFR 1926.

11.3 UNITED STATES ARMY CORPS OF ENGINEERS PUBLICATIONS

U.S. Army Corps of Engineers Safety and Health Requirements Manual. Engineer Manual 385-1-1 (3 NOV 03)

U.S. Army Corps of Engineers (USACE), Washington, DC. EM 1110-1-4009, Engineer Manual, Military Munitions Response Actions, 15 June 2007.

U.S. Army Corps of Engineers (USACE), Washington, DC. Engineering and Design Ordnance and Explosives Response, Engineer Pamphlet 1110-1-18, 24 April 2000.

U.S. Army Corps of Engineers (USACE), Washington, DC. Determination of Appropriate Safety Distances on Ordnance and Explosive (MEC) Project Sites, MEC Center of Expertise (CX) Interim Guidance Document 00-01.

U.S. Army Corps of Engineers (USACE), Washington, DC. Engineer Pamphlet 385-1-95a, Basic Safety Concepts and Considerations for Ordnance and Explosive Operations, 27 August 2004

U.S. Army Corps of Engineers (USACE), Washington, DC. Engineer Regulation 385-1-92, Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities, 1 July 2003.

U.S. Army Corps of Engineers (USACE), Washington, DC. Explosives Site Plans (ESP) for Military Munitions Response Projects, Environmental and Munitions Center of Expertise, Military Munitions Division (CEHNC-EM-CX-) Interim Guidance Document 08-01.

DID MR-001, Type I Work Plan

DID MR-005-02, Technical Management Plan

DID MR-005-03, Explosives Management Plan

DID MR-005-04, Explosives Siting Plan

DID MR-005-06, Accident Prevention Plan

DID MR-005-11, Quality Control Plan

DID MR-005-12, Environmental Protection Plan

DID MR-015, Accident Reports

DID OE-025.02, Personnel and Work Standards

DID MR-045, Report /Minutes, Record of Meetings

DID MR-055, Telephone Conversations/Correspondence Records

11.4 DEPARTMENT OF DEFENSE PUBLICATIONS

DoD 4160.21-M-1, Defense Demilitarization Manual

DoD 6055.9 STD, DOD Ammunition and Explosives Safety Standards

DDESB TP-18, Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel

DDESB TP-16, Fragmentation Characteristics Database

Management Guidance for Defense Environmental Restoration Program, September 2001

11.5 ARMY REGULATIONS AND PAMPHLETS

AR 190-11, Physical Security of Arms, Ammunition and Explosives

AR 385-64, Army Regulation Ammunition and Explosive Safety

Army Regulation 385-40 with USACE Supplement 1, Accident Reporting and Records

DA Pamphlet 385-64, Ammunition and Explosive Standards, paragraph 2-4

Illinois Explosives Act, Title 62 IL Administrative Code, Part 200

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APPENDIX A.
Scope of Work

A.0 SCOPE OF WORK

Project Scope of Work is located in RVAAP 2008 Project Management Plan for the 2008 Performance Based Acquisition of Environmental Investigation and Remediation (19 Dec 2008).

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APPENDIX B.
Site Maps

B.0 SITE MAPS

This appendix contains the following maps:

- Figure 1: Ravenna Army Ammunition Plant Location Map
- Figure 2: All Sites Map

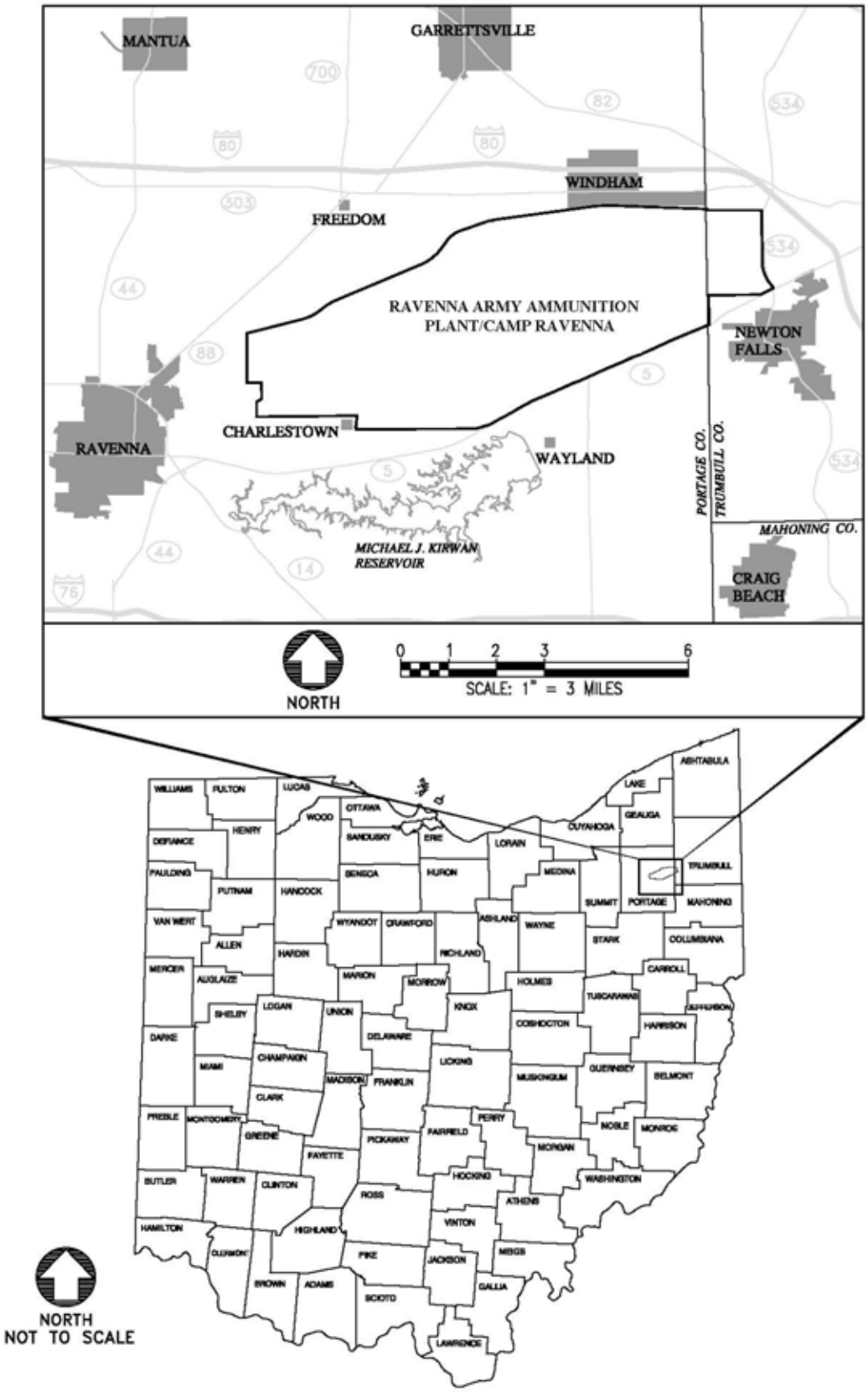

Figure 1. Ravenna Army Ammunition Plant Location Map

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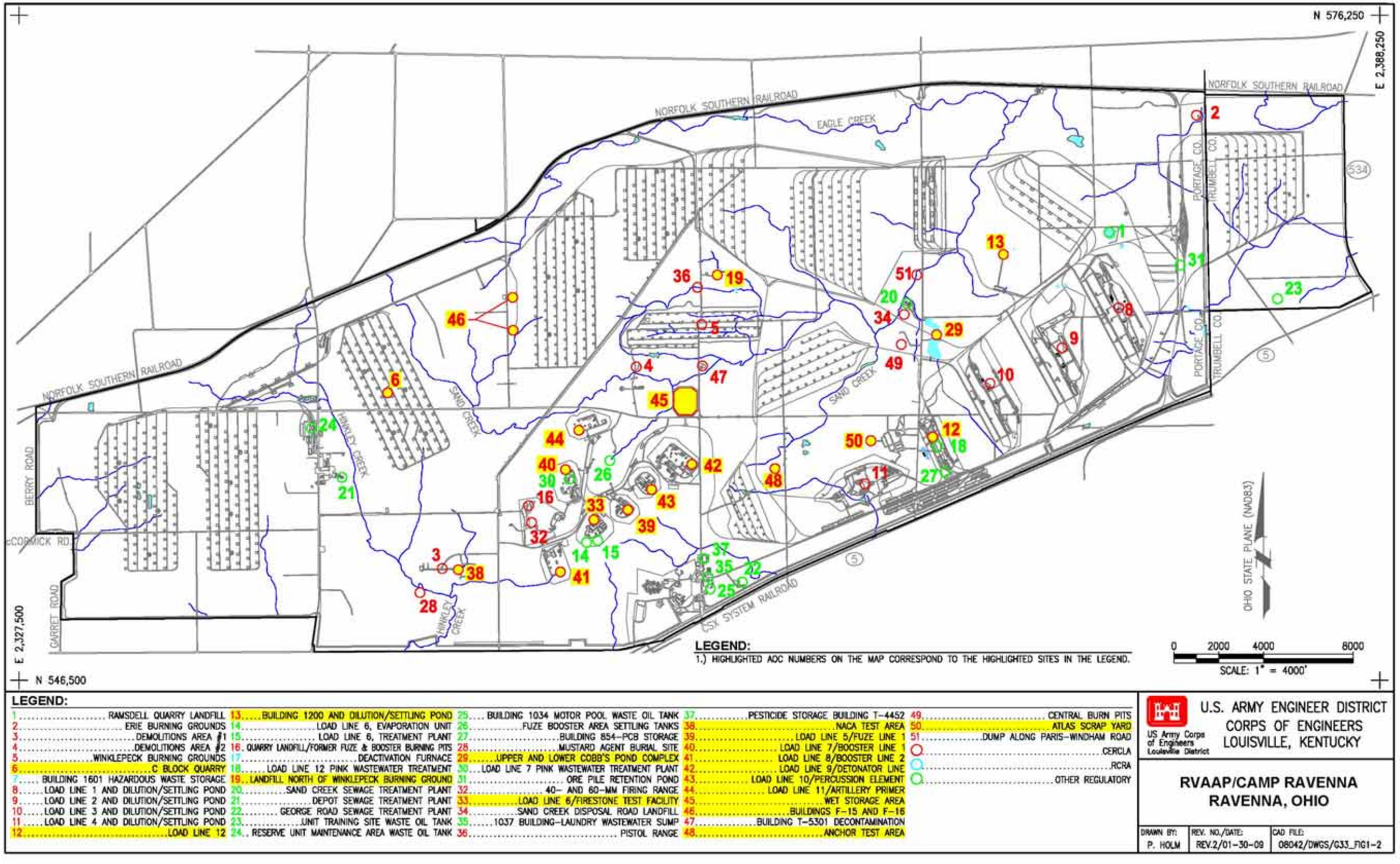

Figure 2. All Sites Map

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APPENDIX C.
Local Points of Contact

C.0 LOCAL POINTS OF CONTACT

Table. C-1. Local Points of Contact and Emergency Telephone Numbers

Service/Contact	Agency/Position	Telephone Number
General Emergency Contact	RVAAP Security Dispatcher (Post 1)	Via radio communication Or Phone: 330-358-2017
Land or Air Ambulance	Ravenna City Fire Department Ravenna, OH	911 Operator, or 330-297-0811
Emergency Hospital Care	Robinson Memorial Hospital 6847 N Chestnut Street Ravenna, OH 42666	330-297-0811
Police	Portage County Sheriff's Office	330-296-5100/325-1023
Police	Trumbull County Sheriff's Office	330-675-2508
Ravenna City Fire Department	Ravenna OH	911 Operator or 330-296-5783
OEPA Emergency Response	Ohio EPA, Columbus, OH	800-282-9378 24 hr 614-224-0946 24 hr
Eileen Mohr	Ohio EPA, Twinsburg, OH	330-963-1221
Closest Military EOD Unit	731st Ordnance Company (EOD), Wright Patterson AFB, OH	937-257-0436 or 937-257-0664
Mark Patterson	RVAAP Facility Manger	330-358-7311
William K. Jago	SAIC Project Manger	865-481-4614
Jed H. Thomas	SAIC Project Engineer	330-405-5802
Jonathan Chionchio	USA Environmental President	831-343-6350
Ken Jones	USA Environmental Project Manger	850-319-3421
Robert Crownover	USA Environmental QC Safety Manager	813-343-6364
Jim McGee	PIKA Inc. RVAAP caretaker contractor	330-358-3005

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APPENDIX D.
Site Safety and Health Plan

Appendix D

Site Safety and Health Plan
for the Draft Work Plan
2008 Performance-Based Acquisition for
Environmental Investigation and Remediation
MEC Avoidance/Removal Services

Ravenna Army Ammunition Plant
Ravenna, Ohio

Contract No. W1912QR-04-0028
Delivery Order No. 0001

Prepared for:
SAIC Engineering of Ohio, Inc.
8866 Commons Boulevard
Twinsburg, Ohio 44087

U.S. Army Corps of Engineers
600 Martin Luther King, Jr. Place
Louisville, Kentucky 40202

Prepared by:
USA Environmental, Inc.
720 Brooker Creek Boulevard
Suite 204
Oldsmar, Florida 34677

May, 2009

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF ATTACHMENTS

LIST OF ACRONYMS

APP	Accident Prevention Plan
COTR	Contractor's Office Technical Representative
EOD	Explosive Ordnance Disposal
MGFD	Munition with the Greatest Fragmentation Distance
MRA	Munitions Response Area
msl	Mean Sea Level
PHSM	Program Health and Safety Manager
POSM	Program Occupational Safety Manager
SHSP	Site Health and Safety Plan
SI	Site Inspection
SZ	Support Zone
°F	Degrees Fahrenheit
AHA	Activity Hazard Analysis
AOC	Area of Concern
BIP	Blown in Place
CFR	Code of Federal Regulations
CHSM	Corporate Health and Safety Manager
CSP	Certified Safety Professional
CWM	Chemical Warfare Material
DMM	Discarded Military Munitions
DoD	Department of Defense
EZ	Exclusion Zone
FWSHP	Facility-Wide Safety and Health Plan
MC	Munitions Constituents
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
MSD	Minimum Separation Distance
NTA	NACA Test Area
OE	Ordnance and Explosives
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
PWS	Performance Work Statement
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
TNT	2,4,6-trinitrotoluene
USAE	USA Environmental, Incorporated
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer
UXOTECHIII	Senior Unexploded Ordnance Supervisor

1.0 INTRODUCTION

This Site Safety and Health and Plan (SSHP) establishes the responsibilities, requirements and procedures for protecting the project personnel, environment and the surrounding community from the hazards associated with the munitions and explosives of concern (MEC) Remediation Services at Ravenna Army Ammunition Plant (RVAAP). This SSHP is an addendum to the Science Applications International Corporation (SAIC) SSHP, which incorporates the Facility-Wide Safety and Health Plan (FWSHP) and Corps of Engineers documents for the RVAAP. USA Environmental (USAE) staff will abide by the requirements of the FWSHP and the SAIC SSHP. The requirements of this SSHP Addendum are in addition to the requirements established in the FWSHP and SAIC SSHP.

This Contract Task Order requires MEC avoidance services, as well as MEC investigation and clearance services at potentially three Areas of Concern (AOCs) within the RVAAP. At the North side of NACA Test Area (NTA) runway, surface sweep and anomaly investigation may be required to a depth of four feet over a 20' x 60' area in support of remedial actions. At the Landfill North of Winklepeck Burning Ground, an area of about 2.5 acres, a MEC surface sweep may be required in advance of vegetation clearance and heavy equipment mobilization. At the Atlas Scrap Yard, a 20 acre area, a surface sweep and anomaly investigation may be required to a depth of four feet. MEC avoidance services will also be required for site characterization operations such as surveys of proposed soil boring and monitoring well drilling locations. There is potential to encounter discarded military munitions (DMM), munitions debris (MD), unexploded ordnance (UXO) and munitions constituents (MC).

1.1 SITE DESCRIPTION

Refer to Section 2.1 of the SAIC SSHP.

1.2 CONTAMINANT CHARACTERISTICS

Refer to Section 2.2 of the SAIC SSHP.

In addition to these contaminants, items previously encountered at the Landfill North of Winklepeck Burning Ground include booster cups, munitions waste, and possibly explosives. Explosive waste included 2,4,6-trinitrotoluene (TNT), Composition B, lead azide, lead styphnate and black powder. UXO items were identified in the demolition area. A UXO/ordnance and explosives (OE) removal was completed in July 2001 at Open Detonation Area #1, located just south of the NTA runway.

Chemical Warfare Material (CWM): The AOCs included in the project scope are not suspected to contain CWM. However, if suspect CWM is encountered during any phase of site activities, USAE personnel will immediately withdraw upwind from the work area, secure the site and contact the SAIC Project Manager. USAE will maintain security at the site until written direction is provided by SAIC regarding the procedure to be followed for performing further MEC remediation work at the site.

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2.0 HEALTH AND SAFETY HAZARD ASSESSMENT

Refer to Section 3.0 of the SAIC SSHP.

An Activity Hazard Analysis (AHA) has been conducted and documented for each activity and its associated hazards (see Attachment 1 for the site-specific AHAs). For the RVAAP site, the following activity hazard analyses have been prepared for all anticipated field operations:

- MEC Avoidance Activities;
- Detector-Assisted Surface Clearance;
- Anomaly Investigation;
- MEC Transport; and
- MEC Disposal.

Should conditions, equipment, or types of operations change during the course of the project work, the Corporate Health and Safety Manager (CHSM) will update an existing AHA for continuing work, or prepare a new AHA for new operations. The site exclusion zone (EZ) of 341 feet will be based on the hazardous fragment distance of the 105mm round at the Landfill North of Winklepeck Burning Ground. The fragmentation distance around the site footprints are for the protection of the general public. A separation distance will also be established between UXO teams of at least 78 feet, to protect individual operating units in the event of an accidental detonation while site operations are underway. This represents the K40 distances of the most hazardous round. On the NTA site and the Atlas Scrap Yard, the EZ of 131 feet will be based on the hazardous fragment distance of the 40mm M406 round. The separation distance between teams on these sites will be at least 40 feet. Should a more hazardous round be encountered at any location, the EZ will be re-calculated based on the most hazardous round. As this work is primarily hazard avoidance, the EZ designation is mostly designed to protect personnel not affiliated with site operations.

Risk management is and will continue to be integrated into the planning, preparation, and execution of all operations at the RVAAP site. Risk management is a dynamic process, and is continuously improved upon as personnel become more familiar with the site operations, equipment, and environment. Site personnel are trained to continuously identify hazards and assess accident risks. Once identified, these hazards will be brought to the attention of the Senior Unexploded Ordnance Supervisor (UXOTECHIII) or Unexploded Ordnance Quality Control Specialist/Unexploded Ordnance Safety Officer (UXOQCS/UXOSO). Control measures will be developed and coordinated by USAE safety personnel. All site personnel are responsible for continuous assessment of variable hazards and the implementation of risk controls.

2.1 HAZARD MITIGATION

The hazards listed above will be addressed through a combination of training, engineering controls, and personal protective equipment (PPE).

2.1.1 Implementation of Engineering Controls and Work Practices

Personnel training with respect to work procedures and the use of engineering controls can prevent accidents from occurring. Training in recognition of MEC or MEC pieces that could be hazardous will be given to all site workers. When MEC or pieces of MEC are encountered, only UXO-qualified personnel will have the authority to identify and dispose of them. Other controls include the Minimum Separation Distance (MSD) of 19 feet, which will provide protection of individual teams from nearby site operations, and the fragmentation distance surrounding the site footprint of 200 feet, will protect the general public from the hazards of site operations.

2.1.2 Upgrades/Downgrades in Levels of Personal Protective Equipment

Due to the types of hazards at this site, Level D PPE will be required. This type of PPE is used for levels of contamination that may present a nuisance, but not an identifiable hazard. Level D PPE consists of a hard hat, safety glasses, hearing protection, leather work gloves, snake leggings (where required) and leather work boots with composite safety toe (no steel toe boots will be permitted in the vicinity of magnetometer operations). The hard hat, hearing protection, and composite safety toe boots are required in the vicinity of heavy equipment operations. If site hazards are encountered that require additional PPE, the PPE level will be increased by the UXOQCS/UXOSO in consultation with the CHSM, who would base the decision on documented evidence of the hazards. If the site is not as hazardous as originally anticipated, the level of PPE can also be downgraded by the CHSM. This decision would also be based on definitive data that confirms the PPE can be lessened. Downgrading PPE will require at least one week of data demonstrating that the site is not as hazardous as originally suspected.

2.1.3 Work Stoppage

All personnel are trained to be constantly aware of their work environment. Anyone has the ability to stop operations for safety reasons. No worker is expected to perform any operation for which he has not been properly trained, or to perform any operation that is considered to be unsafe. After operations are stopped for safety reasons, the UXOQCS/UXOSO will be notified and will evaluate the situation. The UXOQCS/UXOSO will, in consultation with the CHSM and/or Certified Safety Professional (CSP), determine what steps need to be taken to make the situation safe for operations to continue.

2.1.4 Emergency Evacuation

Refer to Section 14 of the SAIC SSHP.

2.1.5 Prevention and/or Minimization of Public Exposure to Hazards Created by Site Activities

The creation of an EZ of at least 341 feet between the site footprint and the general public for the Landfill North of Winklepeck Burning Ground and 131 ft between the other AOCs and the general public, acts as a safety buffer to protect the public and other site operations from site hazards. Controlling access to the site, closing roads, and installing signs and barricades are all means of keeping the general public or installation personnel from accidentally wandering into the site during operations. In addition, the training of all site workers in the hazards and recognition of MECs will reduce the potential for public exposure to hazards. As RVAAP is a secured installation, unauthorized personnel are not expected at this site. However, if unauthorized personnel are observed in the EZ, all MEC operations will cease until the area is cleared.

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3.0 SAFETY STAFF

See Section 5 of the SAIC SSHP.

3.1 UXO QUALITY CONTROL SPECIALIST/UXO SAFETY OFFICER (UXOQCS/UXOSO) – TBD

MEC site activities will be conducted under the supervision of the USAE UXOQCS/UXOSO for safety on an as needed basis. The UXOQCS/UXOSO will act as safety oversight for USAE work and will perform any emergency notification or assistance required as directed by the On-Scene-Incident-Commander. He is also responsible for:

- Implementing the field SSHP;
- Enforcing all provisions of the SSHP;
- Determining evacuation routes;
- Presenting daily safety meetings;
- Presenting training requirements for site personnel and visitors;
- Maintaining safety logs and records in the field;
- Implementing changes to SSHP as directed by the CSHM or CSP;
- General Health and Safety Program administration and enforcement;
- Enforcing the level of personnel protection required;
- Investigating work-related accidents and illnesses and implementing corrective action plans;
- Stopping any operation that threatens the health or safety of the team or surrounding population; and
- Upgrading levels of protection based on site observations or monitoring results.

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4.0 HEALTH AND SAFETY STAFF ORGANIZATION AND RESPONSIBILITIES

See Section 5 of the SAIC SSHP.

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5.0 SITE-SPECIFIC TRAINING

See Section 6 of the SAIC SSHP.

In addition to the training mentioned, all UXO-qualified personnel must meet the training and experience requirements outlined in DDESB TP-18.

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6.0 SITE-SPECIFIC MEDICAL SURVEILLANCE

Refer to Section 8.0 of the SAIC SSHP.

Medical surveillance physical of UXO personnel on site will not exceed one year, and will include the following elements:

- Medical and occupational history questionnaire, which includes information on past gastrointestinal, hematological, renal, cardiovascular, reproductive, immunological, and neurologic problems;
- Information and history of respiratory disease and personal smoking habits;
- Physical examination;
- Blood pressure measurements;
- Complete blood count and differential to include hemoglobin and hematocrit determinations, red cell indices, and smear of peripheral morphology;
- Blood urea nitrogen and serum creatinine;
- SMAC 24;
- Chest x-ray;
- Pulmonary function test;
- Audiogram;
- Echocardiogram for employees over 45 years old, or when other complications indicate the necessity;
- Drug (HR Panel 10) and alcohol screening; and
- Visual acuity.

6.1 PHYSICIAN'S STATEMENT

The results of this examination will be made available to the employee and a written physician's statement will be sent to USAE. A copy of the physician's statement will be kept in each employee's file at the project site for the duration of site operations. The physician's statement will include the following:

- The physician's opinion regarding any conditions that would place the employee at an increased risk from working in hazardous waste operations;

- The physician's recommended limitations upon the employee's assigned work, if any; and

- A statement that the employee has been informed by the physician of the results of the examination, and any conditions that may require further examination or treatment.

6.2 MEDICAL RESTRICTION

Should an occupational injury or illness occur that restricts an employee's ability to function at full capacity, USAE maintains a policy of providing these employees with restricted duty assignments whenever possible to allow them to continue to be productive.

6.3 RECORD KEEPING

USAE will retain and maintain copies of all physician statements, exposure records, and associated information for USAE employees involved in hazardous waste operations, in accordance with the requirements of 29 CFR 1910.120(f). These records will be kept at the project site for the duration of site operations. When the site work is complete, the records will be retained by USAE at the Corporate Office located in Oldsmar, FL. Examining physicians will be responsible for maintaining records related to laboratory analyses and other tests for each USAE employee examined. All records, whether maintained by USAE or by the examining physician, will be kept on file for a period of 30 years beyond an employee's termination.

7.0 PERSONAL PROTECTIVE EQUIPMENT

Refer to Section 7.0 of the SAIC SSHP.

Due to the expected hazards at this site during most operations, Level D PPE will be required. Level D PPE is a work uniform affording minimal protection, used for nuisance contamination only. The following Level D equipment will be required on this site:

- Hard hat – when working around heavy equipment;
- Leather gloves;
- Safety glasses with side shields or safety goggles;
- Hearing protection, where required by high noise levels (e.g., in the vicinity of heavy equipment operations);
- Leather work boots with ankle support, composite safety toes, and non-slip soles (no steel toe boots will be permitted in the vicinity of magnetometer operations;
- Cotton work clothes;
- Back supports (optional); and
- Snake leggings – when working in snake-infested areas.

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8.0 MONITORING AND SAMPLING PLANS

Refer to Section 9.0 of the SAIC SSHP. SAIC will be providing chemical monitoring where required.

Workers on this site will normally be in Level D PPE; however, heat stress monitoring will be required if the temperature rises above 75 F. Should heat stress monitoring be required, site monitoring data will be recorded using the Site Monitoring Log and will be maintained as part of the project record. Should temperatures fall below 40 F, cold stress monitoring may be required.

8.1 HEAT STRESS/COLD STRESS MONITORING

Refer to Section 10.0 of the SAIC SSHP.

8.2 METEOROLOGICAL MONITORING

Rain can constitute a safety hazard to field operations at this site. The UXOQCS/UXOSO will be responsible for monitoring the weather closely. If the area becomes wet, muddy, or slippery such that an unacceptable level of risk exists for personnel who are working in proximity to MEC items, then site operations will cease until the UXOQCS/UXOSO determines the area is safe to continue.

No site MEC operations will take place if an electrical storm is within 10 miles of the site. An electrical storm monitor, set to the proper distance, will be used to determine if an electrical storm is approaching. Site operations will cease when an electrical storm is within 10 miles of the site, and will not resume again until the UXOQCS/UXOSO determines that the electrical storm is at least 10 miles away from the site. Personnel will evacuate the site to the pre-designated evacuation point and will await the determination by the UXOQCS/UXOSO that it is safe to resume operations.

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9.0 HEALTH AND SAFETY WORK PRECAUTIONS AND PROCEDURES

Refer to Section 11.0 of the SAIC SSHP.

Using common sense and following safe practices can reduce hazards. Personnel must keep the following guidelines in mind when conducting field activities:

- Hazard assessment is a continuous process. Personnel must be aware of their surroundings and constantly be aware of MEC, chemical, and physical hazards that are or may be present.

- The number of personnel in the EZ will be the minimum number necessary to perform work tasks in a safe and efficient manner.

- Team members will be familiar with the physical characteristics of each site including wind direction, site access, and the location of communication devices and safety/emergency equipment.

- Detection or appearance of unusual or unknown liquids, odors or discolored soil could indicate the presence of contaminants, and should be reported to the SAIC Site Safety and Health Officer (SSHO) immediately.

- Site personnel are to report any other unusual or potentially hazardous condition to the SAIC SSHO for investigation and/or corrective action.

9.1 SITE RULES/PROHIBITIONS

All personnel on site will be required to follow the safe work practices contained in this Plan. All site personnel will be required to read, understand, and comply with the provisions of this SSHP. If new tasks or hazards are identified during site operations, the SSHP will be amended by the CHSM or CSP to include additional safe work practices and other control methods as needed.

9.1.1 Safe Practices

Safe practices can reduce hazards associated with normal site activities. Personnel must keep the following guidelines in mind when conducting field activities. General personnel requirements:

- Horseplay or fighting is prohibited.

- Eating, drinking, smoking, chewing gum, tobacco, or any other hand-to-face activities are prohibited on site, except in designated areas after both face and hands have been washed.

- When required to sit or kneel on the ground, avoid contaminated surfaces.

- Placing equipment on contaminated surfaces should be avoided.

- Climbing on or over obstacles is prohibited. Stacks of materials can be unstable and could cause injury.

- Open flames of any type are prohibited on site.

- Bringing defective or unsafe equipment on site is prohibited.

Only authorized employees may enter the work site. Visitors must check in with the UXOQCS/UXOSO, receive an appropriate safety briefing, and be escorted by UXO-qualified personnel at all times while on site.

9.1.2 Buddy System

The buddy system is a safety practice in which each individual is concerned with the health and well being of co-workers. The buddy system will be implemented during all on-site activities and will be incorporated when personnel may be working in isolated/remote areas, or as determined by the UXOQCS/UXOSO. The UXOQCS/UXOSO will assign "buddies" to ensure accounting of all site personnel. Additional procedures include:

- A minimum of two personnel, with one being a UXO-qualified person, will be present during all MEC operations to ensure that one person will always act as a safety observer. During all MEC operations, only the minimum number of personnel required to safely perform the task will be allowed on site. All other personnel will evacuate to a pre-designated assembly point.

- At no time will an individual desert his "buddy" unless his "buddy" is injured, and it is considered too hazardous to render assistance. "Buddies" will enter and exit the EZ together and frequently monitor one another for signs of fatigue, heat stress, and any other problems. In such cases, the worker in danger may not be aware he/she is having a problem. The "buddy" must always be alert to changes in the behavior of his "buddy" so that he can remove him/her from the situation immediately.

- "Buddies" should frequently inspect each other's equipment, including PPE, to ensure that it is adequate and in proper working order.

9.2 WORK PERMIT REQUIREMENTS

At this time, USAE does not anticipate work permits for the work associated with this project. Under the Performance Work Statement (PWS) and activities anticipated for this project, there are no anticipated requirements for hot work (e.g., welding or cutting torch). All site personnel will utilize the general fire safety precautions and procedures to eliminate the hazards from ignition sources. There are expected to be no confined spaces or radioactive work on this project. Should this situation

change, this SSHP will be updated to include these additional hazards, and shall handle them in accordance with the USAE Corporate Safety and Health Program, which addresses all of these issues.

9.3 MATERIAL HANDLING PROCEDURES

Many types of objects are handled in normal day-to-day operations. Care will be taken and training will be provided to all personnel for lifting and handling heavy or bulky items, as this is the cause of many joint and back injuries. The following fundamentals address the proper lifting techniques to avoid joint and back injuries:

- The size, shape, and weight of the object to be lifted must be considered. Site personnel will not lift more than they can handle comfortably (not more than 50 lbs).

- A firm grip on the object is essential; therefore, the hands and object will be free of oil, grease, and water, which might prevent a firm grip.

- The hands, and especially the fingers, will be kept away from any points that may cause them to be pinched or crushed, especially when setting the object down.

- The item will be inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces, and pinch points. Gloves will be used, if necessary, to protect the hands.

- The feet will be placed far enough apart for good balance and stability.

- Personnel will ensure that solid footing is available prior to lifting the object.

- When lifting, get as close to the load as possible, bend the legs at the knees, making sure that the back is kept as straight as possible.

- To lift the object, the legs are straightened from their bending position.

- Never carry a load that cannot be seen over or around.

- When placing an object down, the stance and position are identical to that for lifting, with the back kept straight, the legs bent at the knees, and the object lowered.

- If the item to be lifted is too large, bulky, or heavy (over 50 pounds) for one person to safely lift, ask a co-worker for assistance. If a piece of material handling equipment is available that can do the job, the employee should use the equipment instead of trying to lift the object himself/herself.

- When two or more people are required to handle an object, coordination is essential to ensure that the load is lifted uniformly, and that the weight is equally divided between the individuals

carrying the load. When carrying the object, each person, if possible, will face the direction in which the object is being carried.

9.4 SPILL CONTAINMENT

Major spills are not expected to result from work activities conducted under this work plan. Hazardous materials, where necessary, are being brought to the site in small quantity containers and USAE will retain the smallest amount of hazardous material required in order to adequately conduct operations. This approach will minimize the amount of material involved, should a spill occur, as well as reduce the amount of hazardous material on hand to the minimum amount consistent with efficient operations. If a small amount of liquid hazardous material is spilled, it will be cleaned up with absorbent material by site personnel wearing appropriate chemical resistant gloves. It will then be containerized, labeled, and sent for disposal at an approved facility.

9.5 DRUM, CONTAINER, AND TANK HANDLING

USAE does not anticipate the use of drums, containers, or tanks during activities conducted under this Work Plan.

9.6 COMPREHENSIVE ACTIVITY HAZARD ANALYSIS OF TREATMENT TECHNOLOGIES

USAE will not be employing any treatment technologies related to the MEC response.

9.7 MATERIAL SAFETY DATA SHEETS

The Material Safety Data Sheets are located in Attachment 2.

9.8 SUBCONTRACTOR CONTROL

USAE is a subcontractor to SAIC for this work. Subcontractors to USAE are not expected to be used on this project.

10.0 SITE CONTROL MEASURES

Refer to Section 12.0 of the SAIC SSHP.

