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DEPARTMENT OF THE AIR FORCE

HEADQUARTERS 49TH FIGHTER WING (ACC)
HOLLOMAN AIR FORCE BASE, NEW MEXICO

27 JAN 2009

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MEMORANDUM FOR NEW MEXICO ENVIRONMENT DEPARTMENT
Attn: Mr. James Bearzi
Hazardous Waste Bureau
2905 Rodeo Park Drive East
Santa Fe NM 87105-6303

FROM: 49 CES/CD
550 Tabosa Ave
Holloman AFB NM 88330-8458

SUBJECT: Final Work Plan LF 29/SWMU 104 (January 2009) Holloman AFB, NM6572124422 HWB-HAFB

1. The subject work plan is hereby submitted to NMED for review.

2. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

3. If you have any questions, please feel free to contact Mr. David Scruggs at (575) 572-5395.

27 Jan 09

A. DAVID BUDAK
Deputy Base Civil Engineer

Attachment:
RCRA Facilities Investigation (RFI) Work Plan

cc:

(w/Atch)	(w/o Atch)	(w/o Atch)
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Revision 01
January 2009

Final Work Plan

Munitions and Explosives of Concern Removal

Landfill 29/Solid Waste Management Unit 104
Holloman Air Force Base, New Mexico

U.S. Army Corps of Engineers

Omaha District

W9128F-04-D-0004-0043

Final Work Plan

Revision 01

Munitions and Explosives of Concern Removal
Landfill 29/Solid Waste Management Unit 104

Holloman Air Force Base, New Mexico

Contract W9128F-04-D-0004 Task Order 0043

Prepared for

Holloman Air Force Base
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January 2009

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ACRONYMS AND ABBREVIATIONS

AAR.....After Action Report
AF .....Air Force
AFMAN .....Air Force Manual
AFSC .....Air Force Safety Center
AMC.....Air Materiel Command
APP.....Accident Prevention Plan
ARAR.....Applicable or Relevant & Appropriate Requirement
ASCII.....American Standard Code for Information Interchange
ATF P.....Bureau of Alcohol, Tobacco, Firearms, and Explosives Publication
BATF.....Federal Bureau of Alcohol, Tobacco, Firearms and Explosives
Bay West.....Bay West, Inc.
BEAR .....Basic Expeditionary Airfield Resources
bgs .....Below Ground Surface
BRAC.....Base Realignment and Closure
BSI .....Blind Seed Item
Bay West.....Bay West, Inc.
BWM .....Biological Warfare Materiel
CD-ROM .....Compact Disk - Read Only Memory
CERCLA .....Comprehensive Environmental Response, Compensation and Liability Act
CFR.....Code of Federal Regulations
CIH.....Certified Industrial Hygienist
cm .....Centimeter(s)
CO.....Contracting Officer
CPR .....Cardiopulmonary Resuscitation
CWM .....Chemical Warfare Materiel
DD Form .....Department of Defense Form
DDESB.....Department of Defense Explosives Safety Board
DGM.....Digital Geophysical Mapping
DGPS.....Differential Global Positioning System
DID.....Data Item Description
DMM .....Discarded Military Munitions
DoD.....Department of Defense
DOT .....Department of Transportation
DQCR.....Daily Quality Control Report
DQE.....Data Quality Elements
DQO .....Data Quality Objectives
DS.....Disposal Supervisor
EM .....Engineer Manual
EMM .....Earthmoving Machinery
EOD.....Explosive Ordnance Disposal
EP.....Engineer Pamphlet
EPA .....Environmental Protection Agency
EPP .....Environmental Protection Plan
ER.....Engineer Regulation
ERP .....Environmental Restoration Program
ERS .....Environmental Remediation Services
ESRI .....Environmental System Research Institute
ESS .....Explosives Safety Submission
EZ.....Exclusion Zone
FAR .....Federal Acquistion Regulations
FSP.....Field Sampling Plan
ft.....Feet/Foot
FUDS.....Formerly Used Defense Sites
GB .....Sarin (nerve agent)
GIP .....Geophysical Investigation Plan
GIS .....Geographic Information System
GPO.....Geophysical Prove-Out
GPS .....Global Positioning System
HAFB .....Holloman Air Force Base
HSP .....Health and Safety Plan
HAZWOPER..Hazardous Waste Operations and Emergency Response
HFD .....Hazardous Fragment Distance
Hz .....Hertz
IAW.....In Accordance With
IBD.....Inhabited Building Distance
ID .....Identification
IDW.....Investigation Derived Wastes

IM ..... Inter Magazine
in ..... Inch/Inches
kHz ..... KiloHertz
lb/lbs ..... Pound/Pounds
LF ..... Landfill
LLP ..... Lessons Learned Program
µsec ..... Microsecond/s
MC ..... Munitions Constituents
MD ..... Munitions Debris
MEC ..... Munitions and Explosives of Concern
MFDB ..... Munitions Fragmentation Database
MFR-H ..... Maximum Fragment Range-Horizontal
MFR-V ..... Maximum Fragment Range-Vertical
MGFD ..... Munition with the Greatest Fragmentation Distance
MMCX ..... Military Munitions Center of Expertise
mph ..... Miles per Hour
MPPEH ..... Material Potentially Presenting an Explosive Hazard
MR ..... Munitions Response
MRS ..... Munitions Response Site
MrSID ..... Multi-Resolution Seamless Image Database
MSD ..... Minimum Separation Distance
msl ..... Mean Sea Level
mV ..... Millivolts
NAD83 ..... North American Datum of 1983
NCP ..... National Oil and Hazardous Substances Pollution Contingency Plan
NEW ..... Net Explosive Weight
NFA ..... No Further Action
NM ..... New Mexico
NMED ..... New Mexico Environmental Department
nT ..... Nano-Tesla
NTP ..... Notice-to-Proceed
OE ..... Ordnance and Explosives
OESS ..... Ordnance and Explosives Safety Specialist
OSHA ..... Occupational Safety and Health Administration
p-p ..... Peak to Peak
% ..... Percent
PA/SI ..... Preliminary Assessment/Site Investigation
PDC ..... Project Delivery Contractor
PDF ..... Portable Document Format
PDOP ..... Position Dilution of Precision
PI ..... Preliminary Investigation
PLS ..... Professional Land Surveyor
PM ..... Project Manager
PPE ..... Personal Protective Equipment
PTR ..... Public Transportation Route
QA ..... Quality Assurance
QAPP ..... Quality Assurance Project Plan
QC ..... Quality Control
QD ..... Quantity Distance
RA ..... Removal Action
RCWM ..... Recovered Chemical Warfare Materiel
RCRA ..... Resource Conservation and Recovery Act
RFI ..... RCRA Facility Investigation
RI ..... Remedial Investigation
RTK-DGPS .... Real Time Kinematic Differential Global Positioning System
RTS ..... Real Time Survey
SA ..... Site Assessment
SARA ..... Superfund Amendments and Reauthorization Act of 1986
SNR ..... Signal to Noise Ration
SOP ..... Standard Operating Procedure
SOW ..... Statement of Work
SRA ..... Surface Removal Action
SRFI ..... Supplemental RCRA Facility Investigation
SUXOS ..... Senior Unexploded Ordnance Supervisor
SWMU ..... Solid Waste Management Unit
TE ..... Technical Escort
TIFF ..... Tagged Image File Format
TNT ..... Trinitrotoluene
TO ..... Task Order

TP .....Technical Paper
TS .....Test Strip
TSD.....Team Separation Distance
TTC.....Tactical Training Center
U.S. .....United States
UOP .....Unit of Production
USACE.....U.S. Army Corps of Engineers
USAE .....USA Environmental, Inc.
USAESCH.....U.S. Army Engineering and Support Center, Huntsville
USDA.....U.S. Department of Agriculture
UTM.....Universal Transverse Mercator
UXO.....Unexploded Ordnance
UXOQC .....UXO Quality Control Specialist
UXOSO.....UXO Safety Officer
UXOTI.....UXO Technician I
UXOTII.....UXO Technician II
UXOTIII.....UXO Technician III
WDCMP.....Work Data and Cost Management Plan
WP.....Work Plan

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1.0 INTRODUCTION

This Work Plan (WP) has been prepared for the implementation of the Munitions and Explosives of Concern (MEC) Burial Pit Removal Action (RA) at a former Army Landfill at Holloman Air Force Base (HAFB), New Mexico (NM). The landfill is designated Landfill 29 (LF-29) and is also known as Solid Waste Management Unit 104 (SWMU 104). The objective of this project is to reduce the actual and/or potential threat from MEC items to human health and the environment. All efforts will be performed in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Sections 300.120(d) and 300.400(e) and Engineer Pamphlet (EP) 75-1.2.

MEC potentially exists on or in the former LF-29. LF-29 is a reported munitions burial pit. Release or substantial threat of release of potentially existing MEC at the site may present an imminent and substantial endangerment to public health or safety, welfare, or the environment. Due to the discovery of Munitions Debris (MD) and suspect MEC on the surface of LF-29 and the fact that no subsurface investigation of anomalies has taken place, further investigation and removal at the landfill is necessary.

The work will be conducted under a Statement of Work (SOW) issued by the United States (U.S.) Army Corps of Engineers (USACE) Omaha District. Bay West, Inc. (Bay West) of Saint Paul, Minnesota is the prime contractor for this work and is providing Munitions Response (MR) services under Environmental Remediation Services (ERS) Contract W9128F-04-D-0004, Task Order (TO) Number 0043. USA Environmental, Inc. (USAE) of Oldsmar, Florida, is Bay West's principal subcontractor for this project and will provide Digital Geophysical Mapping (DGM) for the burial pit RA. Henceforth in this WP, the Bay West/USAE Team will be referred to as the Project Delivery Contractor (PDC).

The specific requirements of the SOW include the following activities:

- Preparation of a Voluntary Corrective Measures WP for review and approval by New Mexico Environmental Department (NMED);
- Digital Geophysical Mapping;
- Locating buried munitions;
- Sampling and analysis;
- Restoring site conditions;
- Confirmation/closure sampling; and
- Preparation of a closure report requesting no further action at the site.

This WP describes the goals, methods, procedures, and personnel that The PDC will use to implement the SOW. The PDC has prepared this WP in accordance with (IAW) current U.S. Army Engineering and Support Center, Huntsville (USAESCH) Military Munitions Center of Expertise (MMCX) Data Item Description (DID) MR-005-01 Type II WP and the SOW. The following details the format of this WP:

Chapter 1: Introduction - This chapter discusses the project authorization, defines the purpose and scope of the TO, and provides a brief history and description of the site, including its former military use, previous investigations performed at the site, and the types of ordnance reportedly used and recovered during previous investigations and removal actions.

Chapter 2: Technical Management Plan - This chapter provides procedures for detection, clearance and disposal of encountered MD, Material Potentially Presenting an Explosive Hazard (MPPEH) and MEC.

Chapter 3: Explosives Management Plan - This chapter will provide details for the management of explosives IAW Federal Acquisition Regulations (FAR) 45.5, local and state laws and regulations, Bureau of Alcohol, Tobacco, Firearms, and Explosives Publication (ATF P) 5400.7, Department of Defense (DoD) 6055-9, and Department of Transportation (DOT) regulations.

Chapter 4: Explosives Siting Plan - This chapter describes explosive safety criteria for planning and siting explosive operations.

Chapter 5: Geophysical Prove-Out (GPO) Plan - This chapter provides details of the methods and operational procedures to be: (1) employed to perform the GPO and; (2) documented as part of the Geophysical Investigation Plan.

Chapter 6: Geophysical Investigation Plan (GIP) - This chapter provides details of the methods and operational procedures employed in performing a geophysical investigation of the site.

Chapter 7: Geospatial Information and Electronic Submittals - This chapter describes the navigational methods that will be used to locate the excavation boundaries and the location of significant MEC/MPPEH items encountered during the burial pit RA, as well as the electronic submittals of the collected geospatial data.

Chapter 8: Work, Data, and Cost Management Plan - This chapter details the project controls that will be utilized to effectively manage the work, generated data, and allocated funds for the project.

Chapter 9: Property Management Plan - This chapter is not applicable to the project SOW. No Government property will be utilized for the MEC burial pit RA.

Chapter 10: Quality Control Plan - The chapter details quality control (QC) procedures for the project.

Chapter 11: Environmental Protection Plan - This chapter describes the approach, methods, and operational procedures to minimize pollution, protect and conserve natural resources, restore disturbed areas, and control noise and dust during performance of the TO.

Chapter 12: **Investigation Derived Waste Plan** - This chapter is not applicable to the project SOW. No investigation derived waste will be generated from the burial pit RA.

Chapter 13: Interim Holding Facility Siting Plan for Recovered Chemical Warfare Materiel (RCWM) - This chapter is not applicable to the project SOW. No RCWM will be encountered during the burial pit RA.

Chapter 14: Physical Security Plan for RCWM - This chapter is not applicable to the project SOW. No RCWM will be encountered during the burial pit RA.

Chapter 15: **References** - This chapter provides an inventory of the reference materials used in the preparation of this WP.

Appendix A: Figures
Appendix B: Explosive Ordnance Incident Report, 110 Technical Escort, 2007
Appendix C: Local Points of Contact
Appendix D: Accident Prevention Plan
- Attachment 1 OSHA 300 Forms
- Attachment 2 Activity Hazard Analysis
- Attachment 3 Directions to Hospital and Emergency Telephone Numbers
- Attachment 4 Site Safety and Health Plan
- Attachment 5 Plan for Prevention of Alcohol and Drug Abuse
- Attachment 6 Material Safety Data Sheets
- Attachment 7 Hazard Control Plan

Appendix E: Munitions Constituents Sampling and Analysis Plan
Appendix F: Contractor Project Forms
Appendix G: Minimum Separation Distance (MSD) Calculation Sheets
Appendix H: Standard Operating Procedures and Publications

1.1 HAFB Site Description and History

HAFB was originally established in 1942 as Alamogordo Army Air Field six miles west of Alamogordo, New Mexico. HAFB is located in New Mexico's Tularosa Basin between the Sacramento and San Andres mountain ranges. HAFB supports national security objectives with mission-ready F-117A Stealth Fighters, an Air Transportable Medical Clinic, and Basic Expeditionary Airfield Resources (BEAR) Base assets. HAFB also supports Air Expeditionary Force operations, Global War on Terrorism and peacetime contingencies, trains pilots in the F-117A and T-38A aircraft, and provides support to over 18,000 personnel to include German Air Force Tornado operations.

From 1942 – 1945, Alamogordo Army Air Field served as the training ground for over 20 different groups, training their personnel before heading to combat in either the Pacific or European Theater. In 1947, Air Materiel Command (AMC) announced the air field would be the primary site for testing and development of pilotless aircraft, guided missiles, and other research programs. On January 13, 1948, the Alamogordo Army Air Field was renamed HAFB in honor of the late Colonel George V. Holloman, a pioneer in guided missile research.

HAFB wrote its name into the annals of American history in the 1950s and 1960s. On December 10, 1954, Lieutenant-Colonel (Doctor) John P. Stapp received the nickname "The Fastest Man Alive" when he rode a rocket-propelled test sled, Sonic Wind No. 1, to a speed of 632 miles per hour (mph).

On July 1, 1968, the 49th Tactical Fighter Wing arrived at HAFB. The 49th's F-4 Phantom IIs introduced a new era of fighter aircraft training and operations, which continued for the next three decades and until today. In 1977 the 49th transitioned to the F-15 Eagle, the Air Force's (AF's) top air-to-air weapon. In 1992, HAFB again garnered national attention when the AF's most technological fighter, the F-117A Nighthawk made its home there. Today, HAFB continues to operate at the forefront of military operations, with its F-117 "stealth" aircraft and serving as the German AF's Tactical Training Center (TTC).

On May 1, 1996, the German AF TTC was established in concept with the 20th Fighter Squadron, which provides aircrew training in the F-4F Phantom II and the German Tornado. More than 300 German AF members are permanently assigned to the TTC, the only unit of its kind in the U.S.

1.2 Project Description and History

LF-29 was used by the Army from the 1950s to 1975 for the disposal of spent munitions and construction debris (HGL, 2007). It is located near the North Base Building Area, approximately 450 ft northwest of Building 1001. LF-29 is defined by a small berm that extends 400 ft north-south and 350 ft east-west, accounting for approximately 4.28 acres. Some materials may also have been disposed of outside of this berm along the borders, so a buffer zone extending 45 ft to the north and south and 35 ft to the east and west of the berm has been created and will be investigated. Including the buffer zone, the entire area of the LF-29 MRS encompasses approximately 6 acres. **Appendix A, Figure 1-1** depicts the location of HAFB and **Appendix A**, **Figure 1-2** depicts an aerial view of LF-29/SWMU 104.

The site topography slopes gently to the southwest. Vegetation consists primarily of grasses, sagebrush, and other bushes and small trees. The uppermost unit of groundwater is a shallow unconfined aquifer encountered at approximately 15 to 20 ft below ground surface (bgs). Views of the terrain and vegetation are presented as **Appendix A Figures 1-3** and **1-4**.

Previous investigations at this site include a Preliminary Assessment and Site Investigation (PA/SI) conducted in 1983, followed by a Remedial Investigation (RI) Recommendations Report in 1992, a Decision Document in 1993, and a Supplemental RCRA Facility Investigation (SRFI) in 2006. There is a network of four monitor wells in-place around the landfill, with three wells located downgradient and one in an upgradient location with respect to the landfill. No explosives have been detected as a result of groundwater sampling (HGL, 2007). A geophysical study has been previously conducted on-site, where several (~7-8) anomalies were observed. However, this study was performed prior to the clearance of surface debris, so interference from this material precludes the use of this study to confirm or evaluate the presence or absence of subsurface munitions and/or debris.

During a site reconnaissance for the SRFI project in 2006, some MD discovered on the ground surface was tentatively identified as biological warfare bomblets. A removal of approximately 171 pieces of surface MD was performed under command of 110th Technical Escort (TE) in June 2007. According to the Explosive Ordnance Incident Report (see **Appendix B**) prepared by the 110th TE, the MD was identified as E61R4 biological warfare bomblets. TE's research indicated that these items were used for fuze testing and the likely filler was water or water/simulant slurry. Soil samples were tested for the presence of biological warfare materiel (BWM) and were confirmed as having no biological agent present (TE, 2007).

During site reconnaissance in December 2007, it was discovered that not all MD was removed during the TE response. It appears that the surface clearance focused on the biological munitions and other MD was left behind. Furthermore, two collection points containing the biological munitions remained on-site. At least one partially-buried biological bomb was flagged and left in-place by the TE effort and several others remain on the site. M125 chemical bombs are also presently on-site. Some appear to be intact while others appear to have been detonated. A fully intact, live M125 contains 2.6 pounds (lbs) of nerve agent Sarin (GB). Practice versions may be empty or contain simulant filler such as anti-freeze. It is unknown if the intact bombs at LF-29 contain a filler of any nature and there is no record of the evaluation of such. However, it is doubtful that ordnance with live explosives or live chemical agent would be left in an unsecured area. Nevertheless, these M125s will be treated as MEC before certifying them as MD.

1.3 Current and Anticipated Use

HAFB currently classifies the site as an environmental restoration-site with limited access. During the MEC investigation, solid wastes recovered from the landfill, with the exception of MEC and MD, will be returned to the landfill. There is no anticipated future use for that location and restrictions may be placed on it depending on the type of closure achieved from the NMED (clean versus risk-based). HAFB has no plans for any construction on or near the site in the near future. The After Action Report (AAR) will address recommendations for future land use, based upon the results of the MEC removal action.

1.4 Topography, Soil Conditions, and Vegetation

HAFB is located in the Tularosa Basin, which is part of a 170-mile-long structural depression. The basin is bounded to the south by a low topographic divide near the New Mexico/Texas state line; to the west by the uplifted Organ, San Andres, and Oscura Mountains; to the north by Chupadera Mesa; and to the east by the uplifted Jicarilla and Sacramento Mountains. The surrounding mountains rise abruptly to 7,000 to 12,000 ft above mean sea level (msl). The interior plain has low relief with elevations ranging from about 4,000 ft above msl in the southwestern portion of the basin to about 4,400 feet above msl in the northeastern portion. The Tularosa Basin is a closed basin from which no surface water drains. Near HAFB, the ground surface undulates and is composed of alluvial fan deposits, wind-formed dunes, and flat-bottomed playas (pan-shaped depressions carved by wind erosion). The gypsum dunes of the White Sands National Monument lie to the west of the Base.

The U.S. Department of Agriculture (USDA) Soil Conservation Service has identified two soil associations in the vicinity of HAFB: the Holloman-Gypsum Land-Yesum complex, and the Mead silty clay loam. Most of the surficial soils at the Base are the well-drained, sandy loam and gypsum of the Holloman-Gypsum Land-Yesum complex. The soils of this association are formed from alluvial and eolian (carried by wind) gypsiferous sediments. The Holloman unit makes up about 35 percent (%) of the complex. The soil unit is light brown to pink, very fine, sandy loam with a high gypsum content. The soil is moderately permeable, calcareous, and mildly to moderately alkaline. The Gypsum land unit makes up about 30% of the complex. It is soft to hard white gypsum, typically overlain by less than one inch of very fine, sandy loam. The Yesum unit, which makes up 20% of the complex, is light brown to pinkish-white, very fine sandy loam that is also high in gypsum. It is moderately permeable, calcareous, and mildly alkaline (USDA, 1981).

Mead silty clay loam soil occurs over a small area of the Base. This soil consists of reddish-brown, silty clay loam, clay loam, and clay with a high salt content. The Mead soil unit is derived from fine-grained alluvium deposited over lacustrine sediments. The soil has low permeability, and available water capacity is low. This soil is moderately calcareous, and moderately to strongly alkaline. The soil has a layer of salt that is more soluble than gypsum (USDA, 1981).

LF-29 has been modified as a result of historic disposal practices and subsequent construction of the soil berm around the site. The current overall topography of LF-29 within the berm is relatively flat and moderately vegetated with shrubs, dwarf trees, and cacti.

No permanent surface water bodies have been observed within, or adjacent to the site. Due to the unpaved and moderately vegetated condition of the unit, precipitation falling onto LF-29 likely evaporates or infiltrates into the soil.

The soils underlying LF-29 are classified by the USDA Soil Conservation Service as belonging to the well-drained, sandy loam and gypsum of the Holloman-Gypsum Land-Yesum complex (USDA, 1981).

Based on historic and supplemental Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) subsurface investigation activities, LF-29 is underlain by a heterogeneous layering of sands, silts, and clays. Outside the disposal area, the shallow subsurface is composed primarily of silty sand and silt. Silty sands dominate in the northern portion of the unit and grade laterally into a silt to the south. The upper silt unit generally has a maximum thickness of six ft, centered in the vicinity monitoring well MW-29-03. The shallow silty sand unit underlies the upper silt unit to a maximum depth of 15 ft bgs. The silty sand unit is underlain by silt and clay, which is underlain by silty sands and sands.

Groundwater occurs beneath LF-29 as a shallow unconfined aquifer within the underlying silt, silty sand, and clay sediments. Previous investigations show that groundwater flows vary from west to north.

1.5 Climate

The climate in the Tularosa Basin is arid, with low annual rainfall and low relative humidity. The surrounding mountain ranges modify approaching weather systems and provide orographic lift which produces summer thunderstorms. HAFB receives most of its total annual rainfall from thunderstorm activity from May through October. Winter is generally dry with clear skies and erratic snowfall. From March through May, strong southerly wind flow and periods of blowing dust and sand occur. Mean annual precipitation is 7.9 inches. The mean annual lake evaporation rate, commonly used as an estimate of the mean annual evapotranspiration rate, is approximately 67 inches per year.

2.0 TECHNICAL MANAGEMENT PLAN

This chapter documents the approach, methods and operational procedures that will be employed to execute the tasks required by the SOW. This chapter is prepared IAW DID MR-005-01.

2.1 Project Authorization

This WP for this RA outlines the procedures that The PDC will use to perform the TO activities, including surface removal action (SRA) in areas planned for DGM; discrete anomaly investigation, burial pit excavation; screening of the excavated soils for MEC/MPPEH and/or MD; munitions item recognition, identification and location; demilitarization and certification of MPPEH as explosive-free; disposal of MEC by detonation; and inspection, certification and disposal of MD.

This Technical Management Plan is based on the SOW, *MEC Burial Pit Removal Action, Holloman Air Force Base*, August 15, 2007, Revised September 24, 2007, U.S. Army and DoD guidance; USAESCH guidance and requirements; and DID MR-005-02. All requirements given in the DID are addressed in this plan.

The work required under this SOW falls under the purview of the AF. MEC potentially exists on property owned by the AF. RA activities shall be conducted in full compliance with USACE, Department of the AF, and DoD requirements regarding personnel, equipment, and procedures. All MEC operations shall be performed in a manner consistent with the CERCLA and the NCP. Therefore, the administrative requirements of Federal, state, or local permits are not required for implementation of the MEC RA procedures occurring entirely on HAFB, but the substantive permit requirements shall be fulfilled.

The provisions of 29 Code of Federal Regulations (CFR) 1910.120 shall apply to all RA actions performed at the site. In addition, Unexploded Ordnance (UXO) personnel involved in performing MEC procedures will follow the provisions and work standards identified in EP 1110-1-18.

2.2 General Purpose and Scope

The features of work outlined in the SOW that The PDC will use to achieve the objective of this TO are the following:

- Preparation of a comprehensive WP and ancillary plans;
- Surface clearance;
- Geophysics;
- Locating buried munitions;
- Removing munitions from the landfill;
- Transporting and disposing of the munitions;
- Sampling and analysis;
- Restoring site conditions;
- If necessary, importing and placing clean fill material; and
- Upon completion of the fieldwork, preparing a closure report requesting no further action (NFA) at the site.

2.3 Chemical Warfare Materiel

Delivery systems for chemical warfare materiel (CWM) and BWM have been tested at HAFB and ordnance items associated with this testing have been encountered at LF-29. It has been determined that these items contain no CWM or BWM, thus there has been no evidence of CWM being stored,

tested, or existing within the area comprising this project. If on-site UXO personnel suspect that an item is potential CWM, the PDC will implement the following procedure:

1. Work will immediately stop and all personnel will leave the area to an upwind location.
2. The UXO Safety Officer (UXOSO) will notify the USACE Ordnance and Explosives (OE) Safety Specialist (OESS) and the Bay West Project Manager (PM). The OESS will notify the appropriate USACE and AF authorities.
3. The Bay West PM will call the USACE PM to inform him that a potential CWM item has been discovered.
4. On-site UXO personnel will secure and guard the site until told to stand down by the USACE and/or when the HAFB Explosive Ordnance Disposal (EOD) Team takes control of the site. As required, the PDC will support USACE and/or the AF.

2.4 Unidentified MEC

In the event that an unidentified MEC item is encountered, all work will cease and the site will be secured. The PDC will take photographs and measurements (if possible) of the item such that it can be identified from ordnance publications. USACE will call the AF who will call HAFB EOD at (575) 572-5141, to take control of the item if the UXO team cannot safely dispose of it.

2.5 Technical Scope of Work

The primary objective of this work is to perform an RA at LF-29 IAW with the SOW. This will include a surface clearance, DGM of the entire area, removal of discrete potential MEC anomalies and the removal of MEC/MD from identified burial pits. The purpose of the SOW is to reduce the actual and/or potential threat from MEC items that may be at the site.

2.6 Project Organization

The team consists of the USACE Omaha District, Bay West, and USAE. The roles of these team members are described below and illustrated in **Figure 2-1**.

2.6.1 U.S. Army Corps of Engineers Omaha District

The USACE Omaha District is the technical lead, project management, and funding agency for this project. Omaha District has responsibility for review of project plans and documents, supporting The PDC in obtaining site access and coordinating with HAFB, local and state regulatory agencies on issues pertaining to public safety and the environment.

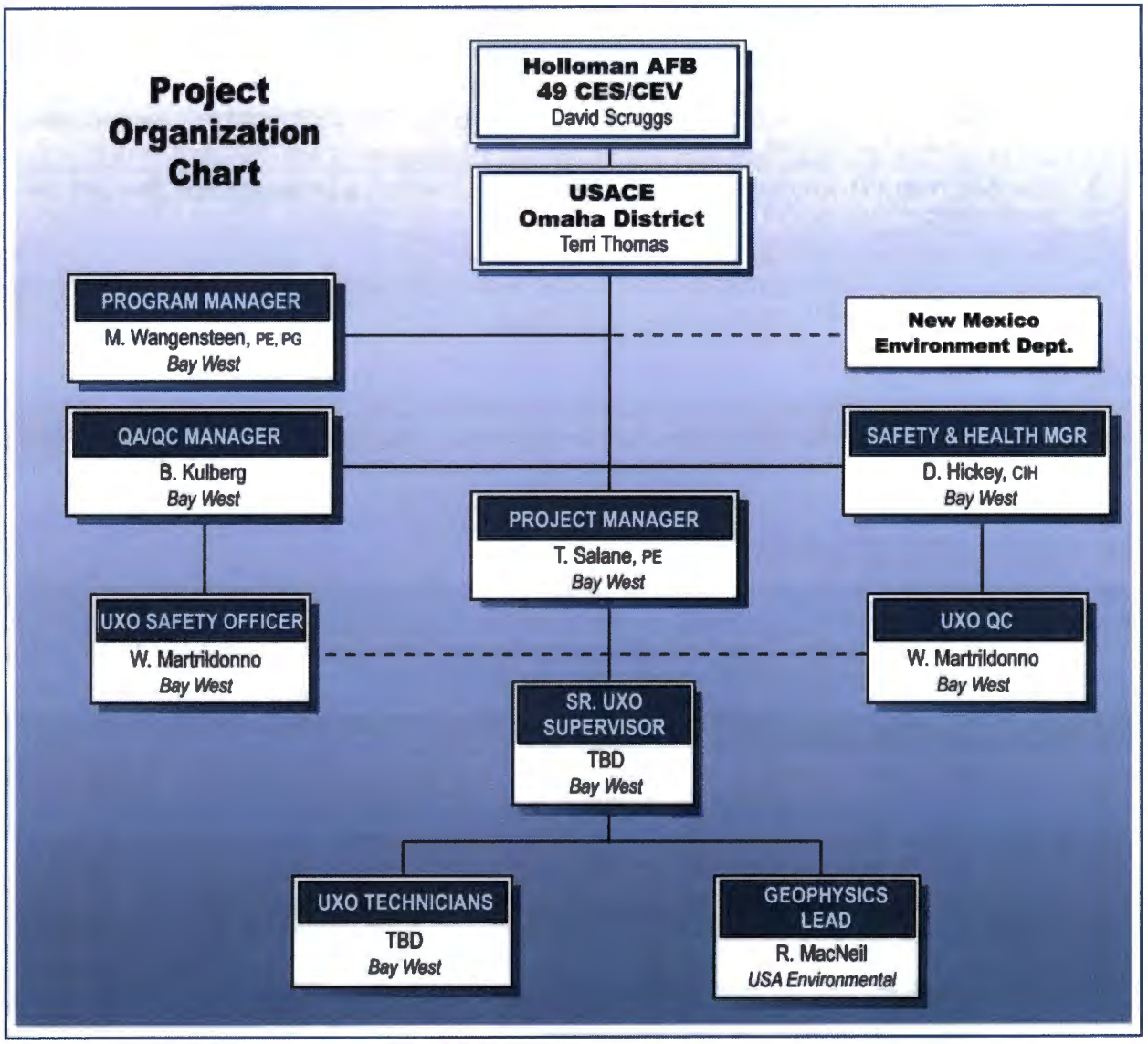
2.6.2 Bay West, Inc.

Bay West is the prime contractor to USACE for this project. Bay West will provide comprehensive engineering, project management, safety, and QC services in support of the project. Bay West is responsible for managing the schedule and budget to ensure completion of the tasks detailed in the SOW. The USACE Administrative Contracting Officer and PM will direct all work performed by Bay West and its subcontractors.

2.6.3 USA Environmental, Inc. (USAE)

USAE is the MR subcontractor to Bay West for this project. USAE will perform the GPO and DGM for the RA.

Figure 2-1 Project Organization Chart



2.7 Project Personnel

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

Field personnel on this project have completed the training presented in **Table 2-1**, Personnel Training. Additional site-specific training, IAW 29 CFR 1910.120, Engineering Manual (EM) 385-1-1 (*USACE Safety and Health Requirements Manual*), and Engineer Regulation (ER) 385-1-92 (*Safety and Occupational Health Document Requirements for Hazardous, Toxic and Radioactive Waste and Ordnance and Explosive Waste Activities*) will be provided to all personnel upon their initial mobilization. Additionally, all field personnel participate in a Medical Surveillance Program, with the latest exam within 12 months of field operations.

During the project, the PDC UXO Quality Control Specialist (UXOQC) or Senior UXO Supervisor (SUXOS) will direct and supervise the activities of on-site personnel. The PDC PM will be primarily off-site, but will be available by telephone for consultation on operational issues.

Table 2-1: Personnel Training

Training Course	Personnel Attending
40-Hour Hazardous Waste Operations Training (HAZWOPER)	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.
8-Hour Supervisor Course	All management and supervisory personnel. This includes the UXOSO, SUXOS, UXOQCS, and all UXO Technician IIIs (UXOTIIIs).
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 Cardiopulmonary Resuscitation (CPR) training.

2.7.1 Project Manager

The Bay West PM is responsible for managing the overall progress of the TO, ensuring timely submittal of project deliverables, and ensuring that resources are available to field personnel. The PM maintains close communication with the USACE to receive constant feedback and assess client satisfaction with performance on the TO. The PM has the following responsibilities:

- Developing the WP;
- Monitoring project cost and performance;
- Ensuring timely submission of contract deliverables; and
- Coordinating with the USACE PM.

2.7.2 Bay West Certified Industrial Hygienist

The Bay West Certified Industrial Hygienist (CIH) develops and coordinates the Accident Prevention Plan (APP). The Bay West CIH is the contact for regulatory agencies on matters of health and safety.

2.7.3 Corporate QC Managers

The Bay West and USAE Corporate QC Managers are responsible for their respective organizations' QC programs. The QC Managers report directly to their vice presidents on matters of effectiveness, adequacy and status of QC methods and procedures. They maintain an alternate line of communication to the presidents of their organizations. The QC Managers have the following responsibilities:

- Preparation of QC policies and procedures;
- Ensuring quality submission of contract deliverables;
- Providing training and assistance to the field QC Supervisors;
- Reviewing employee qualification records to ensure appropriate personnel assignments; and
- Conducting periodic field audits of sites, programs, and projects to ensure QC compliance.

2.7.4 Senior UXO Supervisor

The SUXOS is responsible for the day-to-day UXO operations at the project site. The SUXOS has the following responsibilities:

- Implementation of QC policies and procedures;
- Reporting to the PDC on effectiveness, adequacy, and status of the project;
- Ensuring the timely submission of daily reports;
- Coordinating with project personnel for site tasking and schedules;
- Coordinating on-site activities;
- Analyzing any failures and implementing corrective actions; and
- Establishing additional guidelines to assist in the development of site- and task-specific policies and procedures.

2.7.5 Project Geophysicist

The PDC Project Geophysicist will have a minimum of five years of experience in all aspects of DGM in support of MR projects. The Project Geophysicist will have oversight of all DGM operations, personnel training and certification, data formatting and delivery, and project DGM reporting. The Project Geophysicist will work closely with the USACE Project Geophysicist and the Site Geophysicist (if Project Geophysicist is not on-site) on all project DGM operations, QC metrics, and DGM decisions and recommendations.

2.7.6 Site Geophysicist

The Site Geophysicist will have 6 to 12 months of experience in applying DGM techniques to MR projects. DGM personnel will be fully trained in geophysical sensor set-up and operation, with a working knowledge of acceptable and unacceptable operating conditions and performance. DGM personnel will be fully trained in the set-up and operation of the Real Time Kinematic Differential Global Positioning System (RTK-DGPS) and DGPS positioning systems. The Site Geophysicist will be completely familiar with project DGM Standard Operating Procedures (SOPs) and all QC tests. DGM personnel will be experienced in processing and reporting test results compared to project metrics, as well as on-site processing and analysis of all DGM survey data; selecting and categorizing anomalies, generating anomaly Dig Lists and image maps for field use, and participating in project meetings. The Site Geophysicist will be fully trained in instrument set-up/operation and survey management. He/she will be fully qualified and experienced in positioning sensor data with the RTK-DGPS, data transfer, DGM quality control, data processing, data analysis with anomaly selection and categorization, data delivery/reporting and anomaly reacquisition.

The Site Geophysicist will manage all DGM operational personnel and equipment at the work site.

2.7.7 Geophysical Instrument Operator

Geophysical instrument operators will have at least 40 hours of training or experience in setting-up and operating the geophysical sensors and the RTK-DGPS positioning system. DGM personnel will be experienced in performing all required DGM tests and acquiring field survey data, transferring acquired data to the Site Geophysicist, and managing the files on the data loggers.

The geophysical instrument operators will be fully trained and experienced in instrument set-up, operation, routine quality control tests, and data acquisition with real time quality monitoring and positioning with an RTK-DGPS. They will also be fully trained and experienced in data transfer, data preprocessing and delivery of the data to the Site Geophysicist. They will be trained and experienced in anomaly reacquisition.

Most training for site DGM personnel will be performed at the USAE Corporate Office in Oldsmar, Florida.

Previous experience will be reviewed, documented, and verified with practical exercises at an exercise area convenient to the Oldsmar office.

2.7.8 UXO Quality Control Specialist

Personnel experienced and trained in QC measures and procedures will be assigned to the project. The PDC will ensure that QC management is performed during project activities and documentation is properly recorded and archived for future use. The UXOQC will have experience providing QC support on MR projects. The UXOQC will be familiar with and experienced checking DGM Teams using the DGM SOP and Checklists. Training will include the placement of a QC Blind Seed Item (BSI). The UXOQC and UXOSO roles may be filled by the same person, if there are fewer than fifteen UXO personnel on the project. Mr. Wayne Martrildonno, USACE Resume Database number 0021 is programmed as the UXOQC. The UXOQC is responsible for:

- Implementation of the WP;
- Preparation of reports;
- Communication with the OESS and the USACE geophysicist when on-site;
- Ensuring continuity from the beginning of the project to completion of the Site-Specific Final Report; and
- Keeping the PM informed on all pertinent project information
- Enforcement of the site QC plan;
- Coordinating with the SUXOS for daily operations;
- Maintaining a direct line of communication to the QC Manager;
- Coordinating with the USACE on Quality Assurance (QA) matters;
- Conducting audits, testing and inspection of work; and
- Preparing QC documentation.

2.7.9 UXO Safety Officer

The UXOSO is responsible for enforcement of all safety rules. The UXOSO has STOP WORK authority for all safety matters. The UXOQC and UXOSO roles may be filled by the same person if there are fewer than fifteen UXO personnel on the project. Mr. Wayne Martrildonno will be the UXOSO on this project. The UXOSO's responsibilities include:

- Maintaining communications with the PDC CIH;
- Advising the UXO Team and PM on all safety matters;
- Ensuring project personnel follow the approved APP and Health and Safety Plan (HSP);
- Identifying safety deficiencies and formulating protective actions;
- Assisting with the identification of MEC;
- Assisting with the establishment of work areas including exclusion zones (EZs); and
- Preparing any necessary revisions to the APP or HSP.

2.7.10 UXO Technicians

One UXO Team will consist of at least two qualified UXO personnel; at a minimum, this shall include one UXO Technician III (UXOTIII) and one UXO Technician II or UXO Technician I (UXOTII, UXOTI). The UXO Team shall be used to perform SRA, excavation, soil screening, disposal of MEC and MPPEH/MD

management. The UXO Teams will consist of a minimum of two personnel, but may include additional UXO-qualified personnel, depending on site- and task-specific conditions/requirements. It is anticipated that four UXO Technicians, not including UXOSO/UXOQC and SUXOS will be the baseline resource for the project. All UXO personnel will meet the requirements and qualifications in DDESB TP-18, Chapter 4. Resumes and certificates or USACE Resume database numbers will be provided to the OESS before beginning work.

Only UXO-qualified personnel may perform excavation of MD/MEC/MPPEH. Only UXO-qualified personnel will operate earthmoving machinery (EMM) used to assist in RA operations.

2.8 Site Access

The PDC must notify the Base Environmental Restoration Program (ERP) Manager, or a designated representative, and request approval one week prior to beginning field activities. The PDC must contact the ERP Manager or other AF representatives, either in-person or by phone conversation, upon arrival at the Base to begin field activities, and at the first morning of each workweek thereafter, if the field activities overlap into the following week. Standard work hours are 0700 to 1730, Monday through Friday, except for Federal Holidays. The PDC may request to work during other than standard hours. If the PDC wishes to work during periods other than above, a request must be submitted 72 hours in advance. The PDC shall take all measures to ensure surrounding facilities and roadways are not disturbed or blocked from normal activities. The PDC shall not interfere with the Base traffic flow unless prior coordination is obtained from the Saber Office and the Security Police Desk Sergeant, Fire Department, and the Base Operations Office as required.

2.9 Mobilization and Site Set-Up

The PDC will mobilize upon NTP from the USACE Contracting Officer (CO). The PDC will ship all project-related equipment overnight to the project site. Actions performed during this phase include:

- Identify/procure, package, and ship project equipment;
- Identify USACE/HAFB coordination entities and communication channels;
- Mobilize EMM, roll-off boxes, Conex box, and temporary fencing;
- Procure explosives and place them in storage; and
- Finalize operating procedures and schedules.

2.10 Site-Specific Training

As part of the mobilization, The PDC will perform site-specific training for all personnel assigned to the project. The purpose of this training is to ensure that personnel fully understand the procedures and methods that will be used to perform operations at the site, their individual duties and responsibilities, and all safety and environmental practices/procedures associated with operations. Training is conducted by the SUXOS or other designated personnel and records of attendance will be maintained on-site. Certificates of Training are issued when applicable. This training will include the following:

- Familiarization with the WP, its objectives, and procedures;
- APP orientation and Personal Protective Equipment (PPE) training;
- Environmental considerations peculiar to the operations on the project site;
- Instruction and training on equipment usage and safe work practices;
- Any additional or remedial training as necessary; and
- Daily safety training outlining the day's activities.

2.11 General Site Practices

All MEC-related operational activities at the site will be under the direction of and performed by qualified UXO personnel. Non-UXO qualified personnel will be prohibited from performing MEC-related activities. Detailed safety precautions and procedures are in the APP in **Appendix D**.

To the maximum extent possible, The PDC will coordinate with USACE and HAFB to minimize impacts to HAFB activities. This coordination may include conducting a weekly progress status meeting. The PDC will coordinate access routes and post-activity clean-up with USACE and HAFB. The PDC will provide USACE with project schedule updates at critical junctures in project progress.

2.11.1 Communications

On- and off-site communications will be by cellular telephones. Off-site emergency communications will be by cellular telephone.

2.11.2 Work Hours

Operations will be conducted during daylight hours only. No single field workday will exceed 10 hours. Forty-eight (48) hours will separate each workweek.

USACE standards for UXO operations limit personnel to a 40-hour workweek, either four 10-hour days or five 8-hour days. However, per EP 1110-1-18, a waiver will be requested from the TO CO to allow the project UXO personnel to work more than 40 hours/week.

The PDC has prepared a conceptual daily schedule for the project. The schedule depicts the activities associated with the work in each operating area, the sequence in which the work will be performed and estimated daily start and finish times for accomplishing the work. This schedule is based on a fifty-hour workweek, consisting of five ten-hour days. Work schedules may vary depending on site requirements. A typical daily schedule is outlined below:

Time	Activity	Location
0700-0730	Safety Briefing and Equipment Check	Field Office
0730-1230	Start Work	Work Area
1230-1300	Lunch	Cleared Area
1300-1700	Resume Work	Work Area
1700-1715	Stop Work / Return to Field Office	Work Area
1715-1730	Clean and Store Equipment	Field Office

2.12 Handling of MEC

MEC items will be handled by qualified UXO personnel only. MD will not be removed from the area where it was found or be handled or touched by non-UXO personnel, unless three UXO-qualified personnel have first checked it. This policy will be strictly enforced.

2.13 Safety Training/Briefing

Safety meetings and briefings will be routinely conducted. These include:

- Daily safety and task briefing conducted by the UXOSO and SUXOS;
- Tailgate safety brief by the UXOSO;
- A weekly safety meeting (of longer duration) on a specific topic applicable to the work; and
- Visitor safety briefing.

In addition, the UXOSO and/or SUXOS may hold a safety stand-down at any time they note any degradation of safety or a safety issue warrants review.

2.13.1 Daily Safety and Task Briefing

The UXOSO and SUXOS will conduct daily safety and task briefings for all personnel at the site prior to beginning work. A written record of this training and the signatures of personnel attending the training will be maintained. The briefing will cover general hazards of the project and any new safety issues or hazards identified since the last briefing.

2.13.2 Daily Tailgate Briefing

The UXO Team Leader, UXOSO and/or SUXOS will also conduct tailgate safety briefings on specific hazards and conditions anticipated at each work site during that day's operations and the safety measures to eliminate or mitigate those hazards. It will also refer to other operations within the area whose proximity may have safety ramifications. As work progresses and team locations change within the site, the briefings will also review any corresponding changes in ingress/egress routes and emergency evacuation routes.

2.13.3 Weekly Safety Briefing/Meeting

The UXOSO will conduct a weekly safety briefing. The objective is to provide additional safety training on selected topics such as first aid or fire extinguishers, summarize the week's safety events and receive employee feedback.

2.13.4 Visitor Safety Briefing

Site visitors must receive a safety briefing prior to entering the operating area. All visitors entering the site will sign the visitor's log. MPPEH identification and/or excavation operations will be halted while visitors are within the work EZ.

2.14 Environmental Awareness

Environmental concerns and issues will be discussed as part of safety and operational briefs, with the objective of minimizing environmental impacts. County, State, and community concerns will be taken into consideration.

2.15 Safety and Environmental Violations

Safety violations or unsafe acts will be immediately reported to the UXOSO and SUXOS. Failure to comply with safety or environmental rules/regulations or failure to report violations may result in immediate termination of employment. Reckless interference with sensitive species or blatant disregard for environmental issues will likewise not be tolerated and will lead to termination of employment.

2.16 Compliance with Plans and Procedures

Site operations will be conducted in a systematic manner using proven operating methods and techniques. All activities will be conducted under the direction, supervision, and observation of UXO-qualified personnel. All personnel will strictly adhere to approved plans and established procedures. When operational parameters change and there is a corresponding requirement to change procedures or routines, careful evaluation of such changes will be conducted. Any new course of action or desired change in procedures will be submitted to USACE with justification for approval. Approved changes will be implemented in a manner that will ensure uniformity in procedures and end-product quality on the part of the PDC.

2.17 Equipment Maintenance

The PDC will coordinate scheduled maintenance of the following equipment IAW manufacturer recommendations or the owner's manual:

- Vehicles;
- PPE;
- Communications equipment;
- Geophysical and navigational equipment;
- Handheld magnetometers and all-metals locators; and
- Emergency equipment.

Any equipment not meeting standards will be repaired or replaced. Replacement equipment will meet the same specifications for accuracy and sensitivity as the equipment removed from service. Repair or replacement parts will meet the manufacturer's requirements and 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.

2.18 Preparation of Work Areas

Procedures for preparation of the work areas will vary IAW individual areas of the site. The PDC will obtain a dig permit prior to beginning intrusive work at LF-29. The dig permit includes a utility locate.

Clear access routes will be searched and marked prior to the commencement of site activities to ensure safe ingress/egress routes for fire department or other emergency vehicles that may be needed on the site.

2.18.1 Exclusion Zones and Site Access

Evacuation and relocation of personnel are required as a default condition for performance of all operations involving potential contact with MEC. An EZ based on MSD of the expected MEC will be established at the work site. The EZ will be identified with signs placed beyond the EZ footprint.

The UXO Technicians will control access into the EZ and will limit access to only those personnel essential to accomplish the specific operation(s) or who have a specific purpose and authorization to be in the work zone. No hazardous operations will be conducted when unauthorized persons are in the EZ.

When two or more UXO teams are operating, they must maintain the appropriate Team Separation Distance (TSD).

M125 10-lb Gas Bombs are on the ground surface at LF-29. It is assumed that these particular items do not contain a CWM filler, but the status of the fuzes and bursters are unknown. Therefore, these items will be considered to be MEC until proven otherwise. **Table 2-2** presents the initial MSDs applicable to the project:

Table 2-2: Minimum Separation Distances

Unintentional Detonation			Intentional Detonation			
Munition	**Hazardous Fragment Distance (ft)**	**Team Separation Distance K40 (ft)**	**Maximum Fragment Range-Vertical (ft)**	**Maximum Fragment Range-Horizontal (ft)**	**Required Sandbag Thickness (inches)***	**Minimum Separation Distance (ft)**
M125 10-lb Gas Bomb	195	36	908	1,187	20	200

**NOTES: Sandbag thicknesses and the MSD do not exist for the M125 10-lb gas bomb as detonation of chemical rounds is not generally practiced. It is assumed the items at LF-29 do not contain a CWM filler, but the status of the fuzes and bursters are unknown. The above figures are based on the munition with the next highest kinetic energy, as described in USACE HNC-ED-CS-S-98-7, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions, August, 1998. The kinetic energy data for the M125 was obtained from the DDESB Munitions Fragmentation Data Base (MFDB), December 31, 2007.*

If the UXO Team encounters a MEC item having a greater MSD than described above, the EZs will adjusted accordingly. An amendment to the approved ESS will be submitted. Work may continue before approval of the ESS amendment provided the new MSDs are observed.

2.18.2 Location Survey and Mapping

Areas which have received MEC clearance will be recorded as part of DGM or have their boundaries recorded by either DGPS or a Professional Land Surveyor (PLS). Mapping and surveying are discussed in greater detail in Chapters 6 and 7.

2.18.3 Vegetation Removal

Vegetation will be cut to a height of no less than 6 inches to facilitate use of detection equipment. Vegetation removal will be limited to what is necessary for safety and quality. Ordnance avoidance will be practiced. A UXO Technician will escort the vegetation removal crews.

2.19 Munitions Constituents Sampling and Analysis

Per USACE program guidance in Engineer Manual 1110-1-4009, Bay West will collect soil samples from the locations of all items requiring management/disposal as MEC. The objective of soil sampling on during this field effort is to determine if MC has been released from an in-place MEC item or from project disposal activities. MC delineation is not within the scope of this project. When results of soil analysis are available they will be reported to Holloman AFB Environmental Restoration Section along with a request for a determination if any further action is necessary. Soil sampling protocols and procedures are presented in **Appendix E**.

2.20 Surface MEC Removal Action

An SRA will be necessary in the MRA to remove any MEC that may pose a hazard to the DGM Team and to remove surface metals that may cause interference to DGM. Each area designated for the SRA will be inspected by the UXOQC and/or SUXOS to review the site conditions. If required, location markers, survey stakes, or pin flags will be placed along the survey area boundary lines to allow visual determination of the surface removal limits during fieldwork. Each area will be subdivided into lanes to ensure complete coverage. Surface materials, including potential MEC, will be located using visual search techniques. Handheld metal detectors may be used as an aid to visual searching. No subsurface items will be unearthed or investigated during the surface clearance but visible, partially buried items will be investigated.

Search procedures will be modified to accommodate site conditions or obstacles that may require varying techniques to conduct the work. In each case, the UXOQC and/or SUXOS will make the final determination on the method or procedure to use. The areas searched and personnel utilized will be documented in the Daily Quality Control Report (DQCR).

The existing M125s will be examined. If they cannot be positively determined to be MD, they will be detonated in-place.

2.21 Subsurface MEC Removal Action

This Subchapter describes the procedures the UXO Team will use to investigate and remove subsurface MEC.

Prior to beginning the subsurface removal operation, the UXO Team will do the following:

- Review any archival information available regarding the area of the proposed RA;
- Conduct a general work and safety briefing prior to commencement of on-site clean-up activities;
- Establish an EZ and support zone;
- Ensure that non-essential personnel are not in the EZ during RA activities;
- Function-check metal detectors before use by passing them over known targets and documenting the checks. The UXOQC and/or SUXOS will verify performance of this procedure;
- Ensure that necessary tools are available and serviceable;
- Ensure EMM is properly inspected and serviced; and
- Ensure support vehicles are available.

Potential subsurface MEC will be detected by DGM. DGM procedures are described in Chapter 6, which will include discrete anomalies and potential burial pits.

If UXO personnel unearth or otherwise encounter suspect MEC, all excavation will cease, the suspect item will be flagged and the OESS will be notified. The USACE OESS, SUXOS, and UXOSO shall assess the condition of the suspect MEC to determine if removal/disposal is required by the HAFB EOD or can be performed by the UXO team. Once suspect MEC has been encountered in an excavation, no further excavation will be allowed until the item has been removed. If the MEC can not be removed and is left in place pending disposal, excavation may continue at other parts of the site.

2.22 Equipment

The equipment requirements for the project tasks include the following:

- Magnetometers and/or all-metals detectors;
- Global Positioning System (GPS)/Data collection unit;
- Assorted colored pin flags that will be used to mark MD/MPPEH/MEC (See **Table 2-3**);
- Tracked excavator and articulated rubber-tired loader with appropriate shielding;
- Miscellaneous common hand tools (i.e., shovels, trowels, hammers, etc.);
- Digital camera (if necessary, a disposable camera with developed photographs saved to a compact disk); and
- Forms and logbooks to record site activities and munitions items encountered.

Table 2-3: Marking Materials

Marker	Used to Mark
Red Pin Flag	Danger, suspect MEC
Blue Pin Flag	MD/Non-Hazardous Scrap
White Pin Flag	Boundary or Temporary Marker

2.22.1 DGM Equipment

The DGM equipment used on this project is discussed in Chapters 5 and 6 of this WP.

2.22.2 Analog Metal Detectors

Magnetometers and/or all-metals detectors, also called analog detectors, are the primary detectors that will be used in investigation operations. They do not require calibration. They have a Go/No-Go field operational check. Detectors will be checked daily before starting the work, when there is a concern about their proper operation, or after battery changes. To check the detector, it will be tested against an object of similar material and size as the ordnance expected. This may take place in the GPO or in a specially-prepared test area. Failure to detect the test target is reason to reject an instrument. If an instrument is rejected, the batteries will be replaced and the instrument will be restarted and checked. If the instrument still does not function, it will be replaced.

2.23 Discrete Anomaly Investigation

The following paragraphs describe the procedures UXO Teams will use to investigate discrete anomalies.

Discrete anomalies will be identified by DGM. Anomalies will be selected for investigation based on information obtained from the DGM GPO, (see Chapters 5 and 6). Discrete subsurface target locations identified by DGM will be reacquired using a DGPS as outlined in Chapter 6.

The anomaly or target location will be refined using handheld magnetometers and/or all-metals detectors. Targets will be unearthed using customary UXO excavation techniques. Digging will begin beside the target and work in and will be monitored with handheld detectors and/or probes to avoid contact with the target. UXO Teams will use safety precautions as outlined in the APP, (see **Appendix D**).

EMM may be used to assist in excavation. Shielding of the EMM is not required for excavation of discrete targets as long as the excavation is guided by a UXO Technician on the ground and ceases no closer than one foot to the target, after which excavation will continue with hand tools.

Prior to removal from the excavation, unearthed target items will be characterized as MEC, MD, or other debris. They will then be removed to a holding area or marked for disposal in-place. Any excavated item identified as MEC will be destroyed by detonation. Before detonating an item in-place, the UXO team will ensure no other MEC will be affected by the detonation.

2.24 Burial Pit Excavation and Screening Operations

The following paragraphs describe the procedures the UXO Teams will use to investigate the burial pits.

Based on the DGM data, the apparent boundary of the burial pit will be first located by trenching to determine the correct progression of the work to minimize double-handling of the soils. Once the pit boundaries are located, excavation of the burial pit will proceed in an orderly process to minimize wasted effort.

The exact methodology to excavate the burial pit will be determined by the pit dimensions. Excavation may be guided or unguided.

If unguided excavation with EMM is used to remove material from burial pits, shielding of the EMM operator and observer will be required. Shielding requirements are presented in **Table 2-4**. Unshielded personnel will withdraw to the hazardous fragment distance (HFD) while soil is being moved by EMM. A barricade may be employed to reduce the MSD for nonessential personnel during unguided excavation. Barricades will meet the minimum requirements outlined in USACE Publication, HNC-ED-CS-96-8, *Guide for Selection and Siting of Barricades for Selected Unexploded Ordnance,* and the DDESB Munitions Fragmentation Data Base (MFDB).

Excavated soils will be either cast behind or to one side of the tracked excavator. As necessary, an appropriately shielded, articulated rubber-tired loader will be used to spread the excavated soils in lifts. One UXO Technician will observe the excavation from a shielded location. If an item is encountered which may pose a significant hazard, mechanical excavation will stop and the item will be thoroughly investigated. The loader operator may perform this function.

Once the soil has been spread, the UXO Technicians will screen it for MEC/MD/MPPEH with magnetometers and/or all-metals detectors.

Table 2-4: Shielding Requirements

Munition	Mild Steel (inches)	Hard Steel (inches)	Aluminum (inches)	Lexan™ (inches)	Plexiglas (inches)	Bullet Resistant Glass (inches)
M125 Chemical Bomb (inert chemical filler)	0.34	0.28	0.73	3.1	1.82	1.4

NOTE: Information was extracted from the DDESB MFDB dated December 31, 2007.

All anomalies will be pursued to depth. Excavations will be rechecked with handheld detectors to ensure all metal objects have been removed.

During excavation operations, all MEC/MD/MPPEH that is excavated will be identified, recorded, and moved to a consolidation point within the work area. MD/MPPEH will be segregated and placed in temporary stockpiles and secured in a locked and sealed container at the end of the workday. If possible, excavations will be backfilled at the end of each workday. If that is not possible, the excavation perimeter will be marked as outlined in the APP (**Appendix D**).

If possible, the depth (by tape measure) and location of significant MD/MEC/MPPEH items in the excavation will be recorded with the GPS/Data collection unit.

The coordinates of the excavation will be recorded daily with a GPS by creating a polygon feature and walking the perimeter of the excavation at a safe distance from the edge.

All excavated material with the exception of MEC/MD/MPPEH will be returned to the pit as backfill. If necessary, up to 500 cubic yards of clean fill from the Base borrow pit will be imported to make up the volume of the removed munitions-related material.

2.25 Inspection and Disposal of MEC

MEC will be disposed of on-site by detonation. Recovered MPPEH that cannot positively be ascertained to be free of energetic material, MEC, and suspect MEC will be disposed of by detonating on-site. It is anticipated that MEC will be disposed of on the day of recovery; therefore, no storage of MEC will be necessary. In the event MEC cannot be destroyed on the day recovered, it will be kept under guard until disposal can be accomplished.

MEC that may not be moved will be detonated in-place. MEC that is acceptable to be moved safely may be moved to another location within the MRS prior to disposal for the purpose of consolidating shots. MEC may only be moved with the approval of the OESS. Disposal operations will be supervised by the SUXOS and be performed by a UXO Team consisting of at least one UXOTIII and two other UXO Technicians. The UXO Technician in charge of the disposal operation will be designated the disposal supervisor (DS). All explosive handlers will be licensed IAW the Federal Bureau of Alcohol, Tobacco, Firearms, and Explosives (BATF) requirements. As this project takes place on a U.S. Government installation under direction of the USACE, the State of New Mexico does not require any state explosive licenses or permits.

A cast booster donor charge or explosive perforator will be used for disposal. The charge will be placed on the munition where, after careful evaluation and study of available technical data, the DS determines it is the most advantageous for effective disposal. Detonating cord will be available. Electric blasting caps are the preferred method for initiating disposal shots

Use of DDESB-approved engineering controls as outlined in HNC-ED-CS-S-98-7, August 1998 (see **Appendix H**), is anticipated for most disposal operations, as the nearest inhabited building is within the Maximum Fragment Range-Horizontal (MFR-H) of the Munition with the Greatest Fragmentation Distance (MGFD). Disposal shots may be conducted without engineering controls, if it is safe to do so. There is no guidance on the use of engineering controls for the M125, as disposal of these items by detonation is not normally practiced. As the M125s at HAFB are assumed to be inert filled, disposal by detonation is acceptable. A sandbag thickness of 20 inches and the MSD of 200 ft will be employed. These figures are based on similar size munitions listed in the MFDB.

Measures such as lining the disposal pit with sand, wood or other materials may be employed to reduce soil contamination from explosive residues. Pre- and post-blast soil samples of the disposal location will be collected and analyzed for explosive residue as outlined in **Appendix E** of this WP.

The work site is near an active airfield and electrical initiation will provide positive control of the detonation in case of an aircraft incursion within the Maximum Fragment Range-Vertical (MFR-V). After each detonation, the demolition site will be inspected to ensure that a misfire, low order, or kick-out has not occurred. Intact ordnance items that fail to detonate will be counter-charged and blown in-place. Explosive residue will be collected and detonated. Prior to transport to a staging area, metal fragments will be examined to ensure complete detonation of the explosive material. Personnel will remain at the site as long as the possibility of fire exists as the result of the operation.

2.25.1 Demolition Procedures

2.25.1.1. Pre-blast Procedures

The SUXOS will ensure that all appropriate notifications are made as follows:

Table 2-5: Demolition Notifications

Office Name	Number
New Mexico Department of Homeland Security and Emergency Management*	(505) 476-9635
Command Post	(575) 572- 7575
Civil Engineering Commander's Office	(575) 572-3071
Fire Department	(575) 572-7228
Hospital	(575) 572-3260
Law Enforcement Desk	(575) 572-7171
Base Operations	(575) 572-5410
Explosive Safety	(575) 572-3793
EOD	(575) 572-5141
Control Tower	(575) 572-7303

**Notification to the New Mexico Department of Homeland Security is made as soon as it becomes apparent that a demolition shot will be necessary.*

A pre-blast soil sample will be collected IAW the sampling plan (**Appendix E**).

Explosives will be removed from storage and transported to the work site IAW Chapter 4 of this WP.

2.25.1.2. Blast Procedures

The following actions are to be accomplished during the MEC/MPPEH disposal to ensure a safe and efficient operation:

- All operations involving detonation of explosives will use the following safety signals. Employees will be made familiar with the signals and actions to be taken:
    - WARNING SIGNAL – a series of long audible signals five (5) minutes before blast signal;
    - BLAST SIGNAL – A series of short audible signals one (1) minute prior to the shot; and
    - ALL CLEAR SIGNAL – A prolonged audible signal following the inspection of the detonation-site.
- Personnel not involved in the disposal operation will act as perimeter guards as directed by the DS;
- Detonations will occur only after all unnecessary personnel have left the area, perimeter guards have been positioned, and the required personnel have been notified;
- All activity not associated with the on-site disposal operation will cease and personnel and equipment evacuated from the predetermined EZ;
- The SUXOS will ensure the appropriate calls have been completed before commencing the operation;
- No smoking, open lights, or fire of any kind are allowed within 50 ft of any area where explosive material is being handled;
- A designated vehicle will be positioned near the detonation point, with engine running and directed toward the emergency escape route;
- All demolition shots will use detonating cord;
- All demolition shots will be dual primed to the detonating cord;
- The maximum quantity of explosives that may be disposed of at one time will include the net explosive weight (NEW) of the item(s) to be disposed of plus the weight of the priming charge;
- The DS will keep accurate, up-to-date records of the UXO, related materials disposed of, and demolition materials used in the operation;
- The DS or a designated person will retain control of the blasting machine while down range;
- Explosive materials will be removed from containers only as they are needed for immediate use;
- Priming set-ups will not be made up in excess of immediate need;
- Preparation of electric blasting caps will be accomplished at least fifty (50) ft from other explosive materials;
- Before connecting to the firing wire, electric blasting caps will be tested for continuity using a blasting galvanometer or similar approved device;
- The firing wire will be rolled out between the firing point and the demolition shot and checked for continuity;
- The blasting caps will be attached to the firing wire, ensuring a good electrical connection is achieved. The connections will be insulated;

- Detonating cord will be inserted into the donor charge;
- The DS will direct placement of the initiating explosive. Charges will be placed in such a manner as to take full advantage of the effect of the initiating explosive and contribution from the explosive content of the MEC/MPPEH being detonated;
- The DS and one other fully qualified UXO person will remain at the detonation point to prime the charge. All other personnel will move to the safe area;
- The electric blasting caps will be affixed to the detonating cord using tape, detonating cord connectors or other suitable means;
- The priming team will return to the safe area;
- The five-minute warning signal will be given;
- Firing circuit continuity will be tested;
- The blasting machine will be tested and warmed up IAW manufacturer's directions;
- The blast signal will be given;
- The DS will make a final check of the EZ including the MFR-V; and
- The DS will give authorization and the shot will be fired.

2.25.1.3. Electric Misfires

2.25.1.3.1. Prevention of Electric Misfires

In order to prevent misfires, ensure the following:

- All blasting caps are included in firing circuit;
- All connections between blasting cap wires, connecting wires, and firing wires are properly made;
- Short-circuits are avoided;
- Grounds are avoided; and
- The number of blasting caps in any circuit does not exceed rated capacity of power source on hand.

2.25.1.3.2. Causes of Electric Misfires

The following are the common specific causes of electric misfires:

- Inoperative or weak blasting machine or power source;
- Improperly operated blasting machine or power source;
- Defective and damaged connections causing either a short circuit, a break in the circuit, or high resistance with resulting low current;
- Faulty blasting caps;
- The use in the same circuit of blasting caps (other than M6) made by different manufacturers or of different design; and
- The use of more blasting caps than power source rating permits.

2.25.1.3.3. Clearing Electric Misfires

1. Make three successive attempts to fire.
2. If unsuccessful, remove firing wires from blasting machine and check continuity of firing circuit.

3. If continuity is good, reattach firing wires to blasting machine and make three more successive attempts to fire.
4. Check connections of firing wires to the terminals of blasting machine and make three more successive attempts to fire.
5. Change blasting machine, if another is available, after third unsuccessful attempt with original blasting machine.
6. If still unsuccessful, disconnect firing wire ends from blasting machine and shunt by twisting firing wire ends together.
7. **NOTE: Wait 30 minutes after an electric blasting cap misfire. A malfunctioned electric cap may have initiated a burning explosive charge.**
8. Cut the detonating cord to remove the blasting caps from the charge then disconnect old blasting cap(s) and shunt wires.
9. Connect wires of new blasting cap(s) to firing circuit; reprime charge(s).
10. Reconnect firing wire ends to blasting machine; fire charge(s).

2.25.1.4. Post-Blast Procedures

The demolition site will be inspected to ensure complete consumption of demolition materials and to identify any MEC that may have kicked out. The area will remain secured until the SUXOS, in consultation with the USACE OESS or UXOSO, gives the "all clear." Unique demolition-sites will be photographed for the project record and Site Specific Final Report.

After the all clear is given, a post blast soil sample will be taken IAW the Field Sampling Plan (FSP). If soil contamination levels exceed the screening criteria in Attachment 2 of the Quality Assurance Project Plan (QAPP), the contaminated soil will be removed and sent to a permitted facility for disposal.

2.26 Inspection and Disposition of MPPEH and MD

During performance of field operations, the PDC will recover, inspect and segregate MD and MPPEH according to hazard classification. Inspection and classification of MPPEH and MD is a critical aspect of MEC operations and only personnel qualified as UXO Technicians per DDESB TP-18 will perform these inspections.

All recovered material will initially be inspected by a UXOTII or UXOTIII to determine if it is MEC, MD or other debris. MPPEH that cannot positively be ascertained to be free of energetic material, MEC and suspect MEC will be disposed of by detonating on-site. All inspection, certification, and final disposition procedures will meet the requirements of DoD Instruction 4140.62.

All (100%) of recovered MD, MPPEH and scrap will be inspected a third time, under supervision of a UXOTIII or a person with a higher experience level. All items will be visually inspected for the presence of energetic material. An explosive test kit, such as the Expray™, will be used to test any substance which the inspector cannot positively identify to be non-explosive, as well as to test the interior of several randomly selected MD items. Items containing high explosives or high explosive residue are MEC and will be disposed of on-site.

To ensure accurate classification of munitions-related items (with respect to their explosive hazard), as the information is used to make decisions about the response action, the PDC will inspect suspect MPPEH/MEC and classify these items IAW **Table 2-6.** The list is not all inclusive, but reflects the types of munitions-related material that may be encountered at the project site. The numbers in the table refer to footnotes. It is important to read the footnotes, as they provide additional information of importance to understanding.

Table 2-6: Classification of MEC Related Items

Type of Material	Classification Following Inspection:					
	Presents Explosive Hazard			Does Not Present Explosive Hazard		
	MEC			MC (3)	MD	Other
	UXO	DMM (1)	MC (2)			
Used military munitions, on a range, fired	X				X	
Unused military munitions, on a range, apparently discarded		X			X	
Used military munitions, in a burial pit, on a former range	X(4)				X	
Unused military munitions, in a burial pit on a former range		X(4)			X	
Explosives in the soil			X(5)	X		
Target from a range (other than small arms range)	X(6)	X(6)	X(6)			X(7)
Remnants of munitions from a former range	X(8)	X(8)	X(8)		X(9)	

Footnotes:

1. *Discarded Military Munitions (DMM): Munitions generally considered as DMM include: buried munitions; un-recovered kick outs from open detonations; munitions left behind or discarded accidentally during munitions-related activities; munitions intentionally disposed of without authorization during munitions-related activities. Munitions removed from storage for the purpose of disposal that are awaiting disposal are not DMM.*
2. *Munitions Constituents (MC): This is MC that is both (a) an explosive; and (b) present in sufficient concentrations to present explosive hazards.*
3. *This is MC that is either (a) not an explosive (e.g., lead, beryllium, and cadmium); or (b) an explosive not present in sufficient concentrations to present explosive hazards.*
4. *Although military munitions in a burial pit will normally be DMM, some may be UXO. For explosives safety reasons, munitions in a burial pit should be approached as UXO until assessed by technically qualified personnel (e.g., EOD personnel, UXO-qualified personnel) and determined that they are not UXO or that they do not present explosive hazards similar to UXO.*
5. *Explosive soil is typically found in sumps and settling lagoons for explosives-laden wastewater, and in and around drainage ditches and pipes that carry the wastewater to such sumps and lagoons.*
6. *A target is a type of range-related debris. Although a target is not MEC, it may contain UXO, DMM, or MC. Prior to its release from DoD control, its explosives safety status must be documented.*
7. *A target's explosives safety status must be documented and any demilitarization required to remove its military characteristics must be performed prior to its release from DoD control.*
8. *UXO, DMM, or MC may be found on operational ranges and on former ranges (previously referred to as closed, transferring or transferred ranges). An inspection of the material will determine into which category this material falls. For example, if a projectile breaks apart on impact, one could find (a) a sheared-off fuze, which would be UXO or (b) explosive filler, which would be MC that broke away from the projectile's open body. If during an open detonation of an unserviceable munitions that is conducted on an operational range, the donor charge detonates, but the munitions being destroyed breaks up, but does not detonate, the remnants of the munitions would be DMM or, if explosive residue (e.g., clumps of Trinitrotolulene [TNT]), MC.*
9. *Fragments, while munitions debris, may be evidence of high explosive (HE) usage at the site. For such fragments, the PDC will indicate evidence of HE in its classification. After determination of its explosives safety status, scrap metal from used munitions on a range that is documented as safe would, after any demilitarization required removing its military characteristics, be available for release from DoD control. In additions to these DoD requirements, other regulatory criteria may apply.*

Upon inspection of the material, the UXOQC or SUXOS will complete a DD Form 1348-1A with the following certification:

"This certifies and verifies that the material listed has been 100 percent properly inspected and to the best of our knowledge and belief is inert and/or free of explosive related material."

The SUXOS and the USACE OESS (or designee) will sign the Department of Defense (DD) Form 1348-1A to certify and verify inspection of the scrap.

Containers, such as 55-gallon drums or roll-offs, will be used for storage of MD. Each container will be kept closed and sealed, except when materials are being loaded into the container or the contents of the container are being inspected. Each container will be closed in a manner that requires that the container seal be broken to gain access to the interior of the container. The container will be closed and clearly labeled on the outside with the following information: The first container will be labeled with a unique identification (ID) that will start with USACE/Installation Name/Contractor's Name/0001/Seal's unique identification and continue sequentially.

The MD will be shipped to a specialized processor or transported to a scrap yard for recycling. IAW Chapter 14 of EM 1110-1-4009, the certified and verified material will only be released to an organization that will:

- Upon receiving the unopened labeled containers, each with its unique identified and unbroken seal ensuring a continued chain-of-custody, and after reviewing and concurring with all the provided supporting documentation, sign for having received and agreeing with the provided documentation that the sealed containers contained no explosive hazards when received. This will be signed on company letterhead and stating that the contents of these sealed containers will not be sold, traded or otherwise given to another party until the contents have been smelted and are only identifiable by their basic content; and
- Send notification and supporting documentation to the sealed container-generating contractor documenting the seal containers have been smelted and are now only identifiable by their basic content.

2.27 MD/MPPEH/MEC Accounting

The PDC will record the amount of MEC, MD, and MPPEH recovered in a database and report it on the DQCR.

Copies of all inspection and shipping documents will be retained and included in the AAR.

2.28 Disposition of Non-Munitions Scrap Metal and Debris

Miscellaneous non-munitions related scrap metal, debris, and trash collected during performance of RA activities will be consolidated and returned to the burial pit as backfill.

2.29 Project Communication and Reporting

2.29.1 Project Communications

All communications between the PDC and USACE will be through the USACE PM. Communication directly between the PDC and other Government entities associated with this project will only occur when directed by USACE.

2.29.2 Project Correspondence

The PDC will document substantive phone conversations and written correspondence related to the performance of the work IAW DID MR-055.

2.29.3 Records Management

The PDC will maintain hard copies of primary project records at the Bay West Corporate Office in St. Paul, Minnesota. Such records will include the TO SOW and any modifications, substantive correspondences, draft submittals, responses to comments and final submittals, and correspondence received from USACE or other agencies. The PDC will retain electronic versions of working products within the Bay West St. Paul network server. Access to all servers is password controlled. The PDC will retain historical records and documents, previous study reports, and related items in the Bay West Lektriever file system.

The PDC will maintain field records on-site. These will include logbooks, forms and reports. Following completion of fieldwork, the PDC will deliver all hard copy files to the project files in St. Paul, Minnesota.

The PDC personnel may supplement logbooks and records by the use of preprinted forms (e.g., safety inspection forms, tailgate safety briefings, etc). These forms help to ensure uniformity of activities being conducted, inspected, and reviewed. The PDC project forms are located in **Appendix F** of the WP. Copies of forms will be filed with each day's DQCR. All handwritten records and logbook entries will be scanned into an acceptable digital form and submitted as part of the digital data package.

2.29.4 Daily Quality Control Report

The PDC will prepare and maintain a detailed accounting of activities performed in the DQCR. A sample form is provided in **Appendix F**. The DQCR will be used in lieu of the SUXOS Daily Report. All work activities will be recorded in the DQCR which will be provided to USACE the following work day. The PDC will maintain the DQCR along with associated documents and other field records in a binder at the site office, with copies sent weekly to the project files in St. Paul, Minnesota. All hard copies of forms, meeting minutes and other correspondence will be filed in this binder. The DQCR will include:

- A summary of weather conditions;
- Names and position personnel on site (attachment of safety meeting report suffices);
- A breakdown of work performed by position and the hours worked;
- Vehicles and equipment used;
- A description of work performed;
- Results of QC inspections or other actions;
- Results of QC testing;
- Results of safety inspections;
- Remarks, including conversations with or instructions from the Government representatives; delays of any kind that are impacting the job; conflicts in the contract documents; comments on change orders; and environmental considerations, etc.;
- The location, type, depth (if possible), and description of MEC items encountered which are logged in a standard Dig List and the project investigation database;
- An estimated weight (in pounds) and depth of the MEC/MPPEH/MD removed;
- If possible, the location of significant MD/MEC/MPPEH items in the excavation will be recorded with the Trimble GPS/Data collection unit; and
- An estimated weight (in pounds) of the scrap metal consolidated.

2.29.5 MEC/MD/MPPEH/Explosives Records

The PDC will maintain a detailed account of MPPEH/MEC encountered during operations. This accounting will include the unique identifying number, location of the item (if possible), and a photograph

as part of the official project record. A photograph board indicating the date, UXO Team, any other identifying information and a size indicator will be included in the photograph. The UXO Team will provide specific details regarding the items encountered to include, but not limited to, specific nomenclature, type, fuzing, condition, external markings, etc. This data will be stored in a digital munitions items list and the project digital database. The PDC will maintain the following records:

- List of recovered MEC/MPPEH and records of its disposition;
- A record, by weight, of MD recovered;
- Copies of the DD 1348-1A used to document the inspection of MD;
- Records pertaining to the transfer of MD to the final processor; and
- Records of the receipt and expenditure of donor explosives.

2.29.6 Logbooks

Activity logbooks described below will be maintained daily. All entries will be in ink, neat and legible. Any errors will be lined through with a single line and initialed. Logbooks will be bound, pages consecutively numbered, each page will include the name of the project and the date. Logbooks and records may be supplemented by the use of preprinted forms (e.g., safety inspection forms, tailgate safety briefings, etc). These forms help to ensure uniformity of activities being conducted, inspected and reviewed. Forms are located in **Appendix F** of the WP. Any inspections for which no form is provided will be documented in logbooks. Logbooks may be combined and information may be recorded in a single logbook if, for example, the UXOQC and UXOSO are the same person. The following logbooks and records will be maintained on-site and are subject to inspection.

2.29.7 Journal

The Journal will be maintained by the UXOQC or SUXOS; it provides a summary of all operations conducted on-site to include:

- 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 WP, APP, policies or procedures;
- Injuries and /or illnesses;
- Safety briefings;
- MEC, MPPEH and MD encountered;
- Relevant events and training; and
- Signature of the person maintaining the log.

2.29.7.1. Field Logbooks

Field Logbooks are maintained by the SUXOS, UXO Team Leaders, and DGM Team Leaders. These logbooks are used to record site activities and field data to 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 UXO Technician.

2.29.7.2. Safety Logbook

The site 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 UXO Teams checked; and
- Signature of the UXOSO.

2.29.7.3. Quality Control Logbook

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

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

2.29.8 Training Records

Training records will be maintained by the UXOQC/UXOSO. These records contain any license, certificates, or other qualifying data, to include:

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

2.29.9 Photograph Log

The Photograph Log will be maintained by the UXOQC or SUXOS. This logbook is used to record photographs taken on the project site. This log may be pen and ink or an electronic database using a spreadsheet program. These photographs are used to document significant MD, MPPEH and MEC encountered, and before, during, and after work site conditions. The Photograph Log will include:

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

2.30 Project Deliverables

Project deliverables include project reporting, meeting minutes, and records of project correspondence.

2.30.1 Computer Files

In addition to the paper and digital copies of submittals, all submittals of any and all reports and/or plans will include an uncompressed version of the documents on compact disk – read only memory (CD-ROM) in Microsoft Word. Spreadsheets will be in Microsoft Excel. All data submitted will be Geographic Information System (GIS) compatible and submitted in Environmental System Research Institute (ESRI) (Arcview/Arcinfo) format.

2.30.2 PDF Deliverables

In addition to the paper and digital copies of submittals, all reports and/or plans will be submitted, uncompressed, on CD-ROM in portable document format (PDF). All maps will be in individual PDF files. PDF files will be created from source documents whenever possible.

2.31 Public Affairs

The PDC will not publicly disclose any data generated or reviewed under this contract and will refer all requests for information concerning site conditions to USACE Omaha District. Reports and data generated under this contract are the property of USACE and distribution to any other source, unless authorized by the CO, is prohibited.

2.32 Submittals

The PDC will submit one copy on CD-ROM of the final versions of all submittals (WP, reports, plans, etc.) with each hard copy.

3.0 EXPLOSIVES MANAGEMENT PLAN

High explosives will be used to dispose of MEC during the HAFB LF-29 MEC Removal Action. This explosives management plan describes procedures for the management of those explosives. A DDESB-approved ESS exists for this project.

The PDCs currently hold BATF Explosive User Permits. These will be available for inspection by the explosives vendor and state, federal and local authorities.

3.1 Acquisition

The anticipated initial quantity of explosives to be purchased and the associated NEWs QD are detailed in **Table 3-1**.

Table 3-1: Magazine Net Explosive Weight and Quantity Distance

Magazine Type	Contents	Unit of Issue	DOT Explosive Number*	DoD HC**	Amount	NEW (lbs)	IBD (ft)	PTR (ft)
High Explosive	Cast Boosters	Each	9608031	1.1D	36	36		
	Detonating Cord	Foot	9303282	1.1D	500	3.6		
Magazine Total					***Total NEW***	***39.6***	***388***	***232.8***
Initiating Explosives	Blasting Caps	Each	9709010	1.4B	100	0.21		
Magazine Total					***Total NEW***	***0.21***	***200***	***120***

*NOTE: *From Air Force Manual 91-201 Table 3.9, based on 50 lbs maximum stored NEW. ** From USACE EP 1110-1-18, Table 14.1.*

Project explosives will be purchased by the PDC. The PDC anticipates purchasing explosives from Westco Chemical of Grants, NM. Cooney's Explosives and Black Powder of Hobbs, NM is an alternate source.

3.2 Initial Receipt

The PDC will coordinate with HAFB Safety and Security personnel to obtain access for the vendor's delivery vehicle. The vendor will contact the PDC approximately one hour before arrival at HAFB. The PDC will contact HAFB Weapons Safety. The PDC and Weapons Safety will meet the explosive delivery vehicle at the HAFB gate. The vendor will deliver the explosives to the PDC at Building 903.

The SUXOS or UXOQC will inventory the received explosives ensuring the correct quantities and lot numbers have been delivered. He will then sign the vendor's delivery receipt and retain a copy. A copy of the delivery receipt will be offered to HAFB Weapons Safety. Any discrepancies will be resolved before signing the receipt. If the quantity delivered does not match the quantity or lot numbers shipped, the receiver will notify the explosive vendor. With the concurrence of the explosive vendor, the received quantities may be adjusted.

3.3 Storage

Donor explosives will be stored in two bays of HAFB munitions storage Building #930. This building is sited for 45,000 lbs of Class 1.1 explosives. A numbered seal will be used to detect unauthorized entry to the magazines. The seal number will be recorded by the SUXOS and UXOQC and the integrity of the seal be verified before opening the magazine.

One bay will store detonators and the other high explosives. The bays are separated by reinforced concrete walls and there will be an empty bay between the two storage bays containing explosives and detonators. No more than 50 lbs NEW will be stored in a single magazine. The inhabited building distance (IBD) for this NEW is 388 ft and the public transportation route (PTR) distance is 233 ft IAW Air Force Manual (AFMAN) 91-201, Table 3.9, (see **Appendix A, Figure 3-1**). The bay containing detonators will not affect the IBD of the high explosive magazine. Magazines will be sited outside of the HFD for the MGFD.

If Base facilities should become unavailable, donor explosives will be stored in two BATF Type 2 magazines, which will be rented from an explosives vendor. These will be sited near the MRS outside of the HFD of the project MGFD. Magazines will comply with BATF specifications as outlined in Title 27: Alcohol, Tobacco, and Firearms, Part 555, *Commerce in Explosives*, Subpart K, *Storage*. One magazine will store detonators and the other magazine will store high explosives. The magazines will be separated by the Inter Magazine (IM) distance minimum of 41 ft. Magazines will be grounded for lightning protection IAW EM 1110-1-4009. No more than 50 lbs NEW will be stored in a single magazine. Alternatively, a single BATF approved magazine with attached blasting cap box may be used. The IBD for this NEW is 388 ft and the PTR distance is 233 ft IAW AFMAN 91-201, Table 3.9. The magazine containing detonators will not affect the IBD of the high explosive magazine.

Explosives will remain in their packaging until removed from the magazine for use. Packages of explosives will be placed on dunnage. Only explosives will be stored in the magazines; tools, excess packing material, etc., will be stored separately. Only non-spark-producing tools will be used to open explosive packaging. If maintenance to an explosives storage bay is necessary, the bay will first be emptied of explosives.

3.4 Transportation

As the explosive storage magazine and the work site are within the Base boundary, it will not be necessary to transport explosives on public highways. Explosives will be transported from the magazine to the work site by vehicle. The vehicle will be inspected, equipped, and placarded IAW Section 29 of EM 385-1-1, *Safety and Health Requirements* and 27 CFR 555, *Commerce in Explosives*. An Institute of Makers of Explosives/U.S. Department of Transportation approved truck box will be used for explosive storage during transportation. The approved route between the magazine and the work site is presented in **Appendix A, Figure 3-2**. Vehicle inspections will be recorded on a DD Form 626, *Explosive Vehicle Inspection*. Completed DD Forms 626 will be filed with the DQCR.

3.5 Receipt and Inventory Procedures

The PDC will maintain responsibility over and control of each explosive item until its expenditure or return to the explosives vendor. At any time, if theft of explosives is suspected, a report will be made to the BATF by calling (800) 800-3855. This will be followed within 24 hours with submitting BATF Form 5400.5 (see **Appendix F**) to the nearest BATF field office, which is located in Las Cruces, NM at 1140 Commerce Drive, Suite B, Las Cruces, NM 88011. Telephone number (575) 521-2300, fax number (575) 521-2301. A theft report will also be made to the USACE and the AF. **Table 3-2** describes the personnel responsible for project explosives.

Table 3-2: Explosives Authority and Responsibility

	Receive from vendor	Inventory	Sign Expenditures	Verify Inventories and Expenditures
SUXOS	X	X	X	
UXOQC/UXOSO				X
UXOTIII		X	X	

Initial receipt of explosives is discussed above. After receipt of explosive, the quantities and lot numbers will be recorded on a magazine data card, (see **Appendix F**). The quantities will be adjusted each time explosives are removed or added to the magazine. The data card will be placed atop the items in storage and a copy will be kept in the site office. Magazines will be inventoried each time material is added or removed. If no explosives are used the magazines will be inventoried weekly. Inventories will be annotated on the magazine data card.

If a discrepancy is discovered as the result of an inventory, the SUXOS will investigate. Interviews of site personnel will be conducted to reconstruct any events that may have contributed to a discrepancy. If the discrepancy can be resolved administratively, a report will be prepared for the PDC PM and the OESS. If the report is approved, the inventory will be adjusted. If a discrepancy cannot be resolved, it will be reported to the USACE, AF and BATF as a theft.

3.6 Return of Unused Explosives to Storage

Explosives will be removed from storage for use by the DS and witnessed by the UXOQC. Each time explosives are used, an explosive usage form, (see **Appendix F**) will be completed by the DS and the UXOQC. The completed form will be filed with the DQCR. Unused explosives will be returned to storage and documented.

3.7 Disposition of Unexpended Explosives

Any explosives remaining after completion of the project will first be offered to HAFB. Transfer of these explosives will be documented IAW HAFB and AF directives. If HAFB declines, the explosives will be detonated on-site. Appropriate MSDs will be employed.

4.0 EXPLOSIVES SITING PLAN

This plan outlines the explosive safety criteria that the PDC will use for the planning and execution of the MR action at LF-29.

4.1 Munitions Response Site

The physical setting of the MRS is described in Chapter 1 of the WP. **Appendix A, Figure 1-1** depicts the MRS.

As discussed in Chapter 2 of this WP, the MGFD selected for this project is the M125 10-lb Gas Bomb with simulant filler. **Table 2-2** presents the MSDs for this munition. **Appendix A, Figure 4-1** graphically represents the MSDs for the project. An EZ corresponding to the MSDs will be established at the MRS. Access will be controlled by signage, roadblocks, and/or road guards.

The use of the HFD as the MSD for nonessential personnel for unintentional detonations has been authorized by the USACE in their letter, *Technical Update, Implementation of the Department of Defense Explosive Safety Board (DDESB) Guidance on Minimum Separation Distances for Unintentional Detonations*, dated September 11, 2007. The technical update reads as follows, "USACE has intrusively investigated millions of surface MEC items and subsurface anomalies that have the potential to be unexploded ordnance over the past 15 years on more than 1,000 project locations for Formerly Used Defense Sites (FUDS), Base Realignment and Closure (BRAC), and Active installations. These are extremely conservative estimates. On one project alone, USACE investigated over 3,000,000 anomalies, of which approximately 1.67% were UXO with no accidents or unintentional detonations. For these reasons, the probability of an unintentional detonation due to project activities is assessed to be 'Extremely Low,' and the use of the HFD for the MSD for non-essential personnel for unintentional detonations is warranted and authorized."

4.1.1 Demolition Areas

All demolition/disposal operations will be conducted within the MRS.

4.1.2 Footprint Areas

4.1.2.1. Blow-in-Place

MEC that may not be moved will be intentionally detonated in-place. **Appendix A, Figure 4-1** depicts the MSDs that apply to intentional detonations. Use of DDESB-approved engineering controls as outlined in HNC-ED-CS-S-98-7, August 1998, is anticipated for most disposal operations, as the nearest inhabited building is within the MFR-H of the MGFD. Disposal shots may be conducted without engineering controls, if it is safe to do so.

4.1.2.2. Collection Points

The UXO Team may remove MEC from the immediate work area and place it in a collection point for later disposal. MEC must be acceptable to be moved from a safety standpoint. This location will be visually monitored by the UXO Team. All MEC will be detonated on the day of recovery.

MEC items may be consolidated for disposal and the MSD will be calculated IAW USACE document, *Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosive (OE) Sites*, and USACE Technical Update 3, *Mathematical Equations and Calculations for MEC Operations*. Consolidated shots will be used only when their MSD will not exceed the HFD. Engineering controls have been calculated for the M125 but these are not applicable to consolidated shots so any consolidation will be limited to items whose MSD will not exceed the HFD.