10.1 WORK ZONE DELINEATION AND ACCESS POINTS

Site work zones will be established by the UXOQCS/UXOSO prior to initiating operations to control site access. Establishment of site work zones is based upon site conditions, activities, and exposure potentials. A site EZ will be set up, which includes the footprint of the area where work will take place and a distance of at least 200 feet around that to protect areas outside the site from potential site hazards. Within the EZ, operating teams will maintain a MSD of at least 19 feet to protect the teams from each other's operations. Site work zones will be marked using barricades and signage to close incoming roads to unauthorized vehicular traffic. Barricades and signs will remain in place for the duration of site operations.

10.2 ON AND OFF-SITE COMMUNICATION SYSTEM

On-site communication will be conducted by voice or hand signals. If off-site communication is required, it will be established through the use of cellular telephones. The UXOTECHIII and UXOQCS/UXOSO will have cell phones available, and all site vehicles will be equipped with either a cell phone or radio for communication between teams and the UXOQCS/UXOSO. The list of emergency telephone numbers will be posted in each site vehicle, and with each cell phone.

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11.0 PERSONNEL HYGIENE AND DECONTAMINATION FACILITIES AND PROCEDURES

Refer to Section 13.0 of the SAIC SSHP.

General work practices include the following:

- Safe work practices will be implemented when possible to eliminate or reduce the potential for employee exposure.

- Employees will wash their hands as soon as is feasible after removal of gloves or other PPE.

- Employees will wash hands and any other skin with soap and water, or flush mucous membranes with water immediately following contact with blood or potentially-infectious materials.

- If potentially-contaminated sharps are encountered, the item will immediately be decontaminated, or disposed of in an appropriate puncture-proof container.

- Eating, drinking, smoking, applying cosmetics or lip balm, handling of contact lenses, or storage/ handling of food are prohibited in all areas where potentially infectious or other hazardous materials are present.

- Equipment that has become contaminated will be decontaminated prior to servicing or storage, unless decontamination is not feasible, in which case the equipment will be disposed of properly.

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12.0 EQUIPMENT DECONTAMINATION FACILITIES AND PROCEDURES

Refer to Section 13.0 of the SAIC SSHP.

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13.0 ON-SITE FIRST AID AND EMERGENCY PROCEDURES AND EQUIPMENT

Refer to Section 14.0 of the SAIC SSHP.

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14.0 EMERGENCY RESPONSE PLAN AND CONTINGENCY PROCEDURES

Refer to Section 14.0 of the SAIC SSHP.

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15.0 EVACUATION PLAN

Refer to Section 14.0 of the SAIC SSHP.

Potentially hazardous weather conditions will be closely monitored by the UXOQCS/UXOSO. The UXOQCS/UXOSO will determine if high wind or heavy rain conditions pose a hazard to site operations. If so, personnel will evacuate to the pre-determined evacuation point, and will wait for conditions to clear or for further instructions from the UXOQCS/UXOSO.

After the emergency situation has been controlled or eliminated, the Project Manager, UXOQCS/UXOSO, and CHSM will review the way the emergency was handled and revise procedures if necessary.

After allowing the appropriate wait time (e.g., 24 hours in the case of a fire), the UXOTECHIII and the UXOQCS/UXOSO will enter the site together and determine if the site is safe for re-entry. If MEC is encountered that may have been subjected to extreme temperatures in a fire, it will be considered unsafe to move, and will be blown in place (BIP).

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16.0 LOGS, REPORTS, AND RECORD KEEPING

Refer to Section 15.0 of the SAIC SSHP.

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17.0 ON-SITE WORK PLANS

The approved Work Plans will be maintained on site by the UXOTECHIII and the UXOQCS/UXOSO, which include the SSHP and the Quality Control Plan. These plans will be fully implemented for the duration of site operations. If new hazards are encountered that are not fully addressed within these documents, the documents will be amended in accordance to the requirements of DoD 6055.9 STD and will be sent for approval through the same appropriate channels that approved the original plans.

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18.0 COMMUNICATION PROCEDURES

On-site communication will be verbal within the individual teams. There may also be an alarm signal (e.g., air horn) used for the purposes of site evacuation.

Off-site communication will be by cellular telephone. Telephones will be available in each site vehicle, and the list of emergency telephone numbers will be posted with the telephone.

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19.0 SPILL CONTAINMENT PROCEDURES

Small quantity containers of chemicals will be used at the work site, which will minimize the amount of hazardous materials that could potentially become part of a spill, should an accident occur. The majority of chemicals used will include fuels, oils and lubricants for use in site equipment. Spill clean-up kits will be available for use to clean up these chemicals and the impacted soils in the event a spill occurs. Chemical resistant gloves will be used during all cleanup activities. The spilled chemical and the contaminated soil will be cleaned up, placed in labeled plastic bags, and stored in drums or other secured location until such time as they can be removed from the site and sent to a certified disposition facility.

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20.0 CONFINED SPACE PROCEDURES

Due to the nature of this PWS, confined spaces are not expected to be an issue on this site.

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21.0 FIRE PROTECTION REQUIREMENTS

Through appropriate use and storage of flammable products, USAE intends to prevent fires as much as feasible during operations on this site. Should a fire occur, all site teams will have at least one ABC fire extinguisher with them during the course of operations. Fire extinguishers are the first line of defense should a fire start in this location. USAE personnel will be trained in the use of fire extinguishers and they will be instructed to try to fight a fire only in the incipient stages. If the fire is too large to fight, personnel will evacuate the site and the SAIC SSHO will call in the Fire Department, who will stand no closer than fragmentation distance from the fire to fight or prevent spreading of the fire. If it is possible to safely do so, USAE will remove any flammable and/or combustible materials from the path of the fire.

After the fire has been extinguished, the area will be closely monitored by the UXOQCS/UXOSO for a period of at least one hour for a small fire, to assure that re-ignition does not occur. For larger fires, a wait time of 24 hours will be given after the fire has been extinguished before anyone would be permitted to gain access to the site. At that point, the UXOTECHIII and the UXOQCS/UXOSO would enter the site together. If MEC is observed, it will be considered to be unstable due to exposure to extreme heat. USAE would then blow it in place. After all visible MEC has been disposed of, it is considered safe for other personnel to enter the site for the purposes of site investigations. All personnel entering the site who are not UXO-qualified will be escorted by a UXO-qualified person for the duration of the site visit. If MEC is encountered while non UXO-qualified personnel are visiting the site, they will be removed from the site until the MEC can be BIP, and the site can be made safe for re-entry.

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22.0 INCIDENT REPORTING REQUIREMENTS

Should an accident or mishap occur on the site, regardless of the severity, it will be fully investigated by USAE and all reports and records will be documented on the USAE Accident Report Form. Copies will be maintained on site for the duration of site activities. A permanent copy will be maintained in the USAE Oldsmar, Florida Office. Accidents/incidents shall be reported in accordance with EM 385-1-1. All accident/incident reports will be reviewed by the CHSM and the CSP to assure all root causes of the accident/incident have been adequately addressed in order to prevent future recurrences on this or any other project sites.

The UXOTECHIII will notify the SAIC Project Manager immediately and fill out and submit the USAE Accident Report Form to the Contracting Officer or designated representative for review within one working day of the event.

Any accident involving a fatality or three or more hospitalizations from the same incident will be reported telephonically to the nearest OSHA Area office within 24 hours by the CHSM. If all information is not known at the time, an initial report will be made, and a follow-up report will be submitted after all of the facts are documented.

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23.0 EXCAVATION AND SHORING

Excavation or trenching operations may be taking place, but are not expected to be in excess of four feet in depth, therefore OSHA excavation shoring and entry requirements will not be applicable. None of these spaces should qualify as a confined space. Should these requirements change and the excavations exceed four feet in depth, the excavation and confined space sections of the USAE Corporate Safety and Health Program will be implemented.

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24.0 DRILLING OPERATIONS

Drilling operations will not be required by USAE.

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25.0 STAGING AREA

A staging area will be required for MEC that is safe to move. An approved on-site storage bunker, meeting the requirements of DoD 6055.9, will be used. MEC that is unsafe to move will be BIP.

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26.0 DISPOSAL OF WASTE

Trash receptacles with lids will be located on the site for the collection of normal site waste. These receptacles will be emptied on a daily basis in order to prevent the accumulation of combustible materials on site.

Hazardous materials brought to the site by USAE will consist mostly of fuels and lubricants for the site equipment. These will be brought to the site in small quantity containers. Should there be a spill of any of this material, spill clean-up kits will be available to remove the chemicals and any impacted soil. The spilled material and contaminated soil would be placed in a drum or other suitable container, properly labeled, and shipped to a qualified disposal facility.

Hazardous MEC will be BIP in accordance with standard operating procedures. Inert scrap will be inspected and certified as free of explosives. It will be collected in a secured bin and sent to a qualified recycler at the end of operations on the site.

MEC that is acceptable to move will be sent to an approved bunker for on-site storage for the duration of site operations. This MEC will undergo disposal prior to the end of site work.

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27.0 REFERENCES

USACE 2001. *Facility Wide Safety and Health Plan for Environmental Investigations at the Ravenna Army Ammunition Plant, Ravenna, Ohio,* DACA62-00-D-0001, D.O. CY02, March 2001.

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Attachment 1. Activity Hazard Analyses

Activity Hazard Analysis (AHA)

Investigation of Buried MEC

Activity: Investigation of Buried MEC	**Date: November 14, 2008**
	Project: SAIC Project, Ravenna Army Ammunition Plant, Ravenna, OH
Description of the work: Employ approved techniques and methods during investigation of MEC/UXO.	**Prepared By: Cheryl Riordan, CSP**
	Analyzed By: James Walden
	Review for latest use: Each time before the job is performed.

PRINCIPLE STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
• Locate anomalies using geophysical equipment. • Mark anomaly locations with pin flags. • Carefully dig around the item, so that MEC can be identified and examined for condition. • Anomalies will be carefully excavated using hands and hand tools, so that MEC identification can be made. • Heavy equipment can be used to within one foot of buried MEC. • Inspect MEC for identification and condition. • If acceptable to move, take MEC and MPPEH to secured central staging area at the SAIC bunker. • If item is unsafe to move, item will be blown in place.	• MEC hazards. • Uneven working surfaces – slip, trip, fall hazards. • Muscle strain from carrying instruments. • Heat Stress/Cold Stress. • Unauthorized personnel entering site during operations • Unplanned Detonations. • Biological hazards – spiders, snakes, bees, wasps, ticks, rodents and hazardous plants. • Sunburn. • Heavy equipment hazards. • Noise. • Cuts and abrasions from handling rocks or buried debris.	• On-site MEC Training. • Establish 341 foot exclusion zone around the Landfill North of Winklepeck Burning Ground project site, and 131 feet around the other two AOCs. • Establish 78 foot separation distance between teams on the Landfill North of Winklepeck Burning Ground project site, and 24 feet for the other two AOCs. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles (no steel toe around magnetometer operations). • Follow appropriate lifting/ carrying procedures. • Heat stress monitoring, drinking water, work-rest schedule, and cool shelter for breaks. • Cold stress monitoring, drinking water and warm liquids, work-rest schedule, warm shelter for breaks. Dress in layers. Change socks. • Training in biological hazards avoidance; PPE. • Site control measures will be implemented (fencing, barricades, signage) and exclusion zone established. • Observe all MEC safety precautions, such as movement, heat, shock, and friction. • Only UXO trained personnel will locate anomalies. • Cease operations if unsafe conditions arise. • Maintain positive site control; cease operations if unauthorized entry is made. • Wear the appropriate PPE for the task being performed. • Keep personnel to a minimum during operations. • Use and enforce the buddy system. • Ensure first aid kits and fire extinguishers are in place. • No smoking, except in designated areas.

		• Wear long sleeved shirts and long pants. • Use insect repellants and barrier creams/ointments as necessary. • Use sunscreen and wear cap. Wear hard hat around heavy equipment.

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Appropriate geophysical equipment. • Hand tools. • Heavy equipment. • Footwear with ankle support, non-slip soles, and composite safety toes (no steel toes around magnetometers). • Back braces (optional). • Communications equipment. • Appropriate clothing and PPE to include safety glasses or goggles, leather gloves, cotton work clothes, and hard hat and hearing protection around heavy equipment. • Barricades and signage. • First aid kit. • Fire extinguishers. • WBGT monitor.	**SUXOS/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use. • Communications equipment checked daily prior to use. • First aid kits checked daily and inspected weekly. • Fire extinguishers checked daily and inspected weekly. • Daily serviceability check of magnetometer.	• UXO personnel will meet training and experience requirements outlined in DDESB TP 18. • Site-specific MEC training will be presented to all site personnel. • Valid drivers' license/operators permit/certificate. • Heavy Equipment familiarity as required. • All UXO personnel will receive refresher training in excavating of anomalies. • Site-specific training on slip, trip and fall hazards. • Site-specific training/lifting techniques. • Heat Stress/Cold Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • PPE Training. • All site personnel will have current HAZWOPER training.

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Activity Hazard Analysis (AHA)

Magnetometer-Assisted Surface Clearance

Activity: Magnetometer-Assisted Surface Clearance	**Date: November 14, 2008**
	Project: SAIC Project, Ravenna Army Ammunition Plant, Ravenna, OH
Description of the work: Perform magnetometer-assisted surface clearance of areas identified.	**Prepared By: Cheryl Riordan, CSP**
	Analyzed By: James Walden
	Review for latest use: Each time before the job is performed.

PRINCIPLE STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
• Determine areas where surface clearance is required. • Locate anomalies using geophysical equipment as well as visual survey. • Surface MEC will be identified using pin flags, GPS coordinates or other identification, and photographs. • If MEC is acceptable to move, it will be transported to approved SAIC storage bunker on the site. • If MEC is not acceptable to move, it will be blown in place.	• MEC hazards. • Uneven working surfaces – slip, trip, fall hazards. • Muscle strain carrying instruments. • Heat Stress/Cold Stress. • Biological hazards – bees, wasps, spiders, ticks, snakes, rodents and hazardous plants. • Unauthorized personnel entering site during operations. • Cuts/lacerations hazards. • Sunburn.	• On-site MEC Training. • Establish EZ of 341 feet around Landfill North of Winklepeck Burning Ground project site and 131 feet around the other two AOCs. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Follow appropriate lifting/ carrying procedures • Cold stress monitoring, drinking water, work-rest schedule, and warm shelter for breaks. Dress in layers. Change socks. • Heat stress monitoring, drinking water, work-rest schedule, and cool shelter for breaks. • Training in biological hazards avoidance; PPE • Site control measures (e.g., fencing, barricades, signage) will be implemented and exclusion zones will be established. • PPE for cuts/lacerations. • Wear cap and use sunscreen.

Activity Hazard Analysis (AHA)

Magnetometer-Assisted Surface Clearance

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Appropriate geophysical equipment. • Footwear with ankle support and non-slip soles (no steel toes around magnetometers). • Pin flags. • Back braces (optional). • Communications equipment. • Appropriate clothing and PPE to include safety glasses or goggles, leather gloves. • Barricades and signage. • First aid kit. • Fire extinguishers.	**UXOSO/UXOQCS** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use. • Communications equipment checked daily prior to use. • First aid kits checked daily and inspected weekly. • Fire extinguishers checked daily and inspected weekly.	• UXO personnel will meet training and experience requirements outlined in DDESB TP 18. • Site-specific MEC training will be presented to all site personnel. • Site-specific training on slip, trip and fall hazards. • Site-specific training/lifting techniques. • Heat Stress/Cold Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • All site personnel will have current HAZWOPER training.

Activity Hazard Analysis (AHA)

Magnetometer-Assisted Surface Clearance

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Activity Hazard Analysis (AHA)

MEC Avoidance Activities

Activity: MEC Avoidance Activities	**Date: November 14, 2008**
	Project: SAIC Project, Ravenna Army Ammunition Plant, Ravenna, OH
Description of the work: Using magnetometer and/or downhole gradiometer, assure intrusive operations are free of MEC.	**Prepared By: Cheryl Riordan, CSP**
	Analyzed By: James Walden
	Review for latest use: Each time before the job is performed.

PRINCIPLE STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
• When personnel need to enter an area that has not been cleared, UXO personnel will walk ahead and clear path of entry. • Determine areas where intrusive operations are to occur. • Use a magnetometer on the surface to assure area is anomaly free. • When SAIC performs soil sampling, installation of monitoring wells, or other operations in excess of two feet below ground surface, a downhole gradiometer will be used for every two feet of depth, in order to check for potential anomalies, until the desired depth is attained. • If anomalies are detected at any point in the process, the site for the operation will be moved to an anomaly-free area.	• MEC hazards. • Uneven working surfaces – slip, trip, fall hazards. • Muscle strain from carrying instruments. • Heat Stress/Cold Stress. • Biological hazards – bees, wasps, spiders, ticks, snakes, and hazardous plants. • Unauthorized personnel entering site during operations. • Cuts/lacerations hazards. • Sunburn.	• On-site MEC Training. • Establish EZ of 341 feet around the Landfill North of Winklepeck Burning Ground project site, and an EZ of 131 feet around the other two AOCs. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Follow appropriate lifting/ carrying procedures. • Cold stress monitoring, drinking water, work-rest schedule, and warm shelter for breaks. Dress in layers. Change socks. • Heat stress monitoring, drinking water, work-rest schedule and cool shelter for breaks. • Training in biological hazards avoidance; PPE • Site control measures (e.g., fencing, barricades, signage) will be implemented, and exclusion zones will be established. • PPE for cuts/lacerations. • Wear cap and use sunscreen.

Activity Hazard Analysis (AHA)

MEC Avoidance Activities

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Appropriate geophysical equipment. • Footwear with ankle support and non-slip soles (no steel toes around magnetometers). • Back braces (optional). • Communications equipment. • Appropriate clothing and PPE to include safety glasses or goggles, and leather gloves. • Barricades and signage. • First aid kit. • Fire extinguishers.	**UXOSO/UXOQCS** will assure that all controls are being followed, all equipment is being utilized, and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use. • Communications equipment checked daily prior to use. • First aid kits checked daily and inspected weekly. • Fire extinguishers checked daily and inspected weekly.	• UXO personnel will meet training and experience requirements outlined in DDESB TP 18. • Site-specific MEC training will be presented to all site personnel. • Site-specific training on slip, trip and fall hazards. • Site-specific training/lifting techniques. • Heat Stress/Cold Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • All site personnel will have current HAZWOPER training.

Activity Hazard Analysis (AHA)

MEC Avoidance Activities

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Activity Hazard Analysis (AHA)

MEC Disposal

Activity: MEC Disposal	**Date: November 14, 2008**
	Project: SAIC Project, Ravenna Army Ammunition Plant, Ravenna, OH
Description of the work: Disposal of MEC/UXO Encountered, by Means of Detonation.	**Prepared By: Cheryl Riordan, CSP**
	Analyzed By: James Walden
	Review for latest use: Each time before the job is performed.

PRINCIPLE STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
• Determine area on site for use as disposal area. • Remove MEC and MPPEH from central staging area to disposal site. • Except for personnel involved in the disposal operation, evacuate area around disposal operation for 341 feet, (depending on the amount of MEC/UXO that will be destroyed) at the Landfill North of Winklepeck Burning Ground, and at least 131 feet for the other two AOCs. • Place guard on access road at least 341 feet away (depending on the amount of MEC/UXO that will be destroyed) to assure no further entry into site at the Landfill North of Winklepeck Burning Ground. This distance would be at least 131 feet (depending on the amount of MEC/UXO being destroyed) at the other two AOCs. • Prepare shot. • Make notifications of impending shot. • Personnel performing disposal evacuate to fragmentation distance or to shielded area. • Observe area for potentially-unauthorized entrants. If any are observed, halt operation until they are removed. • Sound signal for impending shot. • Perform disposal operation. • Check to see that disposal operation was successful. • If not successful, repeat disposal operation. • Give signal that operation is complete.	• MEC hazards. • Unintentional detonations. • Unauthorized personnel in area. • Uneven working surfaces – slip, trip, fall hazards. • Heat Stress/Cold Stress. • Biological hazards – bees, wasps, ticks, spiders, snakes, rodents and hazardous plants. • Sunburn. • Noise.	• On-site MEC Training. • Establish exclusion Zone of 341 feet, or greater, depending on the amount of MEC/UXO to be destroyed at the Landfill North of Winklepeck Burning Ground, and an EZ of 131 or greater at the other two AOCs. • Controlled use of radios and cell phones. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Training in biological hazards avoidance. PPE. • Wear long sleeved shirts and long pants. • Heat stress monitoring, drinking water, work-rest schedule, and cool shelter for breaks. • Cold stress monitoring, drinking water and warm liquids, work-rest schedule, warm shelter for breaks, dress in layers, change socks. • Use barrier creams/insect repellants as necessary. • Appropriate PPE for task at hand. • Wear long sleeved shirts and long pants. • Use sunscreen and wear cap.

Activity Hazard Analysis (AHA)

MEC Disposal

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Blasting equipment and explosive charge. • Footwear with ankle support and non-slip soles. • Communications equipment. • Appropriate clothing and PPE to include leather gloves, safety glasses or goggles, hearing protection, and cotton work clothing. • First aid kit. • Fire extinguishers. • WBGT monitor.	**SUXOS/UXOSO** will assure that all controls are being followed, all equipment is being utilized, and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use. • Communications equipment checked daily prior to use. • First aid kits checked daily and inspected weekly. • Fire extinguishers checked daily and inspected weekly.	• UXO personnel will meet training and experience requirements outlined in DDESB TP 18. • Site-specific MEC training will be presented to all site personnel. • Site-specific training on slip, trip and fall hazards. • Heat Stress/Cold Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • PPE Training. • All site personnel will have current HAZWOPER training.

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Attachment 2. Material Safety Data Sheets

MSDS
ANTI-FREEZE

*** IDENTIFICATION ***

MSDS RECORD NUMBER: 897945
PRODUCT NAME(S): ETH. GLYCOL(MEG) OFFSPEC
PRODUCT IDENTIFICATION: PRODUCT CODE R00000024044
DATE OF MSDS: 1994-10-21
EMERGENCY TELEPHONE NO. : 800-964-8861 (SUN COMPANY, AFTER NORMAL BUSINESS HOURS) 800-424-9300 (CHEMTREC, AFTER NORMAL BUSINESS HOURS)

*** MATERIAL SAFETY DATA ***

1. CHEMICAL PRODUCT AND COMPANY INFORMATION
REVISION DATE: 10/21/1994
UN NUMBER- N/A
PRIMARY APPLICATION- ANTIFREEZE, SOLVENT.
SYNONYMS: MONOETHYLENE GLYCOL; ETHYLENE ALCOHOL
CAS REGISTRY NO: 107-21-1
CAS NAME..... : 1,2-ETHANEDIOL
CHEMICAL FAMILY: GLYCOL
EMERGENCY PHONE NUMBERS (AFTER NORMAL BUSINESS HOURS)
SUN CO.. 1-800-964-8861
CHEMTREC. 1-800-424-9300
2. COMPOSITION / INFORMATION ON INGREDIENTS
EXPOSURE GUIDELINES

			OSHA	ACGIH	SUN/MFR
COMPONENT/CAS NO.	LO%	HI%	TWA STEL	TWA STEL	TWA STEL UNIT
LIMITS FOR THE PRODUCT:					
CEILING LIMIT - 50 PPM					
ETHYLENE GLYCOL 107-21-1	99.00	100.0			
CEILING LIMIT - 50 PPM					

ADDITIONAL EXPOSURE LIMITS GOVERNMENT REGULATION
OTHER LIMIT- OSHA/ACGIH CEILING: 50PPM; 125MG/M3.
3. HAZARDS IDENTIFICATION
EMERGENCY OVERVIEW
WARNING] HARMFUL IF INHALED. MAY CAUSE RESPIRATORY TRACT IRRITATION. CAUSES EYE IRRITATION. HARMFUL OR FATAL IF SWALLOWED. CAN CAUSE SEVERE CHRONIC TOXICITY.
APPEARANCE-- COLORLESS LIQUID
ODOR-- SLIGHTLY SWEET
POTENTIAL HEALTH EFFECTS
PRIMARY ROUTES OF ENTRY- INHALATION(X) SKIN(X) EYE(X) INGESTION(X)
INHALATION
EXCESSIVE EXPOSURES MAY CAUSE IRRITATION TO EYES, NOSE, THROAT AND LUNGS. IRRITATION TO RESPIRATORY TRACT; CENTRAL NERVOUS SYSTEM (BRAIN)
EFFECTS; DISCOMFORT, DISAGREEABLE ODOR, NAUSEA. REPEATED EXCESSIVE EXPOSURES MAY CAUSE LIVER EFFECTS OR DAMAGE. KIDNEY EFFECTS OR DAMAGE.
CHRONIC, ADVERSE SYSTEMIC EFFECTS.
SKIN
SKIN ABSORPTION OF MATERIAL MAY PRODUCE SYSTEMIC TOXICITY. CONTAINS A MATERIAL WHICH MAY CAUSE IRRITATION WITH PROLONGED OR REPEATED CONTACT.
EYE
CONTACT WITH THE EYE MAY CAUSE IRRITATION.
INGESTION
HARMFUL OR FATAL IF SWALLOWED. INGESTION OF THIS MATERIAL MAY CAUSE ABDOMINAL PAIN; CENTRAL NERVOUS SYSTEM (BRAIN) EFFECTS; DIFFICULTY IN BREATHING; RESPIRATORY FAILURE; AND DEATH. INGESTION OF THIS MATERIAL MAY CAUSE DAMAGE TO KIDNEYS;
CARCINOGEN LISTED BY-IARC(NO) NTP(NO) OSHA(NO) ACGIH(NO) OTHER(NO)
PRE-EXISTING MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE-
DISORDERS OR DISEASES OF THE SKIN, EYE, KIDNEY, LIVER.
4. FIRST AID MEASURES

MOVE PERSON TO FRESH AIR. IF NOT

BREATHING, GIVE ARTIFICIAL RESPIRATION,
OBTAIN MEDICAL ASSISTANCE.
SKIN
WASH WITH SOAP AND WATER UNTIL NO ODOR REMAINS. IF REDNESS OR SWELLING DEVELOPS, OBTAIN MEDICAL FLUSH WITH WATER FOR AT LEAST 15 MINUTES. IF IRRITATION PERSISTS, OBTAIN MEDICAL ASSISTANCE.
INGESTION
GIVE LIQUIDS AND INDUCE VOMITING UNLESS VICTIM IS UNCONSCIOUS. OBTAIN EMERGENCY MEDICAL ATTENTION. SMALL AMOUNTS WHICH ACCIDENTALLY ENTER MOUTH SHOULD BE RINSED OUT UNTIL TASTE OF IT IS GONE.
5. FIRE FIGHTING MEASURES
FLASH POINT: 245 CLOSED CUP (DEG. F); 111 CLOSED CUP (DEG. C)
AUTOIGNITION TEMP.: 748 (DEG. F); 398 (DEG. C)
---FLAMMABLE LIMITS IN AIR---
LOWER EXPLOSIVE LIMIT (LEL): 3.2 % VOLUME
UPPER EXPLOSIVE LIMIT (UEL): ESTIMATED @ 15.3 % VOLUME
FIRE AND EXPLOSION HAZARDS
CAN BE MADE TO BURN (FLASH POINT GREATER THAN 200F).
EXTINGUISHING-MEDIA
WATER SPRAY. ALCOHOL RESISTANT FOAM. DRY CHEMICAL. CARBON DIOXIDE.
SPECIAL FIRE FIGHTING INSTRUCTIONS
USE WATER SPRAY. COOL TANK/ CONTAINER. WEAR SELF-CONTAINED BREATHINGAPPARATUS. WEAR STRUCTURAL FIREFIGHTERS PROTECTIVE CLOTHING.
NFPA/HMIS CLASSIFICATION
HAZARD RATING
HEALTH - 1 / 1 0=LEAST 1=SLIGHT
FIRE - 1 / 1 2=MODERATE 3=HIGH
REACTIVITY - 0 / 0 4=EXTREME
PERSONAL PROTECTION INDEX - X
SPECIFIC HAZARD: NONE LISTED.
6. ACCIDENTAL RELEASE MEASURES
CONTAIN SPILL. FOR LARGE SPILL, LEAK OR RELEASE. USE PERSONAL PROTECTIVE EQUIPMENT STATED IN SECTION 8. ADVISE EPA; STATE AGENCY IF REQUIRED. ABSORB ON INERT MATERIAL. SHOVEL, SWEEP OR VACUUM SPILL. FLUSH WITH WATER AND REMOVE CONTAMINATED ARTICLES.
7. HANDLING AND STORAGE
KEEP IN COOL, DRY PLACE. KEEP IN WELL VENTILATED SPACE. STORAGE HAS TEMPERATURE LIMITS--SEE STABILITY. NFPA CLASS IIIB STORAGE. CONSULT NFPA AND OSHA CODES. AVOID PROLONGED BREATHING OF MIST OR VAPOR. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. WASH THOROUGHLY AFTER HANDLING.
8. EXPOSURE CONTROL / PERSONAL PROTECTION
CONSULT WITH A HEALTH/SAFETY PROFESSIONAL FOR SPECIFIC SELECTION.
VENTILATION
VENTILATE AS NEEDED TO COMPLY WITH EXPOSURE LIMIT. LOCAL EXHAUST VENTILATION RECOMMENDED. MECHANICAL VENTILATION RECOMMENDED.
PERSONAL PROTECTIVE EQUIPMENT
EYE
SPLASH PROOF CHEMICAL GOGGLES RECOMMENDED TO PROTECT AGAINST SPLASH OF PRODUCT.
GLOVES
PROTECTIVE GLOVES RECOMMENDED WHEN PROLONGED SKIN CONTACT CANNOT BE AVOIDED. POLYETHYLENE; NEOPRENE; NITRILE; POLYVINYL ALCOHOL; NATURAL RUBBER; BUTYL RUBBER;
RESPIRATOR
CONCENTRATION-IN-AIR DETERMINES PROTECTION NEEDED. USE ONLY NIOSH CERTIFIED RESPIRATORY PROTECTION.

RESPIRATORY PROTECTION USUALLY NOT NEEDED UNLESS PRODUCT IS HEATED OR MISTED. HALF-MASK AIR PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES IS ACCEPTABLE TO 10 TIMES THE EXPOSURE LIMIT. FULL-FACE AIR PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES IS ACCEPTABLE TO 50 TIMES THE EXPOSURE LIMIT NOT TO EXCEED THE CARTRIDGE LIMIT OF 1000 PPM. PROTECTION BY AIR PURIFYING RESPIRATORS IS LIMITED. USE A POSITIVE PRESSURE-DEMAND FULL-FACE SUPPLIED AIR RESPIRATOR OR SCBA FOR EXPOSURES ABOVE 50X THE POLYETHYLENE; POLYVINYL ALCOHOL(PVA); NEOPRENE; NITRILE; NATURAL RUBBER; LAUNDER SOILED CLOTHES. FOR NON-FIRE EMERGENCIES RESPIRATORY PROTECTION MAY BE NECESSARY AND WEAR APPROPRIATE PROTECTIVE CLOTHING TO AVOID CONTACT.

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT..... : 388 (DEG. F) _____ 198 (DEG. C)

MELTING POINT..... : 9 (DEG. F) _____ MINUS 13.3 (DEG. C)

SPECIFIC GRAVITY... : 1.1 (WATER=1)

PACKING DENSITY.... : N/A (KG/M3)

VAPOR PRESSURE..... : 0.08 (MM HG @ 20 DEG C)

VAPOR DENSITY..... : 2.1 (AIR=1)

SOLUBILITY IN WATER.: COMPLETE (% BY VOLUME)

PH INFORMATION..... : N/A AT CONC. N/A G/L H2O

% VOLATILES BY VOL..: N.D.

EVAPORATION RATE... : 1000X SLOWER (ETHYL ETHER=1)

OCTANOL/WATER COEFF.: N.D.

APPEARANCE..... : COLORLESS LIQUID

ODOR..... : SLIGHTLY SWEET

ODOR THRESHOLD..... : N.D. (PPM)

VISCOSITY..... : N.D. SUS @ N.D DEG F ... N.D. CST @ N.D DEG C

MOLECULAR WEIGHT... : N.D. (G/MOLE)

10. STABILITY AND REACTIVITY

STABILITY

EXPOSURE LIMIT. IF EXPOSURE IS ABOVE IDLH(IMMEDIATELY DANGEROUS TO LIFE & HEALTH) OR THERE IS THE POSSIBILITY OF AN UNCONTROLLED RELEASE OR EXPOSURE LEVELS ARE UNKNOWN THEN USE A POSITIVE PRESSURE-DEMAND FULL-FACE SUPPLIED AIR RESPIRATOR WITH ESCAPE BOTTLE OR SCBA. IMPORTANT SUPPLEMENTAL INSTRUCTION OR INFORMATION FOR PROPER RESPIRATORY PROTECTION IS CONTAINED IN SECTION 16.

OTHER

IF CONTACT IS UNAVOIDABLE, WEAR CHEMICAL RESISTANT CLOTHING.

STABLE.

CONDITIONS TO AVOID-

EXTREME HEAT WILL IGNITE IN AIR AT 748F. DO NOT STORE AT TEMPERATURES ABOVE 120F (60C).

INCOMPATIBLE MATERIALS

STRONG OXIDIZING CHEMICALS. REACTS VIOLENTLY WITH CHLOROSULFONIC ACIDOLEUM, SULFURIC ACID, STRONG BASES.

HAZARDOUS DECOMPOSITION

CARBON MONOXIDE AND ASPHYXIANTS ARE PRODUCED BY BURNING.

POLYMERIZATION WILL NOT OCCUR.

11. TOXICOLOGICAL INFORMATION

FOR THE PRODUCT

INHALATION: OVEREXPOSURE TO MIST OR VAPORS MAY CAUSE EYE, NOSE, THROAT AND RESPIRATORY TRACT IRRITATION, CNS (BRAIN) EFFECTS, DIZZINESS, DRUNKENESS, INCOORDINATION, COMA, RESPIRATORY FAILURE, OR DEATH.

EXCESSIVE EXPOSURES MAY CAUSE BRAIN, LIVER, AND/OR KIDNEY EFFECTS AND DAMAGE.

SKIN & EYE: LARGE ACUTE EXPOSURE MAY CAUSE SYSTEMIC EFFECTS. IRRITANT ON CONTACT.