4.1.2.3. Explosive Storage Magazines

Explosive storage magazine data, siting information, and the tabulated list of explosives are presented in

Chapter 3, Explosives Management Plan. **Appendix A, Figure 3-1** graphically depicts the magazine location at Building 930 and its QD arc.

4.1.3 Site Map

Site maps are presented as **Figures 1-1, 1-2, 3-1** and **4-1** and are contained in **Appendix A** of this WP.

5.0 GEOPHYSICAL PROVE-OUT PLAN

5.1 Introduction

The GPO plan was developed IAW DID MR-005-05A.01, *Geophysical Prove-Out (GPO) Plan and Report*, and MR-005-05.01, *Geophysical Investigation Plan*.

The GPO plan includes the following tasks:

- Select a GPO location that represents, as closely as possible, actual site conditions (e.g., terrain, vegetation, background noise, geology, infrastructure, etc.);
- Capture and document various digital geophysical instrument and positioning system operations under actual site conditions by acquiring the background data over the GPO plot;
- Seed the GPO with a full range of expected MEC, or their approved simulants, at a variety of depths, orientations, and inclinations;
- Establish sensor and positioning system's capabilities and limitations in detecting the seeded MEC;
- Demonstrate data transfer, processing, analysis, and reacquisition;
- Establish or refine site-specific performance metrics or Data Quality Objectives (DQOs) for background noise, sample density, MEC detection, false positives, positioning accuracy, reacquisition, anomaly selection, and data management; and
- Provide a site-specific GPO letter report documenting the results of the GPO, documenting performance metrics, and recommending the best performing sensor and positioning system for project use. The approved GPO Report is used as a basis for equipment selection and expected system performance.

The PDC will utilize the GPO to demonstrate that the selected digital and analog equipment and personnel are capable of maintaining project performance metrics.

As DGM field teams are mobilized, the PDC will utilize the GPO to demonstrate that the selected equipment and personnel are capable of maintaining project performance metrics. The GPO will also be used for QC checks of equipment and personnel, should there be need for major repair or replacement.

5.2 Purpose

The purpose of the GPO is to demonstrate and document the site-specific capabilities of the proposed survey systems, sensors, navigation equipment, data analysis, data management and associated equipment and personnel to operate as an integrated system capable of meeting project data quality objectives and to develop the initial anomaly selection methodology.

5.3 Test Plot Design

The elements described in the following subchapters describe the procedures associated with the GPO at LF-29.

5.3.1 Prove-Out Size and Location

A prove-out area (assumed to be no greater than 60 ft x 50 ft) will be established consistent with the local site conditions (e.g., in close proximity, easily accessible but with limited public access, similar geology, terrain, vegetation, and cultural features), and seeded with known/expected items to be encountered during DGM of LF-29 for the GPO evaluation. The proposed GPO location is shown on **Appendix A, Figure 5-1**.

5.3.2 Seed Items

The seed items will be based on the range of MEC expected at LF-29. The PDC will use inert munitions

or their approved simulants in sufficient quantities and bury them at various depths, attitudes, and locations. If MD items are used as seeds they will be inspected IAW Subchapter 2.5 of this WP and will be clearly labeled as seed items belonging to this project. An idealized GPO seed map (see **Appendix A, Figure 5-1** and **Table 5-1**) shows/lists each seed item, its planned location (X, Y), depth, inclination, and orientation. The final location of all seed items will be adjusted based on the GPO background surveys. Each seed item (nose, and tail of long seed items or the center of small seed items, and depth from ground surface to first contact) will be surveyed to a horizontal accuracy of 3 centimeters (cm) and a vertical accuracy of 5 cm by a qualified PDC operator to document the "as built" GPO.

Table 5-1: Idealized GPO Seed Table

Seed Item #	Seed Item	X (feet)	Y (feet)	Depth (inches)	Orientation	Inclination
1	E61R4 (1.5" dia. x 7.24")	10	10	8.25	Along-track	Horizontal
2	E61R4 (1.5" dia. x 7.24")	10	20	16.5	Across-track	Horizontal
3	E61R4 (1.5" dia. x 7.24")	10	30	16.5	NA	Vertical
4	M125 (3.6" dia. x 12")	30	5	19.8	Along-track	Horizontal
5	M125 (3.6" dia. x 12")	30	25	39.6	Across-track	Horizontal
6	M125 (3.6" dia. x 12")	30	45	39.6	NA	Vertical

NA: Not Applicable

5.4 Site Preparation

Test plot preparation includes vegetation removal and/or surface MEC removal. The surface removal will remove all non-UXO clutter from the GPO plot. If UXO is discovered during the surface clearance, the GPO plot will be relocated. The test plot will duplicate the conditions under which the geophysical surveys will be conducted.

5.5 Location Surveying

As required, PLS will establish or identify survey control for the site. The corners of the test plot and the seed items (to the nearest 0.5 ft) will be surveyed by the PLS or by qualified PDC personnel using an RTK-GPS, assuming the PLS has provided site survey control. If site control is provided by a PLS, an RTK-DGPS will be used to survey the GPO corners and seed item locations.

5.6 Pre-Seeding (Background) Geophysical Mapping

Prior to the seeding of MD or approved simulant items in the GPO plot footprint, the plot footprint will be surveyed using electromagnetic methods. This initial survey will provide baseline response data for the site and verify the suitability of the proposed GPO site.

5.7 Quality Control

The following QC procedures will be performed and documented during the GPO data collection process and reviewed by the Project Geophysicist on a daily basis.

5.7.1 Data Quality Elements (DQEs)

Positioning Accuracy: The coordinates being obtained from the positioning system are at a sufficient accuracy to allow for appropriate relocation of anomalies for intrusive investigation. *Measurement performance criteria*: During the reoccupation test, the error from a known location does not exceed +/- 0.5 ft (15.2 cm) and with 1.64 ft [0.5 meters (m)] from a known anomaly source.

Data Repeatability: The systems respond consistently from the beginning to the end of an operation. Measurement performance criteria: Response to a standardized item does not vary more than +/- 20% from static test to static test, and anomaly location accuracy does not vary more than +/- 20 cm from repeat test to repeat test.

MEC Detection: The systems reliably detect the required MEC, as specified in the SOW, or to their typical maximum detection depth (11 times diameter, rule of thumb). The GPO will document actual detection capabilities.

Sample Density: Along-track and across-track data densities (site coverage) are sufficient to detect required MEC items. Along-track sampling will have no data gaps 2 ft (0.67 m) or greater and across-track spacing will not vary more than +/- 1 ft (0.30 m) or +/- 20% of design spacing, whichever is greater, except around known obstacles.

Data Handling: All data must be processed and analyzed in a consistent, documented manner. A method to classify anomalies as potential MEC is established. Data must be delivered in a timely manner and in a usable format.

Anomaly Resolution: Known anomalies are relocated within 3 ft (1 m) of their location. Intrusive operations successfully recover and identify each anomaly source. UXOQC and Project Geophysicist agree that each anomaly source has been unambiguously resolved.

To validate the data quality elements are being met or exceeded, the following QC procedures will be performed and documented during the data collection process and reviewed by the Project/Site Geophysicist on a daily basis:

- All equipment will be warmed-up for at least five (5) minutes before use.
- After equipment warm-up, a static background and response to a known target file will be recorded at the beginning and end of each survey day. Static background data will not vary more than 2.5 millivolts (mV) or 5 nano-Teslas (nT) peak to peak (p-p), and the response to the same, known target will not vary more than 20% from test to test, after background correction. A Cable Shake test will be performed as part of each static test. Sensor signals will be monitored for shake-induced offsets (i.e., no data spikes during the cable shake). A Personnel Test will also be performed as part of the static test to insure operators are sufficiently metal-free (i.e., < 2 mV or 3 nT p-p).
- Sensor positioning, within +/- 1 inch (2.54 cm) will be confirmed and recorded at the beginning of each survey day.
- A 6-Line test will be performed the first day on-site for each sensor technology to determine appropriate lag and latency corrections.
- Real time monitoring of sensor and positioning data quality by equipment operator(s).
- The PDC will resurvey a portion of the GPO (e.g., the X=30 ft) to document repeatability of target response and location. The data from the repeat line will be compared to previous survey lines. Sensor response amplitudes will be within +/- 20% in amplitude and anomaly peak location(s) will be positioned within +/- 20 cm from each survey.
- Sensor and positioning data will be reviewed for quality during initial editing and post processing.
- Satellite planning software will be used to predict GPS performance and to schedule daily survey work during times of peak predicted performance (e.g., 4 or more satellites available and Position Dilution of Precision (PDOP) value less than 6 with an elevation mask of 15 degrees above the horizon).
- RTK Differential GPS will be checked each morning at a known point (reoccupation test) with day-to-day location offsets within 0.5 ft (15.2 cm) of the known location (e.g., a GPO corner).

5.7.2 Anomaly Avoidance

The GPO test plot will be established with qualified UXO Technicians using anomaly avoidance techniques to ensure that the locations for the placement of seed items and corner markers are clear of metallic anomalies.

5.7.3 Seeding

Following the baseline surveys of the selected GPO, the plot will be seeded with a range of MD or their approved simulants using hand tools. If soil conditions prove to be too difficult to dig by hand, a backhoe will be used to dig the deeper holes. A sufficient quantity of each item will be tagged as test targets and used to determine the reliable detection depth under a variety of orientations and inclinations. At least one of each seed item type will be buried at half of its maximum detection depth to document signal attenuation with depth. The location, depth, orientation, and inclination of each seeded item will be recorded and documented with a digital photograph. Seed items will be placed a minimum of 10 ft from each other and from any anomalies identified during the pre-seeding background geophysical survey.

Unless otherwise directed, the established GPO will be maintained for the project life cycle for daily geophysical quality control purposes (e.g., repeat test), while working at LF-29, and to demonstrate satisfactory performance of any new or replacement equipment or personnel. The seeded GPO targets will be removed at the completion of the project.

5.8 Selected Equipment

The following industry standard electromagnetic sensors will be used to demonstrate their performance capabilities:

- EM61-MK2 digital all-metals detector; and
- Minelab Explorer II analog all-metals detector.

5.8.1 EM61-MK2

The Geonics EM61-MK2 is a high-resolution time domain electromagnetic induction sensor capable of detecting both ferrous and non-ferrous metallic objects. This system consists of two air-cored coils, a digital data recorder, batteries, and processing electronics. The EM61-MK2's transmitter generates a pulsed primary magnetic field, which then induces eddy currents in nearby metallic objects. The decay of these eddy currents produces a secondary magnetic field that is measured by the receiver coil(s). Secondary voltages induced in the coil(s) are measured in mV at four separate time gates (216, 366, 600, and 1266 microseconds [μsec]) after the transmit pulse termination. For the GPO, the EM61-MK2 will be deployed in the wheel mode with the bottom coil height at 40 cm above the ground surface. Only the bottom coil will be utilized, and all four time gates will be recorded at a 10 Hertz (Hz) rate. A shorting plug will be used on the bottom coil to reduce susceptibility to noise. The DGM Team will demonstrate the 100% grid survey. If necessary, the EM61-MK2 may be deployed in the stretcher mode.

5.8.2 Minelab Explorer II Analog Sensor

The Minelab Explorer II is an analog, multi-frequency, electromagnetic metal detector. It simultaneously operates on 28 frequencies within the range of 1.5 KiloHertz (kHz) to 100 kHz, and can be set to operate on any one of eleven channels. The use of multiple frequencies makes the Minelab Explorer II operable in a wide range of background conditions, as well as offering expanded anomaly discrimination/selection potential. The system provides two metrics for anomaly detection: (1) a conductivity metric; and (2) a ferrous content metric. Settings may be adjusted to enhance detection of specific materials or modified for particular user preferences. The system comes with a standard 10.5-inch coil and with a larger 16.5-inch coil available from after-market providers. The system will be tested at the GPO site to determine the optimum settings and coil size to adequately detect the seed items for the conditions present on-site.

Each UXO Technician Team will demonstrate their ability to use analog geophysical sensors to support UXO escort and anomaly avoidance operations. The following GPO tests will be performed:

- Reliably detect and flag GPO seed items, using standard 5 ft sweep lanes, with a Minelab Explorer II electromagnetic induction sensor with either a 16.5-inch coil or a 10.5-inch coil.
- Flag locations will be surveyed and their locations compared to the "as built" GPO ground truth.

The best performing analog sensor configuration will be used for UXO escort and anomaly avoidance activities and any analog and dig operations in areas inaccessible to DGM.

5.9 Data Positioning

Data positioning will be achieved with RTK-DGPS positioning in the project area. Obstructed areas at the site are minimal and will be surveyed with analog sensors.

The GPO will be surveyed using the same equipment and procedures that are planned for the geophysical surveys. Each geophysical team will perform the GPO prior to participating in the geophysical investigation. If any previously unused geophysical equipment or personnel are introduced on-site, the GPO will be performed for validation.

5.9.1 Real Time Kinematic-Digital Global Positioning System

A Trimble 5700/5800 RTK-DGPS, or equivalent, will be used to position the geophysical data in all open areas with usable access to the GPS satellite network. The Trimble 5700/5800 RTK-DGPS consists of a mobile 5800 GPS antenna/receiver located over the selected sensor and a 5700 base station antenna/receiver. Real time corrections from the base GPS receiver are broadcast to the roving GPS unit via a radio link using a TRIMMARK 3 base station radio and the 5800's internal radio. This system provides positional updates at a rate of 1 Hz, with an accuracy capability of 3 cm horizontal and 5 cm vertical, with five or more satellites in use. The GPS location data will be collected in Geodetic Coordinates and then converted to project Coordinate System and units. Pre-established base stations near the area of interest will be identified or established.

Where the RTK-DGPS will be used, the PDC will use DGPS planning software to schedule DGPS positioned geophysical surveys during periods with more than four satellites visible above an established elevation (typically 15 degrees above the horizon) and a PDOP value of less than 6.0.

5.10 Line Spacing

DGM survey line spacing is planned for every 2.5 ft (0.8 m). Any required analog surveying will be performed in 5 ft lanes. The GPO Report will recommend the line spacing that maximizes production while still meeting all project detection requirements for the smallest expected MEC item.

5.11 Seeded GPO Surveys

The PDC will survey the seeded GPO with the EM61-MK2 with RTK-DGPS positioning and each analog sensor system configuration.

5.12 Data Analysis and Interpretation

Initial data processing for the GPO will be performed in the field by the Site Geophysicist. The geophysical data will be downloaded into a laptop computer for on-site review and editing. Proprietary software supplied by the instrument's manufacturer will be used to make positional corrections based on the RTK-DGPS locations in the data.

Once the initial editing steps have been performed, any local coordinates will be converted to the project coordinate system and units. All data will be carefully leveled and any necessary corrections for positional latency applied using Geosoft's Oasis Montaj software. Data are then gridded, contoured and displayed on a map for GPO target selection. Targets will be selected from these maps initially by running the data through Geosoft's UX-Detect package. Each of the anomalies selected by Geosoft as a target will be analyzed by the Site Geophysicist, and evaluated as to their validity and position. Targets found to be invalid or incorrectly located will be removed (e.g., targets selected on noise peaks) or relocated. Additionally, anomalies that were not selected by UX-Detect, yet deemed to represent a potential UXO target, will be manually selected (e.g., edge anomalies). The spatial extent (anomaly size) will be determined and reported for each anomaly.

Final target lists from the site geophysical survey will be created using the anomaly selection method that will be decided upon following the evaluation GPO background and seeded surveys.

5.13 Reacquisition

The PDC will provide a UXOTII as escort to provide UXO avoidance support during the marking of each reacquired anomaly. Prior to excavation of targets, a two-person team will mark each anomaly location in the field. Utilizing the identical surveying system (sensor and positioning) as was used for the collection of data, the team will re-establish the coordinate location of each anomaly as listed on the Dig List and mark them using red plastic pin flags labeled with the appropriate target identification number. The location of each anomaly will then be refined using the identical geophysical instrument as was used for the original survey. The team will collect and carefully monitor continuous geophysical readings and slowly maneuver the instrument over the anomaly until the peak response is located. Pin flags will then be adjusted to the location of peak response. The reacquisition team will document the offset and direction of any adjusted anomaly location and their peak response values as well as any targets that cannot be reacquired on each Dig List. For the purposes of this GPO, the PDC will select all seed anomalies to demonstrate their reacquisition capability. The PDC will demonstrate anomaly relocation using the RTK-DGPS. The EM61-MK2 will be used to refine isolated anomalies with a 3.3 ft (1 m) radius from each flag.

5.14 Data Evaluation

Successful performance on the GPO test plot will be determined by the following initial criteria. Final values for these metrics will be established during the GPO.

- There is an equipment warm-up time of at least five (5) minutes;
- Personnel Tests do not exceed 2 mV p-p for EM61-MK2 Time Gate 3;
- Cable Shake Test results do not exhibit data spikes;
- Static background does not exceed +/- 2.5 mV p-p for EM61-MK2 Time Gate 3;
- Static response to a known target does not exceed +/- 20% after background correction;
- 6-Line test results demonstrate repeatable anomaly response amplitude within +/- 20% and a positional accuracy within +/- 20 cm;
- Repeat amplitude responses do not exceed +/- 20% and position accuracies do not exceed +/- 20 cm;
- Data collection, processing, and deliverables are completed on-schedule according to the SOW and this WP;
- Fieldwork is performed IAW the APP;
- Successful detection of at least 90% of the seed items, their locations interpreted within 3.3 ft (1 m) of their known burial points;
- Dynamic background noise metric is established from portions of the GPO free of known anomalies;
- Down-track and across-track sampling density metrics are confirmed; and
- Anomaly reacquisition accuracy metrics are confirmed (e.g., within 3.3 ft (1 m) for RTK-DGPS). Reacquired locations (RTK-DGPS or Tape Measures) will be refined with EM61-MK2. Refined locations will be compared to the GPO ground truth.

The PDC's Site Geophysicist will work with the USACE Geophysicist to validate and finalize the initial DGM project metrics based on the GPO results. They will also identify the planned anomaly selection process. This will most likely be a combination of anomaly peak amplitude, and anomaly size (e.g., spatial extent) and exclusion of any known site feature or noise selections where abnormal sensor response results in an initial anomaly selection, but the normal time gate response is not maintained (e.g.,

noise from power lines). Areas of high density subsurface anomalies (e.g., potential disposal pits) will be identified with a boundary polygon. The analog and flag GPO results will be reviewed and the best-performing analog sensor configuration will be selected for any required production use. It is expected that DGM production geophysics will follow immediately.

6.0 GEOPHYSICAL INVESTIGATION PLAN

This geophysical investigation plan describes the methods, equipment, and analysis required to characterize LF-29 for potential MEC to be investigated and removed. The purpose of this geophysical investigation plan is to describe the tools and methods that the PDC will utilize to support the removal action at this site.

6.1 Safety

During all initial fieldwork and all intrusive activities, the geophysical crew will be accompanied by a UXOTII. Prior to the survey crew entering an area potentially containing MEC, the UXOTII will conduct visual surveys for surface ordnance and a magnetometer or electromagnetic survey of each intrusive activity site to ensure the site is anomaly-free prior to the crew setting monuments or driving stakes.

6.2 Personnel Qualifications

All geophysical investigations will be managed by a qualified geophysicist meeting USACE qualification requirements and will utilize the equipment and procedures established at the GPO. For this project, the PDC has assigned Mr. Al Crandall as the Project Geophysicist.

6.3 Geophysical Investigation Plan Outline

The sequence of tasks for the geophysical investigation is outlined below:

- Qualified PDC personnel or the project PLS establishes or identifies existing survey control and installs the site boundaries for the removal action.
- The PDC will provide a UXO Escort for the vegetation removal (if required) crew who identifies MEC on the surface and surface metal scrap (not MEC) that may need to be removed prior to the DGM activities.
- The DGM Teams acquire 100% site characterization data of LF-29 and daily DGM QC data.
- Provide a complete list of all anomalies and data image maps for anomaly review and Dig List generation.
- Utilizing the final Dig List, evaluation of all selected anomalies including:
    - Characterize areas inaccessible to DGM using analog survey (mag and dig) techniques;
    - Anomaly reacquisition;
    - Intrusive investigation; and
    - Post-intrusive QC of items recovered from target anomaly locations.
- Data Management and delivery are demonstrated and determined acceptable.

The PDC will perform the DGM survey to effectively identify and excavate all potential MEC anomalies at the site. The DGM Team will be equipped with the systems (sensor and positioning) demonstrated at the GPO. The results of the DGM surveys (e.g., maps and Dig Lists of subsurface anomalies) will provide critical site characterization data and the source for selecting the anomalies within the site footprint for intrusive investigation. The DGM data, combined with the intrusive results, will form the basis for this removal action. The PDC will dispose of any MEC IAW this WP.

6.4 Site Description

6.4.1 Geophysical Data Quality Objectives

The DQOs for the geophysical investigation at this site include the following:

- DGM activities are able to identify anomalies that may be MEC or MPPEH; and
- DGM activities must maintain all DQOs and DQEs for positioning accuracy, data repeatability, detection, sample density, data processing and analysis, data handling, and anomaly resolution established in the GPO (see Chapter 10 and **Appendix H**).

6.4.2 Specific Areas to be Investigated

The area for the removal action is the former Army LF-29 located on HAFB. This is fully described in Chapter 1 of this WP.

6.4.3 Past, Current and Future Land Use

Past current and future land use is discussed in Chapter 1 of this WP.

6.4.4 Anticipated UXO, Type and Composition

Table 5-1 identifies the expected MEC.

6.4.5 MEC Depth Anticipated

MEC in burial pits may be at any depth, depending on historical disposal operations. Isolated MEC may typically be detected to depths 11 times its diameter. F or this WP, the E61R4 bomblet and M125 bomb have been identified as expected MEC items. Their dimensions and typical maximum detection depths are summarized in **Table 6-1**.

Table 6-1: Typical Maximum Detection Depths

MEC	Diameter (inches)	Length (inches)	Typical Maximum Detection Depth (inches)
E61R4 Bomblet	1.5	7.24	16.5
M125 Bomb	3.6	12	39.6

6.4.6 Vegetation

Vegetation consists primarily of grasses, sagebrush, other bushes and small trees. Vegetation may be cut to facilitate DGM as described in Chapter 2 of this WP.

6.4.7 Geologic Conditions

There are no geologic conditions that would preclude successful DGM operations at this site.

6.4.8 Soil Conditions

There are no soil conditions that would preclude successful DGM operations at this site.

6.4.9 Site Utilities

There are power lines along Dezonia Drive, south of LF-29, an underground cable line south of the site, and a storm drain pipeline running along the side of the unnamed dirt road to the west of the site.

6.4.10 Features Potentially Affecting Geophysical Investigations

During the Site Visit, there were several man-made features noted that might affect geophysical activities. The site has a series of warning signs surrounding the berm, four monitoring wells in close proximity to

the site boundary, various poles in the interior of the site, and a high concentration of metallic debris and other possible MEC-like items that will need to be surface-cleared before DGM activities commence. The berm slopes may limit safe DGM access. Any portions of the site that are inaccessible to DGM will be cleared using analog and dig operations.

6.4.11 Site-Specific Dynamic Events or Other Unusual Factors Affecting Operations

None anticipated.

6.4.12 Overall Site Accessibility

There are no impediments to site access. Procedures for site access are described in Chapter 2.

6.4.13 Potential Worker Hazards

Potential to encounter MEC, exposure to some potentially dangerous wildlife and plants, and heat and cold stress are known potential worker hazards. The APP in **Appendix D** identifies site safety issues, including a Hazard Analysis section.

6.5 Geophysical Investigation

6.5.1 Survey Type – Fixed Pattern

The PDC plans on using sets of overlapping survey lines spaced every 2.5 ft (0.8 m) to geophysically map the site. LF-29 will be surface swept and de-vegetated (if necessary) prior to geophysical mapping. The PDC DGM Team will survey the site in a logical progression, following the site's longest dimension, as demonstrated in the GPO. The undulating and hummocky surface may require the EM61-MK2 be deployed in the stretcher mode to keep it level.

6.5.2 Equipment

The PDC will deploy sensor technology recommended during the approved GPO, and documented in the GPO Report. It is anticipated that this will be the Geonics EM61-MK2 time domain electromagnetic induction sensor with the 1.0- x 0.5 m coil. Sensor positioning will be with an RTK-DGPS.

6.5.2.1. Electromagnetic Sensor

The Geonics EM61-MK2 is a high-resolution time domain electromagnetic induction sensor capable of detecting both ferrous and non-ferrous metallic objects. This system consists of two air-cored coils, a digital data recorder, batteries, and processing electronics. The EM61-MK2's transmitter generates a pulsed primary magnetic field, which then induces eddy currents in nearby metallic/conducting objects. The decay of these eddy currents produces a secondary magnetic field that is measured by the receiver coil(s). Secondary voltages induced in this coil(s) are measured in mV at four separate time gates (216, 366, 600, and 1266 µsec) after the transmit pulse termination. For this project, the EM61-MK2 will be deployed in the wheel mode, or in the "stretcher" mode when appropriate, with the bottom coil height at 40 cm above the ground surface. Only the bottom coil will be utilized, as demonstrated at the GPO (Chapter 5, Subchapter 5.4.1) and all four time gates will be recorded at a 10 Hz rate.

6.5.3 Sampling Rates

Sampling rates for the EM61-MK2 will be 10 Hz, with 1 Hz sampling of the RTK-DGPS, whenever applicable.

6.5.4 Navigation and Mapping System

Positioning of the geophysical data at LF-29 will be accomplished with the RTK-DGPS.

6.5.4.1. Real Time Kinematic-Digital Global Positioning System

A Trimble 5700/5800 RTK-DGPS, or equivalent, will be used to position the geophysical data in all open areas. The Trimble 5700/5800 RTK-DGPS consists of a mobile 5800 GPS antenna/receiver located over the geophysical sensor and a 5700 base station antenna/receiver. Real time corrections from the base GPS receiver are broadcast to the roving GPS unit's internal radio via a radio link using a TRIMMARK 3 base station radio. This system provides positional updates at a rate of 1 Hz. Field experience with this system has demonstrated its ability to position sensor data accurately enough to meet the 1 ft (0.3 m) detection location requirement for known objects. The GPS location data will be collected in Geodetic Coordinates and then converted to the appropriate project Coordinate System (e.g., Universal Transverse Mercator [UTM], with units in meters). Survey line spacing will be every 2.5 ft (0.8 m). Known base stations near the areas of interest will be utilized.

Where the RTK-DGPS will be used, the PDC will use DGPS planning software to schedule DGPS positioned geophysical surveys during periods with more than four satellites visible above an established elevation (typically 15 degrees above the horizon) and a PDOP value of less than 6.0.

6.5.4.2. Line/Station/Fiducial Positioning

Line/Station/Fiducial positioning in not anticipated at this site.

6.6 Data Processing System

The PDC's Site Geophysicist will use sensor-specific software (e.g., Geonics DAT61MK2) to transfer data from field data loggers to a field computer. Sensor-specific software will be used to assess initial data quality and to format the data for data processing and analysis. Geosoft's Oasis Montaj software will be used to process and analyze the pre-processed survey data.

6.7 Daily DGM Procedures

The daily procedures for this geophysical investigation are summarized below:

- Morning health and safety briefing held on-site;
- Mobilize to survey area;
- Equipment set-up and warm-up (minimum of 5 minutes);
- Morning QC checks;
- Static check and known instrument response test/file in a clean area (metrics may be revised based on GPO);
- 1 minute static background data acquisition, no target; <2.5 mV or 1 nT p-p;
- 1 minute static spike test with known object; +/- 20% response from previous tests, after background correction;
- 1 minute static data acquisition, no target; <2.5 mV or 1 nT p-p;
- 30 second vibration test, data profile does not exhibit data spikes;
- 30 second personnel test, ,<2 mV or 3 nT p-p response;
- Acquire a line of repeat data (may be a line thru the GPO), repeatability of Response Amplitude +/- 20%, Positional Accuracy +/- 20 cm;
- Transfer morning QC data to Project Geophysicist;
- Update Field Data Form (DID MR-005-05, Attachment A) for each survey area;

- Acquire morning survey data. Survey data will be acquired within the established site boundaries with sets of overlapping lines. Survey line spacing will be every 2.5 ft (0.8 m), or as recommended at the approved GPO;
- Download morning survey data with initial QC check and lunch;
- Change batteries, as required;
- Sensor 5-minute warm-up; update Field Data Form;
- Acquire afternoon survey data. Survey data will be acquired within the established site boundaries with sets of overlapping lines. Survey line spacing will be every 2.5 ft (0.8 m), or as recommended at the approved GPO;
- Acquire Afternoon QC Checks:
    - Static check and known instrument response test/file in same clean area (metrics may be revised based on GPO);
    - 1-minute static background data acquisition, no target; <2.5 mV or 1 nT p-p;
    - 1-minute static spike test with known object; +/- 20% response from previous tests, after background correction;
    - 1-minute static data acquisition, no target; <2.5 mV or 1 nT p-p;
    - Acquire a line of repeat data (may be a line thru the GPO), repeatability of Response Amplitude +/- 20%, Positional Accuracy +/- 20 cm;
- Download afternoon survey data with final QC check;
- Shut down and store equipment;
- Return to hotel;
- Review survey progress and plan next day's activities;
- Put all batteries on charge;
- Transfer daily data to the PDC's Project Geophysicist for processing and analysis;
- Process and analyze survey data, including QC checks, area coverage, and anomaly selection; and
- Post processed data and QC test results posted to project ftp site.

6.8 Personnel

All geophysical field teams will consist of well-trained, experienced, certified crew members, supervised by the Site Geophysicist. The Site Geophysicist will manage all on-site geophysical investigations, data processing and analysis. The PDC has assigned Mr. Alan Crandall as the Project Geophysicist. He is responsible for all geophysical operations, data management, reporting, and DGM deliveries. The SUXOS, UXOSO/UXOQC, and any UXO Technicians, as required, will support the Site Geophysicist and geophysical teams in the field. Each DGM Team will include a certified Geophysical Instrument Operator (may be a qualified UXO Technician) and one UXO Technicians. The UXOQC is responsible for QC of all DGM operations.

6.9 Production Rates

The geophysical team is anticipated to survey an average of 1.5 acres per day at LF-29.

6.10 Data Spatial Density

Sampling density along-track will not exceed 2 ft (0.67 m) and across-track line spacing will not exceed 3.3 ft (1 m) or the across-track width of the sensor, whichever is smaller. The plan is to acquire data on

2.5 ft (0.8 m) line spacing, or as recommended by the GPO. Only intermittent occurrences of line spacing exceeding 3.3 ft (1 m) will be tolerated, unless these data gaps are around known obstacles.

6.11 Instrument Standardization

Instrument standardization procedures and frequencies will follow DID MR-005-05.01, Attachment B. Procedures and metrics will follow those established at the GPO (see Chapter 5) and will include the following:

- All equipment will be warmed-up for a minimum of 5 minutes before any data is acquired;
- Sensor positioning, within +/- 1 inch (2.54 cm) will be confirmed and recorded at the beginning of each survey day;
- Vibration test will be performed each time the sensor is assembled, typically in the beginning of each survey day. Sensor signals will be monitored for shake-induced offsets (i.e., no data spikes during the cable shake);
- The static background and response to a known target file will be recorded at the beginning and end of each survey day. Static background data will not vary more than 2.5 mV or 1 nT p-p, and the response to the same, known target will not vary more than 20% from test to test, after background correction or as established at the GPO;
- A 6-line test will be performed the first day on-site followed by a daily latency test over a known object; in two directions; and
- A repeat survey line will be acquired each morning and afternoon (may be a line thru the GPO). The data from the repeat line will be compared to previous survey lines. Sensor response amplitudes will be within +/- 20% in amplitude and anomaly peak location(s) will be positioned within +/- 20 cm for each survey.

6.12 Data Processing, Corrections, and Analysis

All data processing and data management will conform to the recommendations of the SOW and the approved GPO.

6.12.1 Initial Field Processing - Raw Geophysical Data Format, Storage, and Processing

Raw field data will be transferred daily from each geophysical team's data loggers to the Site/Project Geophysicist. This data will be stored in a logical file directory (folder) structure to facilitate its management and dissemination to all project members.

All raw field data will have a time stamp associated with each measurement event.

Each survey file name will be matched against the Field Data Form. Sensor-specific software will be used to transfer the survey data and plot survey data (sensor and position) for initial quality assessment.

Survey line numbers will be matched with the Field Data Form. Sensor data will be positioned with RTK-DGPS or DGPS data embedded in the survey data.

Raw survey data will be exported into the required deliverable American Standard Code for Information Interchange (ASCII) (i.e., X, Y, V1, V2, etc.) files for delivery and for import into Geosoft's Oasis Montaj.

Metadata in the form of a read-me file will be associated with each logical grouping of raw field data (e.g., names and contents of all files generated to map a grid).

Metadata will fully describe all measurements recorded in each data file.

Metadata will include all information necessary to successfully associate all geophysical system measurements to their correct geographical location or provide references to the location of this information.

Metadata will include instructions for generating ASCII formatted data from all raw data for use in computer processing systems.

6.13 Standard Processed Data, Format, Storage, and Analysis

After data transfer and initial field data assessment, the survey data will be processed and analyzed by the Site Geophysicist. Standard Geosoft Oasis Montaj processing will include the following:

- Importing each transferred data file into the Oasis project database. There will most likely be a database created for each survey area;
- Positional offset correction for the sensor will be made, if necessary;
- Sensor bias, background leveling and/or standardization adjustment will be performed. If the EM61-MK2 is used, the same background leveling and any adjustments will be applied to all channels equally;
- If necessary, sensor drift will be removed;
- If necessary, instrument latency will be corrected using an appropriate routine that accounts for instrument latency time and sensor velocity. Corrections will be specific for all segments of data with equal sensor velocities. No "zigzag" or "chevron" effects are visible in data maps when plotted at the scales used to detect the smallest amplitude signal for any given UXO item expected at this site;
- Any geophysical noise will be identified and, if necessary, removed. This may include spatial, temporal, motional, or terrain-induced noise that sufficiently exceeds background noise levels and competes with anomaly detection thresholds established at the GPO. The geophysical data processor will consult the field grid sheet and field team to confirm known noise sources;
- Database data will be gridded using the Minimum Curvature method and a typical grid cell size of 1/2 or less of the along-track sample spacing;
- A standard contour level selection with background shading and analysis will initially utilize the contour level used and agreed upon by all parties for the GPO. If necessary, the contour level will be adjusted to fit new data extremes;
- Standard UX-Detect will be used to initially select anomalies. The anomaly selection threshold will initially be the detection threshold used for the GPO data analysis;
- The anomaly classification method, established at the GPO, will be used to classify anomalies;
- All corrections will be documented;
- Data file size will be limited to 100 megabytes or less, and the file length will be limited to 600,000 lines or less. Each data file will be logically and sequentially named so that the file can be easily correlated with the project-specific naming conventions agreed upon; and
- Geo-referenced data image maps will be made for each grid for GIS integration.

6.14 Advanced Data Processing, Filtering and Enhancement

Any advanced data processing techniques (e.g., filtering or normalizing) used will be thoroughly documented. The PDC uses Geosoft UX_Process drift correction filters, as necessary, to level drifting data.

6.15 Anomaly Selection and Decision Criteria

The anomaly selection criteria will initially be based on the method established during the GPO. The GPO threshold will be optimized to maximize GPO seed item detection without selecting background or system noise. Anomaly peak response, signal to noise ratio (SNR), and size will be used to classify isolated anomalies based on the MEC item(s) expected. Each anomaly automatically selected by

Geosoft's Oasis Montaj UX-Detect will be examined by the Project Geophysicist for validity, position, size, and signal to noise/background. Some automatically selected anomalies that are associated with utility signatures or other known cultural signal sources will be commented, as such, in each target database and Dig List. Some anomalies may be re-positioned, and some anomalies that were not automatically selected will be added (e.g., anomalies along site edges). Areas of high density subsurface anomalies (e.g., potential disposal pits) will be identified with a boundary polygon.

6.16 Dig Sheet Development

The selected anomalies generated in Geosoft's software will be exported to a Microsoft Excel file. This file will conform to the Geophysical Anomaly Dig Sheet and Target History, as described in Attachment C of DID MR-005-05, with the inclusion of all anomaly classification parameters. Targets in the Dig List (sheet) will be identified with a unique identification that includes the survey area as part of the ID. A Dig List file of anomalies and any high-density area polygons will be delivered to the Government, along with the geo-referenced data image maps.

6.17 Subsequent Anomaly Resolution

The anomaly resolution phase of the project will be based on the DGM survey results provided above. The specific anomaly resolution tasks include anomaly reacquisition and intrusive investigation.

6.18 Anomaly Reacquisition

The PDC will reacquire each selected anomaly for intrusive investigation. Each anomaly will be relocated using the positioning system used to acquire the DGM data and marked with a plastic pin flag labeled with the target identification. The same sensor type used in the geophysical investigation will be used (e.g., the EM61-MK2 operating in the Monitor/Null mode) to refine the peak location within 1.5 ft (0.45 m) of the flagged anomaly. Once the refined peak location is found, the flag will be moved, if necessary, to mark the refined location and the refined anomaly peak response will be recorded on the Dig List. If an anomaly peak cannot be found, the location flag will be left and a "0 mV" peak response will be recorded on the Dig List, representing a reacquisition "no find." All no finds will be reviewed with the Site Geophysicist and flagged in the completed Dig List submitted to the USACE Geophysicist.

If the RTK-DGPS is used to relocate anomalies, the RTK-DGPS Reoccupation QC Test will be performed to demonstrate proper base station set-up and that the positioning system accuracy is <0.5 ft (15.2 cm).

6.19 Intrusive Investigation

Intrusive investigation procedures are described in Chapter 2 of this WP.

6.20 Feedback Process – Post-Intrusive DGM Check

During the intrusive operations, each anomaly type will be identified. The approximate weight will be logged along with any intrusive team comments. The anomaly location offset and direction from the refined reacquisition flag will be recorded, along with orientation, inclination, and depth to the anomaly top will be reported on the. The PDC's Project Geophysicist will review the results of each recovered anomaly and assess its validity with respect to signature amplitude, spatial extent, and location. If the recovered object and all its reported metrics (e.g., weight, ID, quantity, metal type and condition, surrounding terrain) match the data signature, the UXO Technician Team will "pass" the anomaly and record the results on the Dig List. If the recovered item and its reported metrics do not match the anomaly signature, the team will be asked to:

- Recheck the processed data;
- Recheck reacquisition accuracy and refinement; and
- May require the intrusive team to reinvestigate the anomaly.

If persistent location offsets are discovered, the sensor positioning will be adjusted and the data reprocessed and analyzed.

6.21 Digital Geophysical Mapping Operational Checks

Operational checks for DGM cover all aspects of DGM operations, from equipment set-up, operation, surveying, data processing and analysis, data management and reporting/delivery, as well as operator training. This subchapter describes the PDC's DGM QC methods and procedures. Most of these tasks are performed and checked by operating personnel during normal DGM operations. The QC oversight of the UXOQC is detailed in Chapter 10 of this WP.

6.21.1 On-site Proficiency Demonstration

All DGM field personnel and equipment will demonstrate their ability to meet project DQOs for surveying and anomaly reacquisition on the existing GPO prior to any field work (Chapter 5). This will include the initial mobilization of each team and will be repeated, as necessary, when personnel are replaced or equipment is replaced or repaired.

6.21.2 Periodic checks and audits

The PDC's UXOQC will perform periodic QC checks and audits to ensure the DGM Teams are following the WP requirements and SOPs. The UXOQC will also seed selected investigation areas with blind QC seed items at the rate of two blind QC seed per acre and will evaluate the DGM Team's performance in detecting and reporting QC seed item locations within the project location accuracy DQO (e.g., within 0.3 meters). The PDC's Project Geophysicist will perform a daily check of all DGM data, data processing and analysis results, anomaly selections, and a 100% review of all anomaly intrusive results. At the request of the UXOQC or the Project Geophysicist, any DGM Team may be asked to confirm their performance by repeating a GPO survey.

6.21.3 DGM Instrument Checks

6.21.3.1. Out-of-the-Box Equipment Tests

All equipment will be unpacked, batteries charged, and assembled as necessary at the hotel, the night prior to mobilizing to the GPO. All equipment will be inspected, powered and operated to complete the Out-of-the-Box Equipment Tests checklist.

6.21.3.2. Initial 6-Line Test

The first DGM day on-site, each DGM Team will acquire a 6-line test to document repeatable instrument response and accurate sensor positioning, including all processing latency and lag corrections. A clear line, at least 50 ft long will be identified near the established GPO. The EM61-MK2 will be set-up and warmed up for a minimum of 5 minutes. Data will be acquired with RTK-DGPS as follows:

- Line 0, acquire background in one direction;
- Line 1, acquire background in the opposite direction;
- A known object will be placed on the ground in the center of the line (e.g., at 25 ft);
- Line 2, acquire known object data in one direction, normal survey speed;
- Line 3, acquire known object data in the opposite direction, normal survey speed;
- Line 4, acquire known object data in one direction, faster than normal survey speed; and
- Line 5, acquire known object data in opposite direction, slower than normal survey speed.
- Processed results will demonstrate:
    - Repeatable instrument response within 20 %;

- Low dynamic noise conditions (e.g., < 2.5 mV or 1 nT p-p noise); and
- Known object peaks are positioned within acceptable limits (e.g., <0.3 m).

6.21.3.3. Daily AM and PM Static, and Dynamic Repeat and Position Tests

Daily Static Tests

At the beginning and end of each survey day, each DGM Team will perform the Static Test. These tests will be demonstrated at the GPO, but will be performed at varying locations convenient to each day's surveying, as follows:

- Equipment warmed up for a minimum of 5 minutes in a low-noise area;
- Follow normal instrument set-up;
- Open survey file with name: STMMDDAM or STMMDDPM;
- Line 0, 1 minute of static background;
- Line 1, 1 minute spike response (e.g., known object placed near coil);
- Line 2, 1 minute background;
- Line 3, 30 second Cable Shake test; and
- Line 4, 30 second Operator test.
- Static tests will be reported daily and should document:
  - Acceptable static background noise levels on all four EM61-MK2 channels (e.g., < 2.5 mV p-p);
  - Repeatable response to known object (e.g., +/- 20% from previous measurements);
  - Acceptable return to background;
  - No cable problems (repair/replace broken cable(s) and repeat test; and
  - Acceptable operator metal content (e.g., 2 mV p-p).

Daily RTK-DGPS Reoccupation Accuracy Tests

At the beginning of each survey day when RTK-DGS positioning is to be used, the DGM Team will document proper set-up and operation by

- Setting-up the GPS Base Station at a known survey control point; and
- The rover GPS antenna will be placed and leveled over a known location (e.g., a published grid corner location) and a position measurement made.

The comparison between the known X, Y location and the measured X, Y location will be reported daily and should document location accuracy within 0.5 ft (15.2 cm) total RTK-DGPS offset. Deviations greater than 0.5 ft (15.2 cm) will require the team to:

- Verify differential radio link is working; the rover fix quality is RTK Fixed; and the internal GPS metric for SNR is 4.0 or greater, PDOP is 6.0 or lower, and number of satellites in view is 5 or greater. All of these GPS metrics indicate acceptable system performance; and
- Check and verify proper base station location data has been used and that the base GPS antenna is directly over the control point, or check that Base GPS or radio antennas have not blown over.

6.21.3.4. Repeat RTK-DGPS Reoccupation Test.

Daily Dynamic Repeat and Position Tests

At the beginning and end of each survey day, each DGM Team will perform the Dynamic Test over a known test strip (TS) that is typically 25 ft long, centered over a known object (e.g., M125 Bomb or its approved simulant) in both directions. Standard anomaly avoidance procedures will be followed in locating and seeding the test strip, or a line in the GPO may be used. Each test will be recorded in separate files to distinguish them from production DGM survey data. These tests will be demonstrated at the GPO, but will be performed daily as follows:

- Equipment warmed-up for a minimum of 5 minutes in a low-noise area;
- Follow normal instrument set-up;
- Open a repeat survey file;
- Line 0, acquire data over the test strip in one direction; and
- Line 1, acquire data over the test strip in the opposite direction.
- Processed dynamic tests will be reported daily and should document:
    - Acceptable response to test strip object (e.g., <20% from previous measurements); and
    - TS object location is within project requirements (e.g., <0.3 m).

6.22 Real Time Operator Checks

During all DGM survey operations, the operator will monitor the real time display on the data logger and periodically report the battery voltages, RTK-DGPS status, if used, and observe the display for each time gate for normal values.

6.22.1 Battery Replacement/Recharging (sensor and data logger)

Whenever the EM61-MK2 backpack battery drops below 12.0 volts direct current or excessive instrument drift is observed, the operator will halt the DGM survey and replace the backpack battery and go thru normal start up procedures before continuing. Whenever the data logger battery indicator starts blinking, the operator will halt the DGM survey and charge the data logger for a minimum of one hour before continuing.

6.22.2 Review Satellite Planning Software and Check GPS Base Station

If the RTK-DGPS fix quality is not sufficient for DGM (e.g., the PDOP exceeds 6.0), the Project Geophysicist will review the GPS satellite coverage using commercial satellite planning software to determine if satellite availability, elevation, or geometry are the cause of poor PDOP. DGM surveys using RTK-DGPS positioning will be scheduled during peak satellite coverage.

6.22.3 Data Transfer and Initial Checks

Each DGM Team is responsible for transferring the DGM data to the Project Geophysicist. The EM61-MK2 SOP instructs them to store each day's files to the memory card.

6.22.4 File Name and Size Checks (laptop & data logger)

The Site Geophysicist will verify file names and sizes once the data are transferred to the field PC. Any discrepancy will require the file or files to be re-transferred.

6.22.5 Sensor Noise, Spikes, Drop Outs, Drift, and Offset Checks (Sensor Software & OASIS)

The Project Geophysicist will initially examine the raw data using the sensor manufacturer's software. They will flag noisy data (e.g., background noise levels exceed those experienced at the GPO) for potential resurveying, and spiky data (e.g., cable-related or electronics problem) for possible instrument repair and resurvey. Any data that are flagged for excessive background noise or spikes are checked against the field grid sheet to confirm potential geologic or terrain features and recorded on the Field Editing Check List, as well as in the Weekly DGM Reports. If necessary, the field team will be required to revisit the survey area to confirm the source of increased noise and update the field grid sheet. If the source of the flagged noise can not be confirmed or the noise source is identified as a system fault, that portion of the data will be flagged for recollection. They will use the sensor manufacturer's program to position the survey data with the embedded RTK-DGPS data. They will review the positioned XYZ file for area coverage and data gaps other than those identified on the field grid sheet. The positioned XYZ files will be loaded into Geosoft's OASIS Montaj for processing and analysis. In OASIS, the Project Geophysicist will process the data to remove drift and offsets. He/she will compare the original data to the processed data to insure the processed data has not been adversely affected by the data processing techniques used (e.g., does not alter the peak response of anomalies by more than 5%).

6.22.6 Position Data Quality and Area Coverage Checks (OASIS)

With the data loaded into OASIS, the Project Geophysicist will grid the data and display the gridded data as a color image map. The shape of gridded anomalies (e.g., chevrons) may indicate the need to correct the positioned data for latency or lag. Any gaps in area coverage that differ from the obstructions identified on each field data sheet will be flagged. Using the tools available in OASIS and information from the Repeat QC Tests, the Project Geophysicist will reprocess the data to eliminate chevrons and assess area coverage and sampling density.

6.22.6.1. Corrective Action, If Required

Based on the initial quality control checks, the Project Geophysicist will either accept the data quality for subsequent processing and analysis, or follow one of the following:

- Re-transfer data from data logger;
- Reposition data in DAT61MK2;
- Filter, despike, drift-correct (OASIS) and recheck;
- Re-collect data, if necessary; and
- Archive Raw Data and post on project ftp site.

At the end of each day, the Site Geophysicist will archive the day's data to CD ROM. This will include all raw and processed data. They will post the required data files onto the project ftp site and notify the Project Geophysicist and GIS Manager of their availability. As a final daily check, the Site Geophysicist will open selected archived files to assure valid backup.

6.22.7 Data processing quality control checks

During data processing, the Project Geophysicist will examine each data file to help assure that project DQOs are being maintained.

6.22.7.1. Site and Sensor-Specific Test Results (e.g., GPO results)

The initial GPO results will be examined to verify seed item detection rate is within project requirements.

6.22.8 Daily AM and PM quality Control Test Results – Record

The Project Geophysicist will examine each DGM QC test file and verify and record:

- Background noise level (</= project DQO established at GPO);

- Spike response (+/- 20%) from previous tests;
- Return to background is normal;
- Cable shake results (</= project DQO established at GPO);
- Operator check results (</= project DQO established at GPO);
- RTK-DGPS Reoccupation Test offset is </= 0.5 ft (15,24 cm);
- Repeat amplitude(s) are within +/- 20%; and
- Repeat anomaly locations are within 0.3 m (1 ft) of each other.

6.22.8.1. Daily QC Corrective actions may include:

If the vibration tests indicate data problems, the EM61-MK2 will be examined for loose or faulty cables. All electrical connectors will be examined and reseated. Cable strain relief may be added to reduce cable motion.

If the static background data drifts more than 2.5 mV, the battery will be replaced and the test repeated, including sensor warm-up.

If the static response to a known target varies by more than +/-20%, the batteries will be replaced and the test repeated, including sensor warm-up.

The geophysical repeat data profiles will be examined and compared to data collected previously. Should problems exist in the data set or the quality of the data is unacceptable, the survey will be suspended until the problem(s) is corrected and the corrections are verified. All survey data collected from the time of the last successful repeat test and identification of the quality problem will be isolated and at the discretion of the Project Geophysicist may be rejected and require recollection.

6.22.9 Survey Sensor Data Quality Checks and Corrections

Standard data processing steps and checks include:

- Drift correction (record routine and parameters used);
- Lag or latency correction (record routine and parameters used); and
- Noise, velocity (sample separation), and missed area metrics (footprint); record results.

6.22.10 Data Analysis Checks

Once the Project Geophysicist is satisfied with the data processing and initiates the data analysis for potential anomalies, he/she will:

- Check anomaly threshold picks above background – check all survey area edges; manually add anomalies not automatically picked;
- Check multi-channel response - check for normal sensor response (e.g., TG1>TG2>TG3>TG4), flag or remove anomalies that are automatically selected under abnormal response conditions (e.g., electrical noise near power lines);
- Assess anomaly spatial extent (e.g., target size);
- Assess anomaly SNR;
- Check anomaly size determination based on the project anomaly identification methodology (initially established during GPO);
- Assess anomaly size metrics against background;
- Generate Dig List with all anomalies as established at the GPO;

- Identify any high density areas with polygon. Include polygon points on Dig List;

  NOTE: The PDC will work with USACE to identify and finalize any high density areas.

- Generate Target map with targets and high density polygons;
- Provide Dig List and Target Map to UXOQC for Blind QC Seed check (UXOSO/UXOQC); and
- Record results.

6.22.10.1. Corrective Action, If Required

Corrective measures may include:

- Reprocess, and reanalyze the survey data, if necessary; and
- Assess impact of changing geophysical conditions on project metrics and anomaly selection method.

6.22.11 Data Management Quality Checks

The Site Geophysicist is responsible for managing all field data. The Project Geophysicist is responsible for final data quality checks, formatting the data for delivery, and regular data deliveries. Data management checks include:

- Verify archived data;
- Verify formatted data and associated read me file have been delivered (e.g., posted to project ftp site); and
- Data files will include:
  - Raw data files for all QC tests and survey files;
  - ASCII files of all raw data, positioned data, and final processed databases;
  - Maps; and
  - Dig Lists.

6.22.12 Anomaly Reacquisition Quality Checks

Once the selected anomalies have been reviewed and selected for resolution, they will be reacquired for intrusive investigation. Approved Dig Lists and anomaly image maps will be made available to field personnel. The anomaly reacquisition SOP will be followed to mark and refine all selected anomalies. From this baseline, the following anomaly reacquisition quality checks and reports will be performed.

6.22.12.1. Relocation Accuracy Check

The RTK-DGPS will be checked for accuracy each day with a reoccupation test at a known point to within 0.5 ft (15.2 cm). Any failures during these tests will require the RTK-DGPS set-up and operation to be checked and retested. Once the relocation accuracy is accepted, the individual anomaly locations are reacquired and marked. Once marked, the location is refined with the geophysical sensor operating in the monitor/null mode to identify the anomaly peak location. Once the anomaly peak location is identified, the anomaly flag will be moved to the refined peak location and the following information recorded on the Dig List:

- Refined peak value (mV or nT);
- Refined location offset direction and distance<1 ft (<0.3 m). The UXOQC will monitor all anomaly refining operations and ensure that no offset exceeds 3.3 ft (1 m). Any refined offset that exceeds 3.3 ft (1 m) is referred to the Project Geophysicist to resolve and correct.

In the event that the reacquisition team is unable to reacquire and verify an anomaly on the selected Dig List, the following steps will be applied:

- Place (or replace) a pin flag at the interpreted location;
- Recalculate and re-measure the interpreted location (watch for transposition of numbers); and
- Re-evaluate the location using the geophysical instrument and reacquisition techniques described in Chapter 5.

If the anomaly cannot be relocated, it will be recorded on the Dig List and returned to the Project Geophysicist for review.

If more than 5% of refined dig flags are not positioned within 3.3 ft (1 m) of an anomaly source, anomaly reacquisition work will be suspended. The Dig List and map will be returned to the Project Geophysicist for review (e.g., wrong coordinate assignment, reprocessing of data, data spikes, re-evaluation of picks, etc.). Once the suspect data has been reevaluated, a new Dig List and map will be generated by the Project Geophysicist and forwarded to the reacquisition team. During any of these corrective actions, if the field equipment is found defective, it will be returned to the manufacturer/supplier for replacement. Any new equipment will be demonstrated on the GPO plot prior to project use.

6.23 Post-Intrusive Object/Anomaly Check

The intrusive teams will investigate each refined anomaly location, report their findings on the Dig List, and verify the selected anomaly has been removed with an EM61-MK2. In addition to the standard field UXOQC QC checks on the intrusive results, the Project Geophysicist will review the results of each recovered anomaly and assess its validity with respect to signature amplitude, spatial extent, and location. If the recovered object and all its reported metrics (e.g., weight, ID, quantity, metal type and condition, surrounding terrain) match the data signature, they will "pass" the anomaly and record the results on the Dig List. If the recovered item and its reported metrics do not match the anomaly signature, the team will be asked to:

- Recheck the processed data;
- Recheck reacquisition accuracy and refinement ; and
- May require the intrusive team to reinvestigate the anomaly.

6.23.1 DGM Reports

The Site Geophysicist will maintain and generate a daily DGM report. The daily reports will be summarized in a weekly report that will include a QC section. The weekly DGM report section will:

- Document any DGM failures, their root cause analysis, resulting corrective action(s), and any rework results; and
- Summarize all daily DGM results.

6.24 DGM Records Management

The PDC will utilize the Field Data Sheets and Data Processing Check Lists (see **Appendix H** under Standard Operating Procedures – OPS-05 Digital Geophysical Mapping) to track and account for each data file from acquisition through delivery and final reporting. All raw and processed survey data will be archived daily on the project ftp site.

6.25 Interim Reporting

Weekly survey reports will be delivered to the Government representative and posted to the project ftp site. This report will include areas surveyed, known missed areas, problems encountered and corrective action taken, and plans for the next survey week.

Raw survey data (e.g., ASCII X, Y, V1, V2, etc. format) will be delivered within 36 hours of each survey day.

Initial Dig Lists will be delivered within 24 hours of each survey day. Intrusive investigation results will be reported within 24 hours of intrusive activities; all known missed areas will be documented.

Final processed data, final Dig Lists and final maps will be delivered with the draft report.

6.26 Map Format

All delivered maps will conform to the format specified in DID MR-005-05, attachment D.

DGM maps will be provided in Geo-Tif format for incorporation into the project GIS. Final GIS maps will be delivered in pdf and ESRI formats.

6.27 MEC/UXO Detection

Table 6-1 summarizes the required detection depths for the MEC items listed in the SOW. Actual MEC/UXO detection performance will be established at the GPO.

6.28 Horizontal Accuracy

Horizontally, 95% of all reacquired anomalies will lie within a 1.64 ft/0.5 m radius (unrefined) of their original surface location reported on the Dig List. Horizontally, 95% of all excavated items will lie within a 1.64 ft/0.5 m radius of their mapped surface location (refined), as marked in the field after reacquisition.

6.29 Geophysical Mapping Data, Land Surveying and Mapping

The PDC will utilize an available third order survey control monument or establish a local control point, if no third order control is available, as an RTK-DGPS base station for DGM activities.

Selected anomaly locations will be reported in North American Datum of 1983 (NAD83) UTM, zone, with units in meters. No survey file will exceed 100 MB in size or contain more than 600,000 lines of data. All raw and processed survey data will be delivered in the required ASCII (X, Y, V1, V2, etc.) file format on CD-ROM or via ftp to a designated ftp site. The PDC will provide a site address, username, and password, if this method of data delivery is requested. A Microsoft Word™ document describing the field activities and processing associated with the delivered data will be included.

6.30 Geophysical Data Analysis, Field Reacquisition, and Reporting

Within 24 hours of each intrusive investigation day, the PDC will provide anomaly Dig Lists in Microsoft Excel format, conforming to the format specified in DID MR-005-05.01, attachment C.

6.31 Anomaly Reacquisition and Marking

The PDC will utilize the identical equipment and trained personnel used to acquire the geophysical data to reacquire and mark selected anomaly locations. It is planned that this activity will immediately precede the intrusive activity.

6.32 Anomaly Excavation Reporting

Following the approved project Dig List, the UXO Technicians will excavate each reacquired anomaly. The details of each intrusive investigation will be recorded on the Dig Lists. These updated Dig Lists will be provided to the Project Geophysicist for feedback on data analysis amplitude relative to recovered item and location accuracy. The PDC will provide the updated project Dig Lists with the intrusive results and the Project Geophysicist feedback results to USACE within ten days of completed target anomaly excavations. This data will also be included in the project report.

7.0 GEOSPATIAL INFORMATION AND ELECTRONIC SUBMITTALS

This chapter details procedures that the PDC will use to perform mapping and GIS integration during the MR. This plan has been developed IAW DID MR-005-07.

7.1 Accuracy

The PDC will utilize existing survey control at the Base using Class I, Third Order control monuments, established by a PLS. The horizontal control will be based on either the English or the metric system and referenced to the NAD83 and the UTM Grid System. Vertical control is not required for this project. Any control points established or recovered will be constructed of iron or steel pins, concrete monuments, or other permanent construction method meeting the standards found in EM1110-1-1002. This construction will ensure recoverability for any current or future work at the MRA.

7.2 GIS Incorporation

The GIS database will be maintained at the Bay West office located in St. Paul, Minnesota. This database is used to store preliminary and final or published versions of project GIS data. It is the official project repository of GIS data, including unprocessed feature and attribute data sources that may be used outside the GIS. The home office-based database is the main location for processing data sources into draft and final GIS products, as well as production work.

All GIS data will be in ESRI Shapefile format. Raster data, if acquired, will be in Tagged Image File Format (TIFF) or Multi-Resolution Seamless Image Database (MrSID)-compliant format. Associated databases will be in Microsoft Excel format.

7.3 Plotting

Maps will be plotted at an appropriate scale and have a revision block, title block, index sheet layout, legend, grid lines, scale bar, and a true north arrow. In general, the direction of north will run from the bottom of the file to the top, with no skew. A sheet index for the project will be prepared that includes enough of the planimetric data to indicate the sheet's geographical location in the project area. This index will be shown on each map with the current sheet crossed-hatched or heavily outlined. If required, a separate sheet file may be utilized for the index.

7.4 Mapping

The location, identification, coordinates, and elevations of all control points recovered or established at the site will be plotted on a map. Each control point will be identified on the map by its name and number and the final adjusted coordinates and elevations. The coordinates for grid corners will be shown to the closest 1.0 ft. Locations of individual recovered MEC items will be located to a horizontal accuracy of ± 1 ft (30.48 cm) within the grid and plotted on a map.

7.5 Digital Design Data

All GIS Data will be delivered in ESRI Shapefile format. A READ ME file will be included with delivered data, which will contain basic information about each Shapefile.

7.6 Computer Files and Digital Data Sets

All final document files will be delivered in IBM and MS Office compatible formats. The drawing and plot data will be provided in the UTM Coordinate System, NAD83, and units in feet or meters. GIS data will be submitted in ESRI Arc Map-compatible format. Raster data, such as United States Geological Survey Topographic Quadrangles or Orthophotography will be provided in either TIFF or MrSID format. All ArcGIS project files (.mxd) will be supplied with the appropriate final report. In addition to GIS data and project files, maps will be delivered in PDF format for viewing without modification.

All final GIS data generated from this project will conform to the Spatial Data Standards for Facilities, Infrastructure and Environment.

8.0 WORK, DATA AND COST MANAGEMENT PLAN

This Work Data and Cost Management Plan (WDCMP) has been prepared for the purpose of effective management of allocated funds and project manpower. The plan defines the approach to managing the project, the method of cost control, and outlines a schedule for implementing the project.

8.1 Project Management Approach

The PDC has evaluated the work requirements for the project and has developed a phased structure for achieving the project objectives and performing the work. The goals and objectives of the project are identified in Chapter 2 of this WP.

8.1.1 Communication

All communications between the PDC and USACE will primarily be directed through the PMs. Communication directly between the PDC and other Government entities associated with this project will only occur when directed by USACE.

8.1.2 Subcontractors

The PDC will maintain overall supervisory responsibility for all subcontractor operations. Currently, the sole subcontractor, USAE, will work under the direction and oversight of Bay West's PM and will be monitored by Bay West's UXOQC.

Bay West and USAE will jointly schedule operational activities and a strict accounting will be made of actions performed and activities completed. Throughout operations, Bay West and USAE will coordinate their operations and adhere to this WP.

8.1.3 Records Management

Hard copies of primary records for the project will be retained in the project files located in the Bay West St. Paul, Minnesota, office located at 5 Empire Drive, St. Paul, Minnesota 55103. Such records will include the TO and any modifications, correspondence, including meeting minutes and monthly reports, draft submittals, responses to comments and final submittals, and correspondence received from USACE or other agencies. Electronic versions of working products will be retained within the Bay West St. Paul network server. Access to all servers is password controlled. Historic records and documents including previous study reports, historic drawings and maps, and related items will be retained in working files in the Bay West Lektriever file system. Copies of these data will be provided on CD-ROM, as required.

8.1.4 Project Status Reports

During field operations, the PM will prepare reports as necessary to summarize project information. The reports will be provided to the USACE PM. Information on the following will be provided:

- Schedule/Progress data;
- Progress by task including actual completion versus planned;
- Project schedule indicating baseline schedule and explanations for deviations;
- Notice of 85% expended of project funds;
- Discussion of ability to complete within funds currently authorized;
- List/status of pertinent correspondence related to the project;
- List/status of deliverables and dates submitted; and
- Discussions of any issue that impact completion of project on schedule.

8.2 Monthly Safety Exposure Report

The PM will submit a monthly safety exposure report to the USACE PM. This report will be in letter format and include the following information:

- Hours worked in direct support and cumulative hours to date;
- Number of lost workday accidents and cumulative for the project;
- Number of lost workdays due to on-the-job accidents and cumulative to date; and
- Number of property damage accidents in which property loss value is $2,000.00 or more, and cumulative to date.

8.3 Project Schedule

A final project schedule will be developed after NTP and the project requirements are clarified by USACE.

8.4 Cost Control and Tracking

A computer-based cost control and tracking system will be used to prepare earned value monthly reports. The report will be prepared to assess the project expenditures by task. The expenditures on each task will be rolled-up to total project expenditures to date.

8.5 Deliverables

The PM is responsible throughout the project for issuing the following documents, which is important with respect to the work, data, and cost management plan:

- Daily Quality Control Reports (only during field operations); and
- Monthly Safety Exposure Reports.

9.0 PROPERTY MANAGEMENT PLAN

In accordance with the SOW, a Property Management Plan is not applicable to this project.

10.0 QUALITY CONTROL PLAN

10.1 Introduction

The QC process starts with top management commitment and involvement. The process provides a permanent and workable system that allows each employee to understand the job performance expected. The QC and improvement process ensures that the actions, procedures and tools support every employee and that the training required for the job is provided to the employee. 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 QC Plan provides the procedures and methods to be used for the MEC RA at the HAFB project site. This plan addresses organization and responsibilities, equipment testing and calibration, QC inspections and audits, and reporting procedures.

10.1.1 Three Phase Inspection

The PDC uses a three-phase inspection system to ensure quality. The three-phase inspection system identifies expectations and provides all team members the opportunity to have input to process improvement. These inspections are conducted for each definable feature of work.

10.1.1.1. Preparatory Phase Inspection

The preparatory phase inspection identifies work requirements, expectations, safety criteria and adequacy of equipment, materials and personnel. This inspection is conducted prior to beginning any field work. This inspection consists of a formal briefing, equipment inventories, site training and an on-site proficiency demonstration. All DGM field personnel and equipment will demonstrate their ability to meet project DQOs on the existing GPO. This will be repeated, as necessary, when personnel are replaced or equipment is replaced or repaired. The UXOQC will observe all of these activities to ensure both the WP and DGM SOPs are being followed. See **Appendix F** for an example of the inspection document.

10.1.1.2. Initial Phase Inspection

The initial phase inspection tests the first work completed to identify any problem areas and allow for process improvement. This inspection consists of a briefing/debriefing and process testing. See **Appendix F** for an example of the inspection document.

10.1.1.3. Follow-On Phase Inspection

The follow-on phase inspection controls quality through process observation, testing and feedback from client and work teams. This is a continuous process and is documented in field logs and QC reports.

10.2 Quality Management Structure

The positions listed below comprise the Quality Management Team during operations at the project site. Duties are explained Chapter 2 of this WP. Names and qualifications of additional site personnel will be provided prior to mobilization.

- Corporate QC Manager
- Project Manager
- Senior UXO Supervisor
- UXO Quality Control Specialist
- Project Geophysicist

10.2.1 UXOQC

In addition to the duties outlined in Chapter 2 the UXOQC has the following responsibilities:

- Reviewing, implementing, and enforcing the QC plan;
- Coordinating with the OESS to ensure QC objectives are appropriate for the task being performed;
- Evaluation of site conditions at the time of the work and comparison to basis for planned approach;
- Coordinating with project personnel to ensure QC procedures are appropriate in demonstrating validity sufficient to meet QC objectives;
- Project QC documentation will include, but not be limited to: audits; inspections; corrective/preventive actions and procedures; data management; site operations; pass/fail criteria (as necessary); identification and classification of recovered items; and records generated at site, such as daily logs;
- BSI placement and evaluation. The UXOQC will work with the project PLS to get the location of each BSI;
- Verifying DGM operator training;
- Routine checks and audits to ensure that the DGM Teams are following the approved WP and DGM SOP and Checklists;
- DGM data quality checks, including RTK-DGPS reoccupation accuracy, sensor static and dynamic noise, repeat response amplitude and position, sampling density down-line (e.g., speed) and across-line;
- DGM anomaly selection checks;
- Anomaly reacquisition and intrusive QC checks;
- Post-intrusive DGM checks;
- Conducting QC testing, inspections and audits of documents, work in progress and work performed. Recording and reporting the results to the appropriate project personnel;
- Recommending to the SUXOS any actions to be taken in the event of a QC failure;
- Advising the UXO Teams on all QC related site matters;
- Has STOP WORK authority for issues regarding QC at the project site;
- Documenting all QC actions for inclusion in the project record and after action report;
- Preparing and submitting field change requests; and
- Assisting the Government QA representative.

10.2.2 Project Geophysicist

In addition to the duties outlined in Chapter 2, the Project Geophysicist will work closely with the USACE Project Geophysicist and the PDC Site Geophysicist on all project DGM operations, quality control metrics, and DGM decisions and recommendations. They will work with the site UXOQC to document the detection of QC BSIs. The Project Geophysicist has the following additional responsibilities:

- Verifying DGM operator training;
- Routine checks and audits to ensure that the DGM Teams are following the approved WP and DGM SOP and Checklists;
- DGM data quality checks, including RTK-DGPS reoccupation accuracy, sensor static and dynamic noise, repeat response amplitude and position, sampling density down-line (e.g., speed) and across-line;

- DGM anomaly selection checks;
- Anomaly reacquisition and intrusive QC checks; and
- Post-intrusive DGM checks.

10.3 QC Inspections and Reports

Project QC inspections, audits, and reports are divided into Administrative, Equipment, DGM procedures and MEC intrusive operations.

Personnel responsible for the inspections, reviews, corrections, and reports are identified in the following paragraphs.

10.3.1 Administrative

10.3.1.1. Contract Submittal

Documents required under this contract will be developed and maintained by a project team consisting of the PM, UXOQC, SUXOS (if required), and Corporate QC Manager. These team members will contribute their corporate knowledge and experience to the documents to ensure technical quality.

The PM will lead the 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 SUXOS will review completed documents to ensure accuracy and completeness of munitions-related procedures and reports. After the project team has performed a peer review of documents, the QC Manager 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 experts for resolution. Changes to final WPs will be submitted to the UXOQC immediately upon approval. The UXOQC will be responsible for ensuring that the changes are posted to the hard copy on file at the project site and that all field personnel are made aware of the changes.

10.3.1.2. Qualifications and Training

The UXOQC will maintain personnel files on each employee at the project site. These files include copies of necessary licenses, training records, certificates of qualifications, and resumes that support the employee's placement and position. Site personnel must meet the qualifications as outlined in Chapter 2 of this WP.

10.3.1.3. Logs and Forms

All logs and forms described in Chapter 2 of this WP are subject to review and inspection by the UXOQC and SUXOS.

10.3.2 Vehicles and Equipment

The DGM and UXO Teams are responsible for checks of their vehicles and equipment. The UXOQC will spot check inspections and documentation. Unless otherwise specified all equipment will be inspected daily.

Instruments and equipment, such as geophysical/navigational, and data analysis and transfer systems used to gather and generate site specific data (i.e., GPS, noise, and data sampling densities) to support the removal action, will be tested with sufficient frequency and in such a manner as to ensure that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Instruments or equipment failing to meet the standard will be repaired, recalibrated, or replaced. Replaced instruments or equipment must meet the same specifications for accuracy and precision as the item removed from service. DGM operator proficiency will also be evaluated regularly for proper instrument set-up, operation, survey technique, and data transfer. The Project Geophysicist will conduct training refreshers, if necessary.

Equipment to be tested for use at the project site is identified in Chapter 5 of this WP. This includes, but is not limited to, the EM61-MK2 and the RTK-DGPS.

Geophysical instruments including handheld analog detectors will be checked on the GPO daily and after any repairs. They 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 UXOQC will document and maintain records pertaining to the testing, repair, and/or replacement of equipment on-site.

10.3.2.1. Vehicles and EMM

Vehicles and EMM will be inspected daily IAW the forms in **Appendix F**. Maintenance such as greasing will be conducted IAW with operator/owner manuals.

10.3.2.2. Communications

Cell phones and radios will be checked daily by their users.

10.3.2.3. Hand Tools and Support Equipment

Hand tools will be checked before use for broken parts and usability. Broken equipment will be repaired or replaced. Fire extinguishers, eyewash and first aid kits will be checked at the beginning of each workday as part of the tailgate safety brief.

10.3.2.4. DGM Equipment

Each DGM Team will follow the equipment SOPs (see **Appendix H**) for set-up, operation, and data transfer. These SOPs include all QC checks. Specific QC tests include (metrics may be adjusted at GPO):

- RTK-DGPS Reoccupation QC Test any day the RTK-DGPS is used (offset < 0.5 ft);
- Initial 6-line Test whenever a new DGM Team arrives (appropriate data processing for repeatable amplitude response +/- 20% from previous measurements, and accurate peak positioning within 0.67 ft (0.20 m);
- Daily Equipment Warm-up (e.g., a minimum of 5 minutes);
- AM and PM Static QC Tests: <2.5 mV p-p on Time Gate 3, +/-20% Spike response, no cable related problems, and operator noise is <2 mV on time gate 3, check all time gates; and
- AM and PM Repeat QC Tests: < +/- 20% amplitude variation, and < 0.67 ft (0.20 m) location offset.

DGM Equipment Accuracy

The Project Geophysicist will verify accurate sensor positioning is being maintained primarily by the AM and PM Repeat QC Test results and positioning system Reoccupation QC Test results. The UXOQC will perform weekly reviews of the MEC data to ensure accurate categorization of munitions-related items encountered and to ensure that all MEC items are accounted for. The UXOQC will evaluate the accuracy of all project GIS, (e.g., project map), before posting to the project web site.

PWS coverage will be evaluated by the UXOQC to determine if the geographic features are correct. Errors found will be corrected and noted in the field operations logbook. A detected error will result in the data being examined and the correct location and place points will then be determined in the project GIS data set to represent identifiable elements of the feature (i.e., corners or intersections).

DGM Equipment Calibration

The UXOQC will check to ensure that instruments and equipment are calibrated or recalibrated IAW the manufacturer's recommendation or owner's manual. Calibrations will be completed on a prescribed schedule and the calibration results recorded in the daily field logbook.

If necessary, each DGM Instrument Operator will re-null the EM61-MK2 if the operator observes a shift in local background conditions or any other cause for instrument drift prior to opening and beginning any DGM survey file. The EM61-MK2 operator will not re-null the instrument during any DGM survey. No other calibration is expected.

Recalibration will be performed, as necessary, with the reason for the recalibration and the results recorded in the daily field logbook.

DGM Daily Checks

The UXOQC will conduct audits of operational checks to ensure the DGM Teams are following the WP requirements and SOPs. DGM SOPs and Checklists include the following:

- Out-of-the-Box-Tests;
- EM61-MK2 SOP;
- RTK-DGPS SOP;
- Initial 6-line test;
- Daily Static, Dynamic Repeat, and Position QC Tests;
- Daily Position Reoccupation Accuracy Test;
- Data Storage and Transfer Checklist;
- Checklist for Field Editing and Processing;
- Data Management Checklist; and
- Anomaly Reacquisition SOP.

10.3.2.5. Analog Detectors

The handheld analog magnetometers and/or all-metals detectors will be tested against the known site munitions objects each work day prior to field activities. Before using analog detectors, the PDC will establish a test area containing several "seed" items. These seed items will be of similar size and construction of items anticipated to be located on the project site. Seed items must be free of hazardous items/materials. Seed items will be placed at the typical maximum detection depth. Once the GPO is established, it will serve as the analog detector test plot.

10.4 Quality Control of Field Procedures

10.4.1 Review of DGM Data

The Project Geophysicist will review each day's DGM data for completeness. The Project Geophysicist will review the QC Test data and compare the results to those provided by the Project Geophysicist. Any discrepancies will be resolved prior to data submittal.

10.4.2 Reacquisition

DGM Reacquisition QC tests will include a positioning system reoccupation test each day of reacquisition, and verification by the UXOQC that any refined anomaly offset from the reported anomaly location does not exceed 1.6 ft (0.5 m). The UXOQC will monitor and verify that the reacquisition teams are following the approved WP and SOPs. Routine reacquisition QC tests will include the Positioning system Reoccupation QC Test (offset +/<0.5 ft (0.15 m) and compare reacquisition anomaly peak is within +/- 20% of reported peak.

The reacquisition team will verify that all reacquisition QC test results meet project objectives. The UXOQC will verify that the Dig Lists are being updated with the reacquisition peak response values and location offsets are within 3.3 ft (1 m) of the reported anomaly location or as established at the GPO.

10.4.3 Post-Intrusive Object/Anomaly Check

The intrusive teams will investigate each refined anomaly location and report their findings on the Dig List. In addition to the standard field QC checks on the intrusive results, the UXOQC will verify the Project Geophysicist's 100% review of the reported anomaly results. If, in the professional opinion of the Project Geophysicist, the recovered object matches the data signature, the anomaly will "pass" and be recorded in the results of the Dig List. If, in the professional opinion of the Project Geophysicist, the recovered anomaly does not match the data, he or she will:

- Check the processed data;
- Check reacquisition accuracy and refinement; and
- Require the intrusive team to reinvestigate the anomaly.

10.4.4 Blind Seed Items

The PDC's UXOQC will place QC BSIs at the minimum rate of two BSIs per survey acre. These items will be appropriate simulants within the range of expected MEC. It is expected that the QC BSIs will be placed in areas accessible to DGM. The UXOQC will establish the location of each BSI using the project PLS, GPS, the Laser Distance Meter, or Tape Measures, and will forward those locations to the Project Geophysicist after the generation of the Dig List for resolution of non-selections. The UXOQC will report the QC BSI detection results in the weekly QC report.

10.4.4.1. Corrective Action, if required

Any QC test failure or failure to detect and report a QC BSI will result in the initiation of a root cause analysis to document the cause of the failure, assess any impact of previous work, and initiate a corrective action, including:

- Verifying BSI burial depth and location accuracy;
- Training refresher;
- Equipment repair/replacement;
- QC BSI failure;
- BSI location error;
- BSI behind obstruction and not covered by the sensor;
- BSI buried too deep; and
- Data processing positioning error.

10.4.5 Data Analysis and Anomaly Selection Error

The Project Geophysicist and UXOQC will assess the effect of the nonconformance on previous data and recommend a resolution that may include a check of a minimum of five excavations performed by the same UXO Team prior to and directly after the failed anomaly to ensure project removal action requirements are being met. Any repaired/replaced equipment or change in operators may require a repeat of the GPO survey to document that project objectives and metrics are being met.

10.5 MEC Intrusive Investigation

The UXOQC will perform QC testing of completed work as outlined in **Table 10-1**. All QC inspections will be documented for acceptance or non-acceptance of the work performed. Additionally, the UXOQC will conduct inspections of recovered scrap, MPPEH, etc., to ensure there are no explosive residues.

Table 10-1: Quality Control Testing, Nonconformance Criteria and Remedial Action

Frequency	Testing Method	Nonconformance Criteria	Remedial Action
As Required	Electronic verification of clearance of burial pits using analog detector.	Recovery of a UXO or other metallic object equal to or greater than 1.5 inches by 7.2 inches, the size of the E61R4 biological bomblet.	Re-sweep of completed burial pit UOP and continued excavation if necessary.
As Required	A verification of clearance using the EM61-MK2 of at least 10% of completed DGM selected target investigations, randomly selected.	Recovery of a UXO or other metallic object equal to or greater than 1.5 inches by 7.2 inches, the size of the E61R4 biological bomblet.	Review and rework of all completed work in UOP.
As Required	Verification of reported no finds and geologic anomalies (hot rock or soil, etc.) using the EM61-MK2.	Recovery of a UXO or other metallic object equal to or greater than 1.5 inches by 7.2 inches, the size of the E61R4 biological bomblet.	Review and rework of all completed work in UOP.
As Required	A sweep of at least 10% of the Real Time Survey (RTS) areas using handheld detectors with similar capabilities of those used to clear the area.	Recovery of a UXO or other metallic object equal to or greater than 1.5 inches by 7.2 inches, the size of the E61R4 biological bomblet.	Review and rework of all completed work in UOP.
Daily when DGM is performed	Review of daily DGM QC data. This will include coverage maps.	Any reported recovery or no find, which in the professional opinion of the Project Geophysicist or UXOQC, does not correspond to the reported DGM amplitude.	Re-work of the completed anomaly.
Daily when DGM is performed	Ground truth of DGM data, this may include random RTS sweeps of completed areas with handheld all-metals detectors.	Discovery of any portion of any UOP not receiving an appropriate clearance.	Re-work of incomplete area.
Daily	Random inspection of detection instruments.	Detection instrument unable to detect selected target.	Repair or replace instrument. Verify completion of anomalies that were cleared with the faulty instrument after its last check and prior to the QC check.
As required	Random inspection of at least 10% of MPPEH/MD inspection process.	Item containing energetic material classified as MD or scrap.	Reinspection of all items in UOP.
Daily	Review of logbooks, explosives records, forms or other documents.	Items are not in compliance with guidance in this WP.	Brief UXO teams on actions required to conform, recheck documentation.

Work will be tested in Units of Production (UOP). These will be dictated by work flow and may be any logical unit such as time the work was completed or the area completed. The size of the UOP must be large enough to indicate whether work is in conformance with the contract, but small enough to prevent large areas of rework.

As a component of the initial phase inspection, QC will test the first completed UOP as soon as possible after completion. This ensures that any necessary corrective actions can be taken before any new work is started.

Nonconforming UOPs will be corrected. The UXOQC will conduct a Root Cause Analysis to determine if the nonconformance is the result of the process, procedures, equipment and/or personnel and to what extent of previously performed work may have been affected. The UXOQC will provide his findings to the PM and SUXOS with suggested or required corrective actions. Once approved by management, the UXO Teams will implement the corrective actions. The purpose of the root cause analysis is to identify areas for remedial action, prevent reoccurrence of problems and improve the overall work process. Therefore, the inspection and corrective actions will be briefed to all UXO Teams.

Conforming UOPs will be referred to the Government for quality assurance actions.

10.6 Reports

10.6.1 DGM QC Report

The Project Geophysicist will generate and maintain a daily DGM report. This may be reported in a logbook or on a filed expedient form; a copy will be attached to the DQCR. Daily reports will be summarized into a weekly report that will include a DGM QC section. This weekly report will be signed by the Project Geophysicist and UXOQC, and submitted with the weekly data delivery. A copy will be kept with the DQCR. The weekly DGM QC report section will:

- Document any DGM QC failures, their root cause analysis, impact assessment on previous work, resulting corrective action(s), and any rework results; and
- Summarize all daily QC reports.

10.6.2 UXOQC Reports

The UXOQC will prepare the following reports on the form provided in **Appendix F**. Copies will be attached to the DQCR.

- Inspection report of any UOP inspected; and
- Inspection report of any functional area inspected.

10.7 Lessons Learned Program

As required by ER 1110-1-12, a Lessons Learned Program (LLP) will be developed by the PDC to provide for the exchange of information regarding problems that may occur during the MEC burial pit RA at the HAFB project site.

10.7.1 Lessons Learned Objective

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

- 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
- To promote efficient and cost effective business practice.

10.7.2 Team Responsibilities

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

11.0 ENVIRONMENTAL PROTECTION PLAN

This Environmental Protection Plan (EPP) IAW DID MR-005-12 describes the approach, methods, and operational procedures to minimize pollution, protect and conserve natural resources, restore damage, and control noise and dust during burial pit RA activities at HAFB in Alamogordo, New Mexico. Project activities will comply with all Applicable or Relevant and Appropriate Regulations (ARARs).

Field activities will include: surface sweep; excavation; soil screening for MD/MPPEH/MEC; intrusive investigation of target anomalies in the excavation base and sidewalls; identification, collection, segregation and appropriate disposition of encountered MD/MPPEH/MEC; backfilling; and site restoration (as required).

At the project site, there are no known archaeological resources or sensitive environmental habitats. If potential cultural artifacts are encountered during burial pit RA activities, excavation operations will cease and USACE will be notified of a potential archaeological find.

11.1 Environmental Considerations

Section 121(d)(1) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), requires that remedial actions must attain a degree of clean-up that assures protection of human health and the environment. ARARs include federal standards, requirements, criteria, and limitations under state environmental or facility siting regulations. Although the requirements of CERCLA Section 121 generally apply as a matter of law only to remedial actions, the Environmental Protection Agency's (EPA's) policy for response actions is that ARARs will be identified and attained to the extent practicable.

11.2 Endangered/Threatened Species

The Endangered Species Act, 16 USC 1531 et. Seq., requires that this action not jeopardize the continued existence of endangered or threatened species, or their habitats. As no endangered or threatened species have been identified at the site, this act will not apply to the work being performed.

11.3 Wetlands

The Wetlands Protection Act, 33 CFR 320 et. Seq., requires that this action be taken in such a manner as to minimize loss or degradation of wetlands. There are no designated wetlands at the project site.

11.4 Cultural, Archaeological and Water Resources

No known cultural, archaeological or water resources exist at the site.

11.5 Coastal Zones

The project site is not in a coastal zone.

11.6 Trees and Shrubs

Vegetation may be cut to facilitate the use of geophysical instruments and other work. Vegetation will be cut no closer than six inches to the ground.

11.7 Existing Waste Disposal Sites

LF-29 is a known landfill used for the disposal of spent munitions and construction debris. All material except MEC, MD and MPPEH will be returned to the landfill.

11.8 Mitigation Procedures

11.8.1 Manifesting, Transportation and Disposal of Wastes

Munitions debris will be disposed of as outlined in Chapter 2 of this WP.

11.8.2 Project Generated Solid Wastes

Solid wastes (drinking water bottles, food containers, or other material) generated during the project will be stored in plastic bags for disposal by a local disposal facility. MD will be collected and stored in separate containers and disposed of off-site. Inert MD will be disposed of off-site IAW the SOW. Non-munitions scrap will be returned to the burial pit when backfilling.

11.9 Burning Activities

No burning activities will take place during this project.

11.10 Dust and Emission Control

Airborne dust resulting from the use of EMM will be monitored. If necessary, water will be used to control dust.

11.11 Spill Control and Prevention

Spill control and prevention is addressed in subchapter D.20 the APP in **Appendix D**.

11.12 Storage Areas and Temporary Facilities

The site office will be a portable office. A lockable Conex box will be used for storage of field equipment. Site power will be provided by a portable generator.

11.13 Access Routes

The PDC does not anticipate the need to develop or improve roads for site access. To the greatest extent practical, field teams will use developed roads and surfaces to access work locations within the project site.

11.14 Trees and Shrubs Protection and Restoration

No tree and shrub protection or restoration will be required.

11.15 Control of Water Run-on and Runoff

Excavation activities will not disturb the local drainage patterns. Excavated soils will be used to backfill the excavations and manually graded to site contours.

11.16 Decontamination and Disposal of Equipment

No equipment will require decontamination and disposal on this project. Except for MEC, this project does not involve any hazardous materials or hazardous wastes. Any MEC that is found during the burial pit RA will most likely be disposed of on-site by detonation.

11.17 Minimizing Areas of Disturbance

Procedures for minimizing areas of disturbance include such measures as:

- Driving on established roads as much as possible;
- Limiting vehicle trips in areas without roads; and
- Replacing soil into holes that result from excavation.

11.18 Post-Activity Clean-up

At the conclusion of field activities, the PDC will remove all project materials and solid wastes from the project site. Excavations will be backfilled with the displaced soil and/or imported backfill, and re-graded as best as possible to its prior contours.

11.19 Air Monitoring

Air monitoring will not be performed for the project.

12.0 INVESTIGATIVE DERIVED WASTE PLAN

Because of the shallow depth of sampling on this project the volume of Investigation Derived Wastes (IDW) will be minimal. IDW will be left in its original location.

13.0 INTERIM HOLDING FACILITY SITING PLAN FOR RCWM

In accordance with the SOW, an Interim Holding Facility Siting Plan for RCWM is not applicable to this project.

14.0 PHYSICAL SECURITY PLAN FOR RCWM

In accordance with the SOW, a Physical Security Plan for RCWM is not applicable to this project.

15.0 REFERENCES

The following are references applicable to this project; however, the cited references are not all-inclusive. The PDC will comply with applicable Federal, State, and local requirements. Following all applicable requirements and regulations listed in the following publications will ensure the safety and health of on-site and facility personnel and the local community.

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

15.2 Occupational Safety and Health Administration

Occupational Safety and Health Administration (OSHA) 1994 General Industry Standards, 29 CFR 1910 and Construction Industry Standards, 29 CFR 1926; especially 1910.120/29CFR 1926.65-Hazardous Waste Site Operations and Emergency Response.

15.3 USACE Publications

- EM 1110-1-1905, Bearing Capacity of Soils, October 30, 1992.
- EM 1110-1-4009, Military Munitions Response Actions, June 15, 2007 with Errata Sheets 1 and 2.
- EM 385-1-1, Safety and Health Requirements Manual, November 3, 2003.
- EP 1110-1-18, Military Munitions Response Process, April 3, 2006 with Interim Guidance Document 06-04, March, 2006.
- ER 385-1-95, Safety and Health Requirements for Munitions and Explosives of Concern (MEC) Operations, Military Munitions Center of Expertise (MM CX), March 30, 2007, with Errata Sheet 1 December 2007.
- EP 385-1-95a, Basic Safety Concepts and Considerations for Ordnance and Explosive Operations, August 27, 2004 with Errata Sheet 1 , September 22, 2006, Errata Sheet 2 , June 29, 2007 and Errata Sheet 3 , December 4, 2007.
- EP 385-1-95b Explosives Safety Submissions, March 28, 2003.
- Guide, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions, August 1988.
- Guide, HNC-ED-CS-96-8 Revision 1, Guide for Selection and Siting of Barricades for Selected Unexploded Ordnance, September 1977.
- Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosive Sites, August 1998, with Terminology Update, March 2000.
- Technical Update 3, Mathematical Equations and Calculations for MEC Operations, November 21, 2007.
- Technical Update, Implementation of DDESB Guidance on Minimum Separation Distances for Unintentional Detonations, September 11, 2007.
- DID MR-005-01 Type II WP.
- DID MR-005-02 Technical Management Plan.