INGESTION: TOXIC] HARMFUL OR FATAL IF SWALLOWED. ACUTE POISONING (AS LITTLE AS 100 ML IN HUMANS) CHARACTERIZED BY GI PAIN, NAUSEA, VOMITING, MUSCLE TENDERNESS, CNS

DEPRESSION, POSSIBLE RESPIRATORY AND RENAL FAILURE, DEATH. IN LAB ANIMALS BY ORAL AND INHALATION EXPOSURE EMBRYOTOXICITY & TERATOGENICITY WERE REPORTED.
ETHYLENE GLYCOL (COMPONENT)
INHALATION: OVEREXPOSURE TO MIST OR VAPORS GENERATED BY HEATING MAY
CAUSE EYE, NOSE, THROAT, & RESPIRATORY IRRITATION, CNS (BRAIN) EFFECTS & DIZZINESS. EXCESSIVE PROLONGED EXPOSURES MAY CAUSE KIDNEY, LIVER, BLOOD, BRAIN EFFECTS OR DAMAGE. SKIN & EYE: LARGE ACUTE EXPOSURE MAY CAUSE SYSTEMIC TOXICITY. IRRITANT ON CONTACT. ORAL: TOXIC] HARMFUL OR FATAL IF SWALLOWED. ACUTE POISONING (AS LITTLE AS 100 ML IN HUMANS) CHARACTERIZED BY GI PAIN, NAUSEA, VOMITING, MUSCLE SPASMS, CONVULSIONS & CNS DEPRESSION, POSSIBLE RENAL AND RESPIRATORY
14. TRANSPORTATION INFORMATION
DOT- PROPER SHIPPING NAME- ETHYLENE GLYCOL (ANTIFREEZE)
HAZARD CLASS- NOT REGULATED
IDENTIFICATION NUMBER- NOT REGULATED
LABEL REQUIRED- NOT REGULATED
IMDG- PROPER SHIPPING NAME- NOT AVAILABLE
IATA- PROPER SHIPPING NAME- NOT AVAILABLE
15. REGULATORY INFORMATION
SARA 302 THRESHOLD PLANNING QUANTITY. N/A
SARA 304 REPORTABLE QUANTITY ..... N/A
SARA 311 CATEGORIES- IMMEDIATE (ACUTE) HEALTH EFFECTS.. Y
DELAYED (CHRONIC) HEALTH EFFECTS.. Y
FIRE HAZARD ..... N
SUDDEN RELEASE OF PRESSURE HAZARD. N
REACTIVITY HAZARD ..... N
WHEN A PRODUCT AND/OR COMPONENT IS LISTED BELOW, THE REGULATORY

FAILURE, DEATH. IN LAB ANIMALS BY ORAL & INHALATION EXPOSURE FETAL TOXICITY AND BIRTH DEFECTS WERE REPORTED.
12. ECOLOGICAL INFORMATION
AQUATIC TOXICITY
TLM96 (CONCENTRATION IN WATER THAT KILLS 50% OF EXPOSED ORGANISMS)IS
IN THE RANGE OF 100 TO 1000 PPM. LC50 (24 HRS.) TO GOLDFISH: >5,000 MG/L THE TOXICITY THRESHOLD FOR SCENDESMUS QUADRICAUDA (GREEN ALGAE) TO ETHYLENE GLYCOL IS >10,000 MG/L.
13. DISPOSAL CONSIDERATIONS
FOLLOW FEDERAL, STATE AND LOCAL REGULATIONS. NOT A RCRA HAZARDOUS WASTE IF UNCONTAMINATED. DO NOT FLUSH TO DRAIN/ STORM SEWER. CONTRACT TO AUTHORIZED DISPOSAL SERVICE.

LIST ON WHICH IT APPEARS IS INDICATED.
FOR THE PRODUCT - MA NJ PA RI 01
ETHYLENE GLYCOL - CA FL MA MN NJ PA RI 01
01=SARA 313 02=SARA 302/304 03=IARC CARCINOGEN 04=OSHA CARCINOGEN 05=ACGIH CARCINOGEN 06=NTP CARCINOGEN 07=CERCLA 302.4 08=WHMIS CONTROLLED PROD. 10=OTHER CARCINOGEN PA=PENNSYLVANIA RTK NJ=NEW JERSEY RTK CA=CALIFORNIA PROP 65 MA=MASSACHUSETTS RTK MI=MICHIGAN 406 MN=MINNESOTA RTK FL=FLORIDA RI=RHODE ISLAND IL=ILLINOIS NY=NEW YORK WV=WEST VIRGINIA CT=CONNECTICUT LA=LOUISIANA ME=MAINE OH=OHIO
THIS PRODUCT OR ALL COMPONENTS OF THIS PRODUCT ARE LISTED ON THE U.S. TSCA INVENTORY.
16. OTHER INFORMATION
ETHYLENE GLYCOL IS TOXIC BY INGESTION AND DETAILS ON BODILY

EFFECTS AND FIRST AID TREATMENT CAN BE FOUND IN "CLINICAL TOXICOLOGY OF COMMERCIAL PRODUCTS" BY GOSSELIN, HODGE, SMITH AND GLEASON. WILLIAMS < WILKINS PUB.
WARNING] HARMFUL OR FATAL IF SWALLOWED. DO NOT DRINK ETHYLENE GLYCOL OR SOLUTION. IF SWALLOWED AND IF CONSCIOUS, INDUCE VOMITING. CALL FOR MEDICAL HELP IMMEDIATELY. NON-FATAL DOSES CAN PRODUCE KIDNEY, LIVER, AND OTHER SYSTEMIC DAMAGE. HAS PRODUCED BIRTH DEFECTS IN LABORATORY ANIMAL STUDIES. MINIMIZE EXPOSURE TO MISTS, VAPORS AND FUMES. IN CASE OF EYE CONTACT, FLUSH WITH WATER FOR AT LEAST 15 MINUTES. WASH THOROUGHLY AFTER HANDLING. DO NOT STORE IN OPEN OR UNLABELED CONTAINERS. KEEP OUT OF REACH OF CHILDREN AND ANIMALS.SHELF LIFE LIMITATIONS: 6 MONTHS IN DRUMS OR 12 MONTHS IN BULK.
RESPIRATOR: IF GENERATED AS MIST AT <250 MG/CUBIC METER THEN USEDUST/ MIST FILTER OVER CARTRIDGES STATED IN SECTION 8.

*** IDENTIFICATION ***

MSDS RECORD NUMBER : 515272
PRODUCT NAME(S) : Battery Acid
PRODUCT IDENTIFICATION : CAS Registry Number: 7664-93-9
DATE OF MSDS : 1991-08-21

*** MATERIAL SAFETY DATA ***

1. IDENTIFICATION
Product Name: BatteryAcidComposition/Purity of Hazardous Ingredients: 30-40% Sulphuric Acid
IUPAC Chemical Name: Sulphuric Acid (aqueous solution)
Synonym(s):Electrolyte acid, fertilizer acid, hydrogen sulphate, oil of Vitriol, spirit of sulphur.
CAS Registry Number: 7664-93-9
PIN-UN/NA Number(s): 1830
TDG Classification (Class, Division and Packing Group): 8, 9.2 II
Chemical Family: Inorganic acid
Molecular Formula: H2 SO4
Structural Formula: HO-SOO-OH
WHMIS Classification: D1A, E
Warning Properties: Very toxic, corrosive.

GENERAL DESCRIPTIONS
Appearance, Odour and State: Clear,colourless, oily liquid that is odourless unless heated, then odour becomes sharp and choking; hygroscopic (absorbs moisture from the air).
Odour Threshold: >1 mg/m3
Uses and Occurrences: Manufacture of synthetic fertilizers, explosives, artificial fibres, dyes, drugs, detergents, adhesives, plastics, paint, paper, other chemicals, electrolyte in lead storage batteries, electroplating, pickling agent, dehydrating and alkylating agent, refining of petroleum, food processing, textiles, leather tanning and laboratory reagent.
The following data is for Concentrated Sulphuric Acid (93.2%):

2. PHYSICAL DATA
Boiling Point: 276 deg. C.
Molecular Weight: 98.08
Melting Point/Freezing Point: 10 deg. C. (35-37% rubber and paper.
Hazardous Decomposition Products: Hydrogen, sulphur dioxide, sulphur trioxide.
Hazardous Polymerization: Does not occur.
Corrosiveness to Metals: Highly corrosive to most metals, liberating hydrogen gas.
H2SO4 freezes @ -63 deg. C)
Specific Gravity (Water=1): 1.8354 @ 20 deg. C
Solubility in Water: 100%
pH: 1N Solution = 0.3; 0.1N Solution = 1.2;
0.01 N solution = 2.1
Solubility in Other Liquids: Soluble in most organic solvents.
Vapour Density (Air=1): 3.4
Vapour Pressure: <0.001 TORR @ 20 deg. C.
% Volatiles: No data.
Saturation Vapour Concentration: No data.
Evaporation Rate
(Butyl Acetate = 1): No data.
Co-efficient of Water/Oil
Distribution: No data.

3. FIRE AND EXPLOSION HAZARDS
Flash Point and Method: Non-flammable liquid
Lower Explosive Limit/Lower Flammable Limit (%): N/A
Upper Explosive Limit/Upper Flammable Limit (%): N/A
Autoignition Temperature: N/A
Extinguishing Media: Use media appropriate for surrounding fire.
Special Fire Fighting Procedures: Sulphuric acid does not burn, but is highly reactive. Contact with many combustibles may generate sufficient heat to cause ignition. Avoid using water since it generates heat and may cause splattering. Water spray or fog may be used to cool and prevent rupture of containers involved in a fire. Do not get water in containers.
Note: Sulphuric acid reacts with metals to produce gases that may explode if ignited in confined spaces.
Combustion Products: Sulphur dioxide, sulphur trioxide, sulphuric acid fumes.
Hazardous Explosion Data
- Sensitivity to Impact: No.
- Sensitivity to Static Discharge: No.

4. REACTIVITY DATA
Chemical Stability: Normally stable.
Incompatibility: Reacts violently or explosively with a wide range of organic and inorganic chemicals, including water, alcohol, carbides, chlorates, picrates, nitrates, metals and combustible materials. It also carbonizes

5. HEALTH HAZARD DATA

A. ROUTES OF ENTRY

	Yes	No
i) Inhalation	X	
ii) Eye Contact	X	
iii) Skin Contact	X	
iv) Skin Absorption	X	
v) Ingestion	X	

B. EFFECTS OF SHORT-TERM (ACUTE EXPOSURE)

Inhalation: Mists and vapours are corrosive and can cause severe irritation or damage to the mouth, nose, throat and lungs. Exposure levels can affect symptoms from mild coughing, sneezing, tickling sensations in the nose and throat to larngealedema, bronchitis and pulmonary edema.

Eye Contact: Contact with even small concentrations can cause severe damage (corneal burns and/or necrosis and conjunctivitis) which may result in loss of sight. Dilute solutions of sulphuric acid may produce temporary effects from which recovery is possible.

Skin Contact: Concentrated sulphuric acid produces severe deep and painful burns. Dilute solutions may cause erythema and eczema.

Ingestion: If ingested, concentrated sulphuric acid can cause severe pain, burns and ulceration of mouth, esophagus and stomach with associated pain, nausea, vomiting and shock which if extensive enough, may be fatal.

C. ANIMAL TOXICITY DATA

Toxicity: Oral, rat LD-50 2140 mg/kg.
Inhalation, rat LC-50 510 mg/m3/2 H (approx. 254.4 ppm/4 H)
Inhalation, mouse LC-50 320 mg/m3/2 H (approx. 160 ppm/4 H).
running water remove contaminated clothing as quickly as possible.
Ingestion: If victim is conscious and not convulsing, rinse mouth and throat with water. Drink 1-2 glasses of milk or water to dilute stomach contents. If vomiting occurs naturally, lean forward to avoid aspiration.
Special Equipment/Antidotes:
First Aid Comments: Provide general supportive measures, (comfort, warmth, rest). Shock

D. EFFECTS OF LONG-TERM (CHRONIC) EXPOSURE

Irritancy of Product: Skin:Repeated or long-exposure to dilute solutions may result in dermatitis.
Ingestion/Inhalation: Prolonged exposure to mists and vapours can cause erosion and discoloration of the teeth, chronic irritation of the eyes, nose, throat and respiratory tract.
Sensitizing Capability: No data.
Carcinogenicity: No data.
Mutagenicity: No data.
Teratogenicity: Negative results in one test measuring embryotoxicity and teratogenicity @ 5 or 20 mg/m3/7 day of H_2SO_4 vapours. However, slight maternal toxicity at 20 mg/m3 was observed in both the mouse and rabbit dose.
Synergistic Materials:

E. OCCUPATIONAL EXPOSURE LIMITS

Threshold Limited Values (TLVS): ACGIH
Time-Weighted Average (TLV-TWA): 1 mg/m3 (0.25 ppm) as a mist.
Short-Term Exposure Limit (TLV-STEL): No data.

6. FIRST AID

IN ALL CASES GET IMMEDIATE MEDICAL ATTENTION!

Inhalation: Move victim to fresh air. If breathing has stopped give AR/CPR. If breathing is laboured, get qualified personnel to administer oxygen.
Eye Contact: Immediately irrigate eye(s) with lukewarm running water for 20 minutes occasionally lifting upper and lower lids. Take care not to flush contaminated water into non-affected eye.
Skin Contact: Immediately flush contacted area with running water for 20 minutes. Under

symptoms to be aware of: unconsciousness; pale - chalky or grey appearance; low blood pressure; rapid pulse; sweating (clammy skin); victim feels cold; pupils dilated; victim, if not unconscious, may be thirsty.

7. PREVENTATIVE MEASURES

A. ENVIRONMENTAL AND DISPOSAL INFORMATION

Spill and Leak Procedures: Isolate the area and ensure clean up is done by trained personnel. Ventilate area and remove ignition sources. Have personnel wear appropriate protective clothing and equipment. If spill is small, use inert absorbant material and scoop into appropriate containers for neutralization and disposal. Neutralization can be done by adding dilute solutions of alkalies such as soda ash, sodium bicarbonate or lime. Ensure the ventilation systems can remove the carbon dioxide produced. If spill is large, dike with inert materials and transfer to appropriate containers for re-cycling or disposal.
Disposal: Dispose of spilled, neutralized or waste
product, contaminated soil and other contaminated materials in a licensed landfill in accordance with Federal, State and Municipal regulations.

B. STORAGE AND HANDLING

Storage: Store in a cool, dry, well-ventilated area, away from heat, sources of ignition, direct sunlight, and incompatibles. Store in suitable, closed labelled containers.
Protect from damage.
Handling: Keep material away from sparks, flames and other ignition sources. No smoking in
storage areas. Avoid generating mists in handling and use as small as possible quantities. Keep containers closed when not in use and have safety equipment handy. Always slowly add acid to water as violent splattering occurs when water is added to acid.
Exposure Control: No comment.
Engineering Controls: Isolation of personnel and procedures are desired methods. In addition, appropriate materials for ventilation and storage should be already a designed-in feature.

C. PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection: If ventilation cannot keep the TLV's at a minimum then use a NIOSH/MSHA approved respirator.
Respiratory Protection Guidelines: Up to 25 mg/m3 - use a powered air purifying respirator with an acid gas cartridge. Note: air purifying respirators do not protect against oxygen deficient atmospheres. Up to 50 mg/m3 use a chemical cartridge respirator with a full facepiece and an acid gas cartridge in combination with a high efficiency particulate filter or a SCBA with a full facepiece or, a SAR with full facepiece.
Eye/Face Protection: Chemical safety goggles and/or full face shield.
Skin Protection: Appropriate clothing, boots, gloves, etc. of impervious material plus hard hat.
Resistance of Materials for Protective Clothing: Good - butyl rubber, chlorinated poly-ethylene, neoprene, nitrile, P.V.C., saranex, viton.
Personal Protection Comments: Ensure an eyewash and safety deluge shower is readily available to work station.
Thoroughly launder contaminated clothing before re-use and inform laundry personnel if clothing is contaminated. Do not eat, smoke or drink in work areas involving sulphuric acid.

MATERIAL SAFETY DATA SHEET

DETONATING CORD

SECTION I — **Issued by the Safety and Compliance Dept.**

AUSTIN POWDER COMPANY
25800 SCIENCE PARK DRIVE
CLEVELAND, OHIO 44122
EMERGENCY PHONE
DAY 216-464-2400
NIGHT 216-464-2407

TRADE NAME AND SYNONYMS
Lite Line, Scotch Cord, A-Cord, Tuff-Kote, No. 40, No. 50 No. 60, etc. Seismic Detonating Cord, Slide Line Series, Heavy Duty Series, Cordeau Detonant Fuse, Cord, Detonating, Flexible, Fine Line, Trim Line, Special 18, Special 25 and Special 50.

SECTION II HAZARDOUS INGREDIENTS

PETN, Pentaerythritol tetranitrate, $C_5H_8N_4O_{12}$, CAS No. 78-11-5

SECTION III PHYSICAL DATA

BOILING POINT	N/A	VAPOR PRESSURE (mm Hg)	Negligible at 20 °C
SPECIFIC GRAVITY (H_2O = 1)	1.76	VAPOR DENSITY (Air = 1)	N/A
PERCENT VOLATILE BY VOL. (%)	N/A	EVAPORATION RATE:	N/A
SOLUBILITY IN WATER:	Negligible		

APPEARANCE AND ODOR: Flexible cord with an explosive core of PETN protected within a textile casing covered by a seamless polyethylene and/or ethylene-co-vinyl acetate jacket and an optional outer layer of yarn and wax. PETN is a white crystalline solid. No odor.

SECTION IV FIRE AND EXPLOSION DATA

FLASH POINT:	N/A
FLAMMABLE LIMITS:	N/A
EXTINGUISHING MEDIA:	See below
SPECIAL FIREFIGHTING PROCEDURES:	Do not fight fire. Withdraw personnel immediately . Allow fire to burn itself out.
UNUSUAL FIRE AND EXPLOSION HAZARDS:	May explode when subjected to fire or shock. Avoid toxic fumes from fire.

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: ACGIH: PETN-None
OSHA : PETN-None

EFFECTS OF OVEREXPOSURE: Ingestion of PETN may cause headache and nausea. PETN is a vasodilator and produces dilation of blood vessels.

EMERGENCY AND FIRST AID PROCEDURES:
FUMES: Remove to fresh air.
IF INGESTED: Obtain medical attention immediately.

MATERIAL SAFETY DATA SHEET

DETONATING CORD

SECTION VI REACTIVITY DATA **Issued by the Safety and Compliance Dept.**

STABILITY: Stable under normal conditions. May explode when subjected to fire or shock.
INCOMPATIBILITY (MATERIALS TO AVOID): Avoid contact with strong acids or alkalies.
HAZARDOUS DECOMPOSITION PRODUCTS: Gaseous Nitrogen Oxides and Carbon Oxides.

HAZARDOUS POLYMERIZATON WILL NOT OCCUR.

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Sweep up and dispose of all spilled material immediately. Do not permit smoking or open flames near spill site.

WASTE DISPOSAL METHOD: Dispose of under direct supervision of a qualified person according to local, state and federal regulations. Call Austin Powder for recommendations and assistance. This material may become a hazardous waste under certain conditions and must be collected, labeled and disposed of per state and federal hazardous waste regulations.

TRANSPORTATION EMERGENCIES involving spills, leaks, fires or exposures in the United States: **CALL CHEMTREC:** 1-800-424-9300. For emergency calls originating outside the U. S. dial the U. S. access number followed by: 1-703-527-3887. All calls are recorded.

SECTION VIII SPECIAL PROTECTION INFORMATION:

RESPIRATORY PROTECTION:	Not required under normal conditions.
VENTILATION:	Not required under normal conditions.
PROTECTIVE GLOVES:	Not required except to prevent abrasive injuries.
EYE PROTECTION:	Not required under normal conditions.

SECTION IX SPECIAL PRECAUTIONS

COMPLY WITH "ALWAYS AND NEVER" AS ADOPTED BY THE INSTITUTE OF MAKERS OF EXPLOSIVES. TRANSPORTATION, STORAGE AND USE MUST COMPLY WITH OSHA SAFETY AND HEALTH STANDARDS 29CFR1910.109, APPLICABLE MSHA REGULATIONS, THE DOT AND HAZARDOUS MATERIALS REGULATIONS BATF REQUIREMENTS AND STATE AND LOCAL TRANSPORTATION, STORAGE AND USE REGULATIONS AND ORDINANCES.

DOT or IMDG proper shipping description: Cord, Detonating, Flexible, 1.1D, UN0065, PG II

May be offered for transportation domestically and transported as Cord, Detonating (UN 0289), Division 1.4 compatibility group D (1.4D) Explosives, if the explosive content does not exceed 100 grains per linear foot and the gross weight of all packages of detonating cord does not exceed (45 KG) 99 pounds per vehicle. See 49 CFR 173.63

The maximum recommended temperature for detonating cord is 160°F (71°C).

None of the components are listed in the 1987 IARC Monographs, Group 1, 2A or 2B as known, probable, or possible carcinogens, nor are they listed in the NTP annual report on carcinogens.

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Material Identity
Product Name: DIESEL FUEL #2
General or Generic ID: HYDROCARBON

Company
The Valvoline Company
P.O. Box 14000
Lexington, KY 40512

Telephone Numbers
Emergency: 1-800-274-5263
Information: 1-859-357-7206

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient(s)	CAS Number	% (by weight)
ALIPHATIC & AROMATIC HYDROCARBONS	68476-34-6	100.0

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3. HAZARDS IDENTIFICATION

Potential Health Effects

Eye
May cause mild eye irritation.

Skin
May cause mild skin irritation. Prolonged or repeated contact may dry and crack the skin. Passage of this material into the body through the skin is possible, but it is unlikely that this would result in harmful effects during safe handling and use.

Swallowing
Swallowing small amounts of this material during normal handling is not likely to cause harmful effects. This material can get into the lungs during swallowing or vomiting. This results in lung inflammation and other lung injury.

Inhalation
It is possible to breathe this material under certain conditions of handling and use (for example, during heating, spraying, or stirring). Breathing small amounts of this material during normal handling is not likely to cause harmful effects. Breathing large amounts may be harmful.

Symptoms of Exposure
Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include: stomach or intestinal upset (nausea, vomiting, diarrhea) irritation (nose, throat, airways), central nervous system depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness), loss of coordination, liver damage.

Target Organ Effects

Exposure to this material (or a component) has been found to cause kidney damage in male rats. The mechanism by which this toxicity occurs is specific to the male rat and the kidney effects are not expected to occur in humans. Overexposure to this material (or its components) has been suggested as a cause of the following effects in laboratory animals, and may aggravate preexisting disorders of these organs in humans: anemia, lung damage.

Developmental Information

Based on the available information, risk to the fetus from maternal exposure to this material cannot be assessed.

Cancer Information

Diesel engine exhaust is listed as carcinogenic by the International Agency for Research on Cancer (IARC). Excess lung and bladder cancers have been reported in workers exposed to these emissions. In addition, exposure to diesel exhaust particulates is listed as carcinogenic by the National Toxicology Program. This product (or a component) is a petroleum-derived material. Similar materials and certain compounds occurring naturally in petroleum oils have been shown to cause skin cancer in laboratory animals following repeated exposure without washing or removal.

Other Health Effects

No data

Primary Route(s) of Entry

Inhalation, Skin absorption, Skin contact, Eye contact, Ingestion.

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4. FIRST AID MEASURES

Eyes

If symptoms develop, move individual away from exposure and into fresh air. Flush eyes gently with water while holding eyelids apart. If symptoms persist or there is any visual difficulty, seek medical attention.

Skin

Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before reuse.

Swallowing

Seek medical attention. If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended.

Inhalation

If symptoms develop, move individual away from exposure and into fresh air. If symptoms persist, seek medical attention. If breathing is difficult, administer oxygen. Keep person warm and quiet; seek immediate medical attention.

Note to Physicians

This material is an aspiration hazard. Potential danger from aspiration must be weighed against possible oral toxicity (See Section 3 - Swallowing) when deciding whether to induce vomiting. Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin, lung (for

example, asthma-like conditions), liver, Exposure to this material may aggravate any pre-existing condition sensitive to a decrease in available oxygen, such as chronic lung disease, coronary artery disease or anemias.

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5. FIRE FIGHTING MEASURES

Flash Point
> 135.0 F (57.2 C)

Explosive Limit
No data

Autoignition Temperature
No data

Hazardous Products of Combustion
May form: carbon dioxide and carbon monoxide, various hydrocarbons.

Fire and Explosion Hazards
Vapors are heavier than air and may travel along the ground or be moved by ventilation and ignited by heat, pilot lights, other flames and ignition sources at locations distant from material handling point. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively.

Extinguishing Media
regular foam, carbon dioxide, dry chemical.

Fire Fighting Instructions
Water or foam may cause frothing which can be violent and possibly endanger the life of the firefighter. Wear a self-contained breathing apparatus with a full facepiece operated in the positive pressure demand mode with appropriate turn-out gear and chemical resistant personal protective equipment. Refer to the personal protective equipment section of this MSDS.

NFPA Rating
Health - 1, Flammability - 2, Reactivity - 0

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6. ACCIDENTAL RELEASE MEASURES

Small Spill
Eliminate all sources of ignition such as flares, flames (including pilot lights), and electrical sparks. Absorb liquid on vermiculite, floor absorbent or other absorbent material.

Large Spill
Eliminate all ignition sources(flares, flames, including pilot lights, electrical sparks). Persons not wearing protectivve equipment should be excluded from the area of the spill until clean-up has been completed. Contain spill to the smallest area possible. Dike area to prevent spreading. Prevent from entering drains, sewers, streams or other bodies of water. Recover as much of the product as possible by methods such as vacuuming and use of absorbant. Transfer contaminated absorbent, soil and other materials in proper containers for ultimate disposal.

7. HANDLING AND STORAGE

Handling

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. All five gallon pails and larger metal containers including tank cars and tank trucks should be grounded and/or bonded when material is transferred.

Storage

Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye Protection

Chemical splash goggles in compliance with OSHA regulations are advised; however, OSHA regulations also permit other type safety glasses. Consult your safety representative.

Skin Protection

Wear resistant gloves such as: neoprene, nitrile rubber, To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

Respiratory Protections

If workplace exposure limit(s) of product or any component is exceeded (See Exposure Guidelines), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (consult your industrial hygienist). Engineering or administrative controls should be implemented to reduce exposure.

Engineering Controls

Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

Exposure Guidelines

Component

ALIPHATIC & AROMATIC HYDROCARBONS (68476-34-6)
No exposure limits established

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point

(for product) 320.0 - 400.0 F (160.0 - 204.4 C) @ 760.00 mmHg

Vapor Pressure

(for product) < 1.000 mmHg @ 68.00 F

Specific Vapor Density

> 5.000 @ AIR=1

Specific Gravity
.876 @ 60.00 F

Liquid Density
7.296 lbs/gal @ 60.00 F
.876 kg/l @ 15.60 C

Percent Volatiles (Including Water)
No data

Evaporation Rate
SLOWER THAN ETHYL ETHER

Appearance
No data

State
LIQUID

Physical Form
HOMOGENEOUS SOLUTION

Color
RED, DYED LIQUID

Odor
No data

pH
Not applicable

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10. STABILITY AND REACTIVITY

Hazardous Polymerization
Product will not undergo hazardous polymerization.

Hazardous Decomposition
May form: carbon dioxide and carbon monoxide, various hydrocarbons.

Chemical Stability
Stable.

Incompatibility
Avoid contact with: strong oxidizing agents.

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11. TOXICOLOGICAL INFORMATION

Mutagenicity
This material (or a component) caused mutations in cells in culture and in laboratory animals. The relevance of this finding to human health is uncertain.

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12. ECOLOGICAL INFORMATION

No data

13. DISPOSAL CONSIDERATION

Waste Management Information

Dispose of in accordance with all applicable local, state and federal regulations.

14. TRANSPORT INFORMATION

DOT Information - 49 CFR 172.101

DOT Description:

Not Regulated

Container/Mode:

No data

NOS Component:

None

RQ (Reportable Quantity) - 49 CFR 172.101

Not applicable

15. REGULATORY INFORMATION

US Federal Regulations

TSCA (Toxic Substances Control Act) Status

TSCA (UNITED STATES) The intentional ingredients of this product are listed.

CERCLA RQ - 40 CFR 302.4

None

SARA 302 Components - 40 CFR 355 Appendix A

None

Section 311/312 Hazard Class - 40 CFR 370.2

Immediate(X) Delayed(X) Fire(X) Reactive( ) Sudden Release of Pressure( )

SARA 313 Components - 40 CFR 372.65

None

International Regulations

Inventory Status

AICS (AUSTRALIA) The intentional ingredients of this product are listed.
DSL (CANADA) The intentional ingredients of this product are listed.
ECL (SOUTH KOREA) The intentional ingredients of this product are listed.
EINECS (EUROPE) The intentional ingredients of this product are listed.
ENCS (JAPAN) The intentional ingredients of this product are listed.

State and Local Regulations

California Proposition 65

None

16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances.

Last page

MATERIAL SAFETY DATA SHEET

ELECTRIC DETONATORS
NON ELECTRIC DETONATORS

SECTION I

Issued by the Safety and Compliance Dept.

AUSTIN POWDER COMPANY
25800 SCIENCE PARK DRIVE
CLEVELAND, OHIO 44122
EMERGENCY PHONE
DAY 216-464-2400
NIGHT 216-464-2407

TRADE NAME AND SYNONYMS
Coal* Star, Rock* Star, Time* Star, Coal Mine Delays, Seismic* Star, Twin* Star Detonators, 3-D Star, Seismic Detonators and Shock*Star; In-Hole Delays, Surface Delay Connectors, Quick-Relay Connectors, Dual Delays, Shorty STD (Shock Tube with Detonators) and MS Connector.

Electric Blasting Caps

SECTION II HAZARDOUS INGREDIENTS

Explosive components are PETN (possibly TNT) and lead compounds sealed in a metal shell.

PETN, Pentaerythritol Tetranitrate,	CAS No. 78-11-5
Lead Azide, $Pb(N_3)_2$,	CAS No. 13424-46-9
Lead Styphnate, Lead Trinitroresorcinate, $C_6H_3N_3O_9Pb$	CAS No. 15245-44-0
TNT, Trinitrotoluene, $C_7H_5N_3O_6$	CAS No. 118-96-7 (May be included in some detonators)

SECTION III PHYSICAL DATA

BOILING POINT	N/A	VAPOR PRESSURE (mm Hg)	N/A
SPECIFIC GRAVITY (H_2O = 1)	N/A	VAPOR DENSITY (Air = 1)	N/A
PERCENT VOLATILE BY VOL. (%)	N/A	EVAPORATION RATE:	N/A
SOLUBILITY IN WATER:	Insoluble		

APPEARANCE AND ODOR: Aluminum or copper shells with attached PVC or polyethyene coated copper or iron leg wires. No odor.

SECTION IV FIRE AND EXPLOSION DATA

FLASH POINT:	N/A
FLAMMABLE LIMITS:	N/A
EXTINGUISHING MEDIA:	See below
SPECIAL FIREFIGHTING PROCEDURES:	Do not fight fire. Withdraw personnel immediately . Allow fire to burn itself out.
UNUSUAL FIRE AND EXPLOSION HAZARDS:	May explode when subjected to flame, heat, impact, friction, electric current, electrostatic or radio frequency energy. Do not exceed 150°F (66°C). Avoid toxic fumes from fire.

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: ACGIH: 0.05 mg/M³ TWA, lead, elemental, and inorganic compounds, as Pb.
OSHA : 50 µg/M³ PEL as Pb. For additional information, see 29 CFR 1910.1025

EFFECTS OF OVEREXPOSURE: None likely when safe blasting practices are employed.

EMERGENCY AND FIRST AID PROCEDURES: Improper handling or misuse may cause detonation resulting in injuries from shrapnel. Lead and lead compounds are listed in the 1987 IARC Monographs as possible human carcinogens (Group 2B). Lead is not listed in the NTP annual report on carcinogens.

MATERIAL SAFETY DATA SHEET

ELECTRIC DETONATORS
NON ELECTRIC DETONATORS

SECTION VI REACTIVITY DATA

Issued by the Safety and Compliance Dept.

STABILITY: May explode when subjected to flame, heat, impact, friction, electric currents, electrostatic or radio frequency energy. Avoid static charge build up. Keep lead wires shunted until wiring into circuit.

INCOMPATIBILITY (MATERIALS TO AVOID): Avoid contact with acids or alkalies.

HAZARDOUS DECOMPOSITION PRODUCTS: Gaseous Nitrogen Oxides, Carbon Oxides, and lead fumes.

HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Pick up containers or units by hand. Avoid conditions affecting stability. DO NOT use damaged detonators.

WASTE DISPOSAL METHOD: Dispose of under direct supervision of a qualified person according to local, state and federal regulations. Call Austin Powder for recommendations and assistance. This material may become a hazardous waste under certain conditions and must be collected, labeled and disposed of per state and federal hazardous waste regulations.

TRANSPORTATION EMERGENCIES involving spills, leaks, fires or exposures in the United States: **CALL CHEMTREC:** 1-800-424-9300. For emergency calls originating outside the U. S. dial the U. S. access number followed by: 1-703-527-3887. All calls are recorded.

SECTION VIII SPECIAL PROTECTION INFORMATION:

RESPIRATORY PROTECTION:	Avoid breathing fumes from detonation.
VENTILATION:	Not required.
PROTECTIVE GLOVES:	Not required.
EYE PROTECTION:	Not required.

SECTION IX SPECIAL PRECAUTIONS

COMPLY WITH "ALWAYS AND NEVER" AS ADOPTED BY THE INSTITUTE OF MAKERS OF EXPLOSIVES. TRANSPORTATION, STORAGE AND USE MUST COMPLY WITH OSHA SAFETY AND HEALTH STANDARDS 29CFR1910.109, APPLICABLE MSHA REGULATIONS, THE DOT AND HAZARDOUS MATERIALS REGULATIONS BATF REQUIREMENTS AND STATE AND LOCAL TRANSPORTATION, STORAGE AND USE REGULATIONS AND ORDINANCES.

THESE DETONATORS MAY BE SHIPPED UNDER ONE OF THE FOLLOWING DOT CLASSIFICATIONS:

DOT or IMDG proper shipping description:

Detonators, Electric, 1.4B, UN0255, PGII
Detonators, Electric, 1.1B, UN0030, PGII
Detonator Assemblies, Non-Electric, 1.1B, UN0360, PGII
Detonator Assemblies, Non-Electric, 1.4B, UN0361, PGII
Articles, explosive, n.o.s. 1.4S, UN0349, PGII

Consult IME Safety Library Publication No. 20, SAFETY GUIDE FOR THE PREVENTION OF RADIO FREQUENCY RADIATION HAZARDS IN THE USE OF ELECTRIC BLASTING CAPS, and Publication No. 22, RECOMMENDATIONS FOR THE SAFE TRANSPORTATION OF DETONATORS IN A VEHICLE WITH CERTAIN OTHER EXPLOSIVE MATERIALS.