- DID MR-005-03 Explosives Management Plan.
- DID MR-005-04 Explosives Siting Plan.
- DID MR-005-05 Geophysical Investigation Plan.
- DID MR-005-05.01 Geophysics.
- DID MR-005-05-05A Geophysical Prove-Out Plan (GPO) and Report
- DID MR-005-06 Accident Prevention Plan.
- DID MR 005-07 Geospatial Information and Electronic Submittals.
- DID MR-005-08 Work, Data & Cost Management Plan.
- DID MR-005-11 Quality Control Plan.
- DID MR-005-12 Environmental Protection Plan.
- DID MR-015 Accident Reports.
- DID MR-025 Personnel Resume.
- DID MR-045 Report /Minutes, Record of Meetings.
- DID MR-055 Telephone Conversations/Correspondence Records.
- DID MR-085 Weekly Status Report.

15.4 Army Regulations and Pamphlets

- Army Regulation (AR) 190-11, Physical Security of Arms, Ammunition and Explosives, November 15, 2006.
- AR 385-10, The Army Safety Program, August 23, 2007.
- Department of the Army (DA) Pamphlet 385-64, Ammunition and Explosive Standards, November 28, 1997, with Change 1, December 15, 1999.

15.5 Department of Defense Publications

- DoD Instruction 4140.62, Management of Material Potentially Presenting and Explosive Hazard, December 3, 2004.
- DoD Standard 6055.09-STD, Ammunition and Explosive Safety Standards, February 29, 2008.

15.6 Department of Defense Explosives Safety Board

- Department of Defense Explosives Safety Board Munitions Fragmentation Database, December 31, 2007.

15.7 Other Documentation

- (USDA 1981), (United States Department of Agriculture (USDA) Soil Conservation Service and Forest Service. Soil Survey of Otero Area, New Mexico; Parts of Otero, Eddy, and Chaves Counties, 1981.
- (HGL, 2007) HydroGeoLogic, Inc. (HGL2007), Supplemental RCRA Facility Investigation, LF-10 (SWMUS 101 And 109) and LF-29 (SWMU 104), Holloman Air Force Base, Alamogordo, New Mexico, 2007.
- (TE, 2007) Explosive Ordnance Incident Report, 110-002-07, 110th Technical Escort, June 14, 2007.

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Appendix A
Figures

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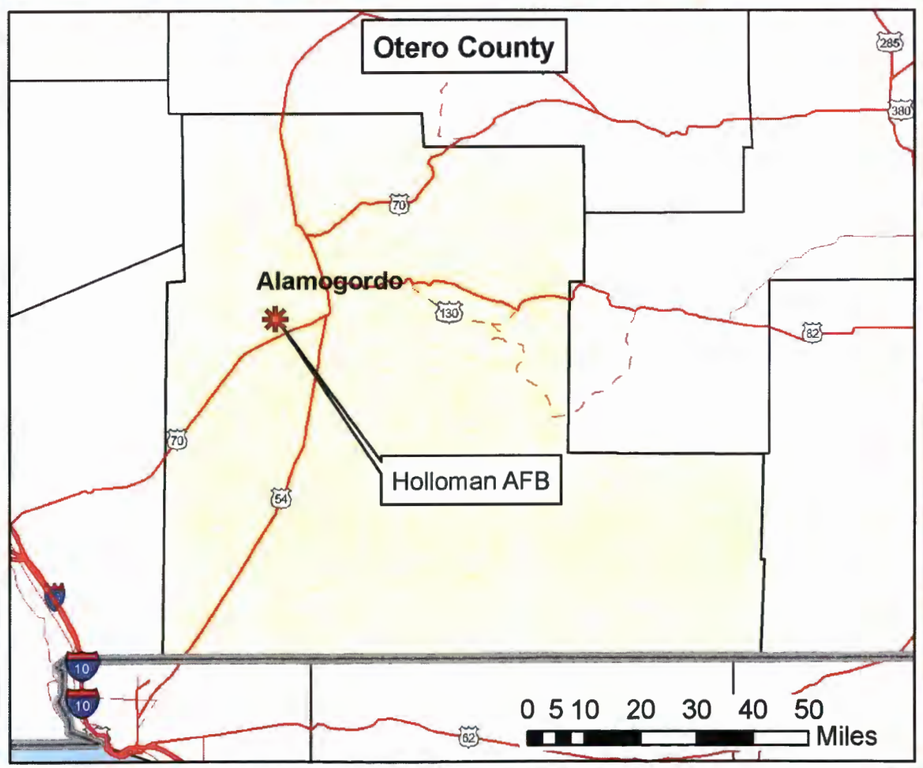

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Data is projected to the UTM Coordinate System: Zone 13 North, NAD83, Units in Meters. Aerial Photo: June 18, 2006

Legend

- Interstates
- Highways
- Major Roads
- Otero County
- New Mexico Border

Figure 1-1
Location

Landfill 29 (SWMU 104)
Holloman AFB, New Mexico

MEC Removal

Contract No: W9128F-04-D-0004
Task Order: 0043

Bay West	ENVIRONMENTAL SERVICES ST. PAUL, MN	
Drawn By: TVP	Scale: Varies	Rev: 00
Checked By: WM	Date Drawn: 7-20-08	
Submitted By: WM	Revision Date:	

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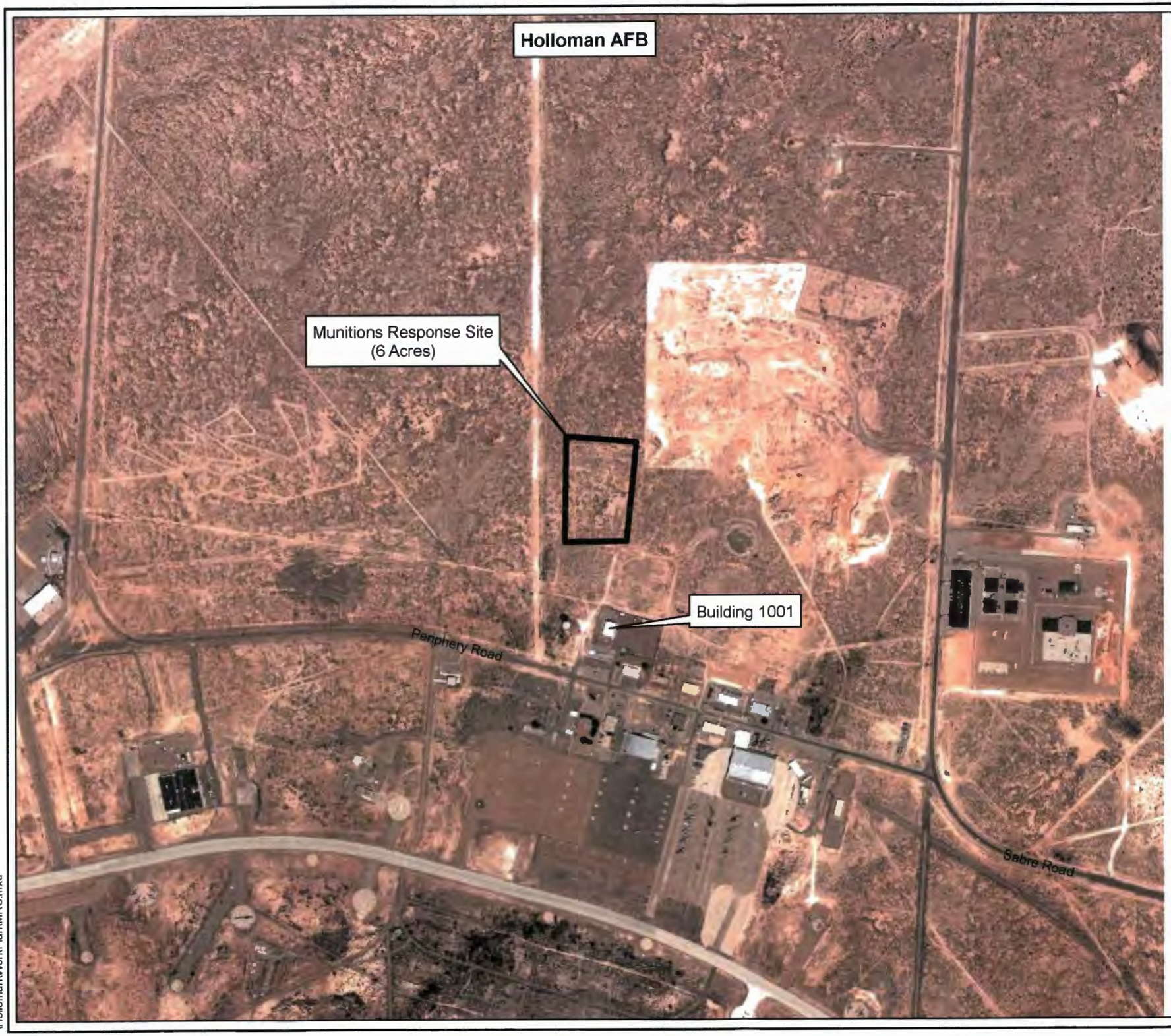

N

Data is projected to the UTM Coordinate System: Zone 13 North, NAD83, Units in Meters. Aerial Photo: June 18, 2006

0 600 1,200 Feet

0 72 144 288 432 Meters

Legend

MRS (6 Acres)

Figure 1-2
Munitions Response Site

Landfill 29 (SWMU 104)
Holloman AFB, New Mexico

MEC Removal

Contract No: W9128F-04-D-0004
Task Order: 0043

Bay West	ENVIRONMENTAL SERVICES ST. PAUL, MN	
Drawn By: TVP	Scale: 1:7,200	Rev: 00
Checked By: WM	Date Drawn: 7-20-08	
Submitted By: WM	Revision Date:	

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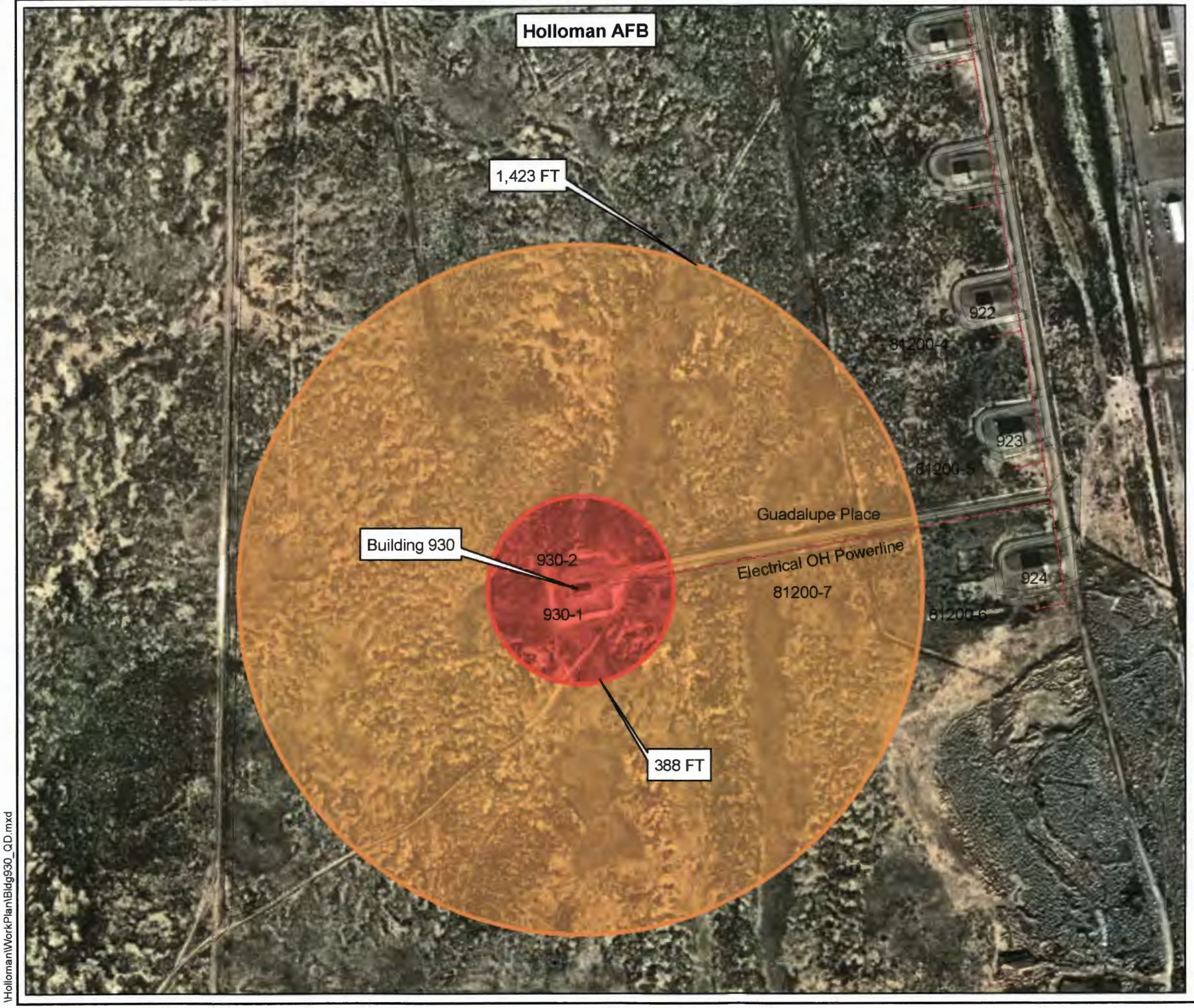

N

Data is projected to the UTM Coordinate System: Zone 13 North, NAD83, Units in Meters. Aerial Photo: June 18, 2006

0 400 800 Feet

0 48 96 192 288 Meters

Legend

- Electrical Overhead Powerline
- 388 FT = Table 3.9 AFMAN 91-201
- 1,423 FT = Based on Sited N.E.W. of 45,000 LBS

Figure 3-1
Building 930
Quantity Distance Arc

Landfill 29 (SWMU 104)
Holloman AFB, New Mexico

MEC Removal

Contract No: W9128F-04-D-0004
Task Order: 0043

Bay West	ENVIRONMENTAL SERVICES ST. PAUL, MN	
Drawn By: TVP	Scale: 1:24,000	Rev: 00
Checked By: WM	Date Drawn: 7-20-08	
Submitted By: WM	Revision Date:	

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N

Data is projected to the UTM Coordinate System: Zone 13 North, NAD83, Units in Meters. Aerial Photo: June 18, 2006

0 2,000 4,000 Feet

0 240 480 960 1,440 Meters

Legend

- Approved Explosive Transportation Route
- 388 FT = Table 3.9 AFMAN 91-201
- 1,423 FT = Based on Sited N.E.W. of 45,000 LBS

Figure 3-2
Building 930 (Explosive Storage Magazine) and Approved Explosive Transportation Route

Landfill 29 (SWMU 104)
Holloman AFB, New Mexico

MEC Removal

Contract No: W9128F-04-D-0004
Task Order: 0043

Bay West — ENVIRONMENTAL SERVICES, ST. PAUL, MN

Drawn By: TVP	Scale: 1:24,000	Rev: 00
Checked By: WM	Date Drawn: 7-20-08	
Submitted By: WM	Revision Date:	

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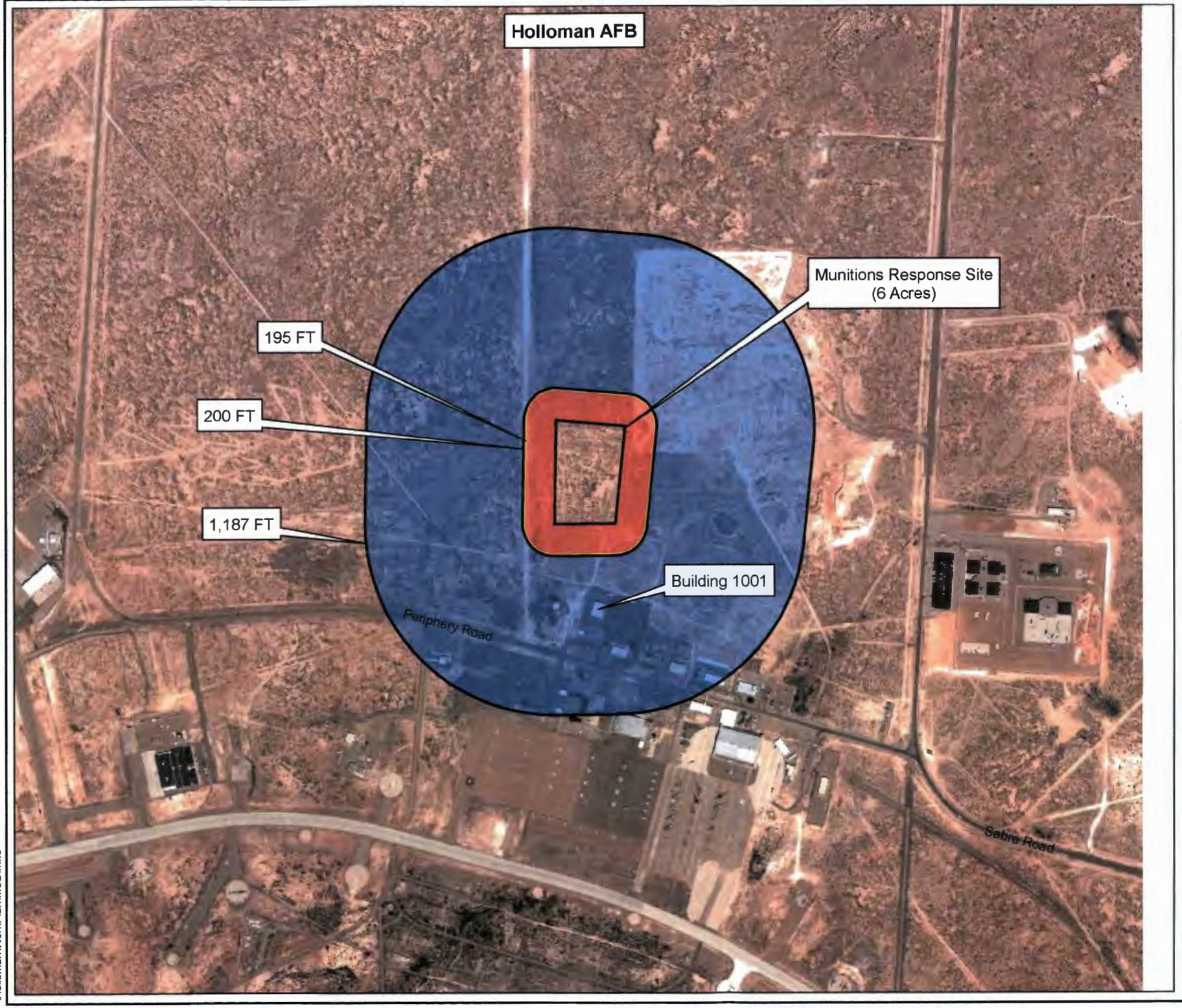

N

Data is projected to the UTM Coordinate System: Zone 13 North, NAD83, Units in Meters. Aerial Photo: June 18, 2006

0 600 1,200 Feet

0 72 144 288 432 Meters

Legend

- MRS (6 Acres)
- Hazardous Fragment Distance (195 FT)
- Minimum Separation Distance For Intentional Detonations With Engineering Controls (200 FT)
- Maximum Fragment Range-Horizontal (1,187 FT)

Note:
Minimum Separation Distances Based On M125 Chemical Bomblet With Simulant Filler.

Figure 4-1 Minimum Separation Distances

Landfill 29 (SWMU 104)
Holloman AFB, New Mexico

MEC Removal

Contract No: W9128F-04-D-0004
Task Order: 0043

Bay West — ENVIRONMENTAL SERVICES, ST. PAUL, MN

Drawn By: TVP	Scale: 1:7,200	Rev: 00	
Checked By: WM	Date Drawn: 7-20-08		
Submitted By: WM	Revision Date:		

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Data is projected to the UTM Coordinate System: Zone 13 North, NAD83, Units in Meters. Aerial Photo: June 18, 2006

0 100 200 Feet

0 12 24 48 72 Meters

Legend

- Site 29 Monitoring Wells
- LF-29 Boundary (6 Acres)
- Potential GPO

Figure 5-1 GPO and LF29 Site Map

Landfill 29 (SWMU 104)
Holloman AFB, New Mexico

MEC Removal

Contract No: W9128F-04-D-0004
Task Order: 0043

Bay West — ENVIRONMENTAL SERVICES, ST. PAUL, MN

Drawn By: TVP	Scale: 1:1,200	Rev: 00
Checked By: WM	Date Drawn: 7-20-08	
Submitted By: WM	Revision Date:	

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Appendix B
Explosive Ordnance Incident Report

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EXPLOSIVE ORDNANCE INCIDENT REPORT For use of this form, see FM 4-30.5; the proponent agency is TRADOC.	1. UNIT NUMBER 110-002-07	2. CONTROL NUMBER	3. UNUSUAL ☒ 4. ROUTINE ☐

SECTION A: INITIAL INFORMATION

5. DATE/TIME REPORTED	9. INCIDENT LOCATION	11. ITEM(S) REPORTED
010300Z Jun 07	Holloman Air Force Base, NM Grid: 13SCS 9795036640	Approximately 171 E61 Bio Bomblets located in a landfill near the northern part of the Holloman AFB Garrison area
6. REPORTED BY USAF Holloman AFB, NM (49th CES)		
7. PHONE NUMBER (505) 572-3066	**10. POINT OF CONTACT** AF MSgt Smith, Lee Superintendant of CE Readiness & Emerg. Mngmt lee.smith@holloman.af.mil	
8. ADDRESS 550 Tabofa Ave HAFB, NM 88330		

SECTION B: ACTION BY EOD

12. PERSONNEL DISPATCHED	13. DATE/TIME	14. TRAVEL DATA	15. WORK HOURS
2LT Flowers, Dustin W. SGT Wilson, Todd SFC Borgelt, Brad SSgt Brandon Parrish, A1C Bren Mejia, A1C Patrick Dougherty (AF)	A. DPRT 030900ZJUN07 B. ARR 032130ZJUN07 C. COMPL 081145ZJUN07	A. AIR: FLYING TIME B. VEH: MILEAGE	A. TRAVEL B. INCIDENT

16. CONFIRMED IDENTIFICATION	17. DISPOSITION
1/2-LB Bomb, Biological, E61R4 w/ E34R4 PD Fuze approx 250ea and approx 12ea E99 Bomblets	At the time of incident completion, all munitions and components were still submerged in decontaminant solution and were turned over to the Holloman AFB hazardous materials team for disposition of the scrap.

18. INCIDENT NARRATIVE (INCLUDE ALL SIGNIFICANT DETAILS AND PROBLEMS

At approximately 010300Z Jun 07 (312300 EDT May 07) Army Operations Center, relayed a request for Technical Escort Unit (TEU) support from USAF Holloman AFB, NM to dispose of suspected biological submunition (171 bomblets) possible E61R4 biological test rounds. CDR, Holloman AFB approved initial entry on 6 Jun 07. Consolidation of elements from 22nd TE and 110th TE were finalized on site and the six-man EOD initial entry party crossed the hotline at approximately 060945JUN07 with a work plan as follows: The incident area of concern was an area around 35m X 20m rectangular, with four well defined piles of ordnance. The 3-man AF EOD team was going to take two piles, and the 3-man Army EOD team were to take the other two piles; plan of action for each team was to establish a decontamination sump (6 gal bleach, 15 gal water) and begin separating the items/munitions that were functioned from items that appeared armed/unfunctioned. A collective count of fired/functioned munitions was not taken because the focus were items that were not yet functioned, and to determine the filler. Each munition and munitions component was inspected by one of the six EOD personnel downrange. As it was determined to be empty/ functioned, the item was placed into the decontamination sump.

The endstate of the initial entry survey was that all surface munitions and components were removed and deemed fired/functioned and soaked in decontamination solution and no other items of interest remained. Upon completion, the EOD team collectively estimated there were 200 to 250 empty munitions soaking in the two down range sumps, and there were no "live" bomblets among them. In addition to the E64R4 bomblets, there were also approximately 12ea E99 bomblets mixed in the piles. These too were deemed empty.

Fort Detrick Special Report 251 dated Sept 1955 (Final Engineering Report, E61R4 and E133R3) indicates that the bomblets dropped over HAFB were for fuze testing purposes as modifications became necessary to the original design, and the filler was likely water, or water/simulant slurry.

EOD left the two sumps downrange as the sample team made entry the following day to take soil samples to be sent to a lab for analysis. Lab results came back negative for contamination. The two sumps full of decontaminant and scrap ordnance were turned over to Holloman AFB for disposition as hazardous waste.

SECTION C: AUTHENTICATION

19. NAME AND GRADE AND SIGNATURE OF UNIT COMMANDER	20. TELEPHONE NO.	21. DATE(YYYYMMDD)
Roberto A. Bettes CPT, OD Commanding	(253) 967-8318	20070614

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Appendix C
Local Points of Contact

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Appendix C
Local Points of Contact

Name	Title or Organization	Telephone	Cellular
Scruggs, David	Holloman AFB Remediation Project Manager	(575) 572-5395	(575) 491-8261
Thomas, Terri	USACE Project Manager	(402) 995-2749	N/A
Myers, Dennis	USACE OESS	(402) 995-3900	(720) 670-0842
Salane, Tim	Bay West Project Manager	(651) 291-3470	(651) 291-1781
Hickey, Doug	Certified Industrial Hygienist	(736) 479-3214	(612) 719-9922
Martrildonno, Wayne	Bay West UXOQC/UXOSO	N/A	(651) 248-9551
Quarles, Shawn	Holloman AFB Weapons Safety	(575) 572-3793	N/A
Gerald Champion Medical Center	N/A	(505) 439-6100	N/A
Holloman AFB EOD	49 CES/CED	(575) 572-5141	N/A

N/A: Not Applicable

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Appendix D

Accident Prevention Plan

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SIGNATURE PAGE

Prepared by: Tim Salane, PE

Tim Salane, PE
Sr. Project Manager
Bay West, Inc.

August 29, 2008
Date

Reviewed by:

Wayne Martrildonno
UXO Technical Manager
Bay West, Inc.

August 29, 2008
Date

Doug Hickey, CIH
Certified Industrial Hygienist
Bay West, Inc.

August 29, 2008
Date

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APPENDIX D: ACCIDENT PREVENTION PLAN

ACKNOWLEDGEMENT

Site Health and Safety Plan Acknowledgment

I have read, understand, and agree to abide by the provisions as detailed in this Accident Prevention Plan and Site-Specific Safety and Health Plan prepared by Bay West, Inc. Failure to comply with these provisions may lead to disciplinary action and/or my dismissal from the work site.

Printed Name	Company	Signature	Date

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Attachment 3 Directions to the Hospital, Evacuation Route and Emergency Phone Numbers
Attachment 4 Site Safety and Health Plan
Attachment 5 Plan for Prevention of Alcohol and Drug Abuse
Attachment 6 Material Safety Data Sheets
Attachment 7 Hazard Control Plan

ACRONYMS AND ABBREVIATIONS

AFB ..... Air Force Base
AHA ..... Activity Hazard Analysis
ANSI ..... American National Standards Institute
APP ..... Accident Prevention Plan
BBP ..... Bloodborne Pathogen
bgs ..... Below Ground Surface
BW ..... Bay West, Inc.
CDC ..... Center for Disease Control
CERCLA ..... Comprehensive Environmental Response, Compensation and Liability Act
CFR ..... Code of Federal Regulations
CIH ..... Certified Industrial Hygienist
CPR ..... Cardiopulmonary Resuscitation
DGM ..... Digital Geophysical Mapping
DoD ..... Department of Defense
DOT ..... Department of Transportation
DQCR ..... Daily Quality Control Report
EM ..... Engineering Manual
EMM ..... Earthmoving Machinery
EMR ..... Experience Modification Rate
EMS ..... Emergency Medical Services
ENG ..... Engineering
EP ..... Engineering Pamphlet
ERP ..... Emergency Response Plan
ERS ..... Environmental Remediation Services
EZ ..... Exclusion Zone
Ft ..... Feet
GB ..... Sarin (nerve agent)
HAFB ..... Holloman Air Force Base
HAZWOPER ..... Hazardous Waste Operations and Emergency Response
HTRW ..... Hazardous, Toxic and Radioactive Waste
IAW ..... In Accordance With
lb/lbs ..... Pound/Pounds
LF-29 ..... Landfill 29
MD ..... Munitions Debris
MEC ..... Munitions and Explosives of Concern
MPPEH ..... Material Potentially Presenting an Explosive Hazard
MR ..... Munitions Response
MSDS ..... Material Safety Data Sheet
N/A ..... Not Applicable
NCP ..... National Oil and Hazardous Substances Pollution Contingency Plan
°C ..... Degrees Centigrade
OE ..... Ordnance and Explosives
°F ..... Degrees Fahrenheit
OSHA ..... Occupational Safety and Health Administration
OSIC ..... On-Scene-Incident-Commander
PDC ..... Project Delivery Contractor
PI ..... Preliminary Investigation
PPE ..... Personal Protective Equipment
QC ..... Quality Control
RI ..... Remedial Investigation
RMSF ..... Rocky Mountain Spotted Fever
SA ..... Site Assessment
SEA ..... Safety Equipment Association
SFRI ..... Supplemental RCRA Facility Investigation
SOP ..... Standard Operating Procedure
SOW ..... Statement of Work
SSHP ..... Site-Specific Safety and Health Plan
SUXOS ..... Senior UXO Supervisor
SZ ..... Support Zone
TBD ..... To-be-determined
TE ..... Technical Escort
USACE ..... Unites States Army Corps of Engineers
USAE ..... USA Environmental, Inc.
UXO ..... Unexploded Ordnance
UXOSO ..... Unexploded Ordnance Safety Officer

APPENDIX D
ACCIDENT PREVENTION PLAN

D4.0 BACKGROUND INFORMATION

This Accident Prevention Plan (APP) has been prepared for the implementation of Munitions and Explosives of Concern (MEC) Burial Pit Removal Action at the Holloman Air Force Base (HAFB) Landfill 29 (LF-29). The purpose of this APP is to establish site-specific safety and health procedures, practices and equipment to be implemented and used to protect affected personnel from the potential hazards associated with the field activities to be performed on the project site. The APP assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted during the Munitions Response (MR) process. This APP will interface with Bay West, Inc's. (BW) Corporate Safety and Health Program.

BW, of Saint Paul, Minnesota is the prime contractor for this work and is performing this munitions debris (MD) clean-up under an Omaha District Environmental Remediation Services (ERS) contract. USA Environmental, Inc. (USAE) of Oldsmar, Florida, is BW's principal subcontractor for the project. The BW/USAE team is collectively referred to as the Project Delivery Contractor (PDC).

D4.1 Contractor

Bay West, Inc.
5 Empire Drive
St. Paul, Minnesota 55103-1867

D4.2 Contract Number

W9128F-04-D-0004

D4.3 Task Order

0043

D4.4 Project Name

Munitions and Explosives of Concern Burial Pit Removal Action
Landfill 29
Holloman Air Force Base
Alamogordo, New Mexico

D4.5 Project Description and Description of Work

D4.5.1 Project Description

LF-29 was used by the Army from the 1950s to 1975 for the disposal of spent munitions and construction debris. It is located near the North Base Building Area, approximately 450 ft northwest of Building 1001. LF-29 is defined by a small berm that extends 400 ft north-south and 350 ft east-west, accounting for approximately 4.28 acres. Some materials may also have been disposed of outside of this berm along the borders so a buffer zone extending 45 ft to the north and south and 35 ft to the east and west of the berm has been created and will be investigated. Including the buffer zone, the entire area of the LF-29 MRS encompasses approximately 6.5 acres.

The site topography slopes gently to the southwest. Vegetation consists primarily of grasses, sagebrush, and other bushes and small trees. The uppermost unit of groundwater is a shallow unconfined aquifer encountered at approximately 15 to 20 ft below ground surface (bgs).

Previous investigations at this site include a Preliminary Investigation and Site Assessment (PI/SA) conducted in 1983, followed by a Remedial Investigation (RI) Recommendations Report in 1992, a Decision Document in 1993 and a Supplemental RCRA Facility Investigation (SFRI) in 2006. There is a network of four monitoring wells in-place around the landfill, with three wells located in the assumed downgradient and one in the upgradient locations with respect to the landfill. A geophysical study has been conducted previously on-site, where several (~7-8) anomalies were observed. However, this study was performed prior to the clearance of surface debris, so interference from this material precludes the use of this study to confirm or evaluate the presence or absence of subsurface munitions and/or debris.

During a site reconnaissance for the SFRI project, some MD discovered on the ground surface was tentatively identified as biological warfare bomblets. A removal of approximately 171 pieces of surface MD was performed under command of 110th Technical Escort (TE) in June 2007. According to the Explosive Ordnance Incident Report (see Attachment 2) prepared by the 110th TE, the MD was identified as E61R4 Biological warfare bomblets. TE's research indicated that these items were used for fuze testing and the likely filler was water or water/simulant slurry. Soil samples were tested for the presence of biological warfare material and were confirmed as having no biological agent present.

During site reconnaissance in December 2007, it was discovered that not all MD was removed during the TE response. It appears that the surface clearance focused on the biological munitions and other MD was left behind. Furthermore, two collection points containing the biological munitions remained on-site. At least one partially buried biological bomb was flagged and left in-place by the TE effort and several others remain on the site. M125 chemical bombs are also presently on-site. Some appear to be intact while others appear to have been detonated. A full up live M125 contains 2.6 pounds (lbs) of nerve agent Sarin (GB). Practice versions may be empty or contain simulant filler such as anti-freeze. It is unknown if the intact bombs at LF-29 contain a filler of any nature and there is no record of the evaluation of such. However, it is doubtful that ordnance with live explosives or live chemical agent would be left in an unsecured area. Nevertheless, these M125s will be treated as MEC before certifying them as MD.

MEC activities shall be conducted in full compliance with U.S. Army Corps of Engineers (USACE), Department of the Army, and Department of Defense (DoD) requirements regarding personnel, equipment, and procedures. (All MEC operations shall emphasize anomaly avoidance, whenever possible, and be performed in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Therefore, the administrative requirements of Federal, state, or local permits are not required for implementation of any MEC procedures occurring entirely on-site, but the substantive permit requirements shall be fulfilled. The provisions of 29 CFR 1910.120 shall apply to all MEC actions taken at this site. In addition, Unexploded Ordnance (UXO) personnel involved in performing MEC procedures will follow the provisions and work standards identified in Engineering Pamphlet (EP) 1110-1-18.

D4.5.2 Description of Work

The PDC shall provide the necessary personnel and equipment to perform the following tasks in accordance with (IAW) the Statement of Work (SOW):

- Identify potential MEC burial pits within LF-29 using digital geophysical mapping.
- Provide MEC burial pit removal action using excavation with visual and instrument-assisted (magnetometer and all-metal) screening of all excavated soils for the potential presence of MD.
- Dispose of MEC on site by detonation.

- Collect MD found during the burial pit removal action, certify as explosive free, and transport to an offsite scrap-metal recycler.

All MEC encountered will be accounted for to include identification, condition, location and disposition. All encountered material potentially presenting an explosive hazard (MPPEH) and MD will be handled IAW with the SOW (see **Appendix A** of the Work Plan).

Table D4-1: Site Description

Site Location	Approximate Size (Acres)
Holloman AFB, Landfill 29	6 Acres
Topography	**Present Usage**
☐ Forested ☐ Tillage	☐ Rural ☐ Commercial
☐ River/Creeks ☐ Other	☐ Urban ☐ Government
☐ Grassland	☐ Industrial ☒ Military
☒ Flat land	☐ Farming ☐ Other:
☒ Open Terrain	☐ Ranching
☐ Wetland	☐ Residential: Minimal
☒ Arid	☐ Recreational

D4.6 Contractor Accident Experience

D4.6.1 Experience Modification Rate

BW's Experience Modification Rate (EMR) for the last five years is shown below. Copies of the Occupational Safety and Health Administration (OSHA) 300A Form is provided in Attachment 1.

Table D4-2: Experience Modification Rate

Year	Interstate	Intrastate
2007	0.83	N/A
2006	0.75	N/A
2005	0.74	N/A
2004	0.69	N/A
2003	0.69	N/A

N/A: Not Applicable

D4.7 Phases of Work and Associated Hazardous Activities Requiring Activity Hazard Analyses

The list of work phases below includes optional tasks that may or may not need to be performed to achieve the desired operational results for this SOW. These optional tasks have been included in the APP, in the event that USACE determines that these tasks are required for the MR process for the project site. Under each phase of work, there are inherently hazardous activities that have been analyzed to identify controls that will protect the safety and health of all personnel working at and entering the project site.

D4.7.1 Phase I Activities

Field activities for former NAFB will occur in two phases. The Phase I activities will be associated with site preparation and include the following:

- Mobilization and staging of equipment for project activities;
- Preparation of area for visual and instrument-assisted screening of excavated soils;

Hazardous activities requiring activity hazard analysis (AHA) for Phase I include:

- Hazards associated with surface or subsurface MEC. These items, if moved, could detonate, either killing or seriously injuring personnel at the work site;
- Biological hazards, such as insects, ticks, mosquitoes, spiders, or other wildlife;
- Slips, trips and falls associated with ground cover, irregular terrain or debris; and
- Heat or cold stress, as environmentally dictated.

D4.7.2 Phase II Activities

Phase II activities will include soil excavation, screening, and removal/disposal of all encountered MD consisting of the following tasks:

- Excavation with visual and instrument-assisted screening for MD;
- Excavation and trenching in accordance with established BW Standard Operating procedure (SOP);
- Potential MEC/MPPEH identification;
- Scrap inspection and certification prior to packaging for shipment; and
- Quality Control inspection of completed field activities.

Hazardous activities requiring AHA for Phase II include:

- Hazards associated with use of Earthmoving Machinery (EMM);
- Hazards associated with surface or subsurface MEC. These items, if moved, could detonate, either killing or seriously injuring personnel at the work site;
- Hazards associated with the investigation of MEC;
- Hazards associated with scrap inspection and QC inspections;
- Biological hazards, such as insects, ticks, mosquitoes, spiders, or other wildlife;
- Slips, trips and falls associated with ground cover, irregular terrain or debris; and
- Heat or cold stress as environmentally dictated.

AHA for the project tasks is included in Attachment 2.

Table D4-3: Hazards Table

Hazards: **Safety, Chemical, Physical, Radiological, Biological, MEC**	**Action Levels:**
Safety Hazards: include falling (rocks, inclines, slippery surfaces); climbing (uneven terrain); walking (uneven terrain, surface indentations); hand and power tool operations (hammers, weed eaters) eye hazards (windy conditions); and MEC.	None/Awareness/Avoidance
Chemical: none anticipated.	Not Applicable
Physical Hazards: include heat or cold injuries. Heavy equipment operation.	Per Monitoring Requirements Only by competent person

Hazards: Safety, Chemical, Physical, Radiological, Biological, MEC	Action Levels:
Radiological: none anticipated.	Not Applicable
Biological Hazards: may be present; include biting and stinging insects, hazardous plants and wildlife.	None/Awareness/Avoidance
MEC Hazards: may be present on-site, use approved measures.	Observe Safety Procedures

D4.8 Statement of Safety and Health Policy

In recognition of the responsibilities of BW and the need for management to establish a policy with regard to the prevention of on-the-job injuries, a Corporate Safety and Health Policy has been developed. Through application of these safety policies and procedures, it is BW's primary goal to reduce to a minimum the human suffering by employees resulting from occupational injuries. Not only can injuries have a serious physical and emotional impact on the employees themselves, but can also have a negative effect on family members and co-workers.

In addition, we recognize the deterrent and eroding effect injuries have on potential profit. Insurance costs, combined with the indirect costs of injuries, are a matter of serious concern and it is our intention that they be reduced. This reduction can take place if the frequency of injuries is kept to a minimum. As it affects BW, the elimination of on-the-job injuries is an important responsibility of management. This responsibility is assumed and treated in the same manner as our business philosophies relating to services rendered.

For BW's Corporate Safety and Health Program to be effective, it is necessary for each employee to take a serious interest in the prevention of injuries. Management intends to provide, in administration of this program, the leadership and direction to which supervisory personnel and employees will respond. It is BW's request that all concerned devote their serious attention toward making this Safety and Health Program an integral part of day-to-day business operations. Always remember that no job is so important, and no service is so urgent, that we cannot take the time to perform safely.

All site operations will be performed in accordance with applicable federal, state, and local regulations and procedures, OSHA requirements, client requirements, and BW's Corporate Safety and Health Program and this APP. BW employees and subcontractors will comply with the requirements of this plan.

D4.9 Responsibilities and Lines of Authority

D4.9.1 Identification and Accountability of Personnel Responsible for Safety at Corporate Level

All personnel are responsible for continuous adherence to this APP and safety and health procedures during the performance of their work. No person may work in a manner that conflicts with the intent of, or the inherent safety and environmental precautions expressed in these procedures. After due warnings, BW will dismiss from the site any person who violates safety procedures. BW employees are subject to progressive discipline and may be terminated for continued violations. All on-site personnel, including subcontractors, will be trained in accordance with this document.

D4.9.1.1 BW Project Manager - Tim Salane, PE

Responsibilities include:

- Ensures conformance with BW corporate and USACE policies and procedures;
- Coordinates project with the USACE personnel;
- Ensures the project has the necessary resources to operate safely;
- Ensures that the project personnel satisfy BW and USACE Safety and Health requirements;
- Ensures that the project personnel implement the project APP; and
- Ensures that the project personnel have the appropriate regard for safe job performance.

Resume is presented in **Appendix H**.

D4.9.1.2 BW Certified Industrial Hygienist - Doug Hickey, CIH

Responsibilities include:

- Oversight in developing and coordinating the APP as required;
- Make changes to the APP if warranted by changed conditions;
- Determine the level of personal protection required;
- Investigate significant accidents and illnesses and implement corrective action plans;
- Establish air-monitoring parameters based on expected contaminants;
- Establish employee exposure monitoring notification programs;
- Develop site-specific project emergency response plans based on expected hazards;
- Stop any operation that threatens the health or safety of the team or surrounding population; and
- Upgrade or downgrade levels of protection based on site observations or monitoring results.

D4.9.2 Responsibilities at Project Level

D4.9.2.1 Senior UXO Supervisor – TBD

All site activities will be conducted under the supervision of the PDC Senior Unexploded Ordnance Supervisor (SUXOS). The SUXOS will oversee normal and emergency work and will perform any emergency notification. He is also responsible for:

- Supervising all site activities;
- Implementing the field APP;
- Coordinating with the UXO Safety Officer (UXOSO) on safety related matters;
- Determining evacuation routes;
- Presenting daily safety meetings;
- Maintaining logs and records in the field; and
- Implementing changes to APP as directed by the Certified Industrial Hygienist (CIH) and/or UXOSO.

D4.9.2.2 UXO Safety Officer – Wayne Martrildonno

Site activities will be conducted under the supervision of the BW UXOSO. The UXOSO will act as safety oversight for normal and emergency work and will perform any emergency notification as the On-Scene-Incident-Commander (OSIC). He is also responsible for:

- Implementing the field APP;
- Enforcing all provisions of the APP;
- 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 APP as directed by the CIH and/or SUXOS;
- 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;

- Establishing air-monitoring parameters based on expected contaminants;
- Establishing employee exposure monitoring notification programs;
- Stopping any operation that threatens the health or safety of the team or surrounding population; and
- Upgrading levels of protection based on on-site observations or monitoring results.

Resume is presented in **Appendix H**.

D4.9.3 Lines of Authority

Table D4-4 contains the project personnel, their involvement on the project, the organization these individuals represent, and several ways to contact these individuals.

Table D4-4: Line of Authority

Name	Organization	Telephone	Cell number	E-mail
David Scruggs	Holloman AFB Remediation Project Manager	(575) 572-5395	(575) 491-8261	clarence.scruggs@holloman.af.mil
Terri Thomas	USACE Project Manager (Omaha)	(402) 995-2749	N/A	terri.l.thomas@usace.army.mil
Dennis Myers	USACE OE Safety Specialist	(402) 995-3900	N/A	dennis.j.myers@usace.army.mil
Tim Salane	BW Project Manager	(651) 291-3470	(651) 341-3249	tims@baywest.com
Doug Hickey	BW Certified Industrial Hygienist	(763) 479-3214	(612) 719-9922	dhickeymn@yahoo.com
Wayne Martrildonno	BW UXO Safety Officer	N/A	(651) 248-9551	waynem@baywest.com
TBD	BW SUXOS	TBD	TBD	TBD

N/A: Not Applicable
TBD: To Be Determined

D4.10 Subcontractors and Suppliers

D4.10.1 Identification of Subcontractors

BW's primary subcontractor for the project is USAE of Oldsmar, Florida. USAE will provide the SUXOS and UXO Technicians for the project.

D4.10.2 Measures of Controlling and Coordinating Subcontractors

Before work is performed by the subcontractors, BW will negotiate and prepare a subcontract agreement that will detail the scope of work and necessary terms and conditions, including safety requirements. Once executed, BW will perform periodic quality control (QC) reviews to ensure that requirements are met. These reviews will cover technical requirements, cost and schedule status.