*** IDENTIFICATION ***

MSDS RECORD NUMBER : 802164
PRODUCT NAME(S) : CFR 40-86-96 RON UNLEADED GASOLINE + 15% MTBE
PRODUCT IDENTIFICATION : PRODUCT CODE R00000573200
DATE OF MSDS : 1994-09-13

*** MATERIAL SAFETY DATA ***

PRIMARY APPLICATION- MOTOR FUEL

SYNONYMS..... : UNLEADED PREMIUM GASOLINE
CAS REGISTRY NO: SEE SEC. 2
CAS NAME..... : NO CLASSIFICATION - MIXTURE
CHEMICAL FAMILY: MOTOR FUEL.

EMERGENCY PHONE NUMBERS (AFTER NORMAL BUSINESS HOURS)
CHEMTREC. 1-800-424-9300

2. COMPOSITION / INFORMATION ON INGREDIENTS

EXPOSURE GUIDELINES

			OSHA		ACGIH				
COMPONENT/CAS NO.	LO%	HI%	TWA	STEL	TWA	STEL	TWA	STEL	UNIT
LIMITS FOR THE PRODUCT:									
			300	500	300	500			PPM
XYLENE									
1330-20-7	.00	25.00	100	150	100	150			PPM
TERT-BUTYL ALCOHOL									
75-65-0	.00	10.00	100	150	100	150			PPM
MTBE									
1634-04-4	15.00	20.00					100	150	PPM
TOLUENE									
108-88-3	.00	30.00	100	150	50				PPM
BENZENE									
71-43-2	.10	4.90	1	5	10				PPM
LIGHT PETROLEUM DISTILLATE									
8006-61-9	.00	84.00	300	500	300	500			PPM
CUMENE									
98-82-8	.00	1.00	50		50				PPM
ETHYL BENZENE									
100-41-4	.00	5.00	100	125	100	125			PPM
N-HEXANE									
110-54-3	.00	5.00	50		50				PPM
NAPHTHALENE									
91-20-3	.00	5.00	10	15	10	15			PPM
CYCLOHEXANE									
110-82-7	.00	9.00	300		300				PPM
1,2,4-TRIMETHYLBENZENE									
95-63-6	.00	5.00	25		25				PPM

ADDITIONAL EXPOSURE LIMITS
OTHER LIMIT- LIMIT IS DEPENDENT ON BENZENE, SEE SECTION 10

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
DANGER EXTREMELY FLAMMABLE LIQUID & VAPOR - VAPOR MAY CAUSE FLASH FIRE.

HARMFUL IF INHALED. HIGH VAPOR CONCENTRATIONS MAY CAUSE DIZZINESS. MAY CAUSE SKIN IRRITATION.

HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD-CAN ENTER LUNGS AND CAUSE DAMAGE. CONTAINS MATERIAL
WHICH CAN CAUSE CANCER.

APPEARANCE-- COLORLESS LIQUID. ODOR-- GASOLINE ODOR

POTENTIAL HEALTH EFFECTS

PRIMARY ROUTES OF ENTRY- INHALATION(X) SKIN(X) EYE(X) INGESTION(X)

INHALATION: EXCESSIVE EXPOSURES MAY CAUSE IRRITATION TO EYES, NOSE, THROAT AND LUNGS. RESPIRATORY TRACT; CENTRAL NERVOUS SYSTEM (BRAIN) EFFECTS;
HEADACHES, NAUSEA; DIZZINESS, LOSS OF BALANCE AND COORDINATION;
UNCONSCIOUSNESS, COMA; RESPIRATORY FAILURE AND DEATH. REPEATED EXCESSIVE EXPOSURES MAY CAUSE BLOOD DISORDERS SUCH AS ANEMIA & LEUKEMIA. CONTAINS A MATERIAL WHICH HAS BEEN RELATED TO CANCER IN HUMANS.

SKIN
SKIN ABSORPTION OF MATERIAL MAY PRODUCE SYSTEMIC TOXICITY. MAY CAUSE MODERATE IRRITATION WITH PROLONGED OR REPEATED CONTACT.

EYE
CONTACT WITH THE EYE MAY CAUSE MILD IRRITATION.

INGESTION
HARMFUL OR FATAL IF SWALLOWED. INGESTION OF THIS MATERIAL MAY CAUSE ABDOMINAL PAIN; PULMONARY ASPIRATION HAZARD IF SWALLOWED AND/OR VOMITING OCCURS - CAN ENTER LUNGS AND CAUSE DAMAGE. CONTAINS MATERIAL THAT HAS
BEEN RELATED TO CANCER IN HUMANS.

CARCINOGEN LISTED BY-IARC(YES) NTP(NO) OSHA(YES) ACGIH(NO) OTHER(NO)

PRE-EXISTING MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE-
DISORDERS AND DISEASES OF THE SKIN, EYE, BLOOD FORMING ORGANS,
NERVOUS SYSTEM AND OR PULMONARY SYSTEM, LUNG (E.G. ASTHMA-LIKE CONDITIONS).

4. FIRST AID MEASURES

INHALATION
MOVE PERSON TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION, OBTAIN MEDICAL ASSISTANCE.

SKIN
WASH WITH SOAP AND WATER UNTIL NO ODOR REMAINS. IF REDNESS OR SWELLING DEVELOPS, OBTAIN MEDICAL ASSISTANCE. IMMEDIATELY REMOVE SOAKED CLOTHING.
WASH CLOTHING BEFORE REUSE.

EYE
FLUSH WITH WATER FOR AT LEAST 15 MINUTES. IF IRRITATION PERSISTS, OBTAIN MEDICAL

ASSISTANCE.

INGESTION
DO NOT INDUCE VOMITING] DO NOT GIVE LIQUIDS] OBTAIN EMERGENCY MEDICAL ATTENTION. SMALL AMOUNTS WHICH ACCIDENTALLY ENTER MOUTH SHOULD BE RINSED
OUT UNTIL TASTE OF IT IS GONE.

5. FIRE FIGHTING MEASURES

FLASH POINT: -40 CLOSED CUP (DEG. F); -40 CLOSED CUP (DEG. C)
AUTOIGNITION TEMP.: APPROX. 750 (DEG. F); APPROX. 400 (DEG. C)

---FLAMMABLE LIMITS IN AIR---
LOWER EXPLOSIVE LIMIT (LEL): 1.5 % VOLUME
UPPER EXPLOSIVE LIMIT (UEL): 7.6 % VOLUME

FIRE AND EXPLOSION HAZARDS
EXTREMELY FLAMMABLE LIQUID (FLASH POINT LESS THAN 20F)

EXTINGUISHING-MEDIA
WATER SPRAY. REGULAR FOAM. DRY CHEMICAL. CARBON DIOXIDE.

SPECIAL FIRE FIGHTING INSTRUCTIONS
COOL TANK/ CONTAINER. WEAR SELF-CONTAINED BREATHING APPARATUS. WEARSTRUCTURAL FIREFIGHTERS PROTECTIVE CLOTHING.

NFPA/HMIS CLASSIFICATION HAZARD RATING
HEALTH - 1 / 1 FIRE - 3 / 3

0=LEAST 1=SLIGHT 2=MODERATE
3=HIGH 4=EXTREME

REACTIVITY - 0 / 0
PERSONAL PROTECTION INDEX - X

SPECIFIC HAZARD: FLAMMABLE

6. ACCIDENTAL RELEASE MEASURES

PREVENT IGNITION; STOP LEAK; VENTILATE AREA. CONTAIN SPILL. USE WATER SPRAY TO DISPERSE VAPORS. KEEP UPWIND OF LEAK. FOR LARGE SPILL, LEAK OR RELEASE. USE PERSONAL PROTECTIVE EQUIPMENT STATED IN SECTION 8. ADVISE EPA; STATE AGENCY IF REQUIRED. ABSORB ON INERT MATERIAL. SHOVEL, SWEEP
OR VACUUM SPILL.

7. HANDLING AND STORAGE

KEEP AWAY FROM HEAT, SPARKS AND FLAME. KEEP CONTAINER TIGHTLY CLOSED. KEEP IN WELL VENTILATED SPACE. NFPA CLASS IA STORAGE. CONSULT NFPA AND OSHA CODES. TRANSFER OPERATIONS MUST BE ELECTRICALLY GROUNDED TO
DISSIPATE STATIC BUILDUP. AVOID PROLONGED BREATHING OF MIST OR VAPOR. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. AVOID CONTACT WITH EYES.
WASH THOROUGHLY AFTER HANDLING. NEVER SIPHON BY MOUTH.

8. EXPOSURE CONTROL / PERSONAL PROTECTION

CONSULT WITH A HEALTH/SAFETY PROFESSIONAL FOR SPECIFIC SELECTION.

VENTILATION
USE ONLY WITH ADEQUATE VENTILATION. EXPLOSION PROOF VENTILATION EQUIPMENT REQUIRED.

PERSONAL PROTECTIVE EQUIPMENT

EYE
SPLASH PROOF CHEMICAL GOGGLES OR FULL FACE SHIELD RECOMMENDED TO PROTECT AGAINST SPLASH OF PRODUCT.

GLOVES
PROTECTIVE GLOVES RECOMMENDED TO PROTECT AGAINST CONTACT WITH PRODUCT. THE FOLLOWING GLOVE MATERIALS ARE ACCEPTABLE: POLYETHYLENE; NEOPRENE;
NITRILE; POLYVINYL ALCOHOL; VITON;

RESPIRATOR
CONCENTRATION-IN-AIR DETERMINES PROTECTION NEEDED. USE ONLY NIOSH CERTIFIED RESPIRATORY PROTECTION. HALF-MASK AIR PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES IS ACCEPTABLE TO 10 TIMES THE EXPOSURE LIMIT. FULL-FACE AIR PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES
IS ACCEPTABLE TO 50 TIMES THE EXPOSURE LIMIT NOT TO EXCEED THE CARTRIDGE LIMIT OF 1000 PPM. PROTECTION BY AIR PURIFYING RESPIRATORS IS LIMITED. USE A POSITIVE PRESSURE-DEMAND FULL-FACE SUPPLIED AIR RESPIRATOR OR SCBA FOR EXPOSURES ABOVE 50X THE EXPOSURE LIMIT. IF EXPOSURE IS ABOVE IDLH(IMMEDIATELY DANGEROUS TO LIFE & HEALTH) OR THERE IS THE POSSIBILITY OF AN UNCONTROLLED RELEASE OR EXPOSURE LEVELS ARE UNKNOWN THEN USE A POSITIVE PRESSURE-DEMAND FULL-FACE SUPPLIED AIR RESPIRATOR WITH ESCAPE BOTTLE OR SCBA.

OTHER
IF CONTACT IS UNAVOIDABLE, WEAR CHEMICAL RESISTANT CLOTHING. THE
FOLLOWING MATERIALS ARE ACCEPTABLE AS PROTECTIVE CLOTHING MATERIALS:
POLYETHYLENE; POLYVINYL ALCOHOL(PVA); NEOPRENE; NITRILE; VITON; POLYURETHANE; SAFETY SHOWER AND EYE WASH AVAILABILITY RECOMMENDED.
LAUNDER SOILED CLOTHES. FOR NON-FIRE EMERGENCIES, POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS (SCBA) & STRUCTURAL FIREFIGHTERS'
PROTECTIVE CLOTHING WILL PROVIDE LIMITED PROTECTION.

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT..... : <100 - 435 (DEG. F) <38 - 223 (DEG. C)
MELTING POINT..... : N/A
SPECIFIC GRAVITY... : 0.74 (WATER=1)
PACKING DENSITY.... : N/A (KG/M3)
VAPOR PRESSURE..... : 325 TO 525 (MM HG @ 20 DEG C)
VAPOR DENSITY..... : 4 (AIR=1)
SOLUBILITY IN WATER.: SLIGHT (% BY VOLUME)
PH INFORMATION..... : N/A AT CONC. N/A G/L H2O
% VOLATILES BY VOL..: 100
EVAPORATION RATE... : RAPID & VARIES (ETHYL ETHER=1)
OCTANOL/WATER COEFF.: N.D.
APPEARANCE..... : COLORLESS LIQUID.
ODOR..... : GASOLINE ODOR
ODOR THRESHOLD..... : 15(EST) (PPM)
VISCOSITY..... : N.D. SUS @ N.D DEG F ... N.D. CST @ N.D DEG C

MOLECULAR WEIGHT... : N.D. (G/MOLE)

10. STABILITY AND REACTIVITY

STABILITY
STABLE. CONDITIONS TO AVOID-
SOURCES OF IGNITION.
INCOMPATIBLE MATERIALS
STRONG OXIDIZERS
HAZARDOUS DECOMPOSITION
CARBON MONOXIDE AND ASPHYXIANTS ARE PRODUCED BY FIRE IGNITION

POLYMERIZATION
WILL NOT OCCUR.

11. TOXICOLOGICAL INFORMATION

FOR THE PRODUCT
INHALATION: OVEREXPOSURE MAY CAUSE EYE & RESPIRATORY TRACT IRRITATION, CNS (BRAIN) EFFECTS, DIZZINESS, LOSS OF BALANCE & COORDINATION, COMA, UNCONSCIOUSNESS, DEATH. CONTAINS

BENZENE: PROLONGED/REPEATED OVER- EXPOSURE TO BENZENE CAN CAUSE BLOOD DISORDERS RANGING FROM ANEMIA TO LEUKEMIA. SKIN: PROLONGED/WIDESPREAD CONTACT MAY CAUSE ADVERSE EFFECT, IRRITATION. EYE: MILD IRRITANT.

ORAL: HARMFUL/FATAL IF SWALLOWED.
ASPIRATION HAZARD--CAN ENTER LUNGS & CAUSE DAMAGE. LIFETIME INHALATION CAUSED LIVER TUMORS (FEMALE MICE)--API STUDY ON AN UNLEADED GASOLINE.
GASOLINE ENGINE EXHAUST CLASSIFIED AS POSSIBLE (IARC 2B) CARCINOGEN (INADEQUATE EVIDENCE EXISTS IN ANIMALS & HUMANS).

XYLENE (COMPONENT) INHALATION: VAPOR HARMFUL] OVEREXPOSURE TO HIGH CONCENTRATIONS CAN CAUSE EYE, NOSE, THROAT, LUNG IRRITATION; CNS (BRAIN) EFFECTS, DIZZINESS, DIFFICULTY IN BREATHING, UNCONSCIOUSNESS, COMA AND DEATH.
REPORTS OF HEART IRREGULARITIES FROM MASSIVE EXPOSURES.
PROLONGED OVEREXPOSURES CAN CAUSE BRAIN, LIVER, KIDNEY EFFECTS/DAMAGE.

SKIN: CAN BE ABSORBED. REPEATED/PROLONGED CONTACT IS IRRITATING. EYES: IRRITANT. ORAL: HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD-CAN ENTER LUNGS AND CAUSE DAMAGE. IN RATS, PROLONGED BREATHING OF 500 PPM-FETAL EFFECTS BUT NO BIRTH DEFECTS; NO EFFECTS AT 400 PPM.
HIGH ORAL DOSE WAS TOXIC TO PREGNANT MICE; CLEFT PALATE IN FETUSES.

TERT-BUTYL ALCOHOL (COMPONENT)
INHALATION: VAPOR HARMFUL] OVEREXPOSURE TO HIGH CONCENTRATIONS MAY CAUSE EYE, NOSE, THROAT, LUNG IRRITATION; CNS (BRAIN) EFFECTS, HEADACHE, NAUSEA, DIZZINESS, DROWSINESS, VOMITING, FATIGUE, BLURRED VISION, LOSS OF BALANCE, UNCONSCIOUSNESS.

SKIN: SLIGHT IRRITANT.

EYES: SEVERE IRRITATION WITH CONTACT.

ORAL: MODERATELY TOXIC.

SYMPTOMS SIMILAR TO INHALATION. HARMFUL OR FATAL IF SWALLOWED.
PULMONARY ASPIRATION HAZARD IF SWALLOWED AND/OR VOMITING OCCURS - CAN ENTER LUNGS AND CAUSE DAMAGE. CAUSED TOXICITY/DAMAGE TO FETUS WHEN
REPEATEDLY FED AT VERY HIGH CONCENTRATIONS TO PREGNANT MICE.

MTBE (COMPONENT) INHALATION: MAY CAUSE EYE & RESPIRATORY TRACT IRRITATION, COUGHING,
SHORTNESS OF BREATH, CNS (BRAIN) EFFECTS, HEADACHE, NAUSEA, DIZZINESS, INCOORDINATION. SKIN: PROLONGED/REPEATED CONTACT MAY CAUSE IRRITATION.

EYE CONTACT: IRRITATION. ORAL: MODERATE ACUTE TOXICITY. HARMFUL OR FATAL IF SWALLOWED AND/OR VOMITING OCCURS BECAUSE IT CAN ENTER LUNGS AND CAUSE DAMAGE--PULMONARY ASPIRATION HAZARD. LIFETIME OVEREXPOSURES
AT HIGH CONCENTRATIONS: 3000 PPM & HIGHER--RATS: DEATH, KIDNEY DAMAGE, AND KIDNEY TUMORS (MALES); AT 8000 PPM-- LIVER TUMORS IN FEMALE MICE.
MICE: MATERNAL TOXICITY & FETAL EFFECTS AT 4000 PPM. HUMAN EXPOSURES AT THESE HIGH CONCENTRATIONS ARE HIGHLY UNLIKELY.

TOLUENE (COMPONENT) INH: VAPOR HARMFUL] OVEREXPOSURE TO HIGH CONCENTRATIONS: EYE, NOSE, THROAT, LUNG IRRITATION; CNS (BRAIN) EFFECTS, DIZZINESS, DIFFICULTY IN BREATHING, COMA, DEATH. REPORTS OF HEART BEAT IRREGULARITIES FROM MASSIVE EXPOSURE. PROLONGED OVEREXPOSURE CAN CAUSE BRAIN, LIVER, KIDNEY EFFECTS/DAMAGE. SKIN: CAN BE ABSORBED. PROLONGED CONTACT IS IRRITATING.

EYE: IRRITATION.

ORAL: HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD-CAN ENTER LUNG & CAUSE DAMAGE. PREG: MAY
CAUSE MENTAL AND/OR GROWTH RETARDATION IN CHILDREN OF FEMALE SOLVENT ABUSERS (SNIFFERS); IN RATS PROLONGED BREATHING WAS TOXIC TO FETUSES &
MOTHERS - 1500 PPM; NO BIRTH DEFECTS - 5000 PPM. NO EFFECTS - 750 PPM.

BENZENE (COMPONENT) INHALATION: VAPOR HARMFUL] OVEREXPOSURE TO HIGH CONCENTRATIONS CAN
CAUSE CENTRAL NERVOUS SYSTEM (BRAIN) EFFECTS, HEADACHE, DIZZINESS, DIFFICULTY IN BREATHING, UNCONSCIOUSNESS, COMA, DEATH. THERE ARE REPORTS OF HEART IRREGULARITIES FROM MASSIVE EXPOSURES. IARC GROUP 1- HUMAN CANCER HAZARD. REPEATED PROLONGED INHALATION CAN CAUSE BLOOD DISORDERS-ANEMIA TO LEUKEMIA. CANCER-ANIMAL STUDIES. CHANGES IN CHROMOSOMES. FETAL EFFECTS IN ANIMAL STUDIES AT REPEATED/PROLONGED EXPOSURES.

SKIN: CAN BE ABSORBED; IRRITATING.

EYE: SEVERE IRRITATION POSSIBLE.

ORAL: POISON] HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD- CAN ENTER LUNGS AND CAUSE DAMAGE.

LIGHT PETROLEUM DISTILLATE (COMPONENT) INHALATION: OVEREXPOSURE MAY CAUSE EYE, NOSE, THROAT, RESPIRATORY TRACT
IRRITATION; CNS (BRAIN) EFFECTS, NAUSEA, DIZZINESS, UNCONSCIOUSNESS, COMA, RESPIRATORY FAILURE, DEATH. SKIN: IRRITATION WITH PROLONGED AND REPEATED CONTACT.

EYE: MILD TO MODERATE IRRITATION. ORAL: HARMFUL OR FATAL IF SWALLOWED DUE TO A PULMONARY ASPIRATION HAZARD IF SWALLOWED
AND/OR VOMITING OCCURS - CAN ENTER LUNGS AND CAUSE DAMAGE.

CUMENE (COMPONENT) INHALATION: VAPOR HARMFUL] OVEREXPOSURE TO HIGH CONCENTRATIONS CAN CAUSE EYE, NOSE, THROAT, RESPIRATORY TRACT IRRITATION, CNS (BRAIN) EFFECTS, NAUSEA, HEADACHE, DIZZINESS, DIFFICULTY IN BREATHING, INCOORDINATION, UNCONSCIOUSNESS, DEATH. SKIN: LOW ACUTE TOXICITY. CAN BE ABSORBED. MODERATE IRRITATION. EYE: MILD IRRITANT.

ORAL: MODERATE ACUTE TOXICITY. HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD - CAN ENTER LUNGS AND CAUSE DAMAGE. OVEREXPOSURE BY INHALATION/INGESTION MAY CAUSE LIVER, KIDNEY, SPLEEN AND LUNG EFFECTS/DAMAGE. EQUIVOCAL RESULTS IN ANIMAL STUDY REPORTING BIRTH DEFECTS & EMBRYONAL MORTALITY. CONFLICTING RESULTS IN GENETIC TESTS.

ETHYL BENZENE (COMPONENT)

INHALATION: OVEREXPOSURE TO HIGH CONCENTRATIONS CAN CAUSE EYE, NOSE, THROAT & RESPIRATORY IRRITATION, CENTRAL NERVOUS SYSTEM (BRAIN) EFFECTS, DIZZINESS, LOSS OF BALANCE & COORDINATION, UNCONSCIOUSNESS, RESPIRATORY FAILURE & DEATH. PROLONGED BREATHING CAN CAUSE LIVER AND KIDNEY EFFECTS.

SKIN: LOW ACUTE TOXICITY. ABSORBABLE THROUGH SKIN. MODERATE IRRITATION.

EYE: MODERATE IRRITANT.

ORAL: HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD IF SWALLOWED AND/OR VOMITING OCCURS-CAN ENTER LUNGS AND CAUSE DAMAGE. PROLONGED OVEREXPOSURE OF 1000 PPM CAUSED MATERNAL AND FETAL TOXICITY.

N-HEXANE (COMPONENT) INHALATION: OVEREXPOSURE TO HIGH CONCENTRATIONS CAN CAUSE EYE, NOSE, THROAT, RESPIRATORY TRACT IRRITATION; CNS (BRAIN) EFFECTS, DIZZINESS, CONFUSION, COMA.

SKIN: CAN BE ABSORBED. PROLONGED AND REPEATED CONTACT MAY CAUSE IRRITATION, BURNING SENSATION, ITCHING, BLISTERS.

EYE: IRRITATING; REPEATED EXPOSURE MAY CAUSE VISUAL DISTURBANCE.

INGESTION: ASPIRATION HAZARD IF SWALLOWED AND/OR VOMITING OCCURS - CAN ENTER LUNGS AND CAUSE DAMAGE. PROLONGED EXPOSURES CAUSE HARM TO THE CENTRAL NERVOUS SYSTEM PRODUCING A LACK OF FEELING IN EXTREMITIES (HANDS AND FEET) AND MORE SEVEE NERVE DAMAGE (PERIPHERAL NEUROPATHY).

NAPHTHALENE (COMPONENT)
INHALATION: VAPORS MAY CAUSE RESPIRATORY TRACT IRRITATION, HEADACHE, CONFUSION, EXCITEMENT, PROFUSE SWEATING, ABDOMINAL PAIN, VOMITING, DIARRHEA.

SKIN: MAY BE ABSORBED THROUGH THE SKIN. MAY CAUSE IRRITATION AND DERMATITIS. CAN CAUSE ALLERGIC SKIN REACTION.

EYE: VAPOR CAUSES IRRITATION AT 15 PPM. CONTACT MAY CAUSE IRRITATION, CONJUNCTIVITIS, CORNEAL OPACITY. REPORTED TO CAUSE CATARACTS.

ORAL: MODERATELY TOXIC IF SWALLOWED . BLOOD EFFECTS (HEMOLYSIS), LIVER &

KIDNEY INJURY MAY ALSO OCCUR. MAY CAUSE GASTROINTESTINAL IRRITATION, VOMITING, AND DIARRHEA.

CYCLOHEXANE (COMPONENT)
INHALATION: OVEREXPOSURE TO HIGH CONCENTRATIONS CAN CAUSE EYE, NOSE, THROAT, RESPIRATORY IRRITATION; CNS (BRAIN) EFFECTS, HEADACHE, DIZZINESS, EXCITEMENT, DIFFICULTY BREATHING, FATIGUE, INCOORDINATION, ANESTHESIA, UNCONSCIOUSNESS, DEATH.

SKIN: LOW ACUTE TOXICITY. MAY BE
IRRITATING WITH PROLONGED AND REPEATED CONTACT.

EYE: MAY CAUSE MILD IRRITATION WITH CONTACT.

ORAL: MODERATE ACUTE TOXICITY. INGESTION OF LARGE QUANTITIES MAY CAUSE EFFECTS SIMILIAR TO INHALATION. HARMFUL OR FATAL IF SWALLOWED AND/OR VOMITING OCCURS BECAUSE IT CAN ENTER LUNGS AND CAUSE DAMAGE--PULMONARY ASPIRATION HAZARD.

1,2,4-TRIMETHYLBENZENE (COMPONENT) INHALATION: MODERATELY TOXIC. VAPOR OR MIST IRRITATES THE EYES, MUCOUS
MEMBRANES, RESPIRATORY TRACT. OVEREXPOSURE MAY CAUSE CENTRAL
NERVOUS SYTEM (BRAIN) EFFECTS, NARCOTIC EFFECTS, NAUSEA, HEADACHE, DIZZINESS, INCOORDINATION, UNCONSCIOUSNESS, COMA, DEATH.

SKIN: CAN BE ABSORBED. CONTACT MAY CAUSE IRRITATION AND DERMATITIS. EYE: IRRITATING

INGESTION: MODERATELY TOXIC. SYMPTOMS SIMILAR TO INHALATION. HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD- HARMFUL OR FATAL BECAUSE IT CAN ENTER THE LUNGS AND CAUSE DAMAGE.

12. ECOLOGICAL INFORMATION

AQUATIC TOXICITY: GASOLINE SPILLS ARE TOXIC TO FISH AND AQUATIC FLORA.

13. DISPOSAL CONSIDERATIONS

FOLLOW FEDERAL, STATE AND LOCAL REGULATIONS. RCRA HAZARDOUS WASTE. DO NOT FLUSH TO DRAIN/ STORM SEWER. CONTRACT TO AUTHORIZED DISPOSAL SERVICE.

14. TRANSPORTATION INFORMATION

DOT- PROPER SHIPPING NAME- GASOLINE HAZARD CLASS- 3 (FLAMMABLE LIQUID) IDENTIFICATION NUMBER- UN1203
LABEL REQUIRED- PG II, PLACARD; FLAMMABLE LIQUID
IMDG- PROPER SHIPPING NAME- GASOLINE
IATA- PROPER SHIPPING NAME- GASOLINE

15. REGULATORY INFORMATION

SARA 302 THRESHOLD PLANNING QUANTITY. N/A

SARA 304 REPORTABLE QUANTITY ..... 204 POUNDS

SARA 311 CATEGORIES- IMMEDIATE (ACUTE) HEALTH EFFECTS.. Y
DELAYED (CHRONIC) HEALTH EFFECTS.. Y
FIRE HAZARD ..... Y
SUDDEN RELEASE OF PRESSURE HAZARD. N

REACTIVITY HAZARD ..... N

WHEN A PRODUCT AND/OR COMPONENT IS LISTED BELOW, THE REGULATORY LIST ON WHICH IT APPEARS IS INDICATED.

FOR THE PRODUCT - FL MA MN NJ 03 04
XYLENE - FL IL MA ME MN NJ PA RI 01 07
TERT-BUTYL ALCOHOL - FL MA MN NJ PA 01
MTBE - MA NJ PA 01 07
TOLUENE - CA FL MA MN NJ PA 01 07
BENZENE - CA FL MA MN NJ PA 01 03 04 06 07 10
LIGHT PETROLEUM DISTILLATE - FL MA MN NJ
CUMENE - FL MA MN NJ PA 01 07
ETHYL BENZENE - FL MA MN NJ PA 01 07
N-HEXANE - FL MA MN NJ PA
NAPHTHALENE - FL MA MN NJ PA 01 07
CYCLOHEXANE - FL MA MN NJ PA 01 07
1,2,4-TRIMETHYLBENZENE - MA NJ PA 01

01=SARA 313
02=SARA 302/304
03=IARC CARCINOGEN
04=OSHA CARCINOGEN
05=ACGIH CARCINOGEN
06=NTP CARCINOGEN
07=CERCLA 302.4
08=WHMIS CONTROLLED PROD.
10=OTHER CARCINOGEN

THIS PRODUCT OR ALL COMPONENTS OF THIS PRODUCT ARE LISTED ON THE U.S. TSCA INVENTORY.

16. OTHER INFORMATION

PRECAUTIONARY LABELING FOR PUMPS, PORTABLE CONTAINERS, AND DRUMS IS REQUIRED. A "HAZARDOUS WHEN EMPTY" PICTOGRAM AND D.O.T. FLAMMABLE LIQUID LABEL ARE ALSO REQUIRED FOR DRUMS. BECAUSE BENZENE IS PRESENT IN THIS PRODUCT ABOVE 0.1%, THE OSHA STANDARD
FOR BENZENE IS APPLICABLE TO WORK LOCATIONS UPSTREAM OF FINAL DISCHARGE FROM TERMINALS. CONSULT 29CFR1910.1028 FOR DETAILS. PROLONGED AND REPEATED EXCESSIVE EXPOSURES TO BENZENE CAN RESULT IN BLOOD DISORDERS
RANGING FROM ANEMIA TO LEUKEMIA. RECOMMEND THAT EXPOSURES TO BENZENE BE KEPT BELOW 1.0 PPM FOR 8-HOURS; 5.0 PPM FOR 15-MIN. NORMAL SERVICE STATION OPERATIONS ARE BELOW THESE VALUES. FOR USE AS A MOTOR
FUEL ONLY. DO NOT USE FOR ANY OTHER PURPOSE.

HALLIBURTON

HALLIBURTON ENERGY SERVICES

Explosive Products Center / 8432 South I-35 West / Alvarado, Texas 76009-9775 / Tel: 817-783-5111 / Fax: 817-783-5812

MATERIAL SAFETY DATA SHEET

PRODUCT IDENTIFICATION

PRODUCT NAME: SHAPED CHARGE PRODUCTS Revision Date: 9/29/94

TRADE NAMES ANS SYNONYMS

Tubing Cutters, Drill Pipe Cutters, Casing Cutters, Big Hole Charges, Deep Penetrating Charges, Gravel Pack Charges, DYNA-Strip Charges, DYNA-Cap Charges, DYNA-Jet Charges, SSB Charges, Sidewinder Charges, GSC Charges, Junk Shot Charges, Linear Shaped Charges, (LSC) Flexible Linear Shaped Charges (FLSC)

MANUFACTURER: Halliburton Energy Services
Explosive Products Center
8432 South I-35 W
Alvarado, Texas 76009-9775

PRODUCT INFORMATION PHONE: (817) 783-5111
EMERGENCY PHONE: (817) 783-5111
TRANSPORTATION EMERGENCY PHONE: INFOTRAC: (800) 535-5053 U.S. & CANADA

****

HAZARDOUS COMPONENTS

CHEMICAL	Exposure Limits TLV	PEL
Cyclotrimethylenetrinitramine (RDX)	1.5mg/M³	1.5 mg/M³
Cyclotetramethylenetetranitramine (HMX)	NE	NE
Hexanitrostilbene (HNS)	NE	NE
2,6-bis (Picrylamino)-3,5-dinitropyridine (PYX)	NE	NE
Nonanitroterphenyl (NONA)	NE	NE
Desensitising Wax	NE	NE
Iron	5 mg/M³	10 mg/M³
Copper	1 mg/M³	1 mg/M³
Tin	2 mg/M³	2 mg/M³
Aluminum	5 mg/M³	NE
Corrosion Resistant Steel	NE	NE
Lead	0.15 mg/M³	50 g/M³
Antimony	0.5 mg/M³	0.5 g/M³

NE = Not Established

****

PHYSICAL DATA

Packed powder charges (encased in metal casing).

****

HAZARDOUS REACTIVITY

INSTABILITY: May detonate with friction, impact, heat, and low level electrical current.

INCOMPATIBILITY: Acids and aklalis.

HAZARD DECOMPOSITION: Detonation may product shrapnel. Gases produced may contain carbon monoxide and nitrogen oxide. Lead fumes may also be produced.

POLYMERIZATION: Polymerization will not occur.

****

FIRE AND EXPLOSION DATA

FLASHPOINT: N/A

EXTINGUISHING MEDIA: None

SPECIAL FIRE FIGHTING PROCEDURES: DO NOT fight fire. Isolate area. Evacuate personnel to a safe area. Guard against intruders. Allow fire to burn itself out.

SPECIAL FIRE FIGHTING PROCEDURES: DO NOT fight fire. Isolate area. Evacuate personnel to a safe area. Guard against intruders. Allow fire to burn itself out.

UNUSUAL FIRE AND EXPLOSION HAZARDS: May detonate with impact or on heating. May explode and throw fragments 1 mile or more if fire reaches cargo. Evacuate all persons, including emergency responders from the area.

****

HEALTH HAZARDS

Shaped Charge Products do not present health hazards in normal handling and use. However, the proudcts are Class A or Class C Explosives and detonation may cause severe physical injury, including death. All explosives are dangerous and must be handled carefully and used folcoing approved sagety procedures under the direction of competent, experienced perosns in accordance with all applicable Federal, State, and Local Laws, Regulations and Ordinances.

Inhalation of explosive powders may cause nervous system irregularities including headaches and dizziness. May be absorbed through the skin in toxic amounts.

Over exposure to lead may cause adverse effects to the blood forming, nervous, urinary, and reproductive systems incldiing weatkness, weight loss, insomnia, constipation, anamia, motor weakness, and encephalopathy. Lead may penetrate the placental barrier and has caused congenital abnomalties in animals. Several animal studies have indicated that hight doses of lead may be carcinogenic.

Nitrogen oxides generated during use are skin, eye and respiratory tract irritants.

CARCINOGENICITY

None of the components of these materials are listed as a carcinogen by NTP, IARC, or OSHA.

OTHER SYMPTOMS AFFECTED

A review of available data does not identify any conditions worsened by exposure to this product.

FIRST AID

INHALATION:
Not a likely route of exposure. If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably by mouth-to-mouth. If breathing is difficult, give oxygen. Seek Prompt Medical Attention.

EYE AND SKIN CONTACT:
Not a likely route of exposure.

INGESTION:
Not a likely route of exposure.

NOTE: Seek prompt medical attention if detonation caused physical injury.

****

SPILL OR LEAK PROCEDURES:

Use appropriate protective equipment. Isolate area and remove sources of friction, impact, heat, low level electrical current, electrostatic or RF energy. Only competent, experienced persons should be involved in clean up procedures. Sweep up with non-sparking tools and remove.

WASTE DISPOSAL

Disposal of in compliance with applicable Federal Regulations under the authority of the Resource Conservation and Recovery Act (40 CFR, parts 260-271).

****

SPECIAL PROTECTION INFORMATION

VENTILATION: Use only with adequate ventilation.

RESPIRATORY: NIOSH/MESA approved particle masks for dust and mist.

EYE: Safety glasses or goggles.

GLOVES: Normal work gloves.

****

SPECIAL PRECAUTIONS

Keep away from friction, impact and heat. Do Not consume food, drink or tobacco in areas where they may become contaminated with these materials.

STORAGE CONDITIONS

Refer to manufacturer's recommendations and warning for proper storage conditions.

****

APPENDIX E.
Munitions Constituents Sampling and Analysis Plan

(not applicable to this project)

APPENDIX F.
USA Environmental, Inc. Forms

DAILY OPERATIONS SUMMARY

DATE: ____/____/____ **PAGE 1 OF 5 PAGES**

SITE / LOCATION: _____

1. WORK SUMMARY

a. Work Accomplished:	**Number Completed**	**Total Remaining**
(1) Survey	_____	_____
(2) Preparation	_____	_____
(3) Mag & Flag	_____	_____
(4) Geophysical	_____	_____
(5) Intrusive	_____	_____
(6) Quality Control	_____	_____
(7) Quality Assurance	_____	_____

b. Discrepancies: _____
_____
_____
_____

c. Inspection Results:	**Pass**	**Fail**
(1) Quality Control	_____	_____
(2) Quality Assurance	_____	_____
(3) Safety	_____	_____

2. INSTRUCTIONS RECEIVED FROM CUSTOMER REPRESENTATIVE: _____
_____
_____
_____
_____

3. UXO SUMMARY

a. UXO Located:

Type:	Quantity:	Live/Prac.:	Remarks:

b. Demolition Supplies Expended:

Type:	Quantity:	Remarks:

c. Scrap Generation / Deposition:

Type:	Quantity:	Weight:	Remarks:

4. Utilization

a. Daily Man-hours:

Labor Category:	Task #	M/H Today:	M/H 0% :	M/H 4%	M/H 8%
Site Manager					
SUXOS					
UXO Technician III					
UXO Technician II					
UXO Technician I					
Laborer					
UXOSO					
UXOQCS					
Admin Personnel					
Visitor					
Sub-Contractor Personnel (List by Category)					

b. Daily Equipment:

Description:	Task:	Hours Used:	Hours Remaining:	% Hours Remaining:	Remarks:

5. Operational Remarks:

_____
_____
_____
_____
_____
_____

6. Signature / Date:

_____ **Date: ____/____/____**

SUXOS

Geophysical Dig Sheet and Target History

Project Name: ____________________
Project Location: ____________________
Date: ____________________
Coordinate System: ____________________
Survey Area ID: ____________________
Sector: ______ Grid: ____________
Field Book ID: ____________________

Geophysical Contractor: ____________________
Project Geophysicist: ____________________
Site Geophysicist: ____________________
Field Team: ____________________
COE Design Center POC: ____________________
COE Project Engineer: ____________________
COE Geophysicist: ____________________

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	**Date**	**Time**

Page ___ of ___

Unique Target ID	**Original Survey**						**Reacquisition Survey**			**Dig Results**												**Post-Dig UXO QC Results**			**Post-Dig Geophysical QC**		
													Offset				Depth (in/cm)										
	Easting Coord. (ft/m)	Northing Coord. (ft/m)	Channel ID (ie-C1 ... C4, top sensor, gradient, etc)	Amplitude Response (units*)	Dig Priority (0 is no dig known anomaly cause,1 is highest dig recommendation, etc.)	Date	Channel ID (ie C1 ....C4, top sensor, gradient, etc)	Amplitude Response (units*)**	Date	Anomaly type ***	Approx. weight (lbs-oz / kg-g)	**Comments**	Distance (ft / m)	Direction (N, NE, etc.)	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename **	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor, U=unacceptable)	Geophysicist QC Initials	Date

Note: * Fill in Units (mV, nT/m, ppt, etc.)
** Optional Field - refer to SOW for applicability.
***Use UXO for UXO, OE for ordnance(non-UXO), ORS for ordnance related scrap, SA for small arms ammunition, NC for no contact, OT for other.

EXPLOSIVE USAGE RECORD *Contract Number:* _____

Team Number: _____ *Date:* _____ *Project Name:* _____

Team Leader: _____ *Work area/Grid Number:* _____

EXPLOSIVES	**LOT NUMBER**	**QUANTITIES**						**Signatures**	
		Issued	*Initials*	*Used*	*Initials*	*Returned*	*Initials*	*Team Leader*	*Checker*

Reviewed and Accepted: _____ **Date:** _____

Senior UXO Supervisor

USA Environmental, Inc. Employee Injury Report

Site/Location: _____ **Control Number**: _____

This is an official document to be initiated by USA supervisors. Be accurate, thorough, and answer all questions.

BACKGROUND DATA

Todays Date: ____/____/____ Date of Accident: ____/____/____ Time: _____ AM PM

Day of Accident: S M T W T F S Weather Conditions: Sunny Clear Rain Fog Overcast

Temperature: 0-32 32-50 50-70 70-85 85 + Wind Conditions: Still Moderate High None

Location of Accident: _____ Time Accident was Reported: _____ AM PM

_____ Reported to Whom: _____

PERSONAL DATA

Name: Last _____ First _____ MI _____

Sex: F M DOB: ____/____/____ Place of Birth: _____

SSAN: _____-_____-_____ DOH: ____/____/____ Position: _____

Address: _____ City: _____ State: ____

Telephone Number: (_____) _____-_____ Zip: _____

ACCIDENT DATA

Nature of Accident: Near Miss ___ 1st Aid ___ Dr Visit ___ Ambul ___ Hospitalized ___ Fatality ___

If Fatality, Name of Agency Notified: _____ Type of Injury: _____

Did Employee Leave the Work Site: Yes ___ No ___ If Yes, Time Departed: _____ AM PM

Name of Medical Facility: _____ Telephone Number: (____) ____-_____

Address: _____ City: _____ State: ___ Zip: _____

Description of Accident: _____

Activity at Time of Accident: _____

Employee Injury Report Con't.

WITNESS DATA

Witness Name: Last _____ First _____ MI _____

Address: _____ City: _____ State: ____ Zip: _____

Telephone Number: (____) _____-_____ Employed By: _____

Statement Attached: Yes ___ No ___ Telephone Number: (____) _____-_____

ACCIDENT ACTIONS/ANALYSIS

Accident Cause(s):_____
_____
_____

Lack of Safety Equipment a Factor: Yes ___ No ___ If Yes, Explain: _____
_____

Safety Regulations or Guidance Violated: Yes ___ No ___ If Yes, Explain: _____
_____

Photographs Taken: Yes ___ No ___ If Yes, Located at: _____

Regulatory Agencies Notified: Yes ___ No ___ If Yes, which: _____

Point of Contact: _____ Date and Time: ____/____/____ _____ AM PM

Corrective Actions Taken or Recommended: _____
_____
_____

Report Prepared By: _____ Signature: _____

SUXO/PROJECT MANAGER

Corrective Actions/Recommendations: _____

SUXO Signature: _____ Date: ____/____/____

Concur With Actions Taken: Yes ___ No ___ Remarks: _____

Project Manager Signature: _____ Date: ____/____/____

Is ENG Form 3394 to be submitted: Yes_____ No____ If Yes, Dated: ___/____/_____

DID OE 005-05.01 Attachment C

MAG & Dig Sheet History

Project Name: ______________________________
Project Location: ______________________________
Date: ______________________________
Coordinate System: ______________________________
Survey Area ID: ______________________________
Sector: ________ Grid: ____________
Field Book ID: ______________________________

UXO Contractor: ______________________________
SUXOS: ______________________________
UXOQCS: ______________________________
Field Team: ______________________________
COE Design Center POC: ______________________________
COE Project Engineer: ______________________________
COE Geophysicist: ______________________________

Geophysical Equipment Used	Component	Serial #	Date	Time

Page ____ of ____

Unique Target ID	Original Survey						Reacquisition Survey			Dig Results												Post-Dig UXO QC Results		
													Offset				Depth (in/cm)							
	Easting Coord. (ft/m)	Northing Coord. (ft/m)	Channel ID (ie- C1 ….C4, top sensor, gradient, etc)	Amplitude Response (units*)	Dig Priority (0 is no dig known anomaly cause,1 is highest dig recommendation, etc..)	Date	Channel ID (ie C1 ….C4, top sensor, gradient, etc)	Amplitude Response (units*)**	Date	Anomaly type ***	Approx. weight (lbs-oz / kg-g)	Comments	Distance (ft / m)	Direction (N, NE, etc.)	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename **	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date

Note: * Fill in Units (mV, nT/m, ppt, etc.)
** Optional Field - refer to SOW for applicability.
***Use UXO for UXO, OE for ordnance(non-UXO), ORS for ordnance related scrap, SA for small arms ammunition, NC for no contact, OT for other.

Magazine Data Card

Nomenclature:

Lot Number:

Hazard Div.

Unit Of Issue:

Date	Name	Received	Issue	Balance	Checker's Initials

The signatures in each section of this document indicate that the items listed were in fact issued, expended, or returned to storage and that all quantities listed were verified through a physical count.

USAE

Operator/Instrument Test Form

FOR MEC OPERATIONS

DATE:	TIME:	NAME:
TEAM #:	INSTRUMENT/SERIAL #:	
SITE NAME AND LOCATION:		
WEATHER CONDITIONS:		
TEST AREA (List by grid number, lane, marker number, or other identifier):		
TEST ITEM(S) (List test item by type, depth, and quantity):		
BLIND SEED ITEM(S) (List type, depth, and quantity):		

II. TEST RESULTS

Item Description	Pass	Item Description	Pass
1. Instrument Checked for Broken/Missing Components	Y / N	9. Operator Familiar with W.P. Procedures	Y / N
2. Instrument Serviceability Check Performed	Y / N	10. Instrument Trained Operator	Y / N
3. Correct Settings Selected for the Instrument	Y / N	11. Instrument Passed Test Area	Y / N
4. Correct Survey/Sweep Techniques Employed	Y / N	12. Operator Passed Test Area	Y / N
5. Instrument Responsive to Test Item(s)	Y / N		
6. Operator Responsive to Instrument Signal/Sound	Y / N	Was a Blind Seed Item (BSI) Employed	Y / N
7. Operator Locates Point of Origin for Test Item(s)	Y / N	Did the Instrument Locate the BSI	Y / N
8 Operator Familiar with Pass/Fail Criteria	Y / N	Did the Operator Locate the BSI Origin	Y / N

SUMMARY OF DEFICIENCIES NOTED (Identify if procedural, process, instrument, or operator):

CORRECTIVE ACTIONS RECOMMENDED (As required):

Instruments failing the test will tagged and removed from service until repaired or replaced.

Individuals will be corrected on deficient procedures, processes, techniques, and/or re-trained to acceptable standards.

VI. SIGNATURES:

I acknowledge that I have been briefed on the results of this test and will take corrective actions as identified by the QC Section.

UXOQCS/UXOT III

INSTRUMENT OPERATOR

Note: QC test are to be conducted for the instrument and operator each day and documented on this form. This form will also be used to document the current status of deficiencies noted during daily tests. Any daily test forms where deficiencies have been noted will be forwarded to the Project Manager and to the USAE QC Manager.

USA Environmental, Inc.

DAILY QUALITY CONTROL REPORT

Date: ____/____/____ **Contract #: _____** **Task Order #: _____**

Site/Location : _____

Weather: _____ Temperature: _____ Rainfall: _____

1. Preparatory Inspection: _____

_____

_____

Results: _____

2. QC Audits Performed

a. Operations: _____

_____

_____

Results: _____

b. Safety: _____

_____

_____

Results: _____

c. Administrative: _____

_____

_____

Results: _____

d. Equipment: _____

_____

_____

_____

Results: _____

_____

Daily Quality Control Report Con't:

3. QC Performed (Grids)

Number of Grids QC'd: _____ Results: _____ # Pass _____ # Fail

Comments: _____
_____
_____
_____

4. Follow Up Inspections and Results

Section(s): _____
_____
_____
Results: _____

5. Instructions Received: _____
_____
_____
_____
_____

Remarks: _____
_____
_____
_____

QC Signature: _____ **Date:** ____/____/____

Printed Name: _____

SAFETY INSPECTION REPORT

Site / Location: _____ Date: ____/____/____

Type of Inspection: ____ Daily ____ Weekly ____ Re-Inspection ____ Other

Type of Operation Inspected:

_____
_____

Equipment Inspected: (Specify if Safety or Operational in Nature)

_____
_____
_____
_____
_____

Comments:

_____
_____
_____
_____
_____

Deficiencies Found or Noted:

_____
_____
_____

Corrective Action:

_____
_____
_____

Re-Inspection Required: ____ Yes ____ No If Yes, Date of Re-Inspection: ____/____/___

Signature:_____ _____
Site Safety Officer SUXO / Project Manager

* Copy to Supervisor if Deficiencies or Corrective Action were found, noted or deemed necessary.

USA Environmental, Inc.

SAFETY MEETING/TRAINING RECORD

DATE: _____/_____/_____ **TIME: _____ AM PM**

LOCATION/SITE: _____

1. Reason for Meeting/Training: (Check all that apply)	
	Daily Safety Meeting/Training
	Initial Site Safety Meeting/Training
	New Task Briefing
	Periodic Safety Meeting/Training
	New Site Procedures
	New Site Information
	Periodic Review of Site Information
	Other (Explain):

2. Personnel Attending Meeting/Training:

Name	Signature	Company

USA Environmental Inc.

Safety Meeting/Training Record Con't:

3. Topics Covered (Check all that apply)			
	Site Safety Personnel		**Decontamination Procedures**
	Site/Work Area Description		**Emergency Response Plan**
	Site Characterization		**Hazard Communication**
	Biological Hazard(s)		**On-Site Emergency**
	Chemical Hazard(s)		**On-Site Injuries/Illnesses**
	Physical Hazard(s)		**Evacuation Procedures**
	Heat Stress		**Rally Point(s)**
	Cold Stress		**Emergency Communication**
	Site Control		**Directions to Medical Facility**
	Work and Support Zones		**Drug and Alcohol Policies**
	PPE		**Medical Monitoring Program**
	Air monitoring		**Specific Task Training**
	Safe Work Practices		**Confined Spaces**
	Engineering Controls and Equipment		**Heavy Equipment**
	Spill Containment Procedures		**Other: (Specify)**
	MEC Hazard(s)		

4. Remarks:

5. Verification:

I certify that the personnel listed above on this record received the Information and/or Training described as indicated. Personnel not attending this meeting/training will receive said information/training prior to commencing their assigned duties.

_____

Site Safety Officer **Date: ____/____/____**

RECORD
OF
SAFETY VIOLATION OR NON-COMPLIANCE

Employee Name: _____ Position: _____

Site / Location: _____ Date: ____/____/____

Type of Violation: ____ PPE ____ Procedural ____ Explosive ____ Equipment ____ Other

Type of Non-Compliance: ____ Policy ____ Procedural ____ Directive ____ Contract
____ Other

Description of Violation or Non-Compliance:

_____
_____

Document Reference (Specify document, page, paragraph, etc. as applicable):

_____
_____
_____

Corrective Action(s) to be taken:

_____
_____
_____
_____

Employee or Company Response and Comments:

_____
_____
_____

Notification made to:

Manager: ____ Yes ____ No Date:

SUXOS: ____ Yes ____ No Date:

Supervisor: ____ Yes ____ No Date:

Corrective Actions Inspection Required: ____ Yes ____ No

If Yes, Date of Inspection: ____/____/___

Signature:_____ Signature: _____
Safety Officer Employee/Company Representative

SITE VISITOR LOG

DATE:	NAME:	TITLE:	COMPANY:	SAFETY BRIEF:	TIME: IN	TIME: OUT	ESCORTED BY:	SITE:	REMARKS:

USA Environmental, Inc.

Tailgate Safety Briefing

Date: _____/_____/_____ **Location:_____**

Time: _____ AM PM **Team #: _____**

1. Reason for Briefing:

	Daily Safety Briefing		New Site Procedure
	Initial Safety Briefing		New Site Information
	New Task Briefing		Review of Site Information
	Periodic Safety Meeting		Other: (Specify)

2. Personnel Attending:

Name	Signature	Position

Briefing Given By:

Name	Signature	Position

3. Topics: (Check All That Apply)

	Site Safety Personnel		Decontamination Procedures
	Site/Work Area Description		Emergency Response/Equipment
	Physical Hazards		On-Site Injuries/Illnesses
	Chemical/Biological Hazards		Reporting Procedures
	Heat/Cold Stress		Directions to Medical Facility
	Work/Support Zones		Drug and Alcohol Policies
	PPE		Medical Monitoring
	Safe Work Practices		Evacuation/Egress Procedures
	Air Monitoring		Communications
	Task Training		Confined Spaces
	MEC Precautions		Other:

4. Remarks:

APPENDIX G.
MSD Calculation Sheets

FRAGMENTATION DATA REVIEW FORM

Database Revision Date 6/30/08

Category:	HE Rounds	DODIC:	C445
Munition:	105 mm M1	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/30/2004
Primary Database Category:	projectile	Individual Last Updated Record:	Crull
Secondary Database Category:	105 mm	Date Record Retired:	
Munition Case Classification:	Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	Comp B
Explosive Weight (lb):	5.07000
Diameter (in):	4.1339
Max Fragment Weight (lb):	0.205734
Critical Fragment Velocity (fps):	4055

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	341
MFR-V [Vertical Range of Max Weight Fragment] (ft):	1494
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	1939

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	78
Inhabited Building Distance (09 psi), K50 Distance:	97
Intentional MSD (0065 psi), K328 Distance:	636

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	4.79
Mild Steel:	0.90
Hard Steel:	0.74
Aluminum:	1.87
LEXAN:	5.36
Plexi-glass:	3.84
Bullet Resist Glass:	3.19

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.205734
Critical Fragment Velocity (fps)SB:	4055
Kinetic Energy 106 (lb-ft2/s2)SB:	1.6914
Required Wall Roof Sandbag Thickness (in)SB:	24
Expected Maximum Sandbag Throw Distance (ft)SB:	135
Minimum Separation Distance (ft)SB:	200

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.205734
Critical Fragment Velocity (fps)W:	4055
Kinetic Energy 106 (lb-ft2/s2)W:	1.6914
Water Containment System:	1100 gal tank
Minimum Separation Distance (ft)W:	200

◀ ▶ Print This Form Close Form

FRAGMENTATION DATA REVIEW FORM

Database Revision Date 6/30/08

Category:	HE Rounds	DODIC:	B562
Munition:	40 mm MK2	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/9/2007
Primary Database Category:	projectile	Individual Last Updated Record:	Crull
Secondary Database Category:	40 mm	Date Record Retired:	
Munition Case Classification:	Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	TNT
Explosive Weight (lb):	0.18700
Diameter (in):	1.5748
Max Fragment Weight (lb):	0.033061
Critical Fragment Velocity (fps):	3605

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	131
MFR-V [Vertical Range of Max Weight Fragment] (ft):	847
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	1095

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	24
Inhabited Building Distance (09 psi), K50 Distance:	30
Intentional MSD (0065 psi), K328 Distance:	199

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	2.17
Mild Steel:	0.40
Hard Steel:	0.33
Aluminum:	0.86
LEXAN:	3.41
Plexi-glass:	2.08
Bullet Resist Glass:	1.63

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.033061
Critical Fragment Velocity (fps)SB:	3605
Kinetic Energy 106 (lb-ft2/s2)SB:	0.2148
Required Wall Roof Sandbag Thickness (in)SB:	12
Expected Maximum Sandbag Throw Distance (ft)SB:	25
Minimum Separation Distance (ft)SB:	200

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.033061
Critical Fragment Velocity (fps)W:	3605
Kinetic Energy 106 (lb-ft2/s2)W:	0.2148
Water Containment System:	5 gal carboys/ inflatable pool
Minimum Separation Distance (ft)W:	200/200

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APPENDIX H.
Resumes

ROBERT D. CROWNOVER **CORPORATE SAFETY, HEALTH AND QUALITY CONTROL MANAGER**

DATE COMPLETED BASIC EOD SCHOOL: AUGUST 1978

OTHER PERTINENT TRAINING: HAZWOPER 40 HOUR, AUGUST 1995; CURRENT 8 HOUR SUPERVISOR/REFRESHER

MILITARY EOD ASSIGNMENTS:

Aug 78 - Apr 80	EOD Technician, 45th EOD, Ft. Polk, LA. Team member who assisted in locating, identifying, removal & destruction of munitions. Member of range clearance team. Assisted in classroom & practical instruction.
Apr 80 - Jun 83	EOD Technician, 72nd EOD, Bremerhaven, Germany. Team member who assisted in determining and implementing render safe & disposal procedures. Range safety NCO. Assisted in training EOD and non-EOD personnel.
Jun 83 - Sep 87	EOD Supervisor, 60th EOD, Ft. Dix, NJ. Assumed command of an EOD Team. Determined render safe and disposal procedures. Performed administrative functions. Supervised other EOD personnel. Conducted range operations.
Sep 87 - May 90	EOD Instructor, EOD Tng. Det #1, Eglin AFB, Florida. Taught courses in ordnance recovery, protection of personnel and property safety, ORD. ID, and access and recovery. Testing of applied instructions. Drafting, finalizing and implementing testing criteria.
May 90 - Sep 90	EOD Supervisor, 52nd EOD, Pine Bluff, AR. Team leader during EOD operations. Range Safety NCO. Conducted training in EOD related matters. Conducted range operations. Performed administrative functions.
Sep 90 - May 91	EOD Supervisor, 16th EOD, Camp Darby, IT. Team leader during EOD operations. Assisted in determining and implementing policy. Range NCO. Safety NCO. Training of other EOD & non-EOD personnel. Regulated administrative functions.
May 91 - Dec 91	EOD Supervisor, 137th EOD, Ft. Sam, Houston, TX. Assumed command of an EOD team. Conducted range safety classes. Conducted training in EOD related matters. Determined render safe and disposal procedures security functions.

CIVILIAN UXO EXPERIENCE:

Mar 93 - Sep 94	UXO Supervisor, CMSI, Kuwait. Team member on minefield team. Conducted sweep, demolition and bunker operations. Field supervisor for 213 Third Country Nationals (TCN) and four EOD technicians. Conducted training for TCN. Supervised disposal operations.
Aug 95 – Jun 96	UXO Specialist, CMS Environmental, Inc., Fort Ord, CA. UXO Team member of a BRAC clearance and removal action.
Jun 96 – Sep 96	UXO Supervisor, CMS Environmental, Inc., Ft. Ord, CA. Sampling and removal of OE.
Sep 96 – Jul 98	Site Safety Officer, CMS Environmental, Inc., Ft. Ord, CA. Responsible for the overall safety of the project personnel and compliance with the Site Safety and Health Plan.
Jul 98 – Nov 99	Site Safety Officer, USA Environmental, Inc., Ft. Ord, CA. Responsible for the overall safety of the project personnel and compliance with the Site

	Safety and Health Plan.
Nov 99 – Present	Corporate Safety & Health Manager/Quality Control Manager, USA Environmental, Inc., Tampa, FL. Responsible for the development and implementation of USA's Safety and QC programs and plans. Performs project site inspections and audits to ensure compliance with requirements and standards. Reviews draft and final work plans, reports, and associated documents for accuracy, completeness, and content. Interfaces with agencies on safety, health, and/or quality issues at the corporate or job site levels.

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KENNETH R. JONES **PROJECT MANAGER**
DATE COMPLETED BASIC EOD SCHOOL November 1983
OTHER PERTINENT TRAINING: HAZWOPER 40 HOUR, JANUARY 1998; CURRENT 8 HOUR SUPERVISOR/REFRESHER

EOD/UXO Assignments:

Nov 83 – Apr 86	Detachment Senior Enlisted Supervisor, EOD Mobile Unit One, Barbers Pt., Hawaii. Responsible for daily operations, and detachment personnel. Responsible for personnel training, and supervision of equipment maintenance. Provided materiel support to 15 remote and mobile detachments.
May 86 – Jul 89	Leading Chief Petty Officer, EOD Group TWO Detachment, Keflavik, Iceland. Responsible for directing daily operations, and detachment personnel. Sweep line supervisor that included one hundred base supplied personnel and twenty EOD technicians.
Aug 89 – Jul 92	Officer in Charge, EODMU FIVE Mine Counter Measures Detachment, Subic Bay Republic of the Philippines. Provided command management, leadership and supervision to a highly trained, specialized unit of explosive ordnance disposal experts. Command representative for multinational planning conferences. Responsible for planning Mine Counter Measures, training, logistics and operations in support of all aspects of the U.S. Navy Seventh Fleet EOD requirements. Participated in seven international exercises within Seventh Fleet.
Aug 92 – Aug 95	Explosive Ordnance Disposal Projects Officer, Navy Experimental Diving Unit Panama City, FL. Managed and coordinated NAVSEA task EOD projects and associated funding. Evaluated EOD related diving systems. Command explosive safety officer and diver subject safety review committee member.

Civilian Assignments:

Sep 95 – Mar 96	UXO Supervisor Team Leader, UXB International Inc, Maui, HI. UXO Supervisor for a five man UXO team in the clearance of the Island of Kaho'olawe, HI model project. Position required coordinating daily work schedule, conducting daily safety briefs, and acting as explosive/work safety observer.
Apr 96 – Jul 96	UXO Supervisor, Human Factors Applications Inc., Madison, ID. UXO Supervisor during clean up of Jefferson Proving Ground, Madison, IN. Duties included conducting daily site safety briefs, submissions of daily accomplishment log and job log, and the supervision of four UXO Specialists.
Nov 96 – Jun 97	UXO Site Safety Officer/UXO Team Supervisor/UXO Specialist, Human Factors Applications Inc., Hot Springs, SD. UXO Team Supervisor during surface clearance of Black Hills Army Depot; clearance involving mustard and distilled muster agents. UXO Site Safety Officer during Buckley Bombing Range, Denver, CO. Responsible for site safety and safety related administration. Team Leader during test grid clearance. UXO Specialist during surface/subsurface clearance at Blossom Point, MD. Preformed location and identification operations. UXO Specialist during clean-up of Jefferson Proving Ground, Madison, IN. Duties included detector operator, recovery of buried 60mm and 81 mm mortars,

	setup and initiation during demolition operations. Rodman and transom operator for surveying in ordnance locations.
Jun 97 – Sep 97	UXO Specialist/Heavy Equipment Operator, Foster Wheeler Environmental Corp., Adak, AK. UXO Team member, during subsurface ordnance sampling for Naval Air Facility, Adak, AK. Responsible for the location, identification, recovery and disposal of UXO/OE on 900 acres. Also served as Heavy Equipment Operator; all sampling was conducted to a depth of 4' accumulated over 750 hours on equipment.
Sep 97 – Nov 97	QA/QC Technician and Survey Team Member, Chemrad Inc., Paducah, KY. Conducted site characterization for radiological contamination at Paducah KY Gaseous Diffusion Plant. The survey used developmental beta detectors and differential globule positioning system for the location and relocation of contamination.
Nov 97 – Dec 97	UXO Specialist, UXB International, Avon Park, FL/Mead, NE. Team member of ordnance avoidance for telephone cable burial for Dames and Moore, at Avon Park, FL. Conducted raw explosive removal during soil abatement project at Mead, NE.
Jan 98 – Apr 98	Site Health and Safety Officer, Foster Wheeler Environmental Corp. Wellfleet, MA. Served as Health and Safety Officer at the Wellfleet, MA Project which consisted of grid sampling. Additional responsibilities: brush cutting and clearing supervisor, dig team member for the Army Corp of Engineers, site ECCA.
Apr 98 – Dec 98	Team Leader, UXB International, Tuzla, Bosnia, Herzegovina. Conducted over 200 pre-construction minefield assessments. Worked independently using the aid of a local interpreter.
Jan 99 – Apr 99	UXO Team Member, EOD Technologies, Inc., Panama City, Panama. Conducted surface and subsurface clearance for the Panama Canal Commission on Empire and Pena target ranges.
Apr 99 – Sep 99	Team Leader, Demining Supervisor, UXB International Inc. Tuzla, Bosnia, Herzegovina. Conducted over 350 pre-construction minefield assessments. Demining Supervisor, five different sites, working with local national demining companies. Ensured demining was conducted to humanitarian standards; enforcing UXB safety standards while completing demining tasks within required time constraints.
Mar 01 – Jul 01	UXO Technician II, USA Environmental, Inc., Conway, SC. UXO team member performing location, excavation, disposal of all UXO and OE related scrap at the former Conway Bombing and Gunnery Range.
Nov 01 – Oct 02	UXO Technician II, USA Environmental, Inc., Ft. McClellan, AL. Member of a six-person UXO team performing UXO clearance activities on the Eastern Bypass task order. Activities included UXO location, excavation, identification and disposal.
Apr 03 – May 04	UXO Safety Officer/Quality Control Specialist, USA Environmental, Inc. CEA (Captured Enemy Ammunition), Combined Joint Task Force-7, in Iraq. Ensured all safety procedures were followed. Ensured compliance with published Work Plans, QC inspections of work performed.
Aug 04 – Jun 05	Site Manager, USA Environmental, Inc. CEA (Captured Enemy Ammunition) and Coalition Munitions Contract (CMC), Jaguar Depot. Senior position at site responsible to USA Environmental's In-Country Project Manager for the Safe, Efficient and Effective execution of all work performed at the depot. Unique management and operational challenges ranged from managing a large complex project in a remote location to dealing with potential threats from hostile forces, terrorist groups and disgruntled citizens. Was responsible for accepting these challenges and for actively leading subordinates in meeting and overcoming these

	challenges by displaying a positive leadership role. Built a cooperative "Team Relationship" with The Government's Project Team and with the other contractors deployed on this project. Ensured that all required project documentation was appropriately recorded, archived and available for inclusion in the Final Report. Identified operational problems and challenges; developed proposed courses of action and implemented those actions needed to move the project forward in a positive and effective manner. Remained at site through its successful completion meeting customer quotas and deadlines.
Jun 05 – Aug 05	Site Manager, USA Environmental, Inc., Coalition Munitions Contract (CMC), Paladin Depot. Assumed site manager responsibilities when depot was turned over to USA Environmental from another organization. Ensured that site operations continued without missing a beat despite changes in personnel, procedures and onsite management. Site was successfully completed by customer's deadline.
Nov 05 – Apr 06	Senior UXO Supervisor, USA Environmental, Inc., Huntsville, AL. Responsible for assisting USA Environmental's Program Manager in preparing final reports on above depots and mobile team operations for the Coalition Munitions Contract (CMC) in Iraq.
Apr 06 – Oct 07	Administrative Project Manager, USA Environmental, Inc., Huntsville, AL. Responsible for estimating, planning and balancing the workload, setting work schedules, ensuring office coverage five days a week, eight hours a day, and initiating and tracking overtime requirements for the USACE CMC Contract in Iraq.
Oct 07 - Present	Project Manager, USA Environmental, Inc., Oldsmar, FL. Responsible for the planning, scheduling, oversight and cost estimating of UXO support operations for multiple projects to include Okinawa, Japan, Elkton, MD, Camp Bullis, TX and Aberdeen Proving Ground, MD. Assists USA Environmental Marketing in preparing responses to requests for proposal from US Army Corps of Engineers and NavFAC.

JAMES WALDEN **UXO SAFETY, HEALTH AND QUALITY CONTROL MANAGER**

Date Completed Basic EOD School: June 1971

B.S. BUSINESS ADMINISTRATION, COLUMBIA COLLEGE

OTHER PERTINENT TRAINING: HAZWOPER 40 HOUR, JULY 1996; CURRENT 8 HOUR SUPERVISOR/REFRESHER; CORPORATE UXO SAFETY & QUALITY TRAINING, NOV 2004; 10-HOUR CONSTRUCTION SAFETY COURSE, JUNE 2005

MILITARY EOD ASSIGNMENTS:

Jun 71 – Aug 73	EOD Specialist, TAD Assignment, Ft. Huachuca, AZ. EOD team member providing range support to the military intelligence school. Involved in one major range clearance.
Nov 73 – Mar 77	EOD Specialist, 40th EOD Cp Shelby, MS. EOD team member providing support to large National Guard training area. Performed range clearance after each training camp.
Apr 77 – Mar 78	EOD Specialist, 8th EOD, Republic of Korea. EOD team member on major demilitarization operation, destroying over 40 tons of ordnance.
Apr 78 – May 84	EOD Team Leader, 13th EOD, Ft Gillem, GA. Provided EOD support to the northern half of the state, including training at Ft. Gordon. Provided support to National Guard training in Puerto Rico.
Jun 84 – Jun 87	EOD Supervisor, 547th EODCT, Ft. Gillem, GA. Provided training and operational support to EOD units throughout the Southeastern US and the Panama Canal Zone.
Jul 87 – Dec 89	EOD Operations NCO, FORSCOM HQ G3, Ft McPherson, GA. Provided operational and training guidance to 54 EOD units within Forces Command. Monitored EOD unit readiness capabilities in conventional, nuclear and biological ordnance. One of two Army EOD personnel selected as a member of the Intermediate Nuclear Force Treaty verification team traveling to the former Soviet Union and communist block countries verifying compliance with the treaty protocols.
Jan 90 - Jun 92	Detachment NCO, 50th EOD, Granite City, IL. Responsible for EOD support in the southern half of Illinois, Indiana and the city of St. Louis, MO. Area expanded to the entire area of both states during Desert Storm. Supported range clearance operations at Ft. McCoy, WI.
Feb 93 - Jan 96	Sergeant Major, EOD Training Department, Redstone Arsenal, AL. Supervised six branch NCOICs responsible for eighty personnel and 300 students annually. Reviewed and revised programs of instruction and lesson plans. Member of the commandant's environmental compliance council.