D4.10.3 Safety Responsibilities of Subcontractors

Any service supplier personnel that are not qualified as UXO technicians that require controlled access to the work area will receive training on ordnance recognition and UXO safety precautions prior to commencing activities at the project site. All personnel will be given a daily safety briefing and will be escorted by a UXO Technician at all times while on-site. All personnel will acknowledge that they have read, understood and will abide by the APP and Site-Specific Safety and Health Plan (SSHP) for this project, by their signature. At all times, subcontractors shall abide by the guidance given by the SUXOS and/or UXO escort accompanying them. Any deviations from the site plans could be used as the basis for termination of the subcontract agreement.

D4.11 Training

Personnel who participate in field activities associated with this project are subject to the training requirements presented in this APP.

D4.11.1 List of Subjects to be Discussed in the Safety Indoctrination

The following subjects will be discussed with site personnel:

- Scope of work;
- Sequence of work events;
- Outline equipment used;
- Identify safety issues to keep site personnel out of harms way;
- Identify who implements directives;
- Required personal protective equipment (PPE);
- Proper lifting techniques;
- Site communication;
- Potential MEC;
- Chemical, physical and biological hazards that may be encountered;
- Escape routes;
- Emergency response plan;
- Emergency notifications; and
- Directions to the hospital.

D4.11.2 List of Mandatory Training and Certification Applicable to this Project

- 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training in accordance with 29 CFR 1910.120 (e);
- 8-hour annual refresher training in accordance with 29 CFR 1910.120 (e);
- 3 days of field experience under the direct supervision of a trained experienced supervisor 29 CFR 1910.120 (e);
- First Aid / Cardiopulmonary Resuscitation (CPR)/Bloodborne Pathogen (BBP) training [minimum of two personnel on-site];
- 8-hour Supervisory Personnel Training (UXOTIII and above) in accordance with 29 CFR 1910.120 (e);
- All heavy equipment operators will be skilled and knowledgeable at the level of competent person, as defined by OSHA for all excavation activities; and
- Annual physicals with medical clearance in accordance with 29 CFR 1910.120 (f).

All current certifications and training tables for site personnel will be maintained on-site for the duration of the project. Individuals without proper training records will not be permitted on-site.

D4.11.3 Requirements for Emergency Response Planning

Prior to commencement of the project, all site personnel will review and discuss the posted emergency telephone numbers, location of spill kit materials, directions to the hospital, location of all site fire extinguishers, proper use of fire extinguishers, location of first aid kits and the persons certified in first aid and CPR.

D4.11.4 Fire Prevention

Smoking and lighters are prohibited in the exclusion zone (EZ) or work zone. A cigarette butt receptacle

will be provided in the designated smoking area. No cigarette butts are to be discarded on the ground. No smoking is allowed except in an approved designated location with fire extinguisher. Review procedures with all site personnel.

D4.12 Emergency Telephone Numbers

The emergency notification sheet and emergency phone numbers will be posted on-site next to the directions to the hospital and the map of the project emergency evacuation routes.

Table D4-5: Emergency Points of Contact

Title	Name	Office	Cellular
USACE Project Manager	Terri Thomas	(402) 995-2749	N/A
USACE OE Safety Specialist	Dennis Myers	(402) 995-3900	(720) 670-0842
BW Project Manager	Tim Salane	(651) 291-3470	(651) 341-3249
BW UXO Technical Manager	Wayne Martrildonno	N/A	(651) 248-9551
BW Certified Industrial Hygienist	Doug Hickey	(763) 479-3214	(612) 719-9922

N/A: Not Applicable

Table D4-6: Emergency Telephone Numbers

Contact	Phone Number
Local Fire / Ambulance / Police	911
Poison Center	(800) 122-2222
Gerald Champion Regional Medical Center	(505) 439-6100

D4.13 Safety Meetings and Training

D4.13.1 Requirements for Supervisory and Employee Safety Meetings

The UXOSO will conduct a general meeting at the beginning of each workday. Corporate management will review the general safety and health program and other issues, as required.

D4.13.1.1 Daily Safety Meetings

The UXOSO will conduct a safety briefing at the beginning of each workday or whenever conditions or tasks change. All site personnel will attend these briefings. These briefings will be used as an opportunity to address site-specific safety issues and also will be used as an opportunity to refresh workers on specific procedures and address new hazards and controls. The topics discussed at the safety meeting include:

- Safety and health considerations for the day's/week's activities;
- MEC related hazards and precautions;
- Environmental conditions encountered; and
- New operations or activities.

Attendance records and meeting notes will be maintained with the project files.

All workers and visitors at the site who may be exposed to safety or health hazards will receive site-specific training before they are permitted to engage in site operations. Personnel will not be permitted to participate in or supervise site activities until they have been trained to the level required by their specific job function and responsibility.

D4.13.1.2 Site-Specific Training and Pre-Entry Briefing

On-site personnel will receive site-specific safety training. Signatures of those attending and the type of training/briefing will be entered in the field logbook or training form before site access will be granted. Two versions of this training will be used:

- The site worker version will contain full information on site hazards, hazard controls, and emergency procedures; and
- An abbreviated version will be used for visitors who will be on-site for short times and who will not do hands on work (observers) and are under safety escort at all times.

Signatures of those attending and the type of briefing will be entered in the field logbook or training form before site access will be granted.

D4.13.1.3 Site Workers Basic Safety Briefing

The UXOSO will conduct a site workers basic safety briefing at the beginning of each week or whenever new employees arrive at the job site, once the job has commenced.

The following is a general list of what will be discussed:

- Names and titles of key personnel responsible for site safety and health;
- Hazards present at the site;
- Components of the site safety and health program;
- General site safety;
- Hazards and symptoms of contaminant exposure (chemical) as applicable;
- Routes of exposure from on-site contaminants (as applicable);
- Physical hazards (fall protection, noise, heat stress, cold stress);
- Biological hazards;
- Location and availability of written hazard communication program;
- Site and activity PPE (including purpose, donning, doffing and proper use);
- Work practices by which employees can minimize risks from hazards;
- Safe use of engineering controls and equipment use;
- Site control measures;
- MEC suspected on-site;
- MEC/UXO hazards and precautions;
- Reporting requirements for UXO, spills, and emergencies;
- Personnel decontamination procedures (as applicable);
- Contingency plans (communications, phone numbers, emergency evacuation routes, assembly points, etc.);
- Worker Right to Know/ Hazard Communication;
- Emergency equipment locations and use (fire extinguishers, spill kits, first aid kits, etc.); and
- Equipment safety.

Attendance records and meeting notes will be maintained with the project files.

D4.13.2 Training Documentation

Certificates of completion of off-site training courses and daily safety briefing logs will be maintained on-site for the duration of the project. Individuals without proper records of their required training will not be permitted on-site.

D4.14 Safety and Health Inspections

General safety and health inspections are described throughout this APP. PDC site personnel will conduct safety inspections on a daily basis or more frequently, if conditions warrant.

The UXOSO will be responsible for daily safety inspections of the project. A safety inspection form will be used to record, track and provide follow-up to ensure that safety deficiencies are corrected after they have been identified. A record of the safety inspection will be maintained in the project file. Deficiencies will be identified, posted, and dated when the deficiencies are rectified.

D4.14.1 Health Safety Inspections

The UXOSO will be responsible for daily inspections of the project. The BW CIH may make random inspections, as warranted.

D4.14.2 External Inspections

External inspections are expected for this project. The USACE Ordnance and Explosives (OE) Safety Specialist assigned to the project conducts those inspections.

D4.15 Safety and Health Expectations, Incentive Programs and Compliance

D4.15.1 BW's Corporate Safety Program

BW's corporate safety program is designed to provide the safety training and tools required to ensure that BW is providing the safest work environment for its employees, subcontractors, and the general population in areas adjacent to project sites.

The BW CIH has reviewed the scope of the project and based on this review, has reviewed and approved this APP designed to protect health and safety during the project.

As part of the job requirements employees are required:

- To read and follow the APP; and
- Required to attend health and safety courses and seminars to make them more informed and aware of potential hazards that exist on the job.

D4.15.2 BW Safety Incentive Program

BW builds an information database for each project it undertakes, which includes the rate/occurrence of accidents and injuries. Safety data, including injury and accident occurrence, are noted, and incentives such as awards and additional training courses are provided as rewards for superior employee performance in the areas of compliance with project APPs and corporate safety/health policies.

D4.15.3 Safety Program Non-Compliance Policies and Procedures

BW management takes seriously employee non-compliance with safety requirements. Personnel not following procedures are warned and counseled on the proper safety procedures and if the problem persists, they are again counseled with notations made in their permanent record. Continued non-compliance can lead to termination of employment. On BW job sites, visitors are briefed about site safety requirements and are provided with the appropriate level of PPE. If visitors refuse to follow these procedures, they are escorted from the site.

D4.15.4 BW's Written Procedures for Holding Managers & Supervisors Accountable for Safety

BW's commitment to safety and health is documented and required from the time an offer is made to a job applicant. Managers and supervisors are made responsible for enforcing safety and health as part of their job descriptions. They are ultimately responsible for protecting the welfare of the employees, as well

as minimizing the potential liability associated with on-the-job accidents.

D4.16 Accident Reporting

This chapter provides the requirements for implementing the accident reporting provisions of Engineering Manual (EM) 385-1-1. This APP requirement applies to all work performed on the project.

The BW PM and the CIH will be notified immediately by telephone of any accidents and follow-up with USACE's Accident Investigation Report form (see **Appendix F**). BW's Site Manager will notify the on-site USACE OE Safety Specialist immediately of the accident. BW internally investigates all accidents.

Person(s) who become ill or injured during work activities will immediately inform their direct supervisor, regardless of the severity of the illness or injury. The victim(s) will be decontaminated if the injury occurred in contaminated areas. In the event that the medical emergency is severe enough, the UXOSO will order a cessation of work and notify offsite emergency personnel. All personnel at the work site shall use the buddy system, staying within sight of their partner. If a partner becomes incapacitated or severely ill, an ambulance will be called. In the event that a cessation of work is ordered, all personnel should:

- Assist the UXOSO and/or supervisor, if required, in decontaminating the victim and/or administering first aid;
- Leave the contaminated area and undergo decontamination prior to entering the worker rest area; and;
- Assist emergency response personnel when requested.

In the event of an accident that results in a lost workday or $2,000 or more in property damage, an Engineering (ENG) Form 3394 will be completed and submitted within five workdays to USACE.

All workers receiving medical treatment by a physician will obtain a release from the physician on the date of treatment stating one of the following: (1) the employee is not fit for duty; (2) the employee is fit for restricted duty; or (3) the employee is fit for duty. A copy of the release will be attached to the accident report (ENG Form 3394) and submitted to USACE.

The following signature chain will be used on the ENG Form 3394; the name of the individual will be typed or printed legibly after each signature:

- Item 15c. Injured employee's supervisor;
- Item 16. BW corporate management;
- Item 17. USACE designated individual;
- Item 18. USACE designated individual; and
- Item 19. USACE designated individual.

D4.16.1 Exposure Data

All work related incidents occurring to BW employees should be reported for statistical purposes. All recordable incidents count against BW's recordable experience modification rate whenever they occur, either to an employee or a subcontractor working under the direct supervision of BW's Site Manager. Personnel man-hours will be defined as hours worked by all persons assigned to the project, including subcontractor employees under direct supervision of BW's Site Manager. These man-hours will be annotated on the Daily Quality Control Report (DQCR) located in **Appendix F** of this Work Plan and transmitted to the PM. The UXOSO will document and review with the CIH the potential exposure data versus the man-hours worked per day to evaluate the association to site accidents or injury.

The most current OSHA 300 form will be posted on-site and is presented in Attachment 1.

D4.16.2 Immediate Notification of Major Accidents

Should an accident occur resulting in a fatality, $100,000 or more in property damage, three or more

persons being hospitalized, or possible adverse publicity to USACE, immediate notification will be made to the USACE PM in person, telephonically, or by email. The reporting requirement of submitting ENG Form 3394 within five working days applies.

D4.17 Medical Support

A minimum of two BW on-site personnel have been trained in CPR and First Aid and have current certification cards. At least two individuals will be on-site throughout the project with current First Aid and CPR training.

For injuries or illnesses requiring Emergency Medical Services (EMS), notification via hardwired phone or cell phone (see **Table D4-6**) will activate EMS. Emergency medical personnel will determine the best course of treatment and the medical treatment facility where this will occur. Injured personnel will be transported to the North Vista Hospital or another medical treatment facility, as determined by EMS personnel.

D4.17.1 Route to Hospital

A map showing the route from the project site to the hospital, Gerald Champion regional Medical Center, and Emergency Telephone Numbers are presented in Attachment 3.

D4.17.1.1 Hospital Information

Name:	Gerald Champion Regional Medical Center
Telephone Number:	(505) 439-6100
Address:	2669 North Scenic Drive, Alamogordo, New Mexico 88310
Distance from Site to Hospital:	17 miles

D4.17.1.2 Route to Hospital

1. Head east on Periphery Rd. toward Saber Rd. for 0.9 miles
2. Periphery Rd. becomes Saber Rd. Drive 1.1 miles.
3. Turn slight right at E. Delaware Ave and drive 0.4 miles.
4. Turn left at 1st St. and drive 1.8 miles.
5. Turn slight right at US 70 E/US 82 E and drive 10.6 miles.
6. Turn right at N. Scenic Dr. and drive 2.1 miles.
7. Arrive at Gerald Champion Medical Center.

D4.18 Personal Protective Equipment

This chapter presents the types of protective clothing that may be used for the project and the procedures followed to assure its proper use, selection and maintenance.

D4.18.1 Types of Equipment

Requirements for task and activity-specific levels of protective clothing are presented on the Activity Hazards Analyses located in Attachment 2 of this APP. Personnel performing site tasks shall use the appropriate level and type of PPE specified in this plan for each individual task. This SSHP makes provisions for use of the following levels of PPE, in accordance with the hazards and contamination level anticipated for each task or operation: Level A, Level B, Level C, and Level D. The following chapters describe the PPE requirements for activities and locations on the site.

D4.18.1.1 Level A Protection

Level A Protection is not required.

D4.18.1.2 Level B Protection

Level B Protection is not required.

D4.18.1.3 Level C Protection

Level C Protection is not required.

D4.18.1.4 Level D Protection

The minimal level of protection that will be required for project personnel and visitors at the site will be Level D. The UXOSO may increase the level of protection due to changing requirements, but may not decrease the level of protection, without approval of the CIH. The following equipment will be used for Level D protection:

- Coveralls or other suitable fieldwork clothing;
- Persons exposed to vehicular or equipment traffic, including signalpersons, spotters, or inspectors, shall wear high visibility apparel meeting American National Standards Institute/Safety Equipment Association (ANSI/SEA) 07-2004 Performance Class 2 requirements;
- Work boots with ankle support, minimal metal content - with composite toes meeting the ANSI Z41 standard during magnetometer and Digital Geophysical Mapping (DGM) operations;
- Work boots with either steel or composite safety toe when conducting operations other than DGM and magnetometer surveys;
- Safety glasses or goggles as needed;
- Hardhat if overhead hazard or heavy equipment is encountered or operated;
- Leather work gloves;
- Hearing protection, earplugs and/or earmuffs as needed;

Should personnel encounter an unusual odor, discolored soil, or an unknown item that may be hazardous, toxic or radioactive waste (HTRW) they will immediately notify their supervisor and will evacuate the site upwind of the suspected item. The UXOSO will notify the on-site USACE OE Safety Specialist of the actions taken.

D4.18.2 Proper PPE Selection, Use and Maintenance

D4.18.2.1 Proper PPE Selection

The selection of the PPE will be done after a thorough evaluation of the hazards involved at the site during each phase of the operation. All persons entering the site area will put on the required personal protective equipment according to established procedures in this plan.

Hazard and risk assessment is a continuing process to be conducted by the BW CIH in conjunction with the UXOSO, throughout the duration of the project. Changes in specific PPE, levels of PPE, or respiratory protection may be made in accordance with information obtained from actual implementation of site activities and data derived from the other sources. As a general rule, levels of PPE will need to be reassessed if any of the following occur:

- Appearance of previously unidentified or anticipated chemicals, conditions or task hazards;
- Airborne concentrations of known chemicals exceed action levels;
- Ambient weather conditions change that impact the use of assigned PPE; and
- A new task is introduced or a previously assigned and evaluated task is expanded in scope.

Specific levels of protection will be changed whenever site conditions change. They can either be increased to the next higher level or decreased to the next lower level. The decision to change levels of protection will be made by the UXOSO with input from the PM and the CIH. If the need arises to protect health and safety, the UXOSO can upgrade protection levels without input from the CIH. Levels of

protection will not be downgraded without prior approval from the CIH.

D4.18.2.2 PPE Use

All BW and subcontractor site personnel will be given initial PPE-specific training. This training will be given by the UXOSO prior to personnel participating in site operations where PPE is required. All personnel receiving PPE training will be required to demonstrate an understanding of the training topics and the ability to correctly use the PPE. This will be accomplished through the UXOSO supervising and visually inspecting each individual's ability to properly don and use the PPE during its initial use.

Upon completion of the training and after each employee has successfully demonstrated the requisite understanding, the UXOSO will complete the Certification of Personal Protective Equipment Training Form (**Figure D4-1**).

D4.18.2.3 PPE Maintenance

Maintenance of PPE can vary greatly, based upon the complexity of the PPE and the intricacy of the repair involved. The UXOSO will become familiar with the manufacturer's recommended maintenance and, when possible, repair defective PPE. If unable or unauthorized to conduct the repair, the UXOSO will return the item to the manufacturer for repair, or to procure a replacement.

The UXOSO will be responsible for ensuring that PPE is in good, clean, working order prior to issuing the PPE the first time. Once issued, site personnel will ensure that re-usable articles of PPE are maintained in a clean, sanitary fashion. During the work task, buddy teams should periodically inspect each other for the proper use of PPE. For items used inside an EZ, site personnel will follow the requirements of the Site-Specific Decontamination Plan, and ensure that the PPE is properly decontaminated before removing the item from the EZ or CRZ.

D4.18.3 PPE Program Effectiveness

Based on the inhalation hazard and potential chemical exposures on this site, Level D PPE is considered adequate for the work that is to be accomplished at the site.

If work tasks are added to the SOW after approval of this APP, the SUXOS and/or UXOSO (as applicable) shall identify and assess the task hazards and relay that information to the CIH. The CIH will prepare an amendment to the APP and submit the amendment for approval from USACE. The amendment will be added to the APP upon USACE approval.

The UXOSO will ensure PPE use complies with all applicable OSHA, USACE, and BW requirements.

It is the responsibility of each employee to report to work wearing proper attire and to assemble the necessary PPE prior to donning and starting work.

Figure D4-1: PPE Certificate

BAY WEST, INC.

CERTIFICATION OF PERSONAL PROTECTIVE EQUIPMENT (PPE) TRAINING

SITE INFORMATION	
Site Name:	
Location:	Instructor(s):
Date of Classroom Instruction:	Date of Demonstration:

PPE TRAINING COURSE ATTENDANCE

The following personnel have attended the site PPE training course, and demonstrated, through use, an understanding of the donning/doffing procedures, inspection, cleaning, maintenance, storage, limitations, and proper disposal of the PPE listed on this certificate. These personnel are now qualified to use the site- and task-specific PPE, as required by the SSHP.

Name	Organization	Name	Organization

TYPES AND LEVELS OF PPE ADDRESSED DURING TRAINING

Trainer's Initials	Personal Protective Equipment Reviewed	Trainer's Initials	Personal Protective Equipment Reviewed

CERTIFICATION

I the undersigned do hereby certify that the above listed personnel have received the requisite training and successfully demonstrated their ability to use the PPE listed above, in accordance with the BW Personal Protective Equipment Program.

Name (printed):	Signature:	Date:

D4.19 Plans and Programs and General Safety Precautions

The following plans have been identified as applicable to this project.

D4.19.1 Hazard Communication Program

The program establishes procedures for BW employees and subcontractors who handle and store chemical products at project sites. It ensures that hazards of all chemicals purchased are evaluated and the information concerning their hazards is transmitted to employees. The delivery of information is to be accomplished by employee training, container labeling, and other forms of warning and material safety data sheets (MSDS). All MSDS are requested from the suppliers at the time of order. If not available then a recent MSDS will be downloaded off the Internet. MSDS for this project are presented in Attachment 6.

The UXOSO must ensure that project personnel can immediately obtain the required information about chemicals of concern during an emergency.

D4.19.2 Spill Plans

The PDC will conduct clean-up operations in the event of a spill of hazardous material (i.e. fuel or oil from UXO field operations). The UXOSO will manage the collection of the spilled material with absorbent pads and containerize the pads or materials within Department of Transportation (DOT) approved drums for offsite disposal. A complete spill kit will be maintained on-site.

D4.19.3 Fire Fighting Plan

In the event of a fire or explosion, the UXOSO will notify the police, fire department, and ambulance service, contact the USACE OE Safety Specialist and the BW PM, and escort the response personnel to the location of the fire or explosion. The UXOSO will determine the extent of the fire, coordinate and manage fire suppression effort until the fire department arrives, use available on-site fire extinguishers on incipient stage fires only and provide emergency first aid, as needed. Site personnel will not fight fires containing explosives. The responding fire department personnel will be informed of the nature of the fire, if explosives are present and the fragmentation distance from which to fight or contain the fire.

D4.19.4 Emergency Response Plan

Prior to start of project, all personnel will review the points of contact list, the posting location, as well as location of the nearest hospital. Emergency evacuation routes are identified in Attachment 3. Meeting places are just outside the main gate and gate E-38, depending on personnel location at the time of the emergency evacuation.

- All personnel will review the locations of fire extinguishers and be competent in use;
- A cell phone will be charged and available on-site to call the local fire department;
- All emergency telephone numbers will be posted next to the directions to the hospital map on-site;
- Heavy equipment used on-site as part of this project will be inspected and operated by trained personnel.

D4.19.4.1 Potential Site Emergencies

There are several emergencies which could reasonably be anticipated during project activities, including:

- Thermal/cold stress;
- Worker injuries, slips, trips or falls, and/or illness;
- Injuries from EMM; and
- Fires and explosions.

D4.19.4.2 Personnel and Lines of Authority

The UXOSO will be responsible for the overall direction and implementation of this Emergency Response Plan (ERP), and for overall coordination of any emergency response actions. Specific responsibilities of the UXOSO include, but are not limited to, the following:

- Notifying facility police, fire department, and other offsite emergency units, as required;
- Notifying the BW PM and providing updates as conditions change;
- Directing offsite emergency response personnel to the scene and providing assistance;
- Site control;
- Completing any follow-up reports;
- Rescuing personnel;
- Accounting for all site personnel and visitors;
- Providing emergency first aid;
- Preventing further injury of personnel;
- Providing current status of the incident to the BW CIH;
- Ensuring that on-site emergency response personnel don the proper PPE if needed;
- Assisting on-site emergency response personnel with treatment and transport of sick/injured;
- Providing medical background information of the sick/injured and applicable site health and safety information to the offsite emergency medical responders; and
- Accompanying sick/injured personnel to hospital.

All BW personnel, subcontractors and visitors will be responsible for:

- Reporting any site emergencies to the UXOSO or SUXOS;
- Knowing the exit location and evacuation route(s) within the EZ;
- Knowing the pre-planned evacuation assembly point and going there in the event of an emergency; and
- Assisting emergency response personnel as requested.

D4.19.4.3 Emergency Recognition and Prevention

An emergency is an unplanned event that threatens the safety of site personnel. Compliance with this APP can assist in the prevention of anticipated site emergencies. These emergency situations can easily be recognized by visual observations, worker complaints, and/or monitoring instruments.

D4.19.4.4 Safe Distances and Places of Refuge

The UXOSO will determine safe distances and places of refuge. Prior to the start of each workday, the UXOSO will hold a safety meeting with all personnel and discuss the following, as applicable:

- Times when the gates on the installation may be locked;
- Who has the gate key or combination on-site;
- Evacuation routes from work areas;
- The assembly point to be used in the event of an emergency;
- Locations of the nearest fire extinguishers and spill containment equipment; and
- Discussion on specific safety and health concerns of personnel.

D4.19.4.5 Evacuation Procedures

The UXOSO will establish site evacuation routes. Evacuation notification will be one long blast on an air horn, vehicle horn, or direct verbal communication. If evacuation is necessary, all personnel are to:

- Gather equipment to the extent safely possible; and
- Evacuate to the vehicle(s) location, prepare to move out.

Facility evacuation routes are delineated in Attachment 3 of this APP.

D4.19.4.6 Medical Emergency Procedures

Any person(s) who become ill or injured during work activities must immediately inform the UXOSO, regardless of the severity of the illness or injury. The victim(s) will be medically evaluated by the UXOSO. In the event that the medical emergency is severe enough, the UXOSO will order a cessation of work and notify offsite emergency personnel. All personnel at the work site will use the buddy system. All personnel using the buddy system will stay within sight of their partner. If a partner becomes incapacitated or severely ill, an ambulance will be called. The two personnel having current CPR and First Aid training will be identified to site personnel. In the event that a cessation of work is ordered, all personnel should:

- Assist the UXOSO if required, in administering First Aid;
- Leave the area if the hazard warrants such action; and
- Assist emergency response personnel when requested and meet them at the entrance to escort to the site.

If the medical emergency is not severe, the victim(s) will be transported to Gerald Champion Regional Medical Center, (505) 439-6100 The UXOSO will provide hospital personnel with the victim's medical background information and information on how the injury or illness occurred.

D4.19.4.7 Fire and/or Explosion Procedures

In the event of any fire or explosion, the UXOSO will:

- Notify the facility police, fire department, and ambulance service;
- Contact the USACE OE Safety Specialist;
- Upon arrival of the fire department, advise the officer in charge of the location, nature, and identification of the hazardous materials on-site; and
- Escort the response personnel to the location of the fire or explosion.

The UXOSO will:

- Determine the extent of the fire;
- Coordinate and manage fire suppression efforts until the fire department arrives;
- Coordinate the evacuation of injured or non-essential personnel from the site following the evacuation procedure;
- Provide emergency first aid as required;
- If the UXOSO has determined that it is safe to do so, site personnel may use available on-site fire extinguishers on incipient stage fires only; and
- Remove or isolate flammable or other hazardous materials, which may contribute to the fire.

D4.20 Respiratory Protection Plan

Not applicable. Respiratory hazards are not anticipated for this project.

D4.21 Health Hazard Control Plan

See Attachment 7.

D4.22 Lead Abatement Plan

Not applicable. Lead hazards are not anticipated for this project.

D4.23 Asbestos Abatement Plan

Not applicable. Asbestos hazards are not anticipated for this project.

D4.24 Abrasive Blasting Plan

Not applicable. Abrasive hazards are not anticipated for this project.

D4.25 Confined Space Entry

Not applicable. Confined space hazards are not anticipated for this project.

D4.26 Hazardous Energy Control Plan

Not applicable. Hazardous energy locations are not anticipated for this project.

D4.27 Critical Lift Procedures

Not applicable. Critical lifts are not anticipated for this project.

D4.28 Contingency Plan for Severe Weather

Daily weather conditions will be a part of the daily briefing. During severe weather, project personnel will seek shelter in an appropriate location (i.e., building or vehicle). The individual is ultimately responsible for his/her personal safety and has the right to take appropriate action when threatened by severe weather.

D4.28.1 Safe Locations during Severe Weather and Locations to Avoid

No place is absolutely safe from severe weather; however, some places are safer than others.

- Large enclosed structures (substantially constructed buildings) tend to be much safer than smaller or open structures;
- The risk for lightning injury depends on whether the structure incorporates lightning protection, construction materials used, and the size of the structure; and
- In general, fully enclosed metal vehicles such as cars, trucks, buses, vans, etc. with the windows rolled up provide good shelter from many weather conditions.

AVOID being in or near:

- High places and open fields, isolated trees, rain or picnic shelters, communications towers, flagpoles, light poles, bleachers (metal or wood), metal fences, water (lakes, streams, rivers, etc.).

When inside a building AVOID:

- Use of the telephone, washing your hands, or any contact with conductive surfaces with exposure to the outside such as metal door or window frames, electrical wiring, telephone wiring, cable TV wiring, plumbing, etc if lightning is a factor.

D4.29 Safety Guidelines for Individuals

Generally speaking, identify and seek shelter that is appropriate for the type of severe weather you are encountering. Proper shelter will always include sound structure and remove you from the elements. When available, pay attention to weather warning devices such as NOAA weather radio and/or credible weather detection systems, however, do not let this information override good common sense.

D4.30 Access and Haul Road Plan

Not applicable. Access and haul roads are not within the SOW for this project.

D4.31 Demolition Plan

Not applicable. Demolitions are not within the SOW for this project.

D4.32 Emergency Rescue Plan

Plan not required for this project. Local Emergency Rescue capabilities will be utilized through the facility emergency response system.

D4.33 Underground Construction Fire Prevention and Protection Plan

Not applicable. Underground activities are not within the SOW for this project.

D4.34 Compressed Air Plan

Not applicable. Compressed air activities are not within the SOW for this project.

D4.35 Form and Shoring Erection and Removal Plan

Not applicable. Form and shoring activities are not within the SOW for this project.

D4.36 Jacking Plan, Slab Plan

Not applicable. Jacking and slab activities are not within the SOW for this project.

D4.37 Safety and Health Plan

The SSHP is located in Attachment 4.

D4.38 Blasting Plan

Blasting/demolition procedures and associated safety precautions are discussed in the main work plan.

D4.39 Diving Plan

Not applicable. Diving activities are not within the SOW for this project.

D4.40 Plan for Prevention of Alcohol and Drug Abuse

The BW program is attached as Attachment 5. All project personnel will be asked to read and abide by this plan. The policy will be posted at the job site and in the office. BW complies with all applicable federal drug testing program requirements including the training of staff for reasonable suspicion recognition.

D4.41 Fall Protection Plan

Not applicable. Height activities are not within the SOW for this project.

D4.42 Steel Erection Plan

Not applicable. Steel erection activities are not within the SOW for this project.

D4.43 Night Operations Lighting Plan

Not applicable. Night operations are not within the SOW for this project.

D4.44 Site Sanitation Plan

The following sanitation provisions will be established and maintained for the duration of this project.

- Drinking water: An adequate supply of cool water will be supplied and will be kept in water coolers in the support zone (SZ) on-site. The water cooler will be kept closed. Personnel will be instructed to wash their face and hands prior to drinking.
- Non-Potable Water: Non-potable water maintained at the project site and all outlets dispensing non-potable water should have posted the following: "CAUTION – WATER UNSAFE FOR DRINKING, WASHING, OR COOKING".
- Toilet Facilities: A chemical toilet will be available on-site. The toilet will be equipped with toilet paper, toilet paper holder, locking door, and adequate ventilation.
- Waste Disposal: A trash receptacle will be present in the SZ for the disposal of hand drying materials, any disposable PPE, paper towels used to dry hands and other generated site debris.

D4.45 Fire Prevention Plan

A copy of the BW Fire Prevention SOP will be posted on-site and implemented.

D4.45.1 Fire Hazards

The site-specific fire hazards include:

- Tall grasses and brush;
- Use of gasoline fueled equipment;
- Inclement weather conditions may include lightning;
- Dry weather conditions; and
- Smoking on-site.

D4.45.2 Proper Handling and Storage Procedures for Hazardous Materials

Procedures to properly handle and store hazardous material, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard.

D4.45.2.1 Hazardous Materials:

None identified for site storage.

D4.45.2.2 Gasoline during Vehicle Refuel

Potential ignition sources:

- Stored static charge; and
- Lighters, matches, lit cigarettes.

Fueling Controls:

- Do not transport fuel in plastic containers in vehicles with plastic bed liners or on carpeted surfaces without securing container in place or placing it in a cardboard box for transport;

- Avoid the practice of leaving the portable fuel container in pickup trucks or cars when refueling. Instead, place the container on the ground a safe distance from the vehicle to dissipate static charge to ground;
- Touch the container with the gas dispenser nozzle before removing the container lid and before placing fuel in the container;
- Keep the nozzle in contact with the container inlet when filling to dissipate the static charge buildup from the flow of gasoline;
- Don't wear synthetic fabrics; not only because they can generate static, but also because they melt and stick to the skin;
- Stand upwind of the refueling operation;
- Don't smoke or use a cell phone or radio;;
- Have one 2A:10B:C extinguishers on each vehicle and at least one 4A:20B:C extinguisher on-site; and
- Report all fires to appropriate personnel.

Procedures to control accumulation of flammable and combustible waste materials:

- No flammable waste materials should be generated on this project.

Employee(s), by position, responsible for the control of fuel source hazards:

- SUXOS
- UXOSO

Fire Prevention, use of the fire extinguisher, fueling procedures, fire hazards and who to notify in case of a fire will be reviewed with site personnel before the start of the project and whenever needed.

D4.46 Contractor Information

This chapter presents those general safety rules that apply to all operations performed by BW and subcontractor personnel. These requirements are generic in the sense that they apply to all projects. Therefore, there may be portions of this chapter that do not apply to this specific project. The following procedures are mandatory for all project employees and site visitors. Personnel not following procedures will be warned. If they refuse to follow these procedures, they will be escorted from the site.

D4.46.1 Site Rules

The following rules apply to all site activities:

- OSHA Poster No. 3165 will be prominently displayed on-site.
- Daily safety briefings will be conducted by the SUXOS or UXOSO (as applicable) to inform personnel of new hazards or procedures.

The SUXOS or UXOSO (as applicable) and project personnel are responsible for suspending/stopping work and requiring all personnel to evacuate the affected area if any of the following situations occur:

- Inadequate safety and/or health precautions on the part of any on-site personnel;
- Potential significant environmental impact as a result of planned activities;
- Personnel will perform only those tasks they believe they can do safely and have been trained to do;
- Personnel will notify the SUXOS or UXOSO (as applicable) of any medical conditions that require special consideration;
- Personnel will maintain proper workplace housekeeping to minimize the potential for accidents;
- Contact with potentially contaminated substances will be avoided;
- Spills will be prevented to the greatest extent possible;

- All injuries and accidents requiring first aid will be reported to the UXOSO, SUXOS, PM, CIH, and USACE;
- All on-site workers will abide by the buddy system, members of a buddy team will maintain verbal and visual contact;
- All personnel entering the site will be thoroughly briefed on the hazards, equipment requirements, safety practices, emergency procedures, and communication methods;
- All persons entering this site will be offered the APP/SSHP to read and sign;
- Personnel will be prohibited from being transported by any other means than those prescribed for movement of personnel (when trucks or other heavy equipment enters or leaves the site, an individual will direct the driver);
- Any employee not willing to comply with this or any other health and safety procedure will be subject to disciplinary action;
- All on-site personnel must wear work boots, hard hats (as needed), and safety glasses (as needed), long pants or trousers and shirts covering the upper body and upper arms or coveralls can also be worn;
- All static ignition sources will be identified and eliminated by the use of bonding and grounding techniques as appropriate;
- All heavy equipment will be equipped with a working horn and back-up alarm;
- Hand signals will be employed between the operator and all ground personnel;
- The operator must be aware of his surroundings before proceeding in any direction;
- No one is permitted to stand in a blind spot to the operator;
- Spotters will be employed when the equipment must be moved while the operator has an obstructed view;
- All personnel will employ hearing protection for noise exceeding 85 dB(A); and
- All operators of vehicles used on-site will be familiar with the requirements for inspection and operation of such vehicle. Unfamiliar operations will be discussed with affected employees before beginning work. The SUXOS or UXOSO (as applicable) will be responsible to check the proficiency of the operator.

MSDSs will be obtained for every chemical product used on-site. This information will be made readily available to all employees upon request and stored in a central location. All containers of any chemical products will be properly labeled to comply with the Federal OSHA Hazard Communication Standard (29 CFR 1910.1200).

All information regarding work to be performed, emergency procedures, and health and safety hazards will be reviewed before the work begins during a daily safety briefing. No work will be performed before this meeting has taken place. At least one copy of this plan will be available at the job work site. Only authorized personnel will be permitted in the work area. All personnel will be knowledgeable of the contents of this APP/SSHP. All visitors will check in with the SUXOS or UXOSO (as applicable) and/or USACE representative.

D4.46.2 Work Permit Requirements

No site-specific work permits are anticipated as part of this project.

D4.46.3 Material Handling

No materials are anticipated to be handled as part of the project.

D4.46.4 Drum/Container Handling

- Waste, scrap, debris, and bags will be stored in approved containers and disposed of in an appropriate manner and location;
- Drums may be used during this project for storage of MEC related debris; and
- No drums of unknown material will be addressed as part of this project.

D4.46.5 Confined Space Entry

No field activities will be conducted requiring confined space entry. See D.26 of this APP.

D4.46.6 Earth Moving Safety

Field activities will be conducted requiring EMM. The procedures in this APP will be followed when EMM is in use.

D4.46.7 Guarding of Machinery and Equipment

All equipment will be operated with all guards provided by the manufacturer and in compliance with 29 CFR 1910, Subpart O and EM 385-1-1 Section 16B. If any guarding must be removed for servicing, the equipment will be disabled to preclude movement or release of energy.

- The SUXOS or UXOSO (as applicable) will inspect all vehicles/equipment before they are brought onto the project site for compliance with rental standards;
- Mounting and dismounting vehicles while in motion is prohibited. Vehicles will not be permitted to run unattended;
- Equipment/Vehicles will not be operated in a manner that will endanger persons or property, nor will the safe operating speeds or loads be exceeded; and
- All hand tools will be kept in good repair and used only for the purpose for which designed. The SUXOS or UXOSO (as applicable) will remove tools having defects that will impair their strength or render them unsafe for use from service.

D4.46.8 Lockout/Tagout

Lockout/tagout activities are not expected as part of this project. See D.27 of this APP.

D4.46.9 Fall Protection

Safe access and fall protect will be provided in accordance with the requirements of EM 385-1-1, Section 21. The walking and working surfaces may become wet and slippery during these tasks. Personnel will be instructed to use extra caution when working on these surfaces. In addition, visible barriers will be erected around any open trenches or pits to prevent personnel from falling into these areas. Fall protection measures include implementation of the Safety Monitoring System.

D4.46.10 Hazard Communication

BW's written Hazard Communications Program will govern hazard communication. All personnel will be informed of any/all chemicals used for the cleaning of the equipment. All potential chemical exposures are presented on the MSDS located in Attachment 6.

D4.46.11 Illumination

All fieldwork will be conducted during daylight hours and natural illumination will be used. Fieldwork will not be conducted during non-daylight hours.

D4.46.12 Sanitation

All employees will keep the work and support areas neat and orderly and free of trash and debris. An

area will be established where personnel can take a break. The area will be clearly marked or identified.

- If the facility does not have a water supply available then potable water will be carried to the site for equipment and employee cleanup;
- All refuse will be deposited into designated containers while on-site. It is the responsibility of the UXOSO to insure that the area is kept clean;
- Signs and Labels;
- Signs will be provided to give adequate warning and caution of hazards, instruction and directions to site workers and the general public; and
- Signs and labels will be visible at all times when a hazard or problem exists and will be removed or covered when the hazard or problem no longer exists.

D4.47 Site-Specific Hazards and Controls

A list of tasks to be performed during this project is provided below:

- MEC/UXO Investigation;
- MPPEH/Related Scrap Inspection, Certification and Disposal;
- EMM;
- Quality Control Inspection;
- Vehicle; and
- Munitions Constituents.

Each task has been analyzed to assess the potential safety, chemical, physical, biological and ionizing radiation hazards that may be encountered by site personnel and prescribe the proper engineering and/or administrative controls and/or personnel protective equipment. These controls will ensure that the risks to site personnel health and safety are reduced or eliminated while performing the project.

An AHA has been developed for each task associated with this project. The AHA can be found in Attachment 2.

D4.47.1 General

The primary hazards of concern associated with this project are as follows:

- Safety hazards: associated with equipment operation, possible falls working on uneven terrain and activities requiring manual labor;
- Chemical hazards: are not anticipated to be encountered during this project;
- Physical hazards: cold stress during the winter and heat stress during summer/fall, and tripping or falling on debris or range residue;
- Biological hazards: including contact with plants, insects, spiders and other wildlife in the wooded areas and underbrush;
- Ionizing Radiation hazards are not anticipated to be encountered during this project; and
- Explosive Ordnance and Explosives: MEC/UXO/MPPEH may be encountered. Avoidance procedures and techniques will be utilized.

D4.47.1.1 Safety Hazards

The following safety hazards may be encountered during this project:

- Slips, trips and falls at range locations;
- Back strain or sprains due to lifting and moving field equipment (Personnel will seek assistance when lifting items greater than 50 pounds);

- Lacerations and skin punctures;
- Physical injury or death resulting from vehicle accidents; and
- Explosion from presence of MEC/UXO.

D4.47.1.2 Chemical Hazards

No known chemical contaminates are suspected at this project:

D4.47.1.3 Physical Hazards

The following physical hazards may be encountered during this project:

- Open trenches or pits and vegetation (see Chapter D.7);
- Cuts and scrapes from visible or buried debris (see Chapter D.7);
- Stress endured from excessive heat or cold (see Chapter D4.19 and D4.20 of the SSHP); and
- Physical hazards are addressed in more detail in the AHA (Attachment 2) and the hazard control plan (Attachment 7).

D4.47.1.4 Biological Hazards

Biological hazards, which may be found on-site, include insects, arachnids, such as: spiders, scorpions, and plants. Several varieties of snakes and other wildlife are also common hazards in this area. Employee awareness and the safe work practices outlined in the following paragraphs should reduce the risk associated with these hazards to acceptable levels.

D4.47.1.4.1 Biting and Stinging Insects

Many types of biting and stinging insects such as bees, wasps, ticks, mites and spiders may be encountered on-site. The SUXOS or UXOSO (as applicable) will encourage the use of insect repellents, if deemed necessary. The biting insects of greatest concern are spiders, especially the black widow and the brown recluse spider. These spiders are of special concern due to the significant adverse health effects that can be caused by their bite.

D4.47.1.4.1.1 Bees, Hornets and Wasps

Contact with stinging insects like bees, hornets and wasps may result in site personnel experiencing adverse health effects that range from mild discomfort to life threatening. Therefore, stinging insects present a serious hazard to site personnel, and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects. Some of the factors that are related to stinging insects that increase the degree of risk associated with accidental contact are as follows:

- The nests for these insects are frequently found in remote wooded, grassy areas where many waste sites are located;
- The nests can be situated in trees, rocks, and bushes or in the ground, and are usually difficult to see;
- Accidental contact with these insects is highly probable, especially during warm weather conditions when the insects are most active;
- If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and swelling which can leave the worker incapacitated and in need of medical attention; and
- Some people are hypersensitive to the toxins injected by a sting, and when stung, experience a violent and immediate allergic reaction resulting in a life-threatening condition known as anaphylactic shock. Anaphylactic shock manifests itself very rapidly and is characterized by extreme swelling of the body, eyes, face, mouth and respiratory passages.

The hypersensitivity needed to cause anaphylactic shock can, in some people, accumulate over time and exposure; therefore, even if someone has been stung previously, and has not experienced an allergic

reaction, there is no guarantee that they will not have an allergic reaction upon receipt of another sting.

D4.47.1.4.2.1 Ticks

The Center for Disease Control (CDC) has noted the increase of Lyme Disease and Rocky Mountain Spotted Fever (RMSF) which are caused by bites from infected ticks that live in and near wooded areas, grass, and brush. Ticks are small, ranging from the size of a comma up to about one quarter inch (**Figure D4-2:** Deer Tick). They are sometimes difficult to see. When embedded in the skin, they may look like a freckle. The tick season extends from spring through summer.

Lyme disease has occurred in 49 states, with the heaviest concentrations in the Northeast (Connecticut, Massachusetts, New Jersey, New York, and Pennsylvania), the upper Midwest (Minnesota and Wisconsin), and along the northern California coast. It is caused by deer ticks and the lone star ticks which have become infected with spirochetes. Female deer ticks are about one quarter inch in size, and are black and brick red in color. Male deer ticks are smaller, and completely black. Lone star ticks are larger and chestnut brown in color.

RMSF has occurred in at least 36 states, with the heaviest concentrations in Oklahoma, North Carolina, South Carolina, and Virginia. It is caused by Rocky Mountain wood ticks and dog ticks that have become infected with rickettsia. Both are black in color.

The first symptoms of either disease are flu like chills, fever, headache, dizziness, fatigue, stiff neck, and bone pain. If immediately treated by a physician, most individuals recover fully in a short period of time. If not treated, more serious symptoms can occur. If you believe you have been bitten by a tick, or if any of the signs and symptoms noted above appears, contact the UXOSO, who will authorize you to visit a physician for an examination and possible treatment.

D4.47.1.4.3.1 Mites (Chiggers)

Chiggers are small mites that are usually a yellowish to bright red color (**Figure D4-3:** Chigger). Chiggers may live year-round but are especially active during spring and summer. The larval chigger is the active stage that bites animals and humans, attaching themselves tightly. After secreting digestive enzymes that break down the skin cells, the mite feeds on the liquefied cells. The rash and intense itching associated with chiggers is an allergic reaction to the mite's salivary secretions. Preventive measures used against mosquitoes are effective against chiggers. Treatments to ease itching include ointments such as calamine lotion, hydrocortisone, and benzocaine.

D4.47.1.4.4.1 Black Widow Spider

The Black Widow Spider is not aggressive unless agitated when guarding her egg sac. They live in a variety of natural and domestic habitats such as under rocks, wooden boards and in dense plant growth. The female spider is glossy black and marked with a characteristic red hourglass on the underside of the abdomen. The female has a body length of about ½" with a total length of about 1 ½", (**Figure D4-4:** Black Widow Spider). The male, which is rarely seen, is smaller and has four pairs of red marks along the sides of the abdomen. Young black widow spiders are tan-to-gray in color and have orange and white "racing stripes" on their abdomens. Black widow spider venom affects the nervous system. The venom causes pain in the lymph nodes. Other symptoms of a severe bite include nausea, elevated blood pressure, sweating, tremors and increased white blood cell counts. The wound may appear as a bluish red spot, surrounded by a whitish area. Victims of a black widow bite may exhibit the following signs or symptoms:

- Sensation of pinprick or minor burning at the time of the bite; and
- Appearance of small punctures (but sometimes none are visible).

After 15 to 60 minutes, intense pain is felt at the site of the bite which spreads quickly, and is followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils and generalized swelling of face and extremities.

D4.47.1.4.5.1 Brown Recluse Spider

The brown recluse is brownish to tan in color, rather flat, 5/8 to 2 inches long with a dark brown "violin" shape on the underside, (**Figure D4-5:** Brown Recluse Spider). It may be found in trees, or in dark locations. Victims of a brown recluse bite may exhibit the following signs or symptoms:

- Blistering at the site of the bite, followed by a local burning at the site 30 to 60 minutes after the bite;
- Formation of a large, red, swollen, pustulating lesion with a bull's-eye appearance;
- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea, and vomiting; and pain may become severe after 8 hours, with the onset of tissue necrosis;
- Formation of a large, red, swollen, pustule lesion with a bull's-eye appearance; and
- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea and vomiting; and pain may become severe after eight (8) hours, with the onset of tissue necrosis.

Treatment for Spider Bites: There is no effective first aid treatment for any of these bites. Except for very young, very old or weak victims, spider bites are not considered to be life threatening; however, medical treatment must be sought to reduce the extent of damage caused by the injected toxins.

If the spider can be retrieved, it should be taken with the patient to medical treatment. If venomous spiders are suspected or known to be on-site, the SUXOS or UXOSO (as applicable) will brief the site personnel as to their identification and avoidance. As with stinging insects, site personnel should report to the SUXOS or UXOSO (as applicable) if they locate these spiders on-site or notice any type of bite while involved in site activities.

Protective Measures: With these things in mind and with the high probability of contact with stinging insects, all site personnel will comply with the following safe work practices:

- If a worker knows that he is hypersensitive to bee, wasp or hornet stings, he must inform the SUXOS or UXOSO (as applicable) of this condition prior to participation in site activities;
- All site personnel will be watchful for the presence of stinging insects and their nests, and will advise the SUXOS or UXOSO (as applicable) a stinging insect nest or presence of a swarm of bees is located or suspected in the area;
- Any nests located on-site will be flagged and site personnel will be notified of its presence;
- If stung, site personnel will immediately report the SUXOS or UXOSO (as applicable) to obtain treatment and to allow the SUXOS or UXOSO (as applicable) to observe them for signs of allergic reaction; and
- Site personnel with a known hypersensitivity to stinging insects will keep required emergency medication on or near their person at all times, and will inform their supervisor of the medication and how to administer it in an emergency.

D4.47.1.4.2 Snakes

Depending on the time of year of the field work, snakes could be encountered. Personnel should be aware of their surroundings and take particular care when traversing areas that may be inhabited by snakes, such as near rocks, logs, crevices and in holes or pipes (**Figure D4-6**).

D4.47.1.4.3 Plants Causing Skin Reactions

A number of hazardous plants may be encountered. The ailments associated with these plants range from mild hay fever to contact dermatitis to carcinogenic affects. The plants that present the greatest degree of risk to site personnel (i.e. potential for contact vs. affect produced) are those that produce skin reactions and skin and tissue injury.

The hazardous plants of greatest concern are a variety of poison ivy (**Figure D4-7**), poison oak (**Figure D4-8**), or sumac found in the project area. Contact with the leaves, stems, or roots of these plants may produce redness, blisters, swelling, and intense burning and itching due to transfer of oils or sap. The victim also may develop an infection should the surface of the skin be broken. The most distinctive features of hazardous plants (**Figures D4-8** and **D4-9**) are readily visible. These plants may grow in all areas around the project site. Improper treatment of an injury can cause secondary infections to occur.

Preventive measures that can prove effective for most site personnel:

- Avoid contact with any hazardous plants on site.
- Remove gloves prior to touching face, neck, or other exposed areas of the body.
- Wash hands, face or other exposed areas at the beginning of each break period and at the end of each workday.
- Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit some of the potential exposure.

D4.47.1.4.4 Plants Causing Skin and Tissue Injury

Contact with sharp leaves, nettles, and thorns are of special concern to site personnel. This concern stems from the fact that punctures, cuts and even minor scrapes caused by accidental contact may result in non-infectious skin lesions, and the introduction of fungi or bacteria through the skin or eye. This is especially important in light of the fact that the warm moist environment created inside protective clothing is ideal for the propagation of fungal and bacterial infection. Personnel receiving any of the injuries listed above, even minor scrapes will report it immediately to the UXOSO or SUXOS for initial and continued observation and care of the injury. Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit much of the potential exposure. If the rash is scratched, secondary infections can occur. The rash usually disappears in one to two weeks in cases of mild exposure and up to three weeks when exposure is severe.

Preventative Measures: The hazardous plants of greatest concern are those varieties found in the project area having the ability to cause redness, blisters, swelling, and intense burning and itching due to punctures, scraps, or lacerations. Improper treatment of an injury can cause secondary infections to occur. Preventive measures that can prove effective for most site personnel are:

- Avoid contact with any hazardous plants on-site;
- Remove gloves prior to touching face, neck, or other exposed areas of the body;
- Wash hands, face or other exposed areas at the beginning of each break period and at the end of each workday; and
- Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit some of the potential exposure.

Figure D4-2: Deer Tick

Figure D4-3: Chigger

Figure D4-4: Black Widow Spider

Figure D4-5: Brown Recluse Spider

Figure D4-6: Rattlesnake

Figure D4-7: Poison Ivy

Figure D4-8: Poison Oak

D4.47.1.5 Radiological

There are no known radiological hazards associated with the project site.

D4.47.1.6 Explosive Ordnance and Explosives

MEC and MEC-related items may be encountered at the site. Personnel should be alert for UXO and UXO-related scrap or MPPEH. All project personnel will adhere to safe work procedures. The following general precautions with regards to MEC/UXO will be observed at all times:

- DO NOT touch or move any ordnance item(s) regardless of the markings or apparent condition unless the functioning or hazards are known;
- DO NOT visit an ordnance site if an electrical storm is occurring or approaching. If a storm approaches during a site visit, leave the site immediately and seek shelter;
- DO NOT use flash photography, radios, or cellular phones in the vicinity of suspect ordnance items;
- DO NOT walk across an area where the ground cannot be seen. If dead vegetation or animals are observed, leave the area immediately due to potential contamination by chemical agent;
- DO NOT drive vehicles into a suspected MEC area; use clearly marked lanes;
- DO NOT carry matches, lighters, or other flame-producing devices onto an MEC site;
- DO NOT rely on color code for positive identification of ordnance item(s) nor their contents;
- Approach ordnance items from the side; avoid approaching the front or rear areas; and
- Always assume ordnance items contain a live charge until it can be ascertained otherwise.

Table D4-7: Suspected MEC Contamination

Type of MEC	Amount	Location	Surface/Sub-surface
M125 Gas Bomb, simulant filled	Unknown	LF-29	Visible on surface
E61R4 Biological Test Units, simulant filled	Unknown	LF-29	Visible on surface

D4.47.1.6.1 Specific Actions to Be Taken Upon Locating Ordnance

- Do not be misled by markings on the ordnance item stating practice or inert. Even practice items may have explosive charges that are used to mark/spot the point of impact; or the item could be incorrectly marked;
- Follow the Safety Precautions set forth in EP 385-1-95a for the type of munitions or UXO encountered;
- Do not roll the item over or scrape the item to identify the markings;
- The location of any ordnance items found during sweep activities should be clearly marked so it can be easily located and avoided. Follow the procedures set forth in the WP; and
- Upon locating any MEC or suspect UXO, notify the SUXOS so appropriate action can be taken.

D4.48 Logs, Reports, and Record Keeping

D4.48.1 Logbook

The SUXOS (as applicable) will keep a daily log recording the following at the site:

- Task assignments;
- Operational issues or problems encountered;

- Instructions issued by the client/customer;
- Accidents; and
- Emergencies.

D4.48.2 Safety Inspection Log

The UXOSO will maintain a daily safety log of all safety related activities. This may be part of the DQCR. The following information will be maintained in the Safety Log:

- Date and location;
- Tailgate safety briefing (time conducted, material discussed, etc.);
- Weather conditions;
- Significant site events relating to safety;
- Accidents (see D.17 for reporting procedures);
- Stop work events related to safety;
- Inspections performed;
- Safety audits; and
- Signature of the UXOSO at the end of each day.

D4.48.3 Training Log

The UXOSO will maintain a training log documenting the following information:

- Date and location;
- Nature of training (personnel will complete the appropriate documentation of training form);
- Visitor training; and
- Signature of the UXOSO.

D4.48.4 Visitor Log

The UXOSO will document all visitors to the project site. Information will include:

- Date and location;
- Arrival and departure times;
- Nature of visit (i.e., regulatory, client/customer, corporate);
- Visitor training requirement; and
- Escort assigned.

D4.48.5 Air Monitoring Log

Air monitoring will not be required on this project.

D4.48.6 Record Keeping

The UXOSO will establish and maintain a filing system on-site for records, reports, and information concerning individual training, medical surveillance, etc. Sections in this filing system will include:

- Training Records - Certificates for training required by 29 CFR1910.120 (40-hour initial HAZWOPER, 8-hr refresher, and supervisory training) will be maintained at the site. Additionally, documentation of CPR and First Aid training will be available at the site;
- Medical Monitoring/Surveillance - Documentation of current enrollment (within last 12 months) in a medical monitoring program will be available for each employee working at the site.

Documentation will consist of the employee's Health Status Report that is written and signed by the examining occupational physician;

- Exposure Records - Documentation of exposures are maintained with the employee medical files and retained IAW OSHA requirements;
- Accident Reports - Copies of any accident/incident reports and follow-up reports;
- Plan Acceptance Forms - Copies of the Plan Acceptance Forms documenting that employees have read and understand the APP/SSHP will be maintained at the site; and
- Visitor Log - Maintained on-site for the duration of the project, transfer to the corporate office for inclusion in reports or stored as directed.

D4.48.7 Injury and Illness Reports

If an injury or illness occurs on-site, the UXOSO is responsible for completing a BW Accident Report form. The UXOSO will coordinate preparation of the respective forms to ensure accuracy and consistency. All accidents/incidents must be investigated by the UXOSO or corporate assigned individual. The purpose of the investigation is to determine the causal factors that lead to the accident/incident and to establish corrective actions to prevent a recurrence. A completed BW Accident Report Follow-Up Form must be forwarded to the CIH within five days after the incident.

In the event of an accident that results in a lost workday or $2,000 or more in property damage, an ENG Form 3394 will be completed and submitted within five workdays. See Chapter D.17 for information and procedures.

OSHA recordable injuries and/or illnesses will be entered on the OSHA Form 300 by the UXOSO This form will be maintained on-site for the duration of the project then returned to the corporate office for inclusion in reports and required filing.

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Appendix D

Attachment 1
OSHA 300 Forms

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OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 2007

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name: Bay West, Inc.
City: St. Paul State: MN

Identify the person			Describe the case			Classify the case (CHECK ONLY ONE box for each case based on the most serious outcome for that case)				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
(A) Case no.	(B) Employee's name	(C) Job title (e.g., Welder)	(D) Date of injury or onset of illness	(E) Where the event occurred (e.g., Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g., Second degree burns on right forearm from accident torch)	Death (G)	Days away from work (H)	Remained at Work: Job transfer or restriction (I)	Remained at Work: Other recordable cases (J)	Away from work (K)	On job transfer or restriction (L)	(M) Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
01	Bradley Henrich	Tech	4/11	Outside - Goldsboro, NC CMP	Contact with poison ivy/oak	☐	☐	☐	☒	0 days	0 days	☐	☒	☐	☐	☐	☐
02	Tim Salaine	Manager	7/19	Granite City, IL	Contact with poison ivy/oak	☐	☐	☐	☒	0 days	0 days	☐	☒	☐	☐	☐	☐
03	Jeff Gordon	Tech	8/07	Project Site - Bloomington, MN	Skin rash - chemical exposure	☐	☐	☐	☒	0 days	0 days	☐	☒	☐	☐	☐	☐
			/			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
04	Delaneo Tillman	Tech	8/28	BW Facility St. Paul, MN	Cut hand on paint can	☐	☐	☐	☒	0 days	0 days	☒	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
05	Janice Noggle	Supervisor	9/22	Loading area	cut to left middle finger	☐	☐	☐	☒	0 days	0 days	☒	☐	☐	☐	☐	☐
06	Dave Olson	Tech	9/18	Shop	cut above left eye	☐	☐	☐	☒	0 days	0 days	☒	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
					Page totals ➤				6			3	3				
												Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Page 1 of 1

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year 20 0 7

U.S. Department of Labor
Occupational Safety and Health Administration
Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	6
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of . . .	(M)
(1) Injuries	3
(2) Skin disorders	3
(3) Respiratory conditions	
(4) Poisonings	
(5) Hearing loss	
(6) All other illnesses	

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name: Bay West, Inc.

Street: 5 Empire Drive

City: St. Paul State: MN ZIP: 55103

Industry description (e.g., *Manufacture of motor truck trailers*):

Standard Industrial Classification (SIC), if known (e.g., 3715): ___ ___ ___ ___

OR

North American Industrial Classification (NAICS), if known (e.g., 336212): 5 6 2 9 1 0

Employment information

(If you don't have these figures, see the Worksheet on the back of this page to estimate.)

Annual average number of employees: 80

Total hours worked by all employees last year: 151,517

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Company executive: [signature] Title: Vice President

Phone: 651 291-3450 Date: 4/7/08

Attachment 2
Activity Hazard Analysis

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Appendix D
Attachment 2
Activity Hazard Analysis (AHA)

Activity: Site Preparation	**Date: August 25, 2008**
	Project: MD Burial Pit Clean-up
Description of the work: Prepare site as needed to conduct safe and effective MEC removal actions.	**Analyzed By: Doug Hickey, CIH - BW**
	Prepared By: Wayne Martrildonno UXO Technical Manager – Bay West
	Review for latest use: Each time before the job is performed.

Task Breakdown	Identify & Analyze the Hazards	Identify Hazard Controls
• Site Preparation.	• Potential MEC/UXO. • Unplanned Detonations. • Unauthorized Personnel. • Wildlife, insects, poisonous/toxic plants. • Sunburn/windburn, slips, trips, and falls. • Heat and cold stress.	• Observe all MEC safety precautions, such as movement, heat, shock, and friction. • Be Alert. Mark and report any MEC encountered. • Establish Exclusion Zones based on the known hazards. Avoid and do not handle wildlife IAW the SSHP briefing. • Use insect repellant as necessary. • Avoid suspect plants IAW the SSHP briefing. • Use barrier creams/ointments as necessary. • Decontaminate person and equipment as necessary. • Use sunscreen/barrier cream as necessary. • Be aware of footing and terrain, watch for slips, trips, and falls hazards. • 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. • Know and observe the safe work practices and operating instructions of the equipment. • Use and enforce the buddy system. • Ensure First Aid Kits and Fire Extinguishers are in place. • No smoking, except in designated areas.

Appendix D
Attachment 2
Activity Hazard Analysis (AHA)

Equipment to be used	Inspection Requirements	Training Requirements
	Inspection to be performed by Technician III or designated individual	Training to be performed by UXOSO or designated individual.
• Communications Equipment. • MEC/UXO flagging material. • First Aid Kit. • PPE level D modified as required.	• Daily serviceability check of instrument. • Daily communications checks. • Type and quantity check of flagging material. • Daily checks of first aid kits and weekly inventory of kits. • Daily check for serviceability, fit, and comfort of PPE.	• Instrument familiarity as required. • Knowledge of the Emergency Response and Notifications procedures IAW the SSHP. • Techniques for MEC/UXO avoidance. • First Aid and CPR training as required by the SSHP. • Safe work practices and precautions associated with task being performed IAW the WP. • Specific response training IAW the WP/SSHP. • Personnel will meet requirements IAW the applicable regulations for the training and use of PPE. • Evacuation and emergency procedures IAW the SSHP. • UXO identification and safety precautions for UXO and Non-UXO personnel IAW the WP/SSHP. • OSHA qualifications and training as required IAW the WP/SSHP.

Appendix D
Attachment 2
Activity Hazard Analysis (AHA)

	PRINT	SIGNATURE	
UXOSO Name:	_____	_____	**Date/Time:** _____
SUXOS Name:	_____	_____	**Date/Time:** _____
Employee Name(s):	_____	_____	**Date/Time:** _____
	_____	_____	**Date/Time:** _____
	_____	_____	**Date/Time:** _____
	_____	_____	**Date/Time:** _____
	_____	_____	**Date/Time:** _____
	_____	_____	**Date/Time:** _____
	_____	_____	**Date/Time:** _____
	_____	_____	**Date/Time:** _____
	_____	_____	**Date/Time:** _____
	_____	_____	**Date/Time:** _____

Appendix D
Attachment 2
Activity Hazard Analysis (AHA)

Activity: MEC/UXO Investigation	**Date: August 25, 2008**
	Project: MD Burial Pit Clean-up
Description of the work: Employ approved techniques and methods during investigation of MEC/UXO.	**Analyzed By: Doug Hickey, CIH - BW**
	Prepared By: Wayne Martrildonno UXO Technical Manager – Bay West
	Review for latest use: Each time before the job is performed.

Task Breakdown	Identify & Analyze the Hazards	Identify Hazard Controls
• Locate Anomalies/Surface MEC/UXO.	• Potential MEC/UXO. • Unplanned Detonations. • Unauthorized Personnel.	• Observe all MEC safety precautions, such as movement, heat, shock, and friction. • Only UXO trained personnel will locate anomalies. • Do not handle MEC items unnecessarily. • Establish Exclusion Zones based on the known hazards. • Establish and observe team separation distances. • Only UXO qualified personnel will handle MEC items if encountered. • Wear the appropriate PPE for the task being performed. • Keep personnel to a minimum during operations. • Properly position personnel for observing spoils for MEC/UXO and establish safety arc prior to commencing operations. • Use and enforce the buddy system. • Ensure First Aid Kits and Fire Extinguishers are in place. • No smoking, except in designated areas.

Appendix D
Attachment 2
Activity Hazard Analysis (AHA)

• Excavate/Investigate MEC/UXO.	• Potential MEC/UXO. • Unplanned Detonations. • Unauthorized Personnel.	• Observe all MEC safety precautions, and follow safe work practices. • Do not allow unauthorized personnel into the area of operations. • Do not handle MEC items unnecessarily. • Only UXO trained personnel will excavate MEC/UXO. • Only hand excavation when within 1 foot of the item. • Unshielded personnel withdraw to the hazardous fragment distance while unguided excavation is employed. • Do not dig directly over the item. • Be alert. Cease operations if unsafe conditions arise. • Maintain positive site control; cease operations if unauthorized entry is made. • Keep personnel to a minimum during operations. • Wear the appropriate PPE for the task being performed. • Establish and observe team separation distances.
• Identify and Record MEC/UXO.	• Potential MEC/UXO. • Unplanned Detonations. • Unauthorized Personnel.	• Observe all MEC safety precautions, and follow safe work practices. • Mark and report all MEC/UXO encountered. • Do not allow unauthorized personnel into the area of operations. • Maintain positive site control and enforce safe separation distances. • Record all MEC/UXO encountered by size, type, condition, and location. • Identification of MEC items will be made by 2 UXO qualified personnel. • Wear the appropriate PPE for the task being performed. • Do not handle MEC items unnecessarily.
	• Wildlife, insects, poisonous/toxic plants.	• Avoid and do not handle wildlife IAW the SSHP briefing.

Appendix D
Attachment 2
Activity Hazard Analysis (AHA)

	• Sunburn/windburn, slips, trips, and falls. • Heat and cold stress.	• Use insect repellant as necessary. • Avoid suspect plants IAW the SSHP briefing. • Use barrier creams/ointments as necessary. • Use sunscreen/barrier cream as necessary. • Be aware of footing and terrain, watch for slips, trips, and falls hazards. • Avoid obstacles when possible. • Wear approved and appropriate work boots. • Dress for the weather, in layers of removable clothing. • Drink the appropriate fluids on a frequent basis. • Know the signs and symptoms of Heat and Cold Stress. • Enforce buddy system monitoring. • Observe safe work practices, operating precautions, and instructions for the equipment in use. • Wear the proper PPE for the task being performed.
	Inspection to be performed by Technician III or designated individual	Training to be performed by UXOSO or designated individual.
• Magnetometer. • Communications Equipment. • MEC/UXO flagging material. • First Aid Kit. • PPE. • Hand tools.	• Daily serviceability check of instrument. • Daily communications checks. • Type and quantity check of flagging material. • Daily checks of first aid kits and weekly inventory of kits. • Daily check for serviceability, fit, and comfort of PPE. • Daily check of hand tool serviceability.	• Instrument familiarity as required. • Knowledge of the Emergency Response and Notifications procedures IAW the SSHP. • Techniques for MEC/UXO avoidance. • First Aid and CPR training as required by the SSHP. • Safe work practices and precautions associated with task being performed IAW the WP. • Specific response training IAW the WP/SSHP. • Personnel will meet requirements IAW the applicable regulations for the training and use of PPE. • Evacuation and emergency procedures IAW the SSHP. • UXO identification and safety precautions for

Appendix D
Attachment 2
Activity Hazard Analysis (AHA)

		UXO and Non-UXO personnel IAW the WP/SSHP. • OSHA qualifications and training as required IAW the WP/SSHP.

	PRINT	SIGNATURE	
UXOSO Name:	_____	_____	**Date/Time:**_____
SUXOS Name:	_____	_____	**Date/Time:**_____
Employee Name(s):	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____
	_____	_____	**Date/Time:**_____

Appendix D
Attachment 2
Activity Hazard Analysis (AHA)

Activity: MPPEH/Related Scrap Inspection, Certification and Disposal	**Date: August 25, 2008**
	Project: MD Burial Pit Clean-up
Description of the work: Inspect, certify, and dispose of MPPEH/related scrap collected on the project site.	**Analyzed By: Doug Hickey, CIH - BW**
	Prepared By: Wayne Martrildonno UXO Technical Manager – Bay West
	Review for latest use: Each time before the job is performed.

Task Breakdown	Identify & Analyze the Hazards	Identify Hazard Controls
• Inspection of Material and Containers.	• Potential MEC/UXO. • Unplanned Detonations. • Unauthorized Personnel. • Cuts and Lacerations.	• Observe all MEC safety precautions, and follow safe work practices. • Only UXO qualified personnel will inspect scrap material. • Be Alert. Mark and report any MEC encountered. • Wear the appropriate PPE for the task being performed. • Place collection/work area downwind and away from break areas. • Follow safe work practices, and handle material as few times as possible. • Inspect containers prior to placing material inside. • Ensure personnel have communications capability. • Post barriers and barricades as necessary prior to commencing operations. • Use and enforce the buddy system. • Ensure First Aid Kits and Fire Extinguishers are in place. • No smoking, except in designated areas. • Be alert. Cease operations if unsafe conditions arise. • Maintain positive site control; cease operations if unauthorized entry is made. • Properly close and seal each container after inspection. • Properly label each container after inspection. • Ensure safe placement of containers for shipment. • Maintain accurate count of containers, weight, and fill. • Complete, sign, and receive copy of Uniform Hazardous Waste Manifest.

Appendix D
Attachment 2
Activity Hazard Analysis (AHA)

• Consolidation, Packaging, and Loading Containers.	• Potential MEC/UXO. • Unplanned Detonations. • Unauthorized Personnel.	• Observe all MEC safety precautions, and follow safe work practices. • Be alert. Cease operations if unsafe conditions arise. • Identify safety/hazardous zones of operations. • Maintain positive site control; cease operations if unauthorized entry is made. • Do not overload containers. • Use only authorized and approved containers. • Keep personnel to a minimum during operations.
• Completing Documentation.	• Unauthorized Personnel.	• Do not allow unauthorized personnel into the area of operations. • Record all pertinent information on forms. • Ensure authorized signatures are documented on the DD Form 1348-1A • Complete, sign, and receive copy of Uniform Hazardous Waste Manifest. • Required documents for inspection, certification, and verification of MPPEH related scrap.
	• Wildlife, insects, poisonous/toxic plants. • Sunburn/windburn, slips, trips, and falls. • Heat and cold stress.	• Avoid and do not handle wildlife IAW the APP/SSHP briefing. • Use insect repellant as necessary. • Avoid suspect plants IAW the APP/SSHP briefing. • Use barrier creams/ointments as necessary. • Decontaminate person and equipment as necessary. • Use sunscreen/barrier cream as necessary. • Be aware of footing and terrain, watch for slips, trips, and falls hazards. • Avoid obstacles when possible. • Wear approved and appropriate work boots. • Dress for the weather, in layers of removable clothing. • Drink the appropriate fluids on a frequent basis. • Know the signs and symptoms of Heat and Cold Stress. • Enforce buddy system monitoring. • Observe safe work practices, operating precautions, and instructions for the equipment in use. • Wear the proper PPE for the task being performed.

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Equipment to be used	Inspection Requirements	Training Requirements
	Inspection to be performed by Technician III or designated individual	Training to be performed by UXOSO or designated individual.
• Hand tools • Communications Equipment • Fire Extinguishers. • First Aid Kits. • PPE level D	• Daily inspection of hand tools IAW the APP. • Daily communications checks. • Daily checks of fire extinguishers. • Daily checks of first aid kits and weekly inventory of kits. • Serviceability of containers. • Daily check for serviceability, fit, and comfort of PPE. • Daily check for security of scrap to prevent intermingling with inspected scrap.	• Knowledge of the Emergency Response and Notifications procedures IAW the APP. • Limitations and placement of extinguishers IAW the APP. • Techniques for the use of extinguishers IAW the APP. • Size and type of extinguisher required by task IAW the APP. • First Aid and CPR training as required by the APP/SSHP. • Universal safety precautions for bloodborne pathogens IAW the APP. • Safe work practices and precautions associated with task being performed IAW the WP/APP. • Hand tool inspection. • Specific MEC response training IAW the WP/APP. • Personnel will meet requirements IAW the applicable regulations for the training and use of PPE. • UXO identification and safety precautions for personnel IAW the WP/APP. • Requirements under DoD 4160.21-M.

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Activity Hazard Analysis (AHA)

	PRINT	SIGNATURE	
UXOSO Name:	_____	_____	**Date/Time:**_____
SUXOS Name:	_____	_____	**Date/Time:**_____
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Activity Hazard Analysis (AHA)

Activity: Earth Moving Machinery	**Date: August 25, 2008**
	Project: MD Burial Pit Clean-up
Description of the work: Excavation, screening (sifting) and handling of soil.	**Analyzed By: Doug Hickey, CIH - BW**
	Prepared By: Wayne Martrildonno UXO Technical Manager – Bay West
	Review for latest use: Each time before the job is performed.

Task Breakdown	Identify & Analyze the Hazards	Identify Hazard Controls
• Excavate Surface Soils and Debris.	• Utility hazards. • Operation of heavy equipment. • Noise exposure.	• Ensure a digging permit approved by Holloman AFB Civil Engineering is on file • Use spotters and backup alarms on heavy equipment. • Provide shielding for the EMM operators and observers when unguided excavation is taking place. • All unshielded personnel withdraw to the HFD when unguided digging is taking place. • Initial PPE Level: Level D. • Utilize dust suppression methods (fine water spray), if required. Control flow to prevent saturation and runoff.
• Screening of Excavated Soils.	• Hazards associated with heavy equipment and rotating parts. • Noise exposure.	• Use hearing protection as needed.
• Backfilling Excavations.	• Operation of heavy equipment. • Noise exposure.	• Use spotters and backup alarms on heavy equipment. • Initial PPE Level: Level D. • Use hearing protection as needed.
		• Use spotters and backup alarms on heavy equipment and

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		trucks. • Initial PPE Level: Level D. • Utilize dust suppression methods (water spray), if required. • Use hearing protection as needed.
Equipment to be used	**Inspection Requirements**	**Training Requirements**
	Inspection to be performed by Equipment Operator or designated individual	Training to be performed by UXOSO or designated individual.
• Heavy Equipment. • Hand Tools, non-powered. • Communications Equipment.	• Construction equipment safety inspection. • Daily communications checks. • Excavation inspection (as required).	• Equipment Operator familiarity with equipment. • Excavation Competent Person Training. • Knowledge of the Emergency Response and Notifications procedures IAW the SSHP. • Techniques for MEC/UXO avoidance. • Safe work practices and precautions associated with task being performed IAW the WP. • Specific response training IAW the WP/SSHP. • Evacuation and emergency procedures IAW the SSHP. • UXO identification and safety precautions for UXO personnel IAW the WP/SSHP. • OSHA qualifications and training as required IAW the WP/SSHP.

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UXOSO Name:	_____	_____	**Date/Time:**_____
SUXOS Name:	_____	_____	**Date/Time:**_____
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Activity: Quality Control Inspection	**Date: August 25, 2008**
	Project: MD Burial Pit Clean-up
Description of the work: Inspect work performance of project personnel at Site.	**Analyzed By: Doug Hickey, CIH - BW**
	Prepared By: Wayne Martrildonno UXO Technical Manager – Bay West
	Review for latest use: Each time before the job is performed.

Task Breakdown	Identify & Analyze the Hazards	Identify Hazard Controls
• Inspection of Project Documentation, Site Conditions, Work Performance and Operations.	• Potential MEC/UXO. • Unauthorized Personnel.	• Observe all MEC safety precautions, such as movement, heat, shock, and friction. • Only UXO trained personnel will perform UXO operations. • Only UXO qualified personnel will escort non-UXO personnel. • Be Alert. Mark and report any MEC encountered. • Establish Exclusion Zones based on the known hazards. • Post barriers and barricades as necessary prior to commencing operations and maintain positive site control. • Only UXO qualified personnel will handle MEC items if encountered. • Wear the appropriate PPE for the task being performed. • Keep personnel to a minimum during operations. • Ensure required site documentation is on hand. • Ensure logs, briefings, reports and forms are completed in a timely and accurate manner. • Use and enforce the buddy system. • Ensure First Aid Kits and Fire Extinguishers are in place. • No smoking, except in designated areas.
• Inspection of Material and Packaging of Containers.	• Potential MEC/UXO. • Damaged Container. • Unauthorized Personnel.	• Observe all MEC safety precautions, and follow safe work practices. • Inspection of material will be made by UXO qualified personnel.

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		• Be alert. Cease operations if unsafe conditions arise. • Identify safety/hazardous zones of operations. • Ensure containers are properly marked, labeled, and stored. • Maintain positive site control; cease operations if unauthorized entry is made. • Keep personnel to a minimum during operations.
• Inspection of Completed Project Documentation.		• Review or inspect all site generated documents for accuracy and deliverability. • Ensure concerned parties receive copies of documents pertaining to their activities. • Ensure contract deliverables have been met. • Required documents for inspection, certification, and verification of MEC/UXO/MPPEH related scrap.
	• Wildlife, insects, poisonous/toxic plants. • Sunburn/windburn, slips, trips, and falls. • Heat and cold stress.	• Report any unsafe condition to the UXOSO or SUXOS. • Avoid and do not handle wildlife IAW the APP/SSHP briefing. • Use insect repellant as necessary. • Avoid suspect plants IAW the APP/SSHP briefing. • Use barrier creams/ointments as necessary. • Use barrier cream as necessary. • Be aware of footing and terrain, watch for slips, trips, and falls hazards. • Avoid obstacles when possible. • Wear approved and appropriate safety toed work boots. • Dress for the weather, in layers of removable clothing. • Drink the appropriate fluids on a frequent basis. • Know the signs and symptoms of Heat and Cold Stress. • Enforce buddy system monitoring. • Maintain safe working distances from equipment. • Observe safe work practices, operating precautions, and instructions for the equipment in use. • Wear the proper PPE for the task being performed. • Use care when handling material, watch for sharp edges and contaminated surfaces.

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Activity Hazard Analysis (AHA)

Equipment to be used	Inspection Requirements	Training Requirements
	Inspection to be performed by Technician III or designated individual	Training to be performed by UXOSO or designated individual.
• Hand Tools • Communications Equipment • Fire Extinguishers. • First Aid Kits. • PPE.	• Daily inspection of hand tools IAW the APP. • Daily communications checks. • Daily checks of fire extinguishers. • Daily checks of first aid kits and weekly inventory of kits. • Serviceability of containers. • Daily check for serviceability, fit, and comfort of PPE.	• Knowledge of the Emergency Response and Notifications procedures IAW the APP/SSHP. • Limitations and placement of extinguishers IAW the APP. • Techniques for the use of extinguishers IAW the APP. • Size and type of extinguisher required by task IAW the APP. • First Aid and CPR training as required by the APP. • Universal safety precautions for bloodborne pathogens IAW the APP. • Safe work practices and precautions associated with task being performed IAW the WP. • Hand tool inspection. • Specific MEC response training IAW the WP/APP. • Personnel will meet requirements IAW the applicable regulations for the training and use of PPE. • UXO identification and safety precautions for personnel IAW the WP/APP. • Requirements under DoD 4160.21-M.

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Activity Hazard Analysis (AHA)

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Activity Hazard Analysis (AHA)

Activity: On-Site Vehicle Operation During Field Work	**Date: August 25, 2008**
	Project: MD Burial Pit Clean-up
Description of the work: Recognize the hazards associated with vehicle operations during field work.	**Analyzed By: Doug Hickey, CIH - BW**
	Prepared By: Wayne Martrildonno UXO Technical Manager – Bay West
	Review for latest use: Each time before the job is performed.

Task Breakdown	Identify & Analyze the Hazards	Identify Hazard Controls
• Identify the hazards associated with vehicle operations	• Potential for vehicle accidents during field operations. • Proper use of vehicle for field operations.	• Always wear a seat belt. • Use a ground guide when reversing and/or as needed. • Obey the speed limit. • Obey all traffic signs. • Use the parking brake if parked on inclines and/or as necessary. • Never leave the vehicle running unattended. • Daily vehicle inspections will be performed to insure a safe operating vehicle. • Must have a valid drivers license. • Fire extinguisher and first aid kit must be with vehicle.
Equipment to be used	**Inspection Requirements**	**Training Requirements**
	Inspection to be performed by Technician III or designated individual	Training to be performed by UXOSO or designated individual

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• Vehicles • First Aid Kit. • Communication equipment	• Daily Preventative Maintenance Checks and Service.	• Valid Drivers license. • Vehicle familiarity.

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Activity: Munitions Constituents Hazards	**Date: August 25, 2008**
	Project: MD Burial Pit Clean-up
Description of the work: Recognize the constituent hazards associated with munitions.	**Analyzed By: Doug Hickey, CIH - BW**
	Prepared By: Wayne Martrildonno UXO Technical Manager – Bay West
	Review for latest use: Each time before the job is performed.

Task Breakdown	Identify & Analyze the Hazards	Identify Hazard Controls
• Identify the hazards associated with munitions constituents	• Potential release of metals and explosives constituents into soil/sediments and surface/ground water resulting from detonation and/or corrosion.	• Wash hands before and after you eat and/or smoke. • Minimize all contact with skin, in the event something comes in contact with skin wash affected area immediately. • Wear the appropriate PPE for the task being performed.
Equipment to be used	**Inspection Requirements**	**Training Requirements**
	Inspection to be performed by Technician or designated individual	Training to be performed by UXOSO or designated individual
• First Aid Kit • PPE	• Daily checks of first aid kits and weekly inventory of kits. • Daily check for serviceability, fit, and comfort of PPE.	• First Aid and CPR training as required by the SSHP. • Personnel will meet requirements IAW the applicable regulations for the training and use of PPE.

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Activity Hazard Analysis (AHA)

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SUXOS Name:	_____	_____	**Date/Time:**_____
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Activity Hazard Analysis (AHA)

Activity: Disposal By Detonation	**Date: August 25, 2008**
	Project: MD Burial Pit Clean-up
Description of the work: Transport donor explosives, prepare and detonated explosive charges.	**Analyzed By: Doug Hickey, CIH - BW**
	Prepared By: Wayne Martrildonno UXO Technical Manager – Bay West
	Review for latest use: Each time before the job is performed.

Task Breakdown	Identify & Analyze the Hazards	Identify Hazard Controls
• Transportation of donor charges.	• Traffic accidents • Unplanned Detonations	• Inspect explosive transportation vehicle prior to loading. • Chock wheels and set parking brake when loading vehicle. • Separate detonators from main charges during transportation. • Follow prescribed explosive transport route. • Obey all traffic laws.
• Preparation of explosive charges	Unplanned Detonations	• Observe all MEC safety precautions, and follow safe work practices. • Only UXO qualified personnel will handle demolition materials. • Wear the appropriate PPE for the task being performed. • Follow safe work practices, and handle material as few times as possible. • Ensure personnel have communications capability. • Post barriers and barricades as necessary prior to commencing operations. • Use and enforce the buddy system. • Ensure First Aid Kits and Fire Extinguishers are in place. • No smoking, except in designated areas. • Be alert. Cease operations if unsafe conditions arise. • Maintain positive site control; cease operations if unauthorized entry is made. • Do not bury blasting caps.

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		• Use detonating cord to allow for priming without disturbance of place donor charges.
• Firing the demolition shot	• Injury to essential and nonessential personnel	• Ensure all notifications as outlined in the work plan have been made. • Ensure all personnel are clear of the demolition site and in a safe are prior to firing the shot. • Visually check the MFR-H and MFR-V to ensure it is clear prior to firing the shot. • Give warning signal prior to firing shot.
• Clearing Misfires	• Unplanned detonation	• Wait 30 minutes before approaching the demolition charge. • Cut the detonating cord to separate the blasting caps from the main charge prior to electrically disconnecting the blasting caps. • When resetting the shot follow all prior safety precautions.
• Post Blast	• Injury from kicked-out MEC • Unplanned detonation	• Ensure no fires involving MEC are burning. • Approach the demolition site with caution to avoid kicked-out MEC.

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UXOSO Name:	_____	_____	**Date/Time:** _____
SUXOS Name:	_____	_____	**Date/Time:** _____
Employee Name(s):	_____	_____	**Date/Time:** _____
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Attachment 3

Directions to Hospital and Emergency Telephone Numbers

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Hospital Information

Name: Gerald Champion Regional Medical Center
Telephone Number: (505) 439-6100
Address: 2669 North Scenic Drive, Alamogordo, New Mexico 88310
Distance from Site to Hospital: 17 miles

Route to Hospital

1. Head east on Periphery Rd. toward Saber Rd. for 0.9 miles
2. Periphery Rd. becomes Saber Rd. Drive 1.1 miles.
3. Turn slight right at E. Delaware Ave and drive 0.4 miles.
4. Turn left at 1st St. and drive 1.8 miles.
5. Turn slight right at US 70 E/US 82 E and drive 10.6 miles.
6. Turn right at N. Scenic Dr. and drive 2.1 miles.
7. Arrive at Gerald Champion Medical Center.

Local Emergency Telephone Numbers

Contact	Phone Number
Local Fire / Ambulance / Police	911
Poison Center	(800) 122-2222
Gerald Champion Regional Medical Center	(505) 439-6100

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Attachment 4
Site Safety and Health Plan

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D4.0 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

D4.1 Project Scope

See Chapter D.5.2 "Description of Work" in the Accident Prevention Plan (APP).

D4.2 Site Description

See Chapter D.5.1 "Project Description" in the APP.

D4.3 Contamination Characterization

The site at the Holloman AFB Landfill 29 covers approximately 6 acres. To date, the MEC identified at the site consists of simulant-filled M125 10 Lb Gas Bombs.

D4.4 Hazard Risk Analysis

See Chapter D.7 of the APP and **Table 4-1** below.

Table 4-1: Hazards Tables

Type Hazard	Hazard	Yes	No
Safety	Confined space entry		✓
	Drowning		✓
	Electrical Shock		✓
	Equipment and Machinery	✓	
	Trench entry	✓	
	Lacerations and skin punctures	✓	
	Lifting and Moving (excess of 25 lbs individual and 50 lbs 2 person lift)		✓
	Slips, trips and falls	✓	
Chemical	CWM		✓
	Organics		✓
	Gasoline	✓	
	Aluminum	✓	
Physical	Heat and Cold Stress	✓	
	Noise	✓	
Radiological	Ionization Radiation		✓
Biological	Spiders	✓	
	Ticks and Mites	✓	
	Hazardous Plants	✓	
	Animals-Dogs	✓	
	Poisonous Snakes	✓	
Explosive	MEC	✓	
	UXO	✓	
	MPPEH	✓	

D4.5 Staff Organization, Qualifications and Responsibilities

See Chapter D.9 of the APP.

D4.6 Training

See Chapter D.11 of the APP.

D4.7 Personal Protective Equipment

The PPE outlined in Chapter D.19 of the APP has been selected according to the site characterization and analysis, job tasks, site hazards, intended use and duration of potential employee exposures. Maintenance and storage of PPE, donning and doffing procedures, inspection and monitoring of effectiveness and limitation are outlined in this Chapter.

D4.8 PPE Program

The level of protection used is based on site-specific information. The level of protection and types of materials selected for a particular task are based on the following:

- Potential for exposure, due to work being performed;
- Route of exposure;
- Measured, or anticipated concentration, in the medium of concern;
- Toxicity, reactivity, or other measure of adverse effect; and
- Physical hazards, such as slips, trips, and falls, or flying projectiles.

In situations where the type of hazard and probability of contact are not known, the appropriate protection is selected based on the professional judgment of the CIH, until the hazards are further evaluated.

Specific levels of protection will be changed whenever site conditions change. They can either be increased to the next higher level or decreased to the next lower level. The decision to change levels of protection will be made by the UXOSO with input from the PM and the CIH. If the need arises to protect health and safety, the UXOSO/SUXOS can upgrade protection levels without input from the CIH. Levels of protection will not be downgraded without prior approval from the CIH.

D4.9 Medical Surveillance

D4.9.1 Medical Examination

All personnel performing on-site work that may result in exposure to contaminant-related health and safety hazards shall be enrolled in a medical surveillance program. They will have successfully completed a pre-placement occupational physical examination and annually thereafter. Certification of Medical Clearance is also appended for review.

This examination has been designed to meet the requirements of 29 CFR 1910.120 (f) requirements for hazardous waste site operations.

The BW medical surveillance program examination consists of:

- Medical and occupational history questionnaire, which includes information on past gastrointestinal, hematological, renal, cardiovascular, reproductive, immunological and neuralgic 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;
- Pulmonary function test;
- Audiogram;
- EKG for employees over 45 years old or when other complications indicate the necessity;
- Drug (HR Panel 10) and alcohol screening; and
- Visual acuity.

The following information is provided to the examining physician:

- Description of employee's duties;
- Anticipated hazards exposure and levels;
- Description of the personal protective equipment commonly used; and
- Information from previous medical exams.

The medical surveillance provided to the employees includes a judgment by the medical examiner of the ability of the employee to use either positive or negative pressure respiratory equipment in accordance with 29 CFR 1910.134. Any employee found to have a medical condition that could directly or indirectly be aggravated by exposure to chemical substances or by the use of respiratory equipment will not be employed for the project requiring clearance under the Respiratory Protection Program. A copy of the medical examination is provided at the employee's request.

The employee will be informed of any medical conditions that would result in work restriction or that would prevent them from working at hazardous waste sites.

Contractors will certify that all their employees have successfully completed a physical examination by a qualified occupational health physician and will supply certification of medical clearance for each on-site employee.

D4.10 First Aid and Medical Treatment

Selected employees are trained in first aid treatment skills (every three years) and CPR (annually). The first aid course includes blood borne pathogen training and prevention. These trained employees will have their current certificate cards on site. Employees should have the telephone number to the hospital at any time during their working hours should an occupational illness or injury occur. The telephone number to the Gerald Champion Regional Medical Center is 505-439-6100.