CIVILIAN UXO EXPERIENCE:

Mar 96 - Jul 98	UXO Technician, UXO Staff Officer, CMS Environmental, Inc. Reviewed and assisted project manager on work plan revisions for Ordnance and Explosives (OE) contracts. Provided input on draft work plans for additional remediation contract proposals. Performed several site visits for contract proposal support and site-specific work plan input.
Jun 96 – Jul 96	UXO Site Safety Officer and QC Specialist, CMS Environmental, Inc. Camp Bullis, TX. Conducted Safety and QC oversight for this OE Investigation project. Provided inputs to work plan preparation (including QC and Safety Plans), wrote site-specific removal report for customer's approval/acceptance.
Aug 96 - Mar 97	Provided technical support to Business Development effort on major contract proposal, the Kaho`olawe Omnibus Cleanup RFP. Selected in December as Section Manager for the Corporate Experience Section of the Technical Volume.
Apr 97 – Mar 98	Project Manager, USA Environmental, Inc., Kettle Point Canada. Attended

	pre-contract meetings with Kettle and Stoney Point First Nation Chief and Council. Revised the technical approach and activity schedule for First Nation support.
Nov 97 - Apr 98	Researched and authored a technology assessment report for innovative geophysical equipment advancements for Humanitarian De-mining applications.
May 98 – May 98	Project Site Leader, USA Environmental, Inc., Atlantic City International Airport, NJ. Supervised a UXO survey and removal project under a subcontract for The Federal Aviation Administration; wrote survey report upon completion of the field activities.
May 98 – Sep 98	Assistant Project Manager, USA Environmental, Inc. Reviewed and revised work plans, final reports and other operational guidance for implementing OE remediation projects.
Sep 98 – April 03	Human Resources Manager, USA Environmental, Inc. Responsible for recruiting and hiring personnel for OE projects throughout the United States and its territories. Maintained personnel database to ensure personnel OSHA training and medical examinations are current. Planned and developed policies and procedures to include employee handbooks and supervisor manuals. Corporate EEO coordinator. Developed the company's affirmative action plan; performed quarterly reviews and annual analysis of the company's affirmative action goals. Provided input to new business proposals as required. Maintained personnel files and other required files.
April 03 – Jul 03	Human Resource Manager/Corporate Safety & Health Manager, USA Environmental, Inc., Tampa, FL. Responsible for recruiting and hiring personnel for OE projects throughout the United States, its territories and OCONUS. Maintained personnel database to ensure personnel OSHA training and medical examinations were current. Planned and developed policies and procedures to include employee handbooks and supervisor manuals. Corporate EEO coordinator. Developed the company's affirmative action plan; performed quarterly reviews and annual analysis of the company's affirmative action goals. Provided input to new business proposals as required. Maintained personnel files and other required files. Responsible for the implementation of USA's Safety program and plans. Performed project site inspections and audits to ensure compliance with requirements and standards. Reviewed draft and final work plans, reports, and associated documents for accuracy, completeness, and content. Interfaced with agencies on safety and health issues at the corporate and job site levels.
Jul 03 –Nov 04	Human Resources Manager/Facility Security Officer, USA Environmental, Inc. Responsible for recruiting and hiring personnel for OE projects throughout the United States, its territories and OCONUS. Maintained personnel database to ensure personnel OSHA training and medical examinations were current. Planned and developed policies and procedures to include employee handbooks and supervisor manuals. Corporate EEO coordinator. Developed and maintained the company's affirmative action plan; performed quarterly reviews and annual analysis of the company's affirmative action goals. Provided input to new business proposals as required. Maintained personnel files and other required files. Appointed facility security officer; set up initial facility clearance and coordinated submittal of security clearance documents for employees as required; maintained liaison with industrial security representative; maintained all required security files.
Nov 04 - Present	UXO Safety, Health and Quality Control Manager, USA Environmental,

Inc., Tampa, FL. Responsible for the implementation of USA's Safety and QC programs and plans. Performed project site inspections and audits to ensure compliance with requirements and standards. Prepared Accident Prevention Plans (APP) and Site Safety and Health Plans for UXO projects and task orders. Reviewed draft and final work plans, reports, and associated documents for accuracy, completeness, and content. Interfaced with agencies on safety and health issues at the corporate and job site levels.

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APPENDIX I.
Technical Project Planning Work Sheets
(not applicable to this project)

APPENDIX J.
USA Environmental, Inc. Standard Operating Procedures

STANDARD OPERATING PROCEDURE
OPS-03 – DEMOLITION/DISPOSAL OPERATIONS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to the conduct of demolition/disposal operations on sites contaminated with unexploded ordnance (UXO) or munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all USA Environmental, Inc. (USA) site personnel, including contractor and subcontractor personnel, involved in the conduct of UXO/MEC demolition/disposal operations on a UXO/MEC contaminated site. This SOP is not intended to contain all of the requirements needed to ensure complete compliance, and should be used in conjunction with approved project plans and applicable referenced regulations. Consult the documents listed in Section 12.0 of this SOP for additional compliance issues.

3.0 RESPONSIBILITIES

3.1 PROJECT MANAGER

The Project Manager (PM) will be responsible for ensuring the availability of the resources needed to implement this SOP, and will also ensure that this SOP is incorporated into plans, procedures, and training for sites where this SOP is to be implemented.

3.2 SENIOR UXO SUPERVISOR

The Senior UXO Supervisor (SUXOS) will be responsible for assuring that adequate safety measures and housekeeping are performed during all phases of site operations, to include demolition activities, and will visit site demolition locations, as deemed necessary, to ensure that demolition operations are carried out in a safe, clean, efficient, and economic manner. The demolition activities will then be conducted under the direct control of the SUXOS, who will have the responsibility of supervising all demolition operations within the area.

The SUXOS will be responsible for training all on-site UXO personnel regarding the nature of the materials handled, the hazards involved, and the precautions necessary. The SUXOS will also ensure that the Daily Operational Log, Ordnance Accountability Log, USA Demolition Shot Records, and inventory records are properly filled out and accurately depict the demolition events and demolition material consumption for each day's operations. The SUXOS will be present during all demolition operations or designate a competent, qualified person to be in charge during any absences.

3.3 UXO SAFETY OFFICER

The UXO Safety Officer (UXOSO) for the site is responsible for ensuring that all demolition operations are being conducted in a safe and healthful manner, and is required to be present during all MEC demolition operations. The UXOSO will ensure the compliance of the demolition team with the above referenced documents that are applicable to the particular task being performed.

3.4 UXO QUALITY CONTROL SPECIALIST

The UXO Quality Control Specialist (UXOQCS) is responsible for ensuring the completeness of demolition operations records and for weekly inspection of the Ordnance Accountability Log, the

Daily Operational Log, the USA Demolition Shot Record, and the inventory of MEC and demolition material. The UXOQCS, assisted by demolition team personnel, will inspect each demolition pit and an area of appropriate radius after each demolition shot, in accordance with the approved explosive siting plan, to ensure that there are no kick-outs, hazardous UXO/MEC components, or other hazardous items. In addition, the pit may be checked with a magnetometer and large metal fragments, and any hazardous debris, will be removed on a per use basis in accordance with the SOW. Any UXO/MEC discovered during the QC check will be properly disposed of using the demolition procedures in the WP. Extreme caution must be exercised when handling UXO/MEC, which has been exposed to the forces of detonation. Personnel must adhere to acceptable safe practices and procedures when determining the condition of munitions and fuzes that have not been consumed in the disposal process.

4.0 GENERAL OPERATIONAL AND SAFETY PROCEDURE

All personnel, including contractor and subcontractor personnel, involved in operations on UXO/MEC-contaminated sites will 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 will be followed by all demolition personnel, at all times. Noncompliance with the general safety provisions listed below will result in disciplinary action, which may include termination of employment.

All safety regulations applicable to demolition range activities and demolition and MEC materials involved will be complied with.

- Demolition of any kind is prohibited without an approved siting plan.
- The quantity of MEC to be destroyed will be determined by the range limit, fragmentation and K-Factor distance calculations.
- In the event of an electrical storm, dust storm, or other hazardous meteorological conditions, immediate action will be taken to cease all demolition range operations and evacuate the area.
- In the event of a fire, which does not include explosives or energetic material, put out the fire using the firefighting equipment located at the site; if unable to do so, notify the fire department and evacuate the area. If injuries are involved, remove the victims from danger, administer first aid, and seek medical attention.
- The UXOSO is responsible for reporting all injuries and accidents that occur.
- Personnel will not tamper with any safety devices or protective equipment.
- Any defect or unusual condition noted that is not covered by this SOP will be reported immediately to the SUXOS or UXOSO for evaluation and/or correction.
- Methods of demolition will be conducted in accordance with this SOP and approved changes or revisions thereafter.
- Adequate fire protection and first aid equipment will be provided at all times.
- All personnel engaged in the destruction of MEC will wear clothing made of natural fiber, close-weave clothes, such as cotton. Synthetic material such as nylon is not authorized unless treated with anti-static material.
- Care will be taken to minimize exposure to the smallest number of personnel, for the shortest time, to the least amount of hazard, consistent with safe and efficient operations.
- Work locations will be maintained in a neat and orderly condition.

- All hand tools will be maintained in a good state of repair.
- Each heavy equipment and/or vehicle operator will have a valid operator's permit or license for the equipment being operated.
- 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 UXO/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.
  - Be sure you have good footing and hold, and lift with a smooth, even motion.
- The demolition range will be provided with two forms of communication, capable of contacting appropriate personnel or agencies (i.e., medical response, Quick Response Force (QRF).
- Motor vehicles and material handling equipment (MHE) used for transporting MEC or demolition materials must meet the following requirements:
  - Exhaust systems will be kept in good mechanical repair at all times.
  - Lighting systems will be an integral part of the vehicle.
  - One Class 10B:C rated, portable fire extinguisher will, if possible, be mounted on the vehicle outside of the cab on the driver's side, and one Class 10B:C fire extinguisher will be mounted inside the cab.
  - Wheels of carriers must be chocked and brakes set during loading and unloading.
  - No demolition material or MEC will be loaded into or unloaded from motor vehicles while their motors are running.
- Motor vehicles and MHE used to transport demolition material and MEC will be inspected prior to use to determine that:
  - Fire extinguishers are filled and in good working order.
  - Electrical wiring is in good condition and properly attached.
  - Fuel tank and piping are secure and not leaking.
  - Brakes, steering, and safety equipment are in good condition.
  - The exhaust system is not exposed to accumulations of grease, oil, gasoline, or other fuels, and has ample clearance from fuel lines and other combustible materials.
- 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.
- A red warning flag, such as an “Active Range Flag” or a wind sock, will be displayed at the entrance to the demolition range during demolition operations when required by local authority. If applicable, the entrance gate will be locked when demolition work is in process.

- Unless otherwise directed or authorized by the explosives siting plan, all demolition shots will be tamped with an appropriate amount of earth/dirt.
- 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 will be the responsibility of the observer to order the SUXOS to suspend firing if any aircraft, vehicles, or personnel are sighted approaching the general demolition area.
- Two-way radios will not be operated in close proximity of the demolition range while the pit is primed or during the priming process. Radio transmissions and explosives will be separated by a minimum of 50 ft.
- No demolition operation will be left unattended during the active portion of the operation (i.e., during the burn or once any explosives or UXO/MEC are brought to the range).
- A minimum radius (approximately 50 feet) around the demolition pit will be cleared of dry grass, leaves, and other extraneous combustible materials around the demolition pit area.
- No demolition activities will be conducted if there is less than a 2,000-ft ceiling or if wind velocity is in excess of 20 mph.
- Demolition shots must be fired during daylight hours (minimum time for sunrise and sunset is determined by the firing procedure used (i.e., electric, non-electric, shock tube 30/60/60).
- Notification of the local authorities will be made in accordance with the site requirements.
- No more than two persons will ride in a truck transporting demolition material or MEC, and no person will be allowed to ride in the trailer/bed.
- Vehicles will not be refueled when carrying demolition material or MEC, and must be 100 ft from magazines or trailers containing such items before refueling.
- All 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 will wash their faces and hands after handling demolition material or MEC.
- Demolition pits will be spaced a safe distance apart, with no more than 10 pits prepared for a series of shots at any one time.

5.0 SPECIAL REQUIREMENTS FOR DEMOLITION ACTIVITIES

The following safety and operational requirements will be met during demolition range operations. Any deviations from this procedure will be allowed only after receipt of written approval from the 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.

5.1 GENERAL REQUIREMENTS

The general demolition range requirements listed below will be followed at all times:

- The CEHNC "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Munitions and Explosives of Concern (MEC) Sites," will be followed when destroying multiple munitions by detonation on site. This document will be present on site during site operations.

- White Phosphorus and propellant will be disposed of only in an approved manner and following the guidance for maximum temperature exposure (90 degrees Fahrenheit).
- Material awaiting destruction will 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 will be protected against accidental ignition or explosion from fragments, grass fires, burning embers, or detonating impulses originating in materials being destroyed.
- UXO/MEC or bulk explosives to be destroyed by detonation should be detonated in a pit not less than 3 ft deep and covered with earth which protrudes not less than 2 ft above existing ground level. Requirements may be found in the explosives siting plan. 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 direct 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 below ground at one time will not exceed the range limit.
- Detonations will be counted to ensure detonation of all pits. After each series of detonations, a search will be made of the surrounding area for UXO/MEC. Items such as lumps of explosives or unfuzed ammunition may be picked up and prepared for the next shot. Fuzed ammunition, or items that may have internally damaged components, will be detonated in place, if possible.
- Prevailing weather condition information can be obtained from the local weather service, or other acceptable source and the data logged in the Demolition Shot Log before each shot or round of shots.
- All shots will be dual primed.
- 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 backfilled until operations resume.
- Upon completion of the project, all disturbed demolition areas will be thoroughly inspected for UXO/MEC. Depending upon contract requirements, the site may have to be backfilled and leveled. If necessary, this will be coordinated with the contractor representative.
- Prior to and after each shot, the USA Demolition Shot Record is to be filled out by the SUXOS with all applicable information. This record will be kept with the Ordnance Accountability Log and reflect each shot.

5.2 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 while the pit is primed or during the priming process.
- The shunt will not be removed from the leg wires of the detonator until the continuity check of the detonator is to be performed.
- 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 1 in. 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 will be tested for continuity. To conduct the test, place the detonators in a pre-bored hole in the ground or place them in 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 fullest 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 all detonators have been tested. This process will be accomplished at least 50 ft from and downwind of any MEC or demolition materials and out of the demolition range personnel and vehicle traffic flow pattern. In addition, all personnel on the demolition range will be alerted prior to the test being conducted.

  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 will remain short circuited until time to connect them to the firing line or Remote Firing Device (RFD) Receiver.

- At the power source end of the blasting circuit, the ends of the wires will be shorted or twisted together (shunted) at all times, 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 ends 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 through the use of two-way radios, if the demolition pit is not visible from the firing point. If radios are used, communication will be accomplished a minimum of 50 ft 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 after the check is completed.

- UXO/MEC to be detonated will be placed in the demolition pit and the demolition material placed/attached in such a manner as to ensure the total detonation of the UXO/MEC. Once the UXO/MEC and demolition material are in place and the shot has been tamped, the detonators will be connected to the det cord. Prior to handling any detonators that are connected to the firing line or RDF, personnel will ensure 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., ensuring that the detonator is not covered with tamping material to allow for ease of recovery/investigation in the event of a misfire.

- Prior to making connections to the blasting machine or RFD Transmitter, the entire firing circuit will be tested for electrical continuity and ohms resistance, or transmitting power (as applicable), to ensure the blasting machine or RFD Transmitter (distance) 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 all personnel in the vicinity have been evacuated to a safe distance. When in use, the blasting machine, or its actuating device, will be in the blaster's possession at all times. 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 warning 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, which is sounded for a duration of one minute, five minutes prior to the shot and again one minute prior to the shot.

5.3 NON-EL USE (SHOCK TUBE)

The following requirements are necessary when using NON-EL (Shock Tube) systems:

- After cutting a piece of shock tube, either immediately tie a tight overhand knot in one or both cut ends or splice one exposed end and tie of the other.
- Always use a sharp knife or razor blade to cut shock tube so as to prevent the tube from being pinched or otherwise obstructed.
- Always cut shock tube squarely across and make sure the cut is clean.
- Use only the splicing tubes provided by the manufacturer to make splices.
- Every splice in the shock tube reduces the reliability of the priming system; therefore keep the number of splices to a minimum.
- Always dispose of all short, cut-off pieces in accordance with local laws as they relate to flammable material.

The shock tube system is a thin plastic tube of extruded polymer with a layer of Pentaerythritol Tetranitrate (PETN) coated on its interior surface. The PETN propagates a shock wave, which is normally contained within the plastic tubing. The shock tube offers the controlled instantaneous action of electric initiation without the risk of premature initiation of the detonator by radio transmissions, high-tension power lines, or static electricity discharge. The NON-EL system uses detonators in the bunch blocks and in the detonator assembly, which are to be handled in accordance with approved procedures.

The high reliability of the shock tube initiating system is due to the fact that all of the components are sealed and, unlike standard non-electric priming components, cannot be easily degraded by moisture. Cutting the shock tube makes the open end vulnerable to moisture and foreign contamination; therefore, care must be taken to prevent moisture and foreign matter from getting in the exposed ends of the shock tubes.

5.3.1 Shock Tube Demolition Procedures

WARNING

Although the detonation along the shock tube is normally contained within the plastic tubing, burns may occur if the shock tube is held.

5.3.2 Shock Tube Assembly

- Spool out the desired length of shock tube from firing point to demolition site and cut it off with a sharp knife or razor blade. Weight down the loose end of trunk line.
- Immediately seal off the shock tube remaining on the spool by tying a tight overhand knot in the cut-off end or use a push-over sealer.
- Using a sharp knife or razor, cut the sealed end off the detonator assembly.

- Push one of the shock tube ends to be spliced firmly into one of the pre-cut splicing tubes provided by the manufacturer at least ¼ inch. Push the other shock tube end firmly into the other end of the splicing tube at least ¼ inch. Secure splice with tape if needed.

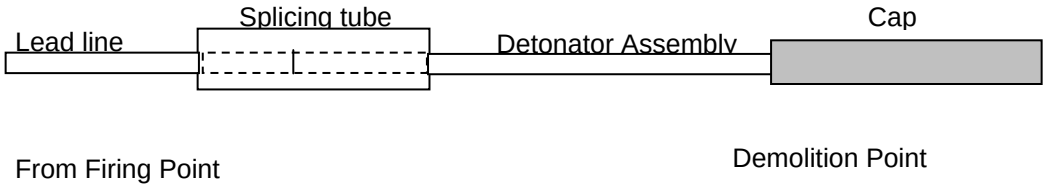

Figure 1

5.3.3 Firing Assembly Setup

1) If there are multiple items to be destroyed using bunch block(s) supplied by the manufacturer, lay out lead lines at demo site to the shot(s) and secure the bunch block with a sandbag, or some other item which will keep it from moving.

NOTE: No more than six leads may be used from any one bunch block.

2) If the detonator assembly has not been attached yet, then, using the splicing tube, splice the detonator assembly to the shock tube branch line as explained in the splicing instructions above.

3) If this is a non-tamped shot, place the detonator assembly into the demolition material. If the shot is to be tamped, then prepare the demolition material with a detonating cord lead long enough to stick out of the tamping at least 1 ft.

4) Tape the detonator assembly with cap to the detonating cord lead as shown in Figure 2.

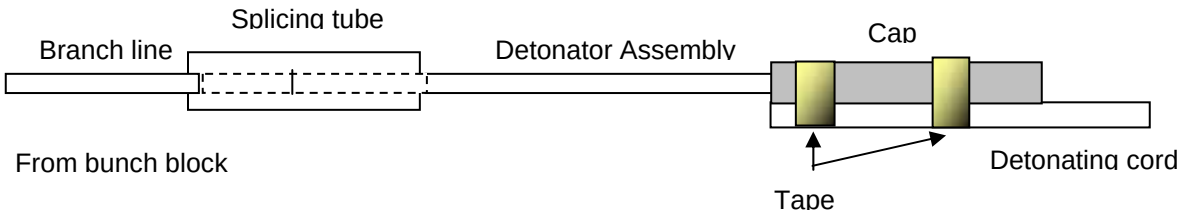

Figure 2

5) Return to the firing position.

6) Cut off the sealed end of shock tube, proceed to the directions listed in Step 7. If you are using a previously cut piece of shock tube, using a sharp knife or razor blade cut approximately 18 inches from the previously cut end, whether or not it was knotted in accordance with the above guidance.

7) Insert a primer into the firing device and connect the shock tube lead line to the firing device ensuring that the shock tube is properly seated in the firing device.

8) Take cover.

9) Signal **"Fire in the hole"** three times and initiate charge.

10) Observe a 5-minute wait time after the detonation.

11) Remain in designated safe area until Demolition Supervisor announces **"All Clear."**

5.4 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, remove det cord only in 1-ft increments.
- 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", original container, or a cloth satchel, depending upon the magazine location and proximity to the demolition area.
- Det cord should be placed at least 50 ft away from detonators and demolition materials until ready for use. To ensure consistent safe handling, each classification of demolition material will be separated by at least 25 ft 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 UXO/MEC. The cord is then strung out of the hole and secured in place with soil, or filled sandbags, being sure to leave a minimum of 6 ft of det cord 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 detonator's explosive end will face down the det cord toward the demolition material or parallel to the main line.
- In all cases, ensure that there is a minimum of 6 ft of 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, 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.

5.5 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 ensure 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 ensure both ends of the time/safety fuse are moisture free, use approved crimpers to cut 6 inches off the end of the time/safety fuse roll, and place the 6 inch piece in the time/safety fuse container.
- If quantity allows, accurately measure and cut off a 6-ft-long piece of the time/safety fuse from the roll.
- Take the 6 ft section out of the magazine, and attach a fuse igniter.
- In a safe location, removed from demolition materials and UXO/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 SUXOS'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.
- When 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 minimum burn time of five minutes.

5.6 DEMOLITION RANGE INSPECTION SCHEDULE

The schedule for the demolition range inspection will be followed when demolition operations are being conducted. This inspection will be conducted by the UXOSO or UXOQCS and will be documented in the Site Safety or QC Log. If any deficiencies are noted, demolition operations will be suspended and the deficiency reported to the SUXOS. Once the deficiencies are corrected, demolition operations may be resumed.

6.0 METEOROLOGICAL CONDITIONS

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

- Demolition operations will not be conducted during electrical storms or thunderstorms.
- No demolition operations will 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 storms, or dust storms.
- Demolition will not be carried out on extremely cloudy days, defined as overcast (more than 80% cloud cover) with a ceiling of less than 2,000 ft.
- Demolition operations will not be initiated until an appropriate time after sunrise, and will be secured at an appropriate time prior to sunset (see Section 4.0).

7.0 PRE-DEMOLITION/DISPOSAL PROCEDURES

7.1 PRE-DEMO/DISPOSAL OPERATIONAL BRIEFING

It is the belief of USA that the success of any operation is dependent upon a thorough brief, covering all phases of the task, which is presented to all affected personnel. The SUXOS will brief all personnel involved in range operations in the following areas:

- Type of UXO/MEC being destroyed
- Type, placement, and quantity of demolition material being used
- Method of initiation (electric, non-electric, or NON-EL)
- 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 clean-up of range.

7.2 PRE-DEMO/DISPOSAL SAFETY BRIEFING

The USA SUXOS, Team Leader, or UXOSO will conduct a safety brief for all personnel involved in range operations in the following areas:

- Care and handling of explosive materials
- Personal hygiene
- Two man rule, and approved exceptions
- Personnel roles and responsibilities
- Potential trip/fall hazards
- Horseplay on the range
- Stay alert for any explosive hazards on the range
- Calling a safety stop for hazardous conditions
- 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
- Location of the assigned paramedic
- Wind direction (to assess potential toxic fumes)
- Locations 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.

7.3 TASK ASSIGNMENTS

Individuals with assigned tasks will report the completion of the task to the SUXOS. The types of tasks that may be required are:

- Contact local military authorities and fire response personnel, and get air clearance, as required.
- Contact hospital/emergency response/medevac personnel, if applicable.
- Secure all 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 UXO/MEC in pit, and place charge in desired location.

7.4 PREPARING EXPLOSIVE CHARGE FOR INITIATION

To prepare the explosive charge for initiation, the procedures listed below will be followed:

- Ensure firing wire is shunted.
- Connect detonator to the firing wire.
- Isolate or insulate all connections.
- Prime the demolition charge.
- Place demolition charge on UXO/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.
- Signal **"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 or turn off RFD Transmitter.
- Remain in designated safe area until SUXOS announces **"All Clear."** This will occur after a post-shot waiting period of 5 minutes and the SUXOS has inspected the pit(s).

8.0 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 procedures listed below:

- After the **"All Clear"** signal, check pit for low orders or kick outs.
- Examine pit, and remove any large fragmentation, as needed.

- Back fill hole, as necessary.
- Police all equipment.
- Notify military authorities, fire department, etc., that the operation is complete.

9.0 MISFIRE PROCEDURES

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

9.1 ELECTRIC MISFIRES

To prevent electric misfires, one technician will be responsible for all 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 a 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.

9.2 NON-ELECTRIC MISFIRES

Working on a non-electric misfire is the most hazardous of all operations. Occasionally, despite all painstaking efforts, a misfire will occur. Investigation and corrective action should be undertaken only by the technician who 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., 5-minute safety fuse plus 60 minutes for a total of 65 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.

9.3 NON-EL MISFIRE

The use of a shock tube for blast initiation can present misfires, which 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 1 ft piece off the end of the tube, re-insert the tube into 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 the 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, after observing a 60-minute wait time. 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, dispose of by demolition.

9.4 DETONATING CORD MISFIRE

USA uses det cord to tie in multiple demolition shots, and to ensure that electric detonators are not buried. Since det cord initiation will be either electrical or non-electrical, the procedures presented in Paragraphs9.1, 9.2, or 9.3, 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 amount of time, and inspect the initiator to the cord connection to ensure it is properly connected. If it was a bad connection, simply attach a new initiator, and follow the appropriate procedures in Paragraph 9.0.
- If the initiator detonated and the cord did not, inspect the cord to ensure that it is det cord and not time fuze. Also, check to ensure that 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 ensure that the demolition charge and the MEC item are not disturbed.

10.0 RECORD KEEPING REQUIREMENT

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

- USA (as directed) will obtain and maintain all required permits.
- The SUXOS will ensure 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 SUXOS will enter the appropriate data on the Ordnance Accountability Log and the Demolition Shot Record, to reflect the MEC destroyed, and will complete the appropriate information on the Explosives Accountability Log (a.k.a. the Magazine Data Card) which indicates the demolition materials used to destroy the MEC.
- The quantities of MEC recovered must also be the quantities of MEC destroyed or disposed.
- USA will retain a permanent file of all demolition records, including permits; magazine data cards; training and inspection records; waste manifests, if applicable; and operating logs.
- Copies of ATF License and any required permits must be on hand.

11.0 SAFETY AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

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

- Hard hats are required only when working around heavy equipment or when an overhead or head impact hazard exists.

- Steel toe/shank boots are not required during surface/subsurface location of anomalies, unless a serious toe hazard exists, whereupon a fiber safety toe will be used.
- Safety glasses will be required whenever 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 radiation (i.e., sunlight).
- Positive means will be required to secure the PPE and prevent it from falling and causing an accidental detonation.

12.0 REGULATORY REFERENCES

Applicable sections and paragraphs in the documents listed below will be used as references for the conduct of UXO demolition/disposal operations:

- USA Corporate Safety and Health Program
- OSHA General Industry Standards, 29 CFR 1910
- OSHA Construction Standards, 29 CFR 1926
- DDESB TP-16, Methodology for Calculation of Fragmentation Characteristics
- DoD 4160.21-M, Defense Reutilization and Marketing Manual
- DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards
- AR 385-64, U.S. Army Explosives Safety Program
- AR 385-10, Army Safety Program
- DA PAM 385-64, U.S. Army Explosives Safety Program
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives
- Applicable TM 60 Series Publications
- AR 190-11, Physical Security of Arms, Ammunition, and Explosives
- ATF 5400.7, Alcohol, Tobacco, and Firearms Explosives Laws and Regulations
- DOT, 49 CFR, Parts 100 to 199, Transportation (applicable sections)
- EPA, 40 CFR Parts 260 to 299, Protection of Environment (applicable sections).
- AR 385-40 w/ USACE Supplement 1, Accident Reporting & Records
- Basic Safety Concepts and Considerations for Ordnance and Explosives Operations, EP 385-1-95a
- USACE EM 385-1-1, Safety and Health Requirements Manual

STANDARD OPERATING PROCEDURE
OPS-07 – EXPLOSIVES STORAGE AND ACCOUNTABILITY

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to the acquisition, storage, and accountability of explosives and unexploded ordnance (UXO) or munitions and explosives of concern (MEC).

The following USA Environmental, Inc. (USA) policies are not all inclusive nor are they applicable in all situations. This SOP is not a stand-alone document and is to be used together with the Work Plan, Site Safety and Health Plan, applicable Federal, State, and local regulations, and contract restrictions and guidance.

2.0 SCOPE

This SOP applies to all site personnel, including contractor and subcontractor personnel, involved in the conduct of operations on a site with UXO/MEC contamination. This SOP is not intended to contain all of the requirements needed to ensure compliance. Consult the documents listed in Section 8.0 of this SOP for additional compliance issues.

3.0 RESPONSIBILITIES

3.1 PROJECT MANAGER

The Project Manager (PM), in conjunction with the Senior UXO Supervisor (SUXOS), is responsible for the initial quantity and type of demolition material ordered. The initial requisition should be of sufficient quantity to support the project for a 90-day period. In the event that the project is scheduled to run for less than 90 days, only one requisition will be made, if possible.

3.2 SENIOR UXO SUPERVISOR

The Senior UXO Supervisor (SUXOS) will be responsible for all subsequent requisitions for demolition materials. He will accomplish this by submitting a purchase order (PO) request through the PM, who approves it and forwards it to Accounting for the preparation of a PO. Accounting then forwards the PO to the Program Manager for action.

4.0 REQUISITION PROCEDURES

The requisition of explosives will be in accordance with USA's policy, which requires that whenever possible three quotes be obtained to ensure the best possible price for the task. Of paramount importance in this process is the determination of the location of the supplier(s). Generally, response time to requisitions is better for those suppliers closest to the site. Additionally, there is the possibility of leasing explosives magazines from the supplier.

5.0 LICENSES/PERMITS

5.1 FEDERAL LICENSE

In order to requisition explosives, USA will maintain a valid Bureau of Alcohol, Tobacco, and Firearms (BATF) license/permit on hand, to include an Explosives Purchase/Receipt Authorization List for the receipt of explosives. These two documents must be on file at the USA Corporate Office,

and at the project site, and each explosives supplier must also have a copy of each in order to sell to USA.

5.2 STATE BLASTER'S LICENSE

If required by the state in which a project is being conducted, USA personnel will obtain a state blaster's license. This will usually be accomplished by contacting the State Fire Marshall or State Safety Office to determine the requirements and schedule for the test. Only those individuals licensed by the State may actually shoot the shot. The PM and SUXOS will be responsible for identifying the need to obtain a blaster's license for a given project and for scheduling the personnel resources needed to obtain the requisite license.

5.3 STATE/COUNTY PERMITS

In some instances, it is necessary to obtain a state or county permit to conduct open burn/open detonation. This is accomplished by contacting the State Fire Marshall or County Fire Department for instructions.

6.0 EXPLOSIVES RECEIPT

Only those individuals named on the authorization list may sign for explosives from the shipper. In order to ensure that the quantity shipped is the same as the quantity listed on the shipping documents, two USA personnel will inventory the shipment prior to signing receipts.

6.1 SHIPPING DOCUMENTS

Explosive shipments generally are accompanied by the explosive supplier's Bill of Lading (B/L) and the freight company's shipping document. The initial inventory will include reconciling the two documents with the actual shipment and creating an on-site record that includes these documents and the inventory records. Regardless of the outcome of the initial inventory, one copy of the B/L and the freight company's shipping document will be attached to a copy of the PO request and the PO. One copy of each of the four documents will be filed on site, and one complete set will be forwarded to the Corporate Office.

6.2 RECEIPT DISCREPANCIES

In the event that there is a discrepancy between the amount shipped and the amount received, the SUXOS will immediately contact the PM and explosives supplier and inform the supplier of the discrepancy. It is then the responsibility of the supplier and shipper to rectify the situation and inform USA of the results. The supplier and/or shipper must then correct their documents and forward the corrected documents to the site. In all cases, only the amount received will be entered on the Explosives Accountability Record/Magazine Data Card, as shown in Figure 1.

7.0 STORAGE AND ACCOUNTABILITY

Demolition operations require the availability and storage of explosive materials. To the maximum extent possible, local government facilities will be used.

7.1 STORAGE

Demolition operations require the availability and storage of explosive demolition materials. To the maximum extent possible, local government or existing facilities will be used. Existing facilities are desirable because of their low cost and pre-approval, negating transport and set up. USA will comply with local storage criteria and procedures when using Government facilities. When required to provide explosives storage, USA will:

- Use portable approved BATF Type 2 structures or existing Government-furnished magazines.
- Locate, install, and maintain the magazines to comply with the magazine criteria and quantity distance requirements established in DOD 6055.9-STD, DoD Ammunition and Explosives Safety Standards.
- Install sufficient magazines to comply with explosive compatibility requirements, (i.e., bulk explosives, initiating explosives, and MEC).
- Establish security, such as fencing and/or guards, to prevent unauthorized access and/or theft.

7.1.1 Type 2 Outdoor Magazines

A Type 2 magazine is a box, trailer, semi-trailer, or other mobile facility.

7.1.1.1 General

Outdoor magazines will be bullet-resistant, fire-resistant, weather-resistant, theft-resistant, and ventilated. They will be supported to prevent direct contact with the ground and, if less than 1 cubic yard in size, will be securely fastened to a fixed object. The ground around outdoor magazines must slope away for drainage or other adequate drainage provided. When unattended, vehicular magazines must have wheels removed or otherwise effectively immobilized by kingpin locking devices or other methods.

7.1.1.2 Exterior Construction

The exterior and doors are to be of not less than ¼-inch steel and lined with at least 2 inches of hardwood. Magazines with top openings will have lids with water-resistant seals or which overlap the sides by at least one inch when in a closed position.

7.1.1.3 Hinges and Hasps

Hinges and hasps will be attached to doors by welding, riveting, or bolting (nuts on inside of door). Hinges and hasps will be installed so they cannot be removed when the doors are closed and locked.

7.1.1.4 Locks

Each door will be equipped with two padlocks fastened in separate hasps and staples. Padlocks must have at least five tumblers and a case-hardened shackle of at least 3/8-inch diameter. Padlocks will be protected with not less than ¼-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.

7.1.2 Signs and Placards

The BATF and the DoD require that all magazines be appropriately posted to indicate the hazard class of the contents, the fire fighting hazards, and the emergency notification list. Magazines will be placarded in accordance with DOD 6055.9-STD. This will require that the magazine area be posted for the most hazardous items stored in the magazine area. For example, a Fire Division Class 1 is needed for recovered UXO, and a Fire Division Class 3 for the demolition material, excluding detonators, which are Fire Division Class 4. In the event that there are two fire division or hazard class items in the same magazine, use the higher hazard division/class placard.

7.1.3 Lightning Protection

Appropriate lightning protection will be installed in accordance with Chapter 7 of DOD 6055.9 and/or the National Fire Protection Association (NFPA) requirements. For sites where existing

storage facilities are typically not available, lightning protection is not required if the following criteria are met:

- The magazine is constructed of metal that is 3/16-inch steel or larger (reference Appendix L of NFPA 780).
- The magazine is grounded in accordance with NFPA requirements.
- All parts of the magazine are located at least 6.5 feet from the nearest fence.

7.1.4 Emergency Notification List

An emergency notification list containing the names, telephone numbers, and local addresses of the individuals to be notified in the event of an emergency, will be posted on the outside and inside of the magazine door. These individuals should be the same individuals authorized to sign for explosives.

7.1.5 Compatibility

Explosive compatibility will be maintained. Table 1 lists the various storage compatibility groups and Table 2 is the compatibility chart. In certain instances, it may be necessary to store incompatible items in the same magazine. If this should occur, a barricade, such as sandbags, within the magazine will physically separate the incompatible items. This situation should be an interim occurrence to be avoided and, if needed, approved by the client prior to implementation.

7.1.6 Key Control

Magazines will remain locked except when receipts and issues are being made. The two locks on the magazines will require two different keys to unlock. One key will be kept by the SUXOS and the second key by the Ordnance Accountability Officer (OAO). This procedure ensures that access to the magazines cannot be made without obtaining the two keys and no one individual can gain access to the magazines.

7.2 ACCOUNTABILITY

USA will employ the following procedures to account for explosive materials:

- Control of and access to explosive magazines will be strictly controlled by the SUXOS. All issues and turn-ins of explosives will be properly documented and verified, though physical count, by a UXO Quality Control Specialist (UXOQCS).
- On receipt, the type, quantity, and lot number of each explosive item is recorded in the magazine data card and the original receipt documents will be maintained on file by the SUXOS or Site Manager.
- All requests for explosives, from the individual operating sites, will be reviewed by the SUXOS. Only sufficient explosives for the day's operations are issued.
- Issues of explosives are recorded on explosives usage records (Figure 2) and deducted from the magazine data card(s) (Figure 1). This procedure will ensure that the quantities of explosives on-the-floor in the magazine reflect the quantities listed on the magazine data card, and that issued explosives are accounted for while they are in the possession of individual users.
- Entries made on the explosive usage records and magazine data cards will be verified through physical count by the UXO Team Leader drawing or turning-in the explosives and the UXOQCS.

- All unused explosives are turned in at the end of each day, re-entered on the magazine data card, and recorded on the explosives usage record.
- At the end of each day the SUXOS and the UXO Team Leader reconcile the entries on each explosives usage record, and will turn these records over to the Project Manager.
- Weekly, the Site Manager will direct that the UXOQCS perform a 100 percent inventory of all explosives on hand. These inspections will include a physical count of the explosives and a comparison of this amount with the amount listed on the individual magazine data cards. Discrepancies and the results of these inventories will be recorded and reported to the Site Manager.

7.2.1 USAGE INVENTORY

Following each occurrence of a receipt or issue of explosive material, the OAO will conduct a joint inventory in conjunction with the demolition team leader, drawing out or returning the explosives. Only those items issued/returned will be inventoried. The OAO will appropriately annotate the two sets of magazine data cards and the explosives usage record (Figure 2).

7.2.2 WEEKLY INVENTORY

The last day of each work week, the SUXOS, the OAO, and a third individual (who will be changed each week) will conduct an inventory and record results on the two sets of magazine data cards.

7.2.3 DISCREPANCIES

In the event that there is a discrepancy during any inventory, the item will be recounted a minimum of two additional times. If a discrepancy still exists, the PM, the Customer's Contracting Officer (or the Contracting Officer's Representative) and the BATF will be notified. All actions from this point will be dictated by the BATF.

7.3 SUMMARY

The procedures contained in this SOP ensure that explosive materials are properly stored, accounted for, and issued. These procedures will be strictly followed and violations of these policies may result in an employee's immediate dismissal.

8.0 REFERENCES

Procedures and information contained in this document were obtained from the below listed references:

- USA Safety and Health Program (SHP)
- DOD 4145.26-M, Contractors' Safety Manual for Ammunition and Explosives
- DOD 6055.9-STD, Department of Defense (DoD) Ammunition and Explosives Safety Standards
- DOD 4160.21-M, Defense Reutilization and Marketing Manual
- DA PAM 385-64, Ammunition and Explosives Safety Standards
- AR 385-64, Ammunition and Explosives Safety Standards
- AR 200-1, Environmental Protection and Enhancement
- AR 385-10, The Army Safety Program

- AR 385-16, System Safety Engineering and Management
- AR 385-40 w/USACE supplement, Accident Reporting and Records
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives
- TM 60 Series Publications
- OSHA, 29 CFR 1910, Occupational Safety and Health Standards
- OSHA, 29 CFR 1926, Construction Standards
- EPA, 40 CFR Parts 260 to 299, Protection of Environment (applicable sections)
- DOT, 49 CFR Parts 100 to 199, Transportation (applicable sections)
- BATF P 5400.7, BATF-Explosives Law and Regulations
- USACE EM 385-1-1, Safety and Health Requirements Manual
- USACE ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous Waste Remedial Actions
- EP 385-1-95a Basic Safety Concepts and Considerations for Ordnance and Explosives Operations

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GROUP A	
Cyclonite (RDX), dry	Mercury fulminate, wet
HMX, dry	PETN, dry
Lead azide, wet	RDX (cyclonite), dry
Lead styphnate, wet	Tetracene, wet
GROUP B	
Fuses (except chemically actuated fuses containing ampules which may initiate, directly or indirectly, explosives and explosives-loaded components which are assembled in the conventional manner to form the finished explosive fuse).	Detonators
	Mines, practice, AP, M17
	Percussion elements
	Primer detonators
GROUP C	
Ammunition, blank and saluting, cannon	Cartridge, 90mm, canister, AP
Ammunition, .50 caliber, except API/incendiary	Cartridges, practice, over 40mm
Ammunition, 20mm, practice and high pressure test	Catapults, aircraft ejection seat, M3A1, M4A1, M5
Ammunition, 25mm, with inert projectile	Charge, propelling, not assembled to projectiles EC powder
Ammunition, 27mm, caseless	Detonating cord (primacord)
Ammunition, 30mm, ball and high pressure test	Nitrocellulose
Ammunition, 30mm, practice and training	Fuel (solid), emergency power unit
Ammunition, 37mm and 40mm, TP and AP	Propellant
Ammunition, 40mm, practice, M407A1, M382, and M385	Rockets, practice, 3.5-inch
Benite	Rocket motors, M3, M5, M6, M10, M13, M26, M30, M37, M42, M53, M66; Pershing 1st and 2nd stages; Spartan 1st, 2nd, and 3rd stages
Boron potassium nitrate	
GROUP D	
Adapter booster	Explosive D
Ammonium nitrate, except in original shipping container or equivalent	Explosives, cratering
Ammonium perchlorate, except when particle size is over 15 microns and in original shipping container or equivalent	Grenades, rifle, AT (except pentolite loaded)
Ammonium picrate (Explosive D)	HMX, wet
Bangalore torpedoes	Mine, APERS, MN, M14 (w/integral fuse)
Baratol	Mines, antipersonnel (bounding type
Black powder, bulk	Mines, antipersonnel (cast iron block)
Bombs, demolition	Mines, HEAT Nitrocellulose wet 8-30% water exposed to detonation hazards at less than intra

	line distance
Bombs, fragmentation	Nitroguanidine
Bombs, general purpose	Nitrostarch Octol
Boosters	PBX
Boosters, auxiliary	pentolite
Bursters	PETN, wet
Charge, demolition, snake	Picratol
Charge, springing earth rod, blast driven	Picric acid
Charge, supplementary, HE	Projectiles, HE, fuzed or unfuzed
Compositions A, A-2, A-3, A-4, B, B-3, C, C-2, C-3, and C-4	RDX (Cyclonite), wet
Cutter, cable M1	Rocket heads, HE and HEAT (except pentolite loaded) w/o motors
Cyclonite (RDX), wet	Shaped charges
Cyclotol	Tetranitrocarbazole (TNC)
Demolition Blocks	Tetryl
Destructor, HE, M10	Tetrytol
Detonating cord (primacord) exposed to detonation hazard at less than intra line distance	TNT
Dynamite	Tritonal
Ednatol	Torpex
GROUP E	
Ammunition, HEP	Ammunition, fixed and semi-fixed, 90mm through 106mm, loaded with ammonal, amatol, Explosive D, composition B or TNT
Ammunition, 20mm, HE, HEI and functional packs containing HE and HEI	Cartridge, heavy mortar, over 81mm (including 81mm M56), except chemical loaded
Ammunition, 30mm, HEDP	Cartridge, light mortar, 81mm or less (excluding 81mm M56), except chemical loaded
Ammunition, 37mm, HE	Redeye guided missiles, packaged 3 complete rounds w/launcher
Ammunition, 40mm, HE, RDX loaded	
Ammunition, 40mm, HE, M406, M386, M441, and M463	Rockets, HEAT, 3.5-inch, complete round
Ammunition, 57mm through 81mm, except White Phosphorous smoke, HEP and blank	Rockets, HE, 2.75-inch (in LAU-3/A rocket launcher)
GROUP F	
Grenades, hand offensive	Grenades, fragmentation
GROUP G	

Ammunition, .50 caliber API and incendiary	Grenades, hand, CN1, ABC, M25A1, w/fuse C12
Ammunition, 20mm, API	Grenades, hand, CM1, ABC, M25A2, w/fuse C12
Ammunition, 20mm, incendiary and functional packs containing incendiary, except those containing HE or HEI	Grenades, illuminating and incendiary

Ammunition, 40mm, riot control and pyrotechnic loaded, except White Phosphorous smoke	Grenades, practice, w/spotting charge
Bombs, photoflash	Grenades, rifle, smoke, XM48E1 and M22 and M23
Cartridge, igniter, M2	Grenades, smoke (except White Phosphorous and PWP)
Cartridge, illuminating	Grenades, riot control, CS1, M25A2
Cartridge, photoflash	Igniter, spotting charge
Cartridge cases, primer (w/o propellant)	Igniters for rocket motors (e.g., M12, M18, M20 and M29)
Charge, igniter assembly, for practice hand grenades	Ignition cartridge for trench mortar ammunition
Charge, spotting, APR practice, M8	Illuminating compositions (consolidated in final press operations)
Chemical ammunition, Group B, tear or smoke producing, w/explosive components, over 40mm	Mines, practice, w/spotting charge and/or fuse
Chemical ammunition, Group B, tear or smoke producing, w/o explosive components	Nuclear fire marker device 11-F2
Chemical ammunition, Group D, containing flammable solids, except for TEA or TPA, w/o explosive components	Photoflash powder
Chemical ammunition, Group D, fixed or semi-fixed rounds, containing flammable solids, except for TEA or TPA	Primers, artillery and cannon, percussion and electric
Clusters, incendiary bomb, M31 and M32 (w/o fuzing components)	Projectiles, illuminating
Destroyer, file, M4	Rocket, riot control agent, CS, 2.75-inch FFAR, MX99
Detonation, simulator, explosive M80	Simulators, M110, M115, M116, M117, M118, M119 and XM142
Grenade, hand, smoke, HC, M8	Smoke pots
Grenades, hand, CN, M7A1, w/fuse M201A1	Spotting charges (cartridge for miniature practice bombs)
Grenades, hand, CS, M7A3, w/fuse M210A1	
GROUP H	
Chemical ammunition, Group C	Grenade rifle, White Phosphorous, M19
Grenades, White Phosphorous	
GROUP J	

Chemical ammunition, Group D, containing flammable liquids or gels, with or w/o explosive components	Chemical ammunition, Group D, fixed and semi-fixed rounds, containing flammable liquids or gels with or without explosive components
GROUP K	
Chemical ammunition, Group A, with or without explosive components	Chemical ammunition, Group B, with or without explosive components, designed for toxic or incapacitating effects greater than lachrymation
Rockets, toxic chemical agents, complete rounds	

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GROUP L	
Aluminum powder	Fuzes, chemically actuated, containing ampoules which may initiate directly or indirectly, explosives and explosives loaded components which are assembled in the conventional manner to form the finished explosive fuse
Ammonium nitrate	Magnesium powder
Ammonium perchlorate	Grenades, rifle, AT (pentolite loaded)
Ammunition, pentolite loaded	Nitrates (inorganic), except ammonium nitrate (in original shipping container or equivalent)
Chemical Ammunition, Group A, without explosive components	Perchlorates
Chemical ammunition, Group B, without explosive components, designed for toxic or incapacitating effects more severe than lachrymation	Peroxides, solid
Chemical ammunition, Group D, TEA or TPA components	Rocket heads, pentolite loaded, w/o motors
Chlorates	Zirconium (types I and II, spec. FED 1665)
DNT	
GROUP S	
Ammunition, 40mm, canister and multiple projectile	Fuse lighters
Ammunition, small arms, less than .50 caliber	Fuse safety
Explosive bellows	Squibs commercial
Firing devices	

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Table 2: Storage Compatibility Chart

GROUPS	A	B	C	D	E	F	G	H	J	K	L	S
A	X	Z										Z
B	Z	X										X
C			X	Z	Z		Z					X
D			Z	X	X							X
E			Z	X	X							X
F						X						X
G			Z				X					X
H								X				X
J									X			X
K										X	U	
L										U		
S	Z	X	X	X	X	X	X	X	X			X

Notes:

1. The marking AX@ at an intersection of the above chart indicates that these groups may be combined in storage. Otherwise, mixing is either prohibited or restricted per Note 2 below.
2. The marking AZ@ at an intersection of the above chart indicates that, when warranted by operational considerations or magazine non-availability, and when safety is not sacrificed, these groups may be combined in storage.
3. Equal numbers of separately packaged components of complete rounds of any single type of ammunition may be stored together. When so stored, compatibility is that of the assembled rounds; i.e., White Phosphorous Filler in Group H, HE Filler in Groups D, E, or F, as appropriate.
4. Group K required not only separate storage from other groups, but also requires that munitions having different toxic chemical agent fillers be stored separately from each other.
5. The marking AU@ on above chart indicates that leaking toxic chemical munitions of one agent type, i.e., GB, with or without explosive components, may be stored together in one magazine specifically designated for storage of leakers of that agent type.
6. Ammunition designated APRACTICE@ by NSN and nomenclature may be stored with the fully loaded ammunition it simulates.

Magazine Data Card

Nomenclature:

Lot Number: Unit Of Issue:

Date	Name	Received	Issued	Balance	Checkers Initials

Figure 1: Magazine Data Card

Explosives Usage Record

Contract Number:

Team Number: Date: Project Name:

Team Leader: Work Areas & Grid Numbers:

Explosives Issued — Signature Of Team Leader:

Item	Quantity	Lot Number	Checkers Initials

Explosives Expended — Signature Of Team Leader

Item	Quantity	Lot Number	Checkers Initials

Explosives Returned — Signature Of QC Officer:

Item	Quantity	Lot Number	Checkers Initials

The signatures in each section of this document indicate that the items listed in that section were in fact issued, expended, or returned to storage and that the quantities listed were verified through a physical count.

Figure 2: Explosives Usage Record

STANDARD OPERATING PROCEDURE
OPS-08 – EXPLOSIVES AND AMMUNITION TRANSPORTATION

1.0 PURPOSE

The purpose of this Explosives and Ammunition Transportation Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to the transportation of explosives and unexploded ordnance (UXO) or munitions and explosives of concern (MEC).

The following USA Environmental, Inc. (USA) policies are not all inclusive nor are they applicable in all situations. This SOP is not a stand-alone document and is to be used together with the Work Plan, Site Safety and Health Plan, applicable Federal, State, and local regulations, and contract restrictions and guidance.

2.0 SCOPE

This SOP applies to all site personnel, including contractor and subcontractor personnel, involved in the conduct of operations on a site with UXO/MEC contamination. This SOP is not intended to contain all of the requirements needed to ensure compliance. Consult the documents listed in Section 6.0 of this SOP for additional compliance issues.

3.0 TRANSPORTATION REQUIREMENTS FOR EXPLOSIVES AND MEC

Transportation of munitions and explosives of concern (MEC) and explosives will comply with all Federal, State, and local regulations. Permits are not required under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for on-site or on Federal Installation transportation of explosives or MEC. Off-site shipment of MEC will be made using commercial carriers approved to transport ammunition and explosives (Hazard Class A and B). For off-site shipment:

- MEC will be packaged in accordance with 49 CFR part 173.
- Drivers will be provided with DD Form 836 (Special Instructions for Motor Vehicle Drivers).
- Vehicles will be inspected using DD Form 626, Motor Vehicle Inspection, and be properly placarded.
- Compatibility requirements will be observed.
- The load will be well braced and, except when in closed vans, covered with a fire-resistant tarpaulin.

4.0 FEDERAL INSTALLATIONS/ON SITE

USA will transport explosives in an on site vehicle and Institute of Makers of Explosives (IME) -22 containers for transportation of explosives to the disposal sites while using public access roads When transporting explosives personnel will comply with the following:

- Initiating explosives, such as blasting caps, will remain separated at all times. Blasting caps may be transported in the same vehicle as long as they are in a separate IME-22 container (49 CFR 173.63) and secured away from other items;
- Vehicles will be inspected using DD Form 626, Motor Vehicle Inspection or USA inspection form at attachment 1, and be properly placarded.
- Compatibility requirements will be observed;
- Only UXO Technicians III and above may be issued and transport explosive materials. The receiving party shall sign the receipt documents for accountability;

- Operators transporting Hazard Division (49 CFR 173.50) 1.1 explosives will have a valid drivers license;

- Drivers will comply with posted speed limits but will not exceed a safe and reasonable speed for conditions. Vehicles transporting explosives off-road will not exceed 25 miles per hour and will be properly equipped; and

- Personnel will not ride in the cargo compartment with explosives or MEC

5.0 SUMMARY

Transportation of explosives presents risks to both the vehicle operator and the surrounding populace. The procedures contained in this SOP are designed to eliminate and/or mitigate these risks. Personnel engaged in these activities will strictly comply with these procedures and those contained in the referenced documents.

6.0 REFERENCES

Procedures and information contained in this document were obtained from the references listed below:

- USA Corporate Safety and Health Program (CSHP)
- DOD 4145.26-M, Contractors' Safety Manual for Ammunition and Explosives
- DOD 6055.9-STD, Department of Defense (DoD) Ammunition and Explosives Safety Standards
- DOD 4160.21-M, Defense Reutilization and Marketing Manual
- DOT, 49 CFR Parts 100 to 199, Transportation (applicable sections)
- 27 CFR Part 55, Commerce in Explosives
- 29 CFR 1910, Occupational Safety and Health Standards
- 29 CFR 1926, Construction Standards
- EPA, 40 CFR Parts 260 to 299, Protection of Environment (applicable sections)
- BATF 5400.7, Bureau of Alcohol, Tobacco, and Firearms Explosives Laws and Regulations
- USACE EM 385-1-1, Safety and Health Requirements Manual
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives
- TM 60 Series Publications

ATTACHMENT 1

Explosive Vehicle Inspection, ON-SITE

This form must be filled out for any vehicle carrying explosives, prior to loading.
This form is for use on site only, if traveling on public highways use DD Form 626

DRIVERS NAME _____ LICENSE NUMBER _____
COMPANY _____
TYPE OF VEHICLE _____ VEHICLE NUMBER _____
INSPECTION DATE/TIME _____ INSPECTOR _____

PART INSPECTED	SAT.	UNSAT.	COMMENT
HORN			
STEERING SYSTEM			
WIPERS			
MIRRORS			
FIRE EXTINGUISHERS (10 ABC, 2 EACH)			
REFLECTORS			
EMERGENCY FLASHERS			
LIGHTS			
ELECTRIC WIRING			
FUEL SYSTEM			
EXHAUST SYSTEM			
BRAKE SYSTEM			
SUSPENSION			
CARGO SPACE			
TIRES, WHEELS, RIMS			
TAILGATE			
TARPAULIN			

INSPECTION RESULTS (INSPECTOR INITIAL) ACCEPTED _____

REJECTED _____

REMARKS _____

DRIVERS SIGNATURE/DATE

INSPECTORS SIGNATURE/DATE

STANDARD OPERATING PROCEDURE – OPS-13

MUNITIONS DEBRIS SCRAP INSPECTION OPERATIONS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide USA Environmental, Inc. (USAE) and subcontractors with the minimum procedures and safety and health requirements applicable to the conduct of munitions debris (MD) scrap inspection operations on sites contaminated with unexploded ordnance (UXO) or munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all USAE site personnel, including contractor and subcontractor personnel, involved in the inspection, storage, and certification phases of MD on a UXO/MEC contaminated site. The following USAE policies and procedures are not all inclusive nor are they applicable in all situations. This SOP is not a stand-alone document and is to be used together with Work Plans, other USAE SOPs, the USAE Site Safety and Health Plan (SSHP), applicable Federal, State, and local regulations, and contract restrictions and guidance. Consult the documents listed in Section 6.0 of this SOP for additional compliance issues.

3.0 OBJECTIVE

Processing activities involve handling Ammunition, Explosives, and other Dangerous Articles (AEDA). Each processing activity shall be preceded by an inspection to verify that there are no MEC or UXO items or material potentially presenting an explosive hazard (MPPEH) present. MEC and MPPEH on or in range residue creates the hazard of personnel injury and/or equipment damage. The extent of MEC or MPPEH required to create these hazards is dependent on the type of MEC or explosive, its concentration or distribution, and confinement. The objective of this SOP is to ensure that all work performed during range residue processing will be accomplished safely and in accordance with applicable Federal, State, local regulations, contract restrictions and guidance.

4.0 MD SCRAP OPERATIONS

All scrap inspection operations at MEC sites will be under the supervision of UXO qualified personnel. Non-UXO qualified personnel will not be allowed in the exclusion zone (EZ) unless accompanied by a UXO Technician. The EZ will encompass an area large enough to protect personnel from fragmentation by an unplanned detonation. In addition, if non-UXO qualified personnel require access to the EZ, all work will stop while they are in the EZ. During operations, USAE personnel will strictly adhere to the Site Safety and Health Plan (SSHP) and the following general safety practices:

- Operations will be conducted during daylight hours only.
- Access to operating areas will be limited to only those personnel necessary to accomplish the specific operation.
- Only qualified UXO Technicians will handle MEC.
- During UXO operations the minimum separation distance (MSD) between UXO and non-UXO operations is the munition with the greatest fragmentation distance (MGFD), as stated in the Work Plan.

- During demolition operations personnel remaining on site will be limited to those personnel needed to safely and efficiently prepare the item/s for destruction.

- All personnel will attend the daily safety briefing (tailgate safety briefing) prior to entering the operating area.

- Anyone can stop operations for an unsafe act or situation.

- Safety violations and/or unsafe acts will be immediately reported to the UXO Safety Officer (UXOSO).

- Failure to comply with safety rules/procedures may result in termination of employment.

4.1 SITE LAYOUT PROCEDURES

Depending on the SOW operations may or may not include disposal of MEC containing explosives. At some sites disposal may be performed by other than USAE. This SOP assumes that USAE will dispose of any live MEC on site. The procedures for establishing the operation are as follows:

- Identify and mark the operating area boundaries.

- The inspection area will be marked with survey stakes, caution tape, or pin flags.

- Identify disposal area for detonation of MEC containing explosives.

- Establish and site an explosive storage area in accordance with USAE's Explosive Storage and Accountability SOP.

4.2 INSPECTION PROCEDURES

Procedures will vary depending on the project scope, which may require disposal of items containing explosives. Inspection teams will consist of UXO Technicians or a combination of non-UXO qualified personnel (General Laborers) and qualified UXO Technicians. Only qualified UXO Technicians will perform MEC operations, which are defined as:

- MEC identification

- Handling of MEC, explosives, or explosive items

- Disposal, including movement, transportation, and final disposal of MEC

4.2.1 INSPECTION TEAM STRUCTURE

The inspection team will consist of either all UXO Technicians or a mix of UXO and non-UXO personnel. The following is the structure and composition of a typical inspection team:

- Senior UXO Supervisor (SUXOS): directs and supervises all team activities, confirms the identification of all MEC encountered, maintains the scrap documentation, and certifies the scrap as free from hazardous material.

- UXO Technician III: assists the SUXOS, identifies all MEC encountered, records the location of the items located, and performs the duties of Site Safety Officer for demolition.

- UXO Technicians or Laborers: visually search the scrap for MEC. These personnel perform their duties under the direction and supervision of the UXO Technician III. Loading and packaging of scrap may be performed by local laborers as long as they are supervised by a UXO Technician and do not handle any MEC.

4.2.2 TEAM PROCEDURES

Within or adjacent to each operating area, the UXO Technician III will establish a temporary scrap metal and non-hazardous MEC collection point. During operations, scrap metal and MEC items that are free of explosive contamination (i.e. fragments, parachutes, etc) will be placed into these collection points. The UXO Technician placing the item in the temporary stockpile will perform an inspection to ensure the item is free of explosive hazards. Upon completion of operations in that area, the UXO Technician III will direct that the materials in these temporary collection points be loaded onto a vehicle for transfer to a central collection point.

As the material is being loaded, the UXO Technician III and other UXO Technicians will perform a second inspection of the material to ensure it is free of explosives and other hazardous materials. At the completion of operations, USAE will turn all scrap over to a local scrap dealer for disposal. Prior to releasing the MEC-related scrap to the scrap dealer, the SUXOS will certify that the scrap contains non-hazardous material, which will then be verified by the USACE OE Safety Specialist. The turn-in document will contain the statement: *"This certifies that the material listed has been 100 percent properly inspected and, to the best of our knowledge and belief, are free of explosive hazards, engine fluids, illuminating dials and other visible liquid HTRW materials"*, signed by the SUXOS and USACE OE Safety Specialist.

All MPPEH is treated by explosively opening the munitions case (venting), physically inspecting the filler, and stockpiling the inert scrap/residue. Items to be vented will be transported to the demolition area for treatment. This method ensures that the filler of each piece of "potentially" inert ordnance is physically exposed and inspected and precludes the possibility of transferring an explosively laden piece of ordnance offsite.

MEC encountered during inspection that is acceptable to move will be transported to the demolition area for disposal. Items that are unfuzed and/or unfired are acceptable to transport unless otherwise instructed. Items that are not acceptable to move will be blown in place (BIP). Operations will move to another location until the item(s) is destroyed. Items that may be acceptable to move but cannot be transported, may be consolidated to reduce the number of shots required.

4.3 DISPOSAL OPERATIONS

Disposal operations consist of actions taken at the site to remove the scrap and dispose of the MEC and explosive contamination. Demolition and transportation of MEC and explosives will be in accordance with USAE's MEC/UXO Demolition Operations and Explosive Transportation SOPs. The use of standard Explosive Ordnance Disposal (EOD) procedures for detonating or disposing of MEC will constitute the principle control measure for ensuring safety during demolition operations. These procedures, contained in EOD technical manuals, are designed to limit fragments and harmful blasts to the immediate vicinity of the disposal operation. These procedures involve the use of controls such as pits, earth cover (tamping), barricades, sandbags, and blast mats; and are tailored to the type of munition, its orientation, and net explosive weight (NEW). In addition, the following measures will be taken:

- Intentional Detonations. The minimum separation distances (MSD) specified in DOD 6055.9-STD will be used unless a lesser distance has been calculated using Technical Paper (TP) Number 16.

- Unintentional Detonations. If the identity of the military munitions to be found is unknown, the MSD specified in DOD 6055.9-STD will be used to establish the EZ. If the identity of the military munitions to be found is known, use TP Number 16 to determine the criteria for establishing the EZ.

- When multiple teams are working on site, a Team Separation Distance (TSD) will be established. The minimum TSD will be the greater of 61 meters (200 feet), the hazardous fragment distance of the MGFD (lesser distance authorized if supported by a hazard assessment), or the K50 (0.9 pounds per square inch) overpressure distance.

- All MEC will be accounted for and identified by nomenclature, if possible. As a minimum, MEC identification will be by type, function, and filler.

- Coordination will be made with the Federal Aviation Administration to ensure air space clearance prior to the start of operations.

- MEC that is acceptable to move may be consolidated at each site to reduce the number of demolition shots and conserve explosives.

- MEC-related scrap or MD (e.g., inert ordnance, expended munitions, or mortar fins) will be removed and transferred to the appropriate reutilization office. Should the reutilization office not be established for the receipt of scrap, the contractor will dispose of the scrap through a local scrap dealer. All material will be accounted for through appropriate documentation, as required by the Government and/or scrap dealer.

- Avenues of approach to each disposal site will be controlled to prevent unauthorized access.

- Prior to the start of disposal activities, the SUXOS and Site Safety Officer will verify that the area around the operating site is clear of all nonessential personnel and that other UXO Technicians have been notified. Prior to priming of demolition charges, all avenues of ingress will be physically blocked by UXO personnel. Radio communications will be maintained among all concerned parties. Avenues of ingress will not be opened without the express permission of the SUXOS. A constant state of vigilance will be maintained by all personnel to detect any intrusion into the fragmentation zone.

5.0 SUMMARY

The procedures contained in this SOP ensure that scrap materials are properly inspected and certified as containing no hazardous materials. These procedures will be strictly followed and violations of these policies may result in an employee's immediate dismissal.

6.0 REFERENCES

- USAESCH Safety Considerations for UXO

- USAE Corporate Safety and Health Program (CSHP)

- OSHA, 29 CFR 1910, Occupational Safety and Health Standards

- OSHA, 29 CFR 1926, Construction Standards

- Applicable sections of EPA, 40 CFR Parts 260 to 299, Protection of Environment

- Applicable sections of DOT, 49 CFR Parts 100 to 199, Transportation
- USACE EM 385-1-1, Safety and Health Requirements Manual
- USACE ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous Waste Remedial Actions
- DOD 4145.26-M, Contractors' Safety Manual for Ammunition and Explosives
- DOD 6055.9-STD, DoD Ammunition and Explosives Safety Standards
- DOD 4160.21-M, Defense Reutilization and Marketing Manual
- DA PAM 385-64, Ammunition and Explosives Safety Standards
- AR 385-64, Ammunition and Explosives Safety Standards
- AR 200-1, Environmental Protection and Enhancement
- AR 385-10, The Army Safety Program
- AR 385-16, System Safety Engineering and Management
- AR 385-40, Accident Reporting and Records
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives

STANDARD OPERATING PROCEDURE – OPS-15

MEC AVOIDANCE

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide all USA Environmental, Inc. (USAE) employees and subcontractors with the minimum procedures and safety and health requirements applicable to perform avoidance operations at sites potentially containing unexploded ordnance (UXO) and/or munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all USAE site personnel, including contractor and subcontractor personnel, involved in the conduct avoidance operations on a UXO/MEC contaminated site. The following USAE policies and procedures are not all inclusive nor are they applicable in all situations. This SOP is not a stand-alone document and is to be used together with Work Plans, other USAE SOPs, the USAE Site Safety and Health Plan (SSHP), applicable Federal, State, and local regulations, and contract restrictions and guidance. Consult the documents listed in Section 8.0 of this SOP for additional compliance issues.

3.0 MEC/UXO BASIC AND GENERAL SAFETY PRECAUTIONS

These basic safety precautions are the minimum MEC safety requirements required of all personnel on site. Other precautions and requirements are in other applicable MEC manuals.

3.1 BASIC CONSIDERATIONS

The following should be taken into consideration when planning or conducting MEC avoidance support operations:

- SAFETY IS PARAMOUNT
- Do not move or disturb unidentified items
- Do not collect souvenirs
- Do not smoke except in designated areas
- Do not carry fire or spark producing devices into the site
- All MEC operations will use the "Buddy" system
- Prohibit non-essential personnel from visiting the site

3.2 BASIC SAFETY PRECAUTIONS

The following safety precautions are applicable to all MEC:

- Suspend all operations immediately upon approach of an electrical storm.
- Observe the hazards of electromagnetic radiation (EMR) precautions and grounding procedures when working with, or on, electrically initiated or susceptible MEC.
- Do not unnecessarily dismantle, strip, or handle any MEC.

- Avoid inhalation and skin contact with smoke, fumes, dust, and vapors of detonations and MEC residue.
- Do not attempt to extinguish burning explosives or any fire that might involve explosive materials.
- Do not manipulate external features of ordnance items.
- Incorporate appropriate property and personnel protective measures for shock and fragmentation when conducting MEC operations.
- Do not subject MEC to rough handling or transportation. Sand bag, chock, and block appropriately.
- Hand carry no more than two items (one in each hand) at a time and then only as required by the operation being performed.
- Do not transport damaged white phosphorous munitions unless fully submerged in water.
- Avoid unnecessary movement of armed or damaged UXOs.
- Avoid the forward portions of munitions employing proximity fuzing.
- Assume unknown fuzes contain cocked strikers or anti-disturbance features.

3.3 GENERAL SAFETY PRECAUTIONS

The following sub-paragraphs describe safety precautions for various types of munitions/disposal operations:

3.3.1 BOMBS

- Ensure fuze wells do not contain fuze components.

3.3.2 CLUSTERS, DISPENSERS, LAUNCHERS

- Approach and work from the sides of a dispenser.
- Consider an intact dispenser as fully or partially loaded.
- Consider any payloads outside the container or dislodged inside as armed.
- Take precautions for the most hazardous payloads until positively identified.

3.3.3 PROJECTILES

- Determine if the projectile has been fired and if so consider it armed.
- Check for the presence of unburned tracers.
- Avoid the rear and front of rocket assisted projectiles,
- Handle projectile components such as powder increments, cartridges, and primers with caution.

- Seal the open ends of projectiles or sheared projectile components with tape or other suitable material before transporting.

3.3.4 GRENADES

- Do not attempt to re-install safety pins on a dud-fired grenade.
- Do not attempt to withdraw impinged firing pins from the fuze of a dud-fired grenade.
- Do not dispose of grenades by functioning them as designed.

3.3.5 ROCKETS

- Approach and work on rockets from the side.
- Do not dismantle or strip dud fired rockets or rocket motors.
- Do not expose electrically fired munitions to radio transmissions within 25 feet.
- Do not transport an unfired rocket motor until having shielded the motor igniter from EMR.

3.3.6 GUIDED MISSILES

- When found, restrict vehicular movement in the area of a guided missile.
- Avoid entanglement with guidance wires of wire guided missiles.
- Restrict radio communications in the vicinity of a dud-fired missile.
- Approach and work on missiles from the side and rear quarter.
- Do not dismantle or strip dud-fired missiles or missile motors.
- Do not transport an unfired missile motor until having shielded the motor igniter from EMR.

4.0 MEC AVOIDANCE FOR SAMPLING AND DRILLING OPERATIONS

MEC avoidance operations may be required in support of soil sampling operations and the drilling of monitoring wells on some contracts. Avoidance operations will consist of a team composed of two UXO qualified personnel. The team will consist of a UXO Technician III and a UXO Technician II or UXO Technician I. The team will not destroy any MEC encountered. All MEC contacts and suspected MEC anomalies will be reported to the Site Manager who will in turn notify the On-site Safety Representative or local Explosive Ordnance Disposal (EOD) unit.

4.1 ACCESS ROUTES TO SAMPLING LOCATIONS

Prior to sampling or well drilling crews going on site, the MEC team will conduct a reconnaissance of the sampling area. The reconnaissance will include locating the designated sampling or drilling location and insuring that it is free of anomalies. If anomalies are detected the point will be relocated as directed in the Work Plan. Once the designated point has been cleared, an access route for the sampling crews, vehicles and equipment will be cleared. The access route, at a minimum, will be twice the width of the widest vehicle and the boundaries will be clearly marked to prevent personnel from straying into un-cleared areas. If surface MEC is encountered, the MEC team will mark and report the item, and divert the approach path around the MEC. A magnetometer will be used to ensure there are no subsurface MEC within the approach path. If a subsurface magnetic anomaly is encountered, it will be assumed to be a

possible MEC and the path diverted to avoid it.

4.2 SOIL SAMPLING AND WELL DRILLING SITES

The MEC team will clear a work site for soil samples and well drilling and clearly mark the boundaries. The area will be large enough to accommodate the drilling equipment and provide a work area for the crews. As a minimum, the cleared area will be a square, with a side dimension equal to twice the length of the largest vehicle or piece of equipment for use on site. If a pre-selected area indicates magnetic anomalies, a new sampling/drilling site will be chosen.

4.3 AVOIDANCE PROCEDURES FOR BOREHOLE SAMPLING

If surface samples are required they will be obtained prior to the start of boring. The borehole procedures will be completed using a hand auger, powered auger, or Direct Push Technology (DPT) equipment. The MEC Team will check the borehole with a down-hole magnetometer, a minimum of every 2 feet, to the deepest sampling depth, or a minimum of 6 feet, to ensure that smaller items of MEC, undetectable from the surface, will be detected.

- **Hand Auger Procedures:** The hand auger will be advanced to the first sampling depth and the auger will be withdrawn. A clean auger bucket will be attached to the handle, returned to the borehole and a sample will be collected. At this point the MEC Team will check the borehole with a magnetometer and if no magnetic anomalies are found, the procedure repeated to obtain the required samples.

- **Power Auger Procedures:** The power auger will be advanced to the first sampling depth and the auger will be withdrawn. A clean hand auger will then be used to collect the sample. The MEC Team will check the borehole with a magnetometer and if no magnetic anomalies are found, the procedure will be repeated to collect the required samples.

- **DPT Procedures:** The DPT rig will be positioned over the sampling point and the rod will be advanced to a maximum depth of 2 feet. The DPT rig will then move a minimum of 20 feet away from the sampling point to prevent the rig from influencing the magnetometer. The MEC Team will then check the borehole with a magnetometer and if no magnetic anomalies are found, the procedure will be repeated to collect the required samples.

4.4 AVOIDANCE PROCEDURES FOR MONITORING WELL INSTALLATION

Prior to drilling equipment being moved to the proposed site, the MEC Team will have checked the designated site, using a magnetometer; to assure that the well location is anomaly free to a depth of 2 feet. If surface samples are required they will be collected prior to the start of drilling. To complete the subsurface magnetometer checks, one of two methods may be used:

- Monitoring, at 2-foot increments, during the actual well drilling operation. This will require the withdrawal of the drill rod or augers from the well and moving the drill rig a minimum of 20 feet away from the well location to prevent the rig from influencing the magnetometer, or

- Installing an offset monitoring hole within 2 feet of the well location. This monitoring hole can be installed by the MEC Team, with a hand or power auger, and monitored at 2-foot increments to the desired well depth or a minimum of 6 feet. This will then allow uninterrupted well installation and/or sampling to continue.

5.0 MEC AVOIDANCE AND CONSTRUCTION SUPPORT

MEC avoidance support is normally comprised of a two-man team consisting of a UXO Technician III (Team Leader) and a UXO Technician II. At sites where the expectation of encountering MEC is low, the MEC support may only consist of the UXO Technician III as MEC safety escort. The intent of MEC

avoidance is to detect and avoid MEC and UXO. The following paragraphs outline minimum procedures for the designated operations.

5.1 LOCATION SURVEYS AND GEOPHYSICAL ESCORT

MEC escort for survey and geophysical operations consists of a visual surface search for MEC. Any UXO or MEC encountered will be marked, avoided, and reported to the appropriate authorities. Prior to driving stakes for grid corners or installing monuments, the UXO Technician will search the location with a magnetometer. Any subsurface anomaly will be assumed to be MEC and an alternate anomaly-free location will be chosen.

5.2 TRENCHING AND PIT EXCAVATIONS

Prior to trenching or excavation crews going on site, the MEC Team will conduct a reconnaissance of the approach route to the site. The reconnaissance will include locating a clear path for the crews, vehicles, and equipment. The approach path, at a minimum, will be twice the width of the widest vehicle. The boundaries of the approach path will be clearly marked to prevent personnel from straying into un-cleared areas. If MEC is encountered, the MEC team will mark and report the item, and divert the approach path around the MEC. Personnel will be instructed to remain within the marked boundary limits. A magnetometer will be used to search for near surface anomalies within the approach path. If a magnetic anomaly is encountered, it will be assumed to be a possible MEC, it will be marked, the approach path diverted, and reported.

5.2.1 EXCAVATION

During excavation operations the UXO Technician(s) will position themselves near (outside the reach of the swing) the earth moving machinery (EMM) (backhoe) where they can observe the excavation. If UXO or MEC is spotted the UXO Technician will signal the EMM operator to stop digging, move the bucket and place it on the ground outside the trench, and remove his hands from the controls. The UXO Technician will then investigate the MEC, which will be handled in accordance with Section 6.0. If MEC that cannot be moved is encountered the excavation operations will be either relocated to another area of operations or suspended until the item is disposed of or rendered safe to move.

5.2.2 HEAVY EQUIPMENT OPERATION

Heavy equipment safety will be in accordance with the SSHP.

5.2.3 EXCAVATION SAFETY

Excavation safety will be in accordance with the SSHP.

5.2.4 EQUIPMENT

The minimum equipment requirements for this activity include:

- Level D PPE
- EMM, (trenching & excavation)
- Schonstedt GA-52CX Magnetometer
- Marking material listed in Table 1
- Miscellaneous common hand tools (e.g. hammer, shovel, etc.)

Table 1: Color Codes – MEC Avoidance

Color	Description
Red Pin Flag/Caution Tape	Danger, identified suspect MEC/UXO, special precaution required
White Pin Flag	Boundary or temporary marker
Green Paint	Marking MEC-related scrap

6.0 LIVE AND SUSPECT MEC

UXO or MEC items encountered a will be inspected by the UXO Technician(s). Items that are safe to move may be relocated to a bermed or sandbagged area a safe distance from ongoing operations. No items will be moved unless positively identified and determined safe to move. The item(s) will be marked and reported to the Site Manager. MEC encountered that is ***NOT*** safe to move will be marked in place and operations will be moved to another location. MEC will be marked by installing four wooden stakes and encircling the stakes with flagging tape (see Table 1). Prior to installing stakes the location will be checked with a magnetometer to avoid driving the stake into a subsurface anomaly. All live and suspect live items will be inspected and identified by UXO Technicians. If the item cannot be positively identified and determined to be inert and safe to move, it will be marked and reported.

Note: If during identification of UXO or MEC it becomes necessary to move or handle the item, non-UXO qualified personnel will withdraw to a safe distance.

6.1 MEC RELATED MATERIAL

Adjacent to each operating area, the UXO Technicians will establish a MEC-related scrap (munitions debris) collection point. During operations items that are free of explosive contamination (i.e., fragments, parachutes, etc.) will be placed into these collection points and marked (see Table 1). Upon completion of operations the materials in these temporary collection points will be transferred to a central collection point for disposal. As the material is being loaded, the UXO Technician(s) will perform a second inspection of the material to ensure it is free of explosives and other hazardous materials.

7.0 DISPOSAL OPERATIONS

All MEC and Material Potentially Presenting and Explosive Hazard (MPPEH) will be disposed of in accordance with the project scope or the Work Plan. All hazardous material encountered will be reported to the Site Manager for disposition.

8.0 SUMMARY

USAE uses proven procedures and methods to provide MEC Support Services. Only qualified UXO personnel will perform tasks associated with MEC location, identification, and item condition determination. The procedures outlined in this SOP are based on industry standards and ensure that operations are safely and efficiently performed.

9.0 REFERENCES

- EP 385-1-95a, Basic Safety Concepts and Considerations for Ordnance and Explosives Operations
- EP 75-1-2, UXO Support during HTRW and Construction Activities
- USAE Corporate Safety and Health Program (CSHP)
- OSHA, 29 CFR 1910, Occupational Safety and Health Standards

- OSHA, 29 CFR 1926, Construction Standards
- Applicable sections of EPA, 40 CFR Parts 260 to 299, Protection of Environment
- Applicable sections of DOT, 49 CFR Parts 100 to 199, Transportation
- USACE EM 385-1-1, Safety and Health Requirements Manual
- USACE ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous Waste Remedial Actions
- DOD 4145.26-M, Contractors' Safety Manual for Ammunition and Explosives
- DOD 6055.9-STD, DoD Ammunition and Explosives Safety Standards
- DOD 4160.21-M, Defense Reutilization and Marketing Manual
- DA PAM 385-64, Ammunition and Explosives Safety Standards
- AR 385-64, Ammunition and Explosives Safety Standards
- AR 200-1, Environmental Protection and Enhancement
- AR 385-10, The Army Safety Program
- AR 385-16, System Safety Engineering and Management
- AR 385-40 w/USACE supplement, Accident Reporting and Records
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives
- TM 60 Series Publications

STANDARD OPERATING PROCEDURE – OPS-17

MEC SURFACE SWEEPS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide all USA Environmental, Inc. (USAE) employees and subcontractors with the minimum procedures and safety and health requirements applicable to perform surface sweep operations at sites potentially containing unexploded ordnance (UXO) and/or munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all USAE site personnel, including contractor and subcontractor personnel, involved in the conduct surface sweep operations on a UXO/MEC contaminated site. The following USAE policies and procedures are not all inclusive nor are they applicable in all situations. This SOP is not a stand-alone document and is to be used together with Work Plans, other USAE SOPs, the USAE Site Safety and Health Plan (SSHP), applicable Federal, State, and local regulations, and contract restrictions and guidance. Consult the documents listed in Section 5.0 of this SOP for additional compliance issues.

3.0 SURFACE SWEEP OPERATIONS

All surface sweep operations at MEC sites will be performed under the direct supervision of UXO qualified personnel. Non-UXO qualified personnel will not be allowed in the EZ during intrusive operations. If access is required by non-UXO qualified personnel, all work will stop while they are in the EZ. During operations, USAE personnel will strictly adhere to the SSHP and the following general safety practices:

- Operations will be conducted during daylight hours only.
- Access to operating areas will be limited to only those personnel necessary to accomplish the specific operation.
- UXO will only be handled by qualified UXO Technicians.
- During UXO operations the minimum separation distance (MSD) between UXO and non-UXO operations is fragmentation distance of the munition with the greatest fragmentation distance (MGFD), as stated in the Work Plan.
- During demolition operations personnel remaining on site will be limited to those personnel needed to safely and efficiently prepare the item/s for destruction.
- All personnel will attend the daily safety briefing (tailgate safety briefing) prior to entering the operating area.
- Anyone can stop operations for an unsafe act or situation.
- Safety violations and/or unsafe acts will be immediately reported to the UXO Safety Officer (UXOSO).
- Failure to comply with safety rules/procedures may result in termination of employment.

3.1 SITE LAYOUT PROCEDURES

Depending on the method selected and approved by the customer, the site layout and search grids will be established using a Global Positioning System (GPS), licensed surveyor, or compass and measuring tape. Survey crews will be escorted in the field by a UXO Technician II who will provide UXO avoidance including checking the intended survey stake locations with a magnetometer prior to driving stakes into the ground, which will prevent driving stakes into buried MEC. The site layout procedures are as follows:

- Identify and mark the operating area boundaries:
  - The boundary will be marked with survey wooden stakes, with black and yellow survey tape, approximately every 200 meters. The stakes should be visible from one to the next. Therefore depending on the terrain, it may be necessary to place them closer together.
- Identify and mark search grids:
  - Search grids will vary in size depending on the site and the number of personnel to be used in sweeping. The grid width should be in multiples of 5 feet as the typical individual can cover a 5-foot wide lane with a magnetometer. For example, a 30-foot wide grid would accommodate six sweepers on line.
  - Grid boundaries will be marked with survey wooden stakes, with orange survey tape, and temporary survey lanes with white pin flags or twine/string.
- Establish and, mark if required, search lanes:
  - A typical search lane will be a width of approximately 5 feet. The lanes may or may not be established prior to sweeping. If temporary lanes are marked prior to sweeping it will be done by a UXO technician to ensure safety.
  - For wide area surface clearances, sweep lane boundaries may be marked while sweeping. For example, the sweep line would begin sweeping with a grid boundary on one side and place pin flags on the opposite side of the line as they sweep. This would provide a boundary for the return sweep and ensure 100% coverage.

3.2 SWEEP PROCEDURES

Sweep teams will consist of UXO technicians or a combination of non-UXO (General Laborers) and UXO personnel. Sweeps may be for surface (visible) or sub-surface (buried) MEC. Regardless of the type of clearance, MEC operations will only be performed by qualified UXO Technicians.

- MEC operations are defined as:
  - MEC identification
  - Access procedures such as excavation, either by hand or using heavy equipment
  - Handling of UXOs, explosives, or explosive items
  - Disposal, including movement, transportation, and final disposal of MEC

3.2.1 FLAGS AND MARKERS

USAE uses a system of colored flags/flagging and markers to identify MEC, scrap metal, sweep lanes, and site, zone, and grid boundaries. Table 1 lists the types of markers used.

Table 1: Marking Material

Type Marker	Flag/Flagging Color	Item/Area Marked
Stake	Black and Yellow	Site boundary
Stake	Red and Orange	Zone boundary
Stake	Orange	Grid boundary
Pin Flag	White	Temporary Boundary
Pin Flag	Red	MEC
Pin Flag	Yellow	Subsurface Anomaly
Pin Flag	Blue	MEC Scrap
Pin Flag	Green	Non-MEC Scrap

3.2.2 SURFACE SWEEP

The purpose of a surface sweep of a grid is two fold: first to locate, mark, and record the location of the surface MEC contamination contained in each grid; and second to consolidate the scrap metal contamination within each grid. The typical span of control for a UXO Technician is three to five sweepers. This ensures positive control and safety.

3.2.2.1 Sweep Team Structure

The sweep team will consist of either all UXO Technicians or a mix of UXO and Non-UXO personnel. The following is an example and composition of a typical Sweep Team:

- One UXO Technician III, who directs and supervises all team activities, confirms the identification of all MEC encountered, and maintains the sweep team journal.

- One UXO Technician II who assists the UXO Technician III, identifies all MEC encountered, and records the location of the items located.

- Five sweepers (either UXO Technicians or General Laborers) who visually search the area for MEC. These personnel perform their duties under the direction and supervision of the UXO Technician III.

3.2.2.2 Surface Sweep Team Procedures

All sweep operations will be performed under the direct supervision of a qualified UXO Technician III. The UXO Technician III will assemble the sweepers into a sweep line and direct their movement across the survey grid.

- Sweepers will be spaced approximately 5 feet apart and, at the direction of the UXO Technician III, move through the grid on line abreast.

    - When an item is encountered, the individual will call out "hold the line", and hold up his/her hand. The line will stop and the UXO Technician II will inspect the object to determine if it is MEC or scrap and mark the item with the appropriate colored Pin Flag. The line will not move again until directed by the UXO Technician III.

- As the team moves forward the sweeper at the edge of the grid will use the grid stakes as one sweep lane boundary, the sweeper on the opposite end of the line will mark the limit of the sweep lane with White Pin Flags. These flags become the guide for the return sweep and define the limits of the previously cleared lane.
- This procedure is continued until the grid is completely swept.

- The UXO Technician III will follow behind the sweep line insuring that proper spacing is maintained, inspect and verify the identification of the flagged items, and record data on the type, nomenclature, and location of the contamination.

- Upon completion of the grid sweep the sweep team will recover and stockpile metal scrap at a central location. Under the direct supervision of the UXO Technician III, the scrap will be stockpiled in a central location in the grid. Items marked with Red Pin Flags will be left in place for the Disposal Team.

UNDER NO CIRCUMSTANCES WILL GENERAL LABORERS HANDLE OR MOVE MEC/UXO CONTAMINATION.

3.2.3 MAGNETOMETER ASSISTED SURFACE SWEEP

Magnetometer assisted surface sweep procedures are basically the same as surface sweeps. In addition to identifying surface contamination, magnetometers are used to locate buried MEC that may be concealed by brush or heavy grasses. Instructions on the use and calibration of magnetometers are in the USAE magnetometer SOP. The purpose of a magnetometer assisted-surface sweep of a grid is to first locate, mark, and record the location of the surface and buried MEC contamination contained in each grid; and second to consolidate the scrap metal contamination within each grid. The typical span of control for a UXO Technician is three to five magnetometer operators. This ensures positive control and safety.

3.2.3.1 Magnetometer Assisted Surface Sweep Team Structure

The sweep team will consist of either all UXO Technicians or a mix of UXO and Non-UXO personnel. The following is the structure and composition of a typical Sweep Team:

- One UXO Technician III, who directs and supervises all team activities, confirms the identification of all MEC encountered, and maintains the sweep team journal.

- Two UXO Technicians II who assist the UXO Technician III, identify all MEC encountered, excavate and identify buried contacts, and record the location of the items located/detected.

- Five Magnetometer Operators (either UXO Technicians or trained General Laborers) who visually and electronically search the area for MEC. These personnel perform their duties under the direction and supervision of the UXO Technician III.

3.2.3.2 Magnetometer Assisted Surface Sweep Team Procedures

All sweep operations will be performed under the direct supervision of a qualified UXO Technician III. The UXO Technician III will assemble the Magnetometer Operators into a sweep line and direct their movement across the survey grid. Procedures will be the same as detailed in Section 3.2.2.2 with the exception that the Magnetometer Operators will utilize the magnetometer to assist in searching in heavy brush and grass.

4.0 DISPOSAL OPERATIONS

Disposal operations consist of actions taken at the site to remove the scrap and dispose of the MEC/UXO and explosive contamination. Demolition and transportation of MEC and explosives will be in accordance with USAE's Demolition Operations and Explosive Transportation SOPs.

The use of standard Explosive Ordnance Disposal (EOD) procedures for detonating or disposing of MEC will constitute the principle control measure for ensuring safety during demolition operations. These procedures, contained in EOD technical manuals, are designed to limit fragments and harmful blast to the immediate vicinity of the disposal operation. These procedures involve the use of controls such as pits, earth cover (tamping), barricades, sandbags, and/or blast mats, and are tailored to the type of munition, its orientation, and net explosive weight (NEW). In addition, the following measures will be taken:

- All MEC/UXO will be accounted for and identified by nomenclature, if possible. As a minimum, UXO identification will be by type, by function, and filler.

- Coordination will be made with the Federal Aviation Administration to ensure air space clearance prior to the start of operations.

- MEC/UXO that is safe to move may be consolidated at each site to reduce the number of demolition shots and conserve explosives.

- Munitions debris (e.g., inert ordnance, expended munitions, mortar fins) will be removed to the appropriate reutilization office. Should the reutilization office not be established for the receipt of scrap, the contractor will dispose of the scrap through a local scrap dealer at no cost to the Government. All material will be accounted for through appropriate documentation, as required by the Government and/or scrap dealer.

- Avenues of approach to each disposal site will be controlled to prevent unauthorized access.

- Prior to the start of disposal activities, the Senior UXO Supervisor (SUXOS) and UXOSO will verify that the area around the operating site is clear of all nonessential personnel and that other UXO Technicians III have been notified. Prior to priming of demolition charges, all avenues of ingress will be physically blocked by UXO personnel. Radio communications will be maintained among all concerned parties. Avenues of ingress will not be opened without the express permission of the SUXOS. A constant state of vigilance will be maintained by all personnel to detect any intrusion into the fragmentation zone.

Minimum distances of 1,250 feet (non-fragmenting), 2,500 feet (fragmenting), and 4,000 feet (bombs and projectiles greater than 5 inches in diameter) will be established and maintained around the operating site. Depending on the type of munition being destroyed, the fragmentation distance may be increased or decreased based on data obtained from Technical Manual 60A-1-1-4. Personnel remaining on site will be limited to those personnel needed to safely and efficiently prepare the item/s for destruction.

4.1.1 DISPOSAL TEAM STRUCTURE

The Disposal Team will consist of:

- One UXO Technician III will direct and supervise all team activities, maintain the Site Explosive Log Book, and inspect the scrap for hazardous material.

- Two UXO Technicians II will assist the UXO Technician III and perform disposal operations.

4.1.2 DISPOSAL TEAM PROCEDURES

The Disposal Team will remove the scrap from each survey grid and transport it to a designated central collection point. During this removal, the UXO Technician III will perform a through examination of the scrap to ensure that it is free of hazardous material. All MEC containing hazardous material will be disposed of in-situ whenever possible. The preferred method is detonation in place; however, items that are safe to be moved may be consolidated to reduce the number of shots. If MEC cannot be disposed in place or moved, the SUXOS will request EOD support.

5.0 REFERENCES

- USACE Safety Considerations for UXOs
- USAE Corporate Safety and Health Program (CSHP)
- OSHA, 29 CFR 1910, Occupational Safety and Health Standards
- OSHA, 29 CFR 1926, Construction Standards
- Applicable sections of EPA, 40 CFR Parts 260 to 299, Protection of Environment
- Applicable sections of DOT, 49 CFR Parts 100 to 199, Transportation
- USACE EM 385-1-1, Safety and Health Requirements Manual
- USACE ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous Waste Remedial Actions
- DOD 4145.26-M, Contractors' Safety Manual for Ammunition and Explosives
- DOD 6055.9-STD, DOD Ammunition and Explosives Safety Standards
- DOD 4160.21-M, Defense Reutilization and Marketing Manual
- DA PAM 385-64, Ammunition and Explosives Safety Standards
- AR 385-64, Ammunition and Explosives Safety Standards
- AR 200-1, Environmental Protection and Enhancement
- AR 385-10, The Army Safety Program
- AR 385-16, System Safety Engineering and Management
- AR 385-40 w/USACE supplement, Accident Reporting and Records
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives

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- TM 60 Series Publications

STANDARD OPERATING PROCEDURE
OPS-23 – LEASED AND RENTAL VEHICLES

1.0 GENERAL

The following USA policies and/or procedures will be used by personnel utilizing leased or rental vehicles for project purposes. Personnel are reminded to obey and observe all applicable Federal, state, and local traffic laws, regulations, or guidance, as well as contractual restrictions and requirements imposed by the leasing or rental company.

Rental vehicles are to be used for the purpose of transporting project personnel and equipment to and from work locations and other authorized locations or facilities. The use of rental vehicles during non-working hours for personal use is a privilege, not a right, which may be withdrawn by the project contracting authority or USA management. Assigned vehicle operators (see attached form) will follow the requirements of this SOP on Leased and Rental Vehicles.

The driver of any rental vehicle may be liable for damages in the event that vehicle damage is incurred during working or non-working hours and it is determined that the driver has not complied with this SOP.

All vehicles will have a copy of this SOP, Vehicle Inspection Forms, Accident/Incident Report forms, a list of project contact phone numbers, and a disposable camera as well as all safety-related equipment (fire extinguisher, first aid kit, etc.).

1.1 REFERENCES

Information contained in this document was obtained from the below-listed references:

- USA Safety and Health Program (SHP)
- Applicable sections of DOT, 49 CFR Parts 100 to 199, Transportation
- Vehicle owners manual
- Leasing/Rental agreement
- Administrative SOP

1.2 REQUIREMENTS

Personnel assigned project vehicles must be listed on the Authorized Drivers List and be legally permitted to operate the assigned vehicle. Personnel assigned project vehicles are responsible for maintaining positive control of keys. Personnel not assigned project vehicles may not use a vehicle unless specifically authorized by the Site Manager (or SUXOS when a project is not assigned a site manager) and then only for the authorized personal related activities as described in Section 2.1.

Personnel utilizing leased or rental vehicles will comply with the following:

- Only properly licensed personnel will operate vehicles.
- Operators will obey and observe all applicable traffic laws.
- Operators will be familiar with the vehicle in use.
- Operators will observe the cautions and warnings located in the owner’s manual.
- Operators will be familiar with accident reporting procedures.

- Operators will perform daily inspections of vehicles.
- Operators will report all unsafe or defective conditions found.
- Unsafe conditions will be corrected prior to vehicle use.
- Vehicles will be maintained in a clean and serviceable condition.
- Rental/lease contractual requirements will be followed.

2.0 PROCEDURES

The procedures below are to be followed by personnel receiving, using, and returning leased or rental vehicles.

- Receiving – Personnel responsible for receiving leased or rental vehicles are to ensure that:
  - Vehicle documentation is accurate and complete, with proper signatures.
  - Contract documents accurately reflect mileage, fuel level, and overall vehicle condition, including any exterior or interior damage.
  - Operators are properly licensed.
  - Vehicle is clean and in a serviceable condition.
  - Vehicle has all required safety/spare equipment.
  - Owner's/operator's manual is on hand.
  - Copy of lease or rental contract is in vehicle.
  - An inspection of the vehicle is performed prior to acceptance.
  - The "Lower Option" vehicle is used, if available (e.g., vinyl instead of cloth or leather interior).
- Use – Personnel responsible for the use of leased or rental vehicles are to ensure that they:
  - Are properly licensed.
  - Obey and observe all applicable traffic laws.
  - Always use seatbelts.
  - Observe safe operating procedures.
  - Do not allow unauthorized use of the vehicle.
  - Maintain the vehicle in a clean and serviceable condition.
  - Report all unsafe or defective conditions.
  - Do not operate an unsafe vehicle.
  - Report all accidents immediately.
  - Follow all rental/lease contractual requirements.
  - Perform daily/weekly inspections and document these inspections on the Weekly Vehicle Inspection Sheet.
  - Maintain added safety equipment (i.e., fire extinguishers and first aid kits).

  - Purchase (at company expense) materials to assist in keeping the vehicle clean.
  - Purchase (at company expense) inexpensive floor mats and/or seat covers, if necessary.
  - Utilize "Wash Racks" (at company expense) if high pressure washing is necessary.
  - Wipe down and sweep out the interior of the vehicle, as needed.
  - Do not use vehicle off road, unless necessary, and then only during working hours.
  - Do not overload the vehicle.
  - Use/maintain the vehicle in a manner that reflects favorably upon the personnel, the project, and USA.
  - Prohibit the use of tobacco products in project vehicles by all occupants at all times.
  - Do not use cell phones while operating project vehicles.
  - Decrease speed when adverse weather conditions are present.
  - Obey Stop, Yield, Parking, and other traffic regulating signage.
  - Do not drive/use vehicles while under the influence of alcohol or drugs. Personnel taking "over the counter" medications or prescription medications are prohibited from operating project vehicles until the effects of the medication(s) are known not to inhibit the individual's driving abilities.
- Turn-In – Personnel responsible for the turn-in of leased or rental vehicles are to ensure that:
  - The vehicle is **cleaned**, inside and out, prior to turn-in (should be in "as good or better than when received" condition).
  - The vehicle is inspected and results are recorded.
  - All documentation is accurate and complete, with proper signatures.
  - Any discrepancies are corrected or reported prior to departure.
  - All rental/lease contractual requirements have been met.
  - Copies of all documentation are received.
  - Copies of all documentation are forwarded to USA's corporate office.
  - Damage requiring claims forms have been initiated and USA's corporate office has been notified.
  - Points of contact for all parties involved in a claim are listed.

2.1 AFTER HOURS FOR PERSONAL USE OF VEHICLES

The use of project vehicles after normal working hours will be limited to the following:

- Travel to and from food stores
- Travel to and from laundry facilities
- Travel to and from restaurants
- Travel to and from medical facilities
- Other locations as authorized by the Site Manager

The off-duty use of project leased vehicles will be authorized under the following conditions:

- After hours use of project vehicles will be restricted to use by personnel traveling by commercial transportation to the project site.
- Project personnel will receive this SOP upon arrival at the job site. Those who wish to use project vehicles for personal use after normal working hours must complete and sign the enclosed Vehicle Liability Form and return it to Human Resources.
- Failure to provide the completed and signed Vehicle Liability Form will be cause for denying the employee use of project vehicles.
- Vehicle used during the week will be returned not later than 21:00 hours, local time.
- Car pooling for trips to the store, dinner, etc. is encouraged.
- For weekend usage, operators will complete a vehicle inspection form, record the mileage when receiving the vehicle, and will return it on Monday with a full tank of fuel and cleaned inside and out. Weekend use will be limited to a reasonable number of miles established by the Site Manager/SUXOS. Under no circumstances will vehicles be used for "sightseeing" or travel to other metropolitan areas.
- Project vehicles will not be used to transport non-project personnel.
- Off-duty vehicle users will comply with the guidance elsewhere in this SOP.

2.2 DAMAGE/ACCIDENT REPORTING

Should an employee become involved in an accident while operating a project vehicle or should the vehicle sustain damage while in the possession of the employee, the operator will:

- Immediately notify his/her Team Leader, the UXOSO, SUXOS, or Site Manager of any accident involving another vehicle or personnel injuries.
- Complete an Accident/Near Miss Report Form.
- Further document the accident by photographing the accident scene and damage incurred to the vehicle(s).
- Submit to a blood alcohol content (BAC) test within 2 to 4 hours after the accident. The driver will be driven to the test site by the Team Leader, UXOSO, SUXOS or Site Manager if impairment is suspected.

Site management personnel will report all accidents and incidents in accordance with the procedures outlined in the project Accident Prevention Plan (APP). The Project Manager is to be immediately notified of any accident involving serious injury to the driver or other parties.

2.3 SUMMARY

The procedures contained within this SOP are not all inclusive. Personnel are reminded to comply with the referenced material. To eliminate, reduce, and mitigate the risks to the vehicle operator, vehicle passengers and the surrounding populace, good, safe driving skills and habits are essential to an accident-free project.

AUTHORIZED DRIVERS LIST
USA ENVIRONMENTAL, INC

Project Site/Location:

Date Vehicle Assigned:	Name of Person Vehicle Assigned To:	Drivers License State, Number and Expiration Date:	Type Vehicle Assigned and Identifying Number: (i.e. license plate number)	Signature of Assigned USA Employee:	Signature of Senior USA Employee Assigning Vehicle:

USA Environmental, Inc.

Vehicle Liability Form

USA Environmental, Inc. requires you to complete this form if you are flying to the job site and wish to drive a company-leased vehicle after work hours for personal use. USA Environmental, Inc. will acquire a Motor Vehicle Report (MVR) from the state where your license is issued and may revoke driving privileges based on report results.

If you do not intend to drive a company-leased vehicle after work hours for personal use, please print your name, check the box below and sign and date the form.

Employees will be given a copy of, and are expected to adhere to, the company's Standard Operating Procedures (SOP) for Leased Vehicles. Employees who damage a vehicle while in non-compliance of the SOP may be liable for all damages incurred. USA Environmental, Inc. reserves the right to deduct these costs from your pay, as permitted by applicable state law.

Negligent use of company-leased vehicles may also result in disciplinary action, up to and including termination.

□ I **do** intend to drive a company-leased vehicle for personal use. The following is my personal information:

Employee Name: _____

Address: _____

City/State/Zip _____

Job Site: _____

Driver's License State: _____

Driver's License Number: _____

Expiration Date: _____

□ I do **not** intend to drive a company-leased vehicle for personal use.

My signature below verifies that I have received a copy of the SOP for Leased Vehicles.

_____ _____

Signature Date