D4.11 Medical Restriction

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

D4.12 Medical Records

Medical and personal exposure monitoring records will be maintained according to the requirements of 29 CFR 1910.120 (f) and 8 CCR 3204 and shall kept for a minimum of 30 years. Employee confidentiality shall be maintained.

D4.13 Exposure Monitoring/Air Sampling Program

There is no reference to the assessment of airborne chemical constituents in the SOW. Action levels need not be established for this project. Organic vapors are not anticipated to be encountered on this project. The deployment of monitoring equipment is not required for this project.

D4.14 Airborne Organics

Air monitoring for volatile organic compounds (VOCs) is not anticipated to be a factor during this project.

D4.15 Airborne Dust

Airborne dust is anticipated to be a factor during this project. BW will have a water truck on-site to mitigate any dust from the excavation, soil stockpiles and soil screening activities. The water truck will be operated by a qualified UXO Technician to avoid any work stoppage due to non-essential personnel entering the exclusion zone.

D4.16 Time Weighted Sampling

Time weighted air sampling will not be conducted on this project.

D4.17 Noise

Occupational Noise is the most significant health hazard present in the modern industrial workplace. BW's hearing conservation program complies with OSHA Occupational Noise Exposure Standards (CFR, Title 29, Part 1010.95). In addressing industrial noise, the following components are identified:

- Recognition;
- Evaluation;
- Control; and
- Training.

Noise hazards will be associated with intentional detonations and use of EMM on this project.

D4.18 Heat/Cold Stress Monitoring

It is the responsibility of the UXOSO/SUXOS and each employee to ensure that temperature stress controls are adequate for the site conditions and tasks. All employees, and specifically the UXOSO/SUXOS, are empowered and expected to stop or modify work and take any precautionary measures to prevent temperature-related illnesses.

The ambient air temperature will be measured during the day using a wet-bulb globe temperature index monitor (portable thermal stress monitor) placed at the work location and in the same conditions experienced by the workers. If the temperatures reach or exceed 70°F or reach or fall below 40°F, temperature stress controls will be implemented. All temperature monitoring results, physiological monitoring results, and temperature stress controls will be documented in field records using logbooks.

D4.19 Heat Stress

Heat stress is one of the most common (and potentially serious) illnesses that affect site workers. When site personnel are engaged in operations involving hot environments, a number of physiological responses can occur which may seriously affect the health and safety of the workers. These effects can be eliminated or controlled through the use of a comprehensive heat stress prevention and monitoring program.

Individuals vary in their susceptibility and degree of response to stress induced by increased body heat. Heat stress can result in health effects ranging from transient heat fatigue to serious illness or death. Heat stress is cause by a number of interacting factors including environmental condition, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses at work sites, regular physiological or area monitoring (as appropriate) and other preventive precautions are vital.

Factors that may predispose a worker to heat stress include:

- Lack of physical fitness;
- Lack of acclimatization to hot environments;
- Degree of hydration;
- Level of obesity;
- Current health (i.e., having an infection, chronic disease, diarrhea, etc.);
- Alcohol or drug use;
- The worker's age and sex; and
- Prior history of heat stress.

The amount and type of PPE worn directly influences reduced work tolerance and the increased risk of excessive heat stress. PPE adds weight and bulk, severely reduces the body's access to normal heat exchange mechanisms (evaporation, convection, and radiation), and increases energy expenditure. Therefore, when selecting PPE, each item's benefit should be carefully evaluated in relation to its potential for increasing the risk of heat stress. Once PPE is selected, the safe duration of work/rest periods should be determined based on the following criteria and that of the recommendations of the American Conference of Governmental Industrial Hygienists (ACGIH) TLV handbook:

- Anticipated work rate;
- Ambient temperature and other environmental factors;
- Type of protective ensemble; and
- Individual worker characteristics and fitness.

Sweating does not cool the body unless moisture is removed from the body. The use of PPE reduces the body's ability to eliminate large quantities of heat because the evaporation of sweat is decreased. The body's effort to maintain an acceptable temperature may become impaired and this may cause heat stress. Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of hazardous tasks. For this project, Level D PPE will be utilized, thus providing minimal increase in the potential for heat stress. Level D PPE is defined as standard work clothes with sturdy work boots, long pants, short or long sleeve shirt as applicable, safety glasses, appropriate gloves, hard hats and safety boots (when working around heavy equipment).

D4.19.1 Early Symptoms of Heat Related Problems

- Decline in task performance;
- Lack of coordination;
- Decline in alertness;
- Unsteady walk;
- Excessive fatigue;
- Muscle cramps; and
- Dizziness.

D4.19.2 Heat Stress Disorders

This Chapter outlines the major heat related illness that may result from exposure to high heat environments, which include heat rash, fainting, heat cramps, heat exhaustion, and heat stroke. For the purpose of this program, reference to "liquids" will indicate the use of water or an electrolyte replacement solution, and not tea or coffee (unless it is decaffeinated) or carbonated soft drinks.

D4.19.2.1 Heat Rash

Heat rash is caused by continuous exposure to heat and humid air and is aggravated by wet chafing clothing. This condition can decrease a worker's ability to tolerate hot environments.

- Symptoms: Mild red rash, especially in areas of the body that sweat heavily; and
- Treatment: Decrease amount of time in protective gear and provide powder such as cornstarch or baby powder to help absorb moisture and decrease chafing. Maintain good personal hygiene standards and change into dry clothes if needed.

D4.19.2.2 Heat Cramps

Heat cramps are caused by a profuse rate of perspiration that is not balanced by adequate fluid and electrolyte intake. The occurrence of heat related cramps are often an indication that excessive water and electrolyte loss has occurred, which can further develop into heat exhaustion or heat stroke.

- Symptoms: Acute, painful spasms of voluntary muscles such as the back, abdomen and extremities; and
- Treatment: Remove victim to a cool area and loosen restrictive clothing. Stretch and massage affected muscles to increase blood flow to the area. Have patient drink one to two cups of liquids immediately, and every twenty minutes thereafter. Consult with physician if condition does not improve. If available, an electrolyte replacement solution should be taken along with liquids.

D4.19.2.3 Heat Exhaustion

Heat exhaustion occurs due to the large fluid and salt loss from profuse sweating. It is a state of very definite weakness or exhaustion caused by increased stress on various organs to meet increased demands to cool the body due to excessive loss of fluids from the body. This condition leads to inadequate blood supply and cardiac insufficiency. Heat exhaustion is less dangerous than heat stroke, but nonetheless must be treated. If allowed to go untreated, heat exhaustion can quickly develop into heat stroke.

- Symptoms: Pale or flushed, clammy, moist skin, profuse perspiration, and extreme weakness. Body temperature is basically normal or slightly elevated, the pulse is weak and rapid, and breathing is shallow. The individual may have a headache, be dizzy or nauseated; and
- Treatment: Remove the individual to a cool, air-conditioned place, loosen clothing, elevate feet and allow individual to rest. Consult physician, especially in severe cases. Have patient drink one to two cups of liquids immediately, and every twenty minutes thereafter. Total liquid consumption should be about one to two gallons per day. If the signs and symptoms of heat exhaustion do not subside, or become more severe, immediate medical attention will be required.

D4.19.2.4 Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by failure of the heat regulating mechanisms of the body. Heat stroke occurs when the body's system of temperature regulation fails and the body temperature rises to critical levels. When this occurs, the body core temperature rises very rapidly to a point (>105.8°F) where brain damage and death may result if the person is not cooled quickly.

Symptoms: The victim's skin is hot, and may or may not be red, dry and/or spotted, due to the fact that the individual may still be wet from having sweat while wearing protective clothing earlier; nausea; dizziness; confusion; extremely high body temperature; rapid respiratory and pulse rate; delirium;

convulsions; unconsciousness or coma; and

Treatment: Cool the victim immediately. If the body temperature is not brought down quickly, permanent brain damage or death may result. The victim should be moved to a shady area; he should lie down and keep head elevated. Cool the victim by either sponging or immersing the victim in very cool water to reduce the core temperature to a safe level (<102°F). If conscious, give the victim cool liquids to drink. Observe the victim and obtain immediate medical help. Do not give the victim caffeinated or alcoholic beverages. Heat stroke is considered a medical emergency. Medical help should be summoned immediately. EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH.

D4.19.2.5 Preventive Measures

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat exhaustion, that person may become predisposed to additional heat injuries. In order to avoid heat related illnesses, proper preventive measures will be implemented whenever environmental conditions dictate the need, normally whenever the temperature reaches at least 70°F. These preventive measures represent the minimal steps to be taken and will include the following procedures:

The UXOSO/SUXOS or other authorized person will observe each site worker prior to the start of daily operations, and periodically throughout the day, to determine the individuals susceptible to heat induced stress. Evidence of extreme dehydration, illness or drug or alcohol use may require the UXOSO/SUXOS to restrict the worker's activities until such time as the worker is fit for duty. Personnel identified as being at high risk for heat stress who are allowed to participate in site operations will be monitored frequently by the SUXOS/UXOSO.

Site workers will be trained to recognize and treat heat-related illnesses. This training will include the signs, symptoms and treatment of heat stress disorders as outlined in this SSHP.

In order to maintain workers' body fluids at normal levels, workers will be encouraged to drink, as a minimum, approximately sixteen ounces of liquids prior to start of work in the morning, after lunch and prior to leaving the site at the conclusion of the day's activities. Disposable four to twelve ounce cups and liquids will be provided on site. Liquids to be provided will be water. Liquids containing caffeine should be avoided.

When ambient conditions and site workload requirements dictate, as determined by the SUXOS/UXOS, workers will be required to drink a minimum of 16 to 32 ounces of liquids during each rest cycle. The normal thirst mechanism is not sensitive enough to ensure that enough water will be consumed to replace lost sweat. When heavy sweating occurs, workers shall be encouraged to drink even though they may not be thirsty.

A shelter or shaded area may be provided where workers can be protected from direct sunlight during rest periods.

Monitoring of ambient or physiological heat stress indices will be conducted to allow prevention and/or early detection of heat induced stress. Monitoring will be conducted in accordance with applicable paragraphs of this SSHP.

Site workers will be given time to acclimatize to site work conditions, temperature, protective equipment, and workload. Acclimatization is the adaptive process that usually takes two to six days of continued work in hot environments, resulting in a decrease of the physiological strain and allowing the worker's body to become adjusted to the level and type of work required by the application of a constant environmental stress. This process involves a gradual increase in the individual's workload over the required period, the length of which depends upon the nature of the work performed, ambient temperatures, and the individual's susceptibility to heat stress.

Work schedules will be adjusted as follows:

- Modify work/rest schedules according to monitoring requirements;

- Mandate work slowdowns as needed;
- Rotate personnel: alternate job functions to minimize over-stress or overexertion at one task;
- Add additional personnel to work teams; and
- Perform work during cooler hours of the day if possible.

Workers will be encouraged to achieve and maintain an optimum level of physical fitness. Increased physical fitness will allow workers to better tolerate and respond to hot environments and heavy workloads. In comparison to an unfit person, a fit person will have: less physiological strain, a lower heart rate and body temperature and a more efficient sweating mechanism.

Alcohol should not be consumed in a hot environment because the loss of body fluids increases the risk of heat stress.

D4.19.3 Physiological Heat Stress Monitoring

Because the incidence of heat stress depends on a variety of factors, all workers shall be monitored physiologically. Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work. The length of the work cycle will be governed by the frequency of the required physiological monitoring.

Monitoring of personnel wearing PPE should begin when the ambient temperature is 72°F or above. **Table 4-2** presents the suggested frequency for such monitoring. Monitoring frequency should increase as the ambient temperature increases or as slow recovery rates are observed.

A person with a current first aid certification who is trained to recognize heat stress symptoms should perform heat stress monitoring.

When monitoring the worker physiologically, measure:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period;
- If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same;
- If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third;
- Oral temperature. Use a clinical thermometer (three minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking);
    - If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period;
    - If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third; and
- Do not permit a worker to wear a semi-impermeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

D4.19.4 Wet Bulb, Dry Globe Temperature (WBGT) Monitoring

For site conditions where personnel are working in Level D PPE, and the ambient temperature is greater than 72°F, the UXOSO/SUXOS may conduct WBGT monitoring to assist in controlling the potential for site workers experiencing heat related adverse health effects. The UXOSO/SUXOS may take readings on a WBGT monitor throughout the day to determine the work/rest schedule to be implemented. When workers are wearing permeable clothing (i.e., standard cotton work clothes), follow recommendations for monitoring requirements and suggested work/rest schedules in the current ACGIH Threshold Limit Values for Heat Stress. The values outlined in **Table 4-2** and **4-3** are designed such that nearly all acclimatized,

fully clothed workers with adequate water and electrolyte replacement liquids intake will be able to function without the body temperature exceeding 100.4°F (38°C).

D4.19.5 Heat Stress Documentation

The UXOSO/SUXOS will be responsible for recording all heat stress related information. This will include training sessions and monitoring data. Training sessions will be documented on the Safety Meeting and Training Form, and WBGT data and other information will be recorded on a heat stress monitor log.

Table 4-2: Suggested Frequency of Physiological Monitoring for Fit and *A*cclimatized Workers

Adjusted Temperature[b]	Normal Work Ensemble[c]	Impermeable Ensemble
90°F (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°-90°F(30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-28.1°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

[a] *For work levels of 250 kilocalories/hour*

[b] *Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)*

[c] *A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.*

Table 4-1: Permissible WBGT Heat Exposure Threshold Limit Values (TLV)

Work – Rest Regimen	WORK LOAD		
	Light*	Moderate	Heavy
Continuous work	86 (30.0)	80 (26.7)	77 (25.0)
75% Work - 25% Rest, each hour	87 (30.6)	82 (28.0)	78 (25.9)
50% Work - 50% Rest, each hour	89 (31.4)	85 (29.4)	82 (27.9)
25% Work - 75% Rest, each hour	90 (32.2)	88 (31.1)	86 (30.0)

* *Consult the ACGIH TLV booklet for definitions of Light, Moderate and Heavy workloads. Values are given in °F and (°C) WBGT, and are intended for workers wearing single layer summer type clothing. Use of semi or totally impermeable clothing requires monitoring IAW the Heat Stress Prevention Program. As workload increases, the heat stress impact on a non-acclimated worker is exacerbated. For non-acclimated workers performing a moderate level of work, the permissible heat exposure TLV should be reduced by approximately 2.5°C.*

D4.20 Cold Stress

If work on this project is conducted in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Work will cease under unusually hazardous conditions (e.g., wind-chill less than 0°F, or wind-chill less than 10°F with precipitation). Systemic cold exposure is referred to as hypothermia. Localized cold exposure is generally labeled frostbite. Recognition of the symptoms of cold related illness will be discussed during the health and safety briefing conducted prior to the onset of site activities. Refer to the 2003 ACGIH TLV for Chemical Substances and Physical Agents for additional information on cold stress prevention, monitoring, and work-warming regimens.

D4.20.1 Hypothermia

Hypothermia is a life-threatening condition in which the core body temperature falls below 95°F. Hypothermia can occur at temperatures above freezing particularly, when the skin or clothing becomes wet. During exposure to cold, maximum shivering occurs when the core temperature falls to 95°F. As hypothermia progresses, depression of the central nervous system becomes increasingly more severe. This accounts for the progressive signs and symptoms ranging from sluggishness and slurred speech to disorientation and eventually unconsciousness (see **Table 4-4**). The ability to sustain metabolic rate and to reduce skin blood flow is diminished by fatigue. Thus, fatigue increases the risk of severe hypothermia by decreasing metabolic heat. Additionally, because blood flow through the skin is reduced to conserve heat, the skin and underlying tissues become more susceptible to frostbite.

Table 4-2: Progressive Clinical Symptoms of Hypothermia

Core Temperature (°F)	Clinical Signs
95°	Maximum shivering
87° - 89°	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated
84° - 86°	Progressive loss of consciousness; muscular rigidity; respiratory rate decreases
79°	Victim rarely conscious
70° - 72°	Maximum risk of ventricular fibrillation

D4.20.2 Frostbite

Frostbite is both the general and medical term given to areas of cold injury. Unlike hypothermia, frostbite rarely occurs unless environmental temperatures are less than freezing and usually less than 20°F. Frostbite injuries occur most commonly on the distal parts of the body (nose, earlobes, hands, and feet) that are subject to intense vasoconstriction. The three general categories of frostbite are:

- *Frostnip* - A whitened area of the skin, which is slightly burning or painful;
- *Superficial frostbite* - Waxy, white skin with a firm sensation but with some resiliency. Symptomatically feels "warm" to the victim with a notable cessation of pain; and
- *Deep frostbite* - Tissue damage deeper than the skin, at times, down to the bone. The skin is cold, numb and hard.

D4.20.3 Prevention of Cold Related Illness

- Educate worker to recognize the symptoms of frostbite and hypothermia;
- Ensure the availability of an enclosed, heated environment within the vehicles. The nearest heated environment will be the interior of the vehicles at the site;
- Ensure the availability of dry changes of clothes;
- Record temperature readings; and
- Ensure the availability of warm beverages, preferably non-caffeinated.

D4.20.4 Monitoring for Cold Exposure

Cold stress monitoring will be conducted in accordance with the ACGIH cold stress TLV. The TLV objective is to prevent the deep body core temperature from falling below 96.8°F and to prevent cold injury to body extremities. Temperature monitoring and recording will be initiated in the following situations:

- At the UXOSO/SUXOS discretion when suspicion is based on changes in worker's performance or mental status;
- At worker's request; and
- As a screening measure whenever any one worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92°F) cannot return to work for 48 hours.

D4.21 Standard Operating Safety Procedures, Engineering Controls and Work Practices

See Chapter D.20 of the APP

D4.22 Site Control Measures

D4.22.1 Site Access

Site workers will enter the Site via Dezonia Drive. Alternate/additional job site emergency evacuation routing may be established as site activities dictate. It is the UXOSO/SUXOS responsibility to notify all project personnel of the proper site evacuation route(s) and specify if there are any changes in direction to evacuate the site and/or access emergency care. Facility evacuation routes are detailed in Attachment 3b and will stay the same for the project duration, unless notified by the facility that alternate facility emergency evacuation routes are required.

D4.22.2 Work Zones

The work zone(s) will be established by the UXOSO/SUXOS and briefed daily during the execution of this project. These zones are the EZ and SZ. The EZ will have a radius of no less than the HFD extending around the location of the UXO team. The SZ will be located outside the exclusion zone and in a manner to facilitate access in case of emergencies. These zones are temporary and will be moved during activities throughout the site area.

D4.22.3 Exclusion Zone (EZ)

The EZ shall consist of the HFD minimum unless the UXOSO/SUXOS makes further delineation. Since this area shall be considered active, all personnel within the area must use the prescribed levels of PPE.

During all work activities within an exclusion zone, the implementation of a buddy system is mandatory. A buddy system requires that at least two people work as a team and maintain visual and audio contact with each other at all times. The UXOSO/SUXOS shall maintain a portable cellular telephone and radio on-site with key personnel for emergency response notifications and communications.

D4.22.4 Support Zone (SZ)

The SZ shall consist of a staging area in a non-hazardous or clean area. It shall contain the team vehicles, a first aid/medical monitoring station, and other elements necessary to support site activities. Normal work clothes and boots may be worn in this area. Location shall be based upon favorable wind direction, topography and site accessibility, when conditions allow.

D4.23 On-site Communications

In an emergency, important messages shall be conveyed quickly and accurately. Site personnel shall be able to communicate information even through noise and confusion. Outside support sources shall be reached, assistance obtained, and measures for public notification ensured, if necessary. Separate internal emergency signals shall be developed and rehearsed daily at safety meetings. External communications shall be obtained through cellular phones or radios located in the support zone and procedures shall be posted in an accessible location for all site workers.

Verbal communication shall be the primary form of communication at the site. The anticipated distance between the site workers is no more than 25 feet. Verbal communication at the site can be impeded by on-site background noise and the use of personal protection equipment.

D4.24 Personal Hygiene and Decontamination

Fieldwork is anticipated to be conducted in Level D. Site personnel will wash their hands, face, and exposed skin surfaces with soap and potable water upon leaving the EZ and prior to ingestion of food, liquids or any other hand to mouth activities. A portable hand washing facility with potable water, soap, and paper towels shall be located in the SZ.

D4.25 Equipment Decontamination

Equipment decontamination during this project is not anticipated.

A designated "clean area" will be provided within in the SZ for performing equipment maintenance. This area shall be used when personnel are required by normal practices to have equipment come in contact with the ground, (i.e., checking project equipment).

D4.26 Respirator Decontamination

Respirator use or decontamination during this project is not anticipated.

D4.27 Emergency and First Aid Equipment

A complete first aid kit, Type III, 16 unit or larger in a waterproof container, and containing at a minimum, a one pocket mouthpiece for CPR, absorbent compresses, adhesive bandages, adhesive tape, antiseptic swabs, burn gel, sterile pads, and a triangular bandage will be readily available on-site. Its contents will be evaluated and possibly modified for this specific project. It will be located in the SZ. The contents will be checked prior to their utilization for sterility and to replace expended items. The UXOSO/SUXOS or other designated individual will inventory the kit weekly.

Prior to the start of work, the UXOSO/SUXOS will discuss with site personnel the prevention steps, symptoms and medical persons available to assist with injuries or questions on diseases, plants or animals that could be encountered while working on this project.

A working cell phone and radio with adequate signal in this area will be maintained on-site and fully charged at the start of each work day.

A fire extinguisher, (dry chemical or carbon dioxide with a minimum rating of one 4A:20B:C will be readily available on-site. It will be located in the SZ, not more than 25 feet from the SZ activities. A 2A: 10B:C will be maintained in each vehicle as well. Personnel will be instructed on the proper use of fire extinguishers.

D4.28 Emergency Response Plan (ERP)

See Chapter D.20.4 of the APP

D4.29 Emergency Response Team (ERT)

Project personnel will rely on local community emergency response personnel through the use of the 911 emergency notification system.

Response to hazardous substances release will be limited to immediate action available due to equipment and training, (i.e. oil or fuel spills of small quantities). Responding facility emergency response personnel have authority for the site upon arrival. Project Emergency Response Team (ERT) personnel will assist local facility emergency response personnel, as needed.

The project ERT will notify facility emergency response personnel, project personnel, and the USACE OE Safety Specialist in the event of a hazardous substance release. Team response is limited to the confining or recovery of small spills using a spill containment kit, shovel and approved container with lid. Training of personnel is IAW 29 CFR 1910.120(q)(6)(ii).

D4.30 Confined Space Entry

Entry into a confined space is not authorized or anticipated during this project.

D4.31 References

- US Army Corps of Engineers (USACE), *Safety and Health Requirements Manual* (EM-385-1-1). 3 November, 2003;
- US Army Corps of Engineers (USACE), Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities, Regulation No. 385-1-92, May 1, 2007;
- Title 29 of the Code of Federal Regulations, Part 1926.65 (29 CFR 1926.65); (US DOL/OSHA);
- BW Environmental, Inc. Safety and Health Program;
- SOW – MEC Burial Pit Removal Action, Holloman Air Force Base, Alamogordo, New Mexico, dated August 15, 2007, Rev 02 dated September 24, 2007
- AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI);
    - ANSI Z41-1991 Protective Footwear
    - ANSI Z89.1-1969 Industrial Head Protection
    - ANSI Z88.2-1980 Respiratory Protection
    - ANSI Z87.1-1989 Eye and Face Protection
    - ANSI Z358.1-1990 Emergency Eyewash and Shower Equipment
- 29 CFR 1904 Recording and Reporting Occupational Injuries and Illnesses; and
- 29 CFR 1910 Occupational Safety and Health Standards.

D4.32 Accident Prevention

See Chapter D.15 Safety and Health Inspections in the APP.

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Appendix D

Attachment 5
Plan for Prevention of Alcohol and Drug Abuse

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5.0 BAY WEST DRUG AND ALCOHOL USE AND TESTING PROGRAM

5.1 POLICY

Bay West recognizes that alcohol and drug abuse adversely affects employees', health and safety, job performance, their employment opportunities, and the quality of their work. The purpose of this document is to provide employees with the Company's policy regarding the use of drugs and alcohol while at work. While Bay West has no intention of intruding into the private lives of its employees, it strongly believes that a drug-free workplace is in the best interest of both the employee and Bay West alike and is committed to complying with all applicable federal, state, and local rules and regulations concerning the prevention of drug and alcohol use in the workplace. Therefore, in accordance with these policies, Bay West has developed the following Drug and Alcohol Use Testing Program. The intent of this Policy is to comply with the United States Department of Transportation requirements (49 CFR Parts 40 Procedures for Transportation Workplace Drug Testing Programs and 199 Pipeline Safety Regulations Drug Testing) for emergency response work on pipeline spills of hazardous liquids, and Minnesota's Drug Testing in the Workplace Act, Minn. Stat. 181.950 et.seq.

5.1.1 Covered Employees

This policy applies to all covered employees including applicants for employment, and to all operational, administrative, contract, or temporary employees. The policy is applicable at Bay West facilities or whenever employees are performing company business.

5.1.2 Disclaimer

Employment at Bay West is at-will. This policy is not a unilateral employment contract and should not be interpreted as creating a unilateral employment contract.

5.1.3 Non-Discrimination

Consistent with its policy prohibiting discrimination, Bay West recognizes that disabled individuals should be protected from discriminatory treatment. Under Minnesota law, a disabled person is someone who has a medical or psychological condition which materially impairs major life activities. However, in accordance with Minnesota law, disability does not include any condition resulting from current alcohol or other drug abuse which prevents a person from performing essential functions of the job or which creates a direct threat to property or the safety of co-workers or other individuals.

5.1.4 General Prohibitions

No employee shall report to work under the influence of alcohol, marijuana, controlled substances, or other drugs that affect his/her alertness, coordination, reaction, response, judgment, decision-making, or safety.

*NOTE: **This SOP is current as of the date printed on the bottom. Bay West personnel may produce paper copies of this procedure printed from the controlled document electronic file located on the Intranet. However, it is their responsibility to ensure that they are trained and utilize the current version of this procedure.***

No employee shall operate, use, or drive any equipment, machinery, or vehicle of Bay West while under the influence of alcohol, marijuana, controlled substances, or other mood-altering drugs. Such employee is under an affirmative duty to immediately notify his/her supervisor that he/she is not in an appropriate mental or physical condition to operate, use, or drive the Company's equipment.

No employee shall unlawfully manufacture, distribute, dispense, possess, transfer, or use a controlled substance in the workplace or wherever Bay West's work is being performed.

Engaging in off-duty sale, purchase, transfer, use, or possession of illegal drugs or controlled substances may have a negative effect on an employee's ability to perform his/her work for Bay West. In such circumstances, the employee is subject to disciplinary action.

When an employee is taking medically authorized drugs or other substances that may alter job performance, the employee is under an affirmative duty to notify the appropriate supervisor of his/her temporary inability to perform the job duties of his/her position.

Bay West will notify the appropriate law enforcement agency when it has reasonable suspicion to believe that an employee may have illegal drugs in his/her possession at work or on Bay West premises. When appropriate, Bay West will also notify licensing boards.

Employees are prohibited from consuming alcoholic beverages during lunch periods, dinner periods, or breaks when the employee intends on returning immediately thereafter to perform work on behalf of Bay West.

5.2 DEFINITIONS

a. "Work Related Alcohol and Other Drug Abuse" is defined as the use of mood-altering drugs, including all forms of alcohol, narcotics, depressants, stimulants, hallucinogens, marijuana, or the use of prescription drugs when resulting behavior or appearance adversely affects work performance.

b. "Adversely Affect Work Performance" and "Under the Influence" shall be determined to be present if the employee is perceptively impaired, has impaired alertness, coordination, reactions, responses, or efforts; if the employee's condition threatens the safety of him/herself or others; or if the employee's condition or behavior presents the appearance of unprofessional or irresponsible conduct detrimental to the public's perception of Bay West as an employer as determined by the supervisor or manager or other observing the employee.

c. "Controlled Substances" means those substances whose distribution is controlled by regulation or statute, including but not limited to narcotics, depressants, stimulants, hallucinogens, and cannabis.

d. "Mood-Altering" or "Alter" means changed behavior that may limit an employee's ability to safely and efficiently perform his/her job duties or poses a threat to the safety of the employee or others.

*NOTE: **This SOP is current as of the date printed on the bottom. Bay West personnel may produce paper copies of this procedure printed from the controlled document electronic file located on the Intranet. However, it is their responsibility to ensure that they are trained and utilize the current version of this procedure.***

e. Accident

1. Liquid Natural Gas (LNG) "accident" is:
   a. An event that involves a release of gas from a pipeline or if liquefied natural gas or gas from an LNG facility
   b. A death or personal injury necessitating in-patient hospitalization; or
   c. Estimated property damage, including cost of gas lost, of the operator or others or both, of $50,000 or more.
   d. An event that results in an emergency shutdown of an LNG facility.
   e. An event that is significant in the judgment of the operator, even though it did not meet the criteria of paragraphs 1 or 2.

2. Hazardous liquid pipeline "accident" is:
   a. Any failure in a pipeline system in which there is a release of the hazardous liquid or carbon dioxide transported resulting in any of the following:
      - Explosion or fire not intentionally set by the contractor.
      - Loss of 50 or more barrels of liquid, or carbon dioxide.
      - Escape to the atmosphere of more than five barrels a day of highly volatile liquids.

3. Death of any person.

4. Bodily harm to any person resulting in one of the following:
   - Loss of consciousness
   - Necessity to carry the person from the scene.
   - Necessity for medial treatment
   - Disability that prevents the discharge of normal duties or the pursuit of normal activities beyond the day of the accident

f. Estimated property damage to the property of the contractor or others, or both exceeding $5,000.00 when working on a pipeline project.

5.3 AFFECTED EMPLOYEES, DESIGNATED BAY WEST REPRESENTATIVES

a. Covered employees will be notified of the provisions of the Bay West Drug and Alcohol Use and Testing Program by receiving a copy of this Plan. In addition, copies of the Plan are available from the H&S Manager. Each employee receiving a copy of the Plan will sign the "Acknowledgement and Receipt of Drug and Alcohol Use and Testing" form. The Acknowledgement Form is found at the end of this section.

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b. The job titles of Bay West, Inc. supervisory personnel that receive "Reasonable Suspicion" training include:

Vice President of Operations
Team Leaders
Project Managers
Safety & Health Manager
Human Resources Manager

c. The Employee Assistance Program Training educates supervisors (who are authorized to initiate "reasonable suspicion" testing) on the health effects of drug use, treatment options, signs and symptoms of abuse, and intervention strategies in the work place.

d. The job titles of Bay West, Inc. personnel responsible for record keeping include:

Safety & Health Manager
Human Resources Manager
Human Resources Assistant

5.4 CONFIDENTIALITY

Bay West utilizes seven methods to ensure employee confidentiality.

5.4.1 Seven Methods for Insuring Confidentiality of Records

1. A Medical Review Officer (MRO) receives the laboratory reports and communicates the information to the SAFETY & HEALTH MANAGER via mail marked "CONFIDENTIAL," and a secure e-mail . The information is printed and filed in a locked file. The e-mail message is deleted.
2. Mail marked "CONFIDENTIAL" is not opened by the receptionist.
3. Mail marked "CONFIDENTIAL" addressed to the S&H Manager is opened by the S & H Manager, and the results are filed in a locked employee drug testing file.
4. An employee who asks to review their drug testing records is allowed to examine their record in the presence of the S&H Manager or Human Resources Manager.
5. An employee may make a copy of their drug testing record.
6. The employee drug testing file is kept locked unless records are added, records are reviewed for reporting purposes, or for employee examination.
7. Records are not removed from the room where the locked file is located.

Removed records and unlocked file is not left unattended by the **SAFETY & HEALTH MANAGER.** Removed records are replaced or covered when other personnel enter the area.

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5.4.2 Ensuring Confidentiality of Positive Test Results

Positive test results (as determined by the MRO) will be communicated to the Safety & Health Manager and the Human Resources Manager. The Safety & Health Manager will inform the "employer" of the positive test results. The employer includes the employee's immediate supervisor and Bay West management team members having a specific need to know. Each person receiving information regarding an employee's positive drug test will be expected to maintain strict confidentiality of the information.

5.5 CONTROLLED SUBSTANCES

The following 5 DOT drugs will be tested for:

1. Marijuana
2. Cocaine
3. Opiates
4. Amphetamines
5. Phencyclidine

5.6 DRUG TESTS CONDUCTED

Employees who are required to submit to testing under this program must appear at the offices of the United Occupational Health (the designated collector of urine samples) at the time of their appointment as indicated by the Human Resources Assistant, Human Resources Manager, or Safety & Health Specialist. In order to carry out the Company's commitment to an alcohol and drug-free workplace, Bay West reserves the right to require that applicants and employees submit to testing in accordance with the provisions of the applicable state in which the employee is employed. This policy represents the notice required under Minnesota Statute and will be provided to all applicants and employees who are requested to undergo testing. Testing for out of area employees will be arranged through local occupational health centers.

5.6.1 Who May be Subject to Testing.

5.6.1.1 Job Applicants

Bay West will require all applicants who have received conditional offers of employment to be tested. If the offer of conditional employment is subsequently withdrawn, Bay West will notify the applicant of the reason for the withdrawal.

5.6.1.2 Routine Physical Examination Testing

Bay West may require employees to undergo a test once a year as part of a routine physical examination. Employees to be tested will be notified at least two weeks in writing in advance of the examination.

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5.6.1.3 Random Testing

Employees are randomly selected for testing through Advanced Drug Testing (ADT). Employees are instructed to proceed to the testing facility within one hour of notification by ADT. If the employee is out of the office at the time of notification, he/she will be notified upon arrangement of the closest qualifying clinic.

Random selection is conducted once per month throughout the year. Random selection of employees to be tested is performed as described above. The number of employees selected for random testing in a year will be equal to: 25% of the eligible employee pool for drugs under the PHMSA program and 50% of the eligible employee pool for drugs and 10% for alcohol under the FMCSA program.

5.6.1.4 Reasonable Suspicion Testing.

Bay West may require an employee to be tested when the Bay West reasonably suspects that the employee is:

- Under the influence of drugs or alcohol;
- Has violated the Company's written work rules prohibiting drug and alcohol use;
- Has sustained or caused another employee to sustain personal injury; or
- Has caused a work-related accident or was operating or helping to operate machinery, equipment, or vehicles involved in a work-related accident.

5.6.1.5 Post Accident

In the event of an accident, employees whose performance either contributed to the accident or cannot be completely discounted as a contributing factor will be tested as soon as possible, but no later than 32 hours after the accident for drugs and within 2-4 hours for alcohol. If the driver is too seriously injured to provide a urine sample, he or she must authorize release of hospital records.

5.6.1.6 Return to Duty

Employees who return to duty after rehabilitation shall be subject to a reasonable program of follow up drug testing without prior notice during 60 months after his/her return to duty.

5.7 CONDUCTING THE TESTING

5.7.1 Consent

All persons to be tested will be required to complete and sign the employee consent form. Each signed form must also be witnessed by a designated person within the Company.

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5.7.2 Refusal to Participate

An employee or job applicant has the right to refuse testing. However, a refusal of testing will be treated as a failure to comply with Bay West policy and may result in withdrawal of a job offer or disciplinary action up to and including termination of employment.

5.7.3 The Laboratory

The laboratory selected to perform testing must be certified by the National Institute on Drug Abuse (NIDA), the College of American Pathologists (CAP), or the New York State Department of Health.

5.7.4 Test Results

Negative Test Results (passed tests). Individuals who test negative on an initial drug or alcohol test will be given written notice of the test result within three (3) days after Bay West is notified of the result. Likewise, individuals who test negative on a confirmatory test taken after a positive initial test will be given written notice of the test result within three (3) days after the Bay West of the result.

5.7.4.1 Positive Test Results (failed tests)

A confirmatory test will automatically be performed on all samples that result in a positive test result on an initial test. Individuals who test positive on the confirmatory test will be notified in writing of the test result and of the right to explain the result, including any over-the-counter or prescription medications they have taken, within three (3) days after Bay West has been notified of the result. Individuals who wish to provide explanatory information regarding their positive confirmatory test result must do so in writing within (3) three working days after receiving notice of the positive test result.

Individuals who wish to have a *retest* of their confirmatory test must notify Bay West in writing of their intention to have a retest within five (5) working days after being notified of the confirmatory test result. Persons requesting a confirmatory retest are responsible for the cost of the retest.

5.7.4.2 Right to Test Result

An employee or job applicant has the right to request and receive from Bay West a copy of the test result report on any drug or alcohol test.

5.7.5 Costs

All costs related to alcohol and drug testing will be paid by Bay West, with the exception of confirmatory retests which must be paid for by the employee or job applicant requesting the retest.

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5.8 DISCIPLINARY ACTION IN RESPONSE TO A POSITIVE TEST RESULT

5.8.1 Interim Disciplinary Action

Bay West reserves the right to transfer an employee with a positive test to another position at the same rate of pay or to temporarily suspend the employee pending the outcome of the confirmatory test (and, if requested, the confirmatory re-test) if Bay West believes that it is reasonably necessary to do so. An employee who is suspended without pay will be reinstated with back pay if the confirmatory test or re-test is negative. In the case of job applicants, a positive initial test result must be verified by a confirmatory test before a conditional offer of employment will be withdrawn.

5.8.2 First Failed Test – Discharge/Withdrawal of Job Offer

Bay West will not discharge an employee if the employee tests positive on a confirmatory test and the positive confirmatory test was the first such result. Bay West may, however, discharge an employee for whom a positive confirmatory test is the first such result where:

1. The employee is given an opportunity to participate in, at the employee's expense or pursuant to coverage under an employee's benefit plan, a drug or alcohol counseling or rehabilitation program; and
2. The employee has either refused to participate in the counseling or rehabilitation program or has failed to successfully complete it.

The type of counseling or rehabilitation program in which an employee participates will be determined by the Bay West after consultation with a certified chemical use counselor or physician trained in the diagnosis and treatment of chemical dependency. Bay West reserves the right to withdraw a conditional offer of employment from a job applicant who tests positive on a confirmatory alcohol and/or drug test.

5.8.3 First Failed Test – Discipline

Bay West reserves the right to take any other disciplinary action short of discharge it deems warranted in the event that an employee tests positive on his or her first confirmatory test.

5.8.4 Second Failed Test

Bay West reserves the right to discharge an employee who tests positive on a confirmatory test and who has previously had a positive confirmatory test result. This action may be taken without first referring the employee to a chemical dependency counseling or rehabilitation program.

5.9 PRIVACY OF TEST RESULTS

Test results and other information acquired as a result of the testing program are private and confidential information and will not be disclosed by the Bay West or the testing laboratory to another employee or to third party individuals, government agencies, or private organizations without written consent of the employee or applicant being tested.

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Evidence of a positive test result on a confirmatory test, however, may be used in an arbitration proceeding pursuant to a collective bargaining agreement, an administrative hearing, or a judicial proceeding, provided the information is relevant to the hearing or proceeding. Such evidence may also be disclosed to any federal agency or other unit of the United States government as required under federal law, regulation, or order. Evidence of a positive test result on a confirmatory test may also be disclosed to a substance abuse treatment facility for the purpose of evaluation or treatment.

Bay West will provide an employee with access to information in the employee's file relating to positive test result reports and other information acquired in the testing process as well as conclusions drawn from or actions taken based upon such information.

5.10 TESTING LABORATORY

The drug-testing laboratory is:

MedTox Laboratories
402 W. Co. Dr. D
St. Paul, MN 551112
651/636-7466

The testing laboratory is required to retain samples that yield confirmed positive test results for one year in frozen, secured, storage.

5.11 MEDICAL REVIEW OFFICER (MRO)

The Medical Review Officer (MRO) is Dr. Howard, MD. His address is:

Advanced Drug Testing
107 22nd St. W.
PO Box 1452
Williston, ND
(701)577-0494

Dr. Marafioti is a licensed physician with knowledge of drug abuse disorders.

The MRO reviews all results (negative and positive) before they are reported to the company.

The MRO reviews and interprets positive test results as described below to determine if there is an alternative medical explanation for a confirmed positive test result.

a. The MRO conducts a medical interview
b. The MRO reviews the medical history and any relevant biomedical factors
c. The MRO reviews all medical records to determine if a confirmed positive test resulted from legally prescribed medication

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d. If necessary, the MRO authorizes a reanalysis of the original specimen to reaffirm the accuracy of the test results

e. The MRO verifies that the laboratory report and assessment are correct

f. The MRO performs the following duties in situations where employees who have tested positive may eventually return to duty.

   1. The MRO determines whether, and when, the employee may be returned to duty.
   2. The MRO determines the schedule for testing after an employee has been slated for return to duty.
   3. The MRO ensures that the employee has been drug tested in accordance with DOT procedures before the employee is returned to duty.

g. The MRO uses the following rules to make determinations.

   1. The MRO takes no further action if there is a legitimate reason for a positive drug test and reports the test as negative.
   2. If there is no legitimate reason for a confirmed positive drug test, the MRO refers the individual tested to the Safety & Health Officer or Human Resources Manager for action in accordance with this plan.
   3. A specimen deemed scientifically insufficient by the MRO will be reported by the MRO to Bay West as a negative test result. Before declaring the scientifically insufficient specimen negative, the MRO must consider the following.

      a. Reanalysis of the original sample to an alternate laboratory which is certified in accordance with the DHHS Guidelines, or

      b. Consultation from the drug testing laboratory concerning the drug test results

5.12 CONSEQUENCES OF A FAILED DRUG TEST

- "Failing a drug test" means the MRO has determined there is no legitimate medical explanation for the confirmed positive test other than unauthorized use of a prohibited drug.
- If an applicant for a covered position fails a drug test, his/her conditional offer of employment may be withdrawn.
- If an employee fails a drug test he/she will be unqualified to participate in covered or safety sensitive activities (maintenance or emergency response operations at LNG/pipeline release sites, DOT commercial driving, etc.).

5.13 CONSEQUENCES OF REFUSAL TO TAKE A DRUG TEST

An employee or an applicant has the right to refuse to submit to drug testing. If the employee or applicant does not present him/herself at the appointed place and time for drug testing, this will be construed as refusal. If an employee refuses to submit to drug testing, he/she will be unqualified to participate in covered or safety sensitive activities, and he/she will be subject to disciplinary action

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up to and including immediate termination. If an applicant refuses to submit to drug testing, his/her offer of employment may be withdrawn.

Use of an employee in a covered or safety sensitive position is acceptable under the following conditions:

1. The employee has passed a drug test following a positive test
2. The employee has been recommended by the MRO for Return to Duty, and
3. The employee has not failed a drug test after being returned to duty following a positive test

Within five (5) working days of receipt of final (positive) test results from the MRO, the employee or applicant may notify Bay West in writing of his/her intention to obtain a confirmatory test at his/her expense. The original sample may be analyzed by the same laboratory or transferred under NIDA approved chain-of-custody procedures to another DHHS certified laboratory for analysis. If the confirmatory test does not confirm the original positive test result, no adverse personnel action based on the original confirmatory test may be taken against the employee or applicant. If the retest is negative, the employee or applicant will be reimbursed for the retest cost.

Because it is possible that some analytes may deteriorate during storage, the result of a retest is to be reported as confirmation of the original test result even if the detected level of the drug is (a) below the DOT established limits and (b) equal to or greater than the sensitivity of the test.

5.14 REHABILITATION

This section applies only to Bay West employees (not applicants):

In the event of a confirmed positive test result, the Human Resources Manager will meet with the affected employee to discuss evaluation and rehabilitation. An employee for whom a positive test result was the first such result will be offered an opportunity to participate, at the employee's own expense, either a drug or alcohol counseling or rehabilitation program, whichever is more appropriate after consultation with a certified chemical use counselor or a physician trained in the diagnosis and treatment of chemical dependency. The employee will be responsible for covering all costs associated with the initial consultation and evaluation of the employee with a certified drug counselor. The employee has the opportunity to participate, at his/her own expense, in a drug counseling or rehabilitation program, as determined by Bay West through consultation with trained and certified counselors or physicians.

Employees shall be given access to information in their personnel file relating to positive test result reports and other information acquired in the drug testing process and conclusions drawn from, and actions taken, based on the reports and other acquired information.

No other appeal procedures are available to employees.

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5.15 DISCIPLINE AND DISCHARGE

A covered employee who tests positive twice for any of the five classes of drugs, regardless of the time span between positive tests, may be terminated at the discretion of Bay West management.

An employee who refuses to participate in the counseling or rehabilitation program or has failed to successfully complete the program, as evidenced by a withdrawal from the program before its completion or by a positive test result on a confirmatory test anytime after completion of the program, may be terminated.

5.16 SUBSTANCE ABUSE EDUCATION

Bay West provides initial training to supervisors (who are authorized to initiate "reasonable suspicion" testing) on the health effects of drug use, treatment options, signs and symptoms of abuse, and intervention strategies in the work place.

5.17 RECORDKEEPING

The records identified below are kept for the specified periods and these records verify that the Bay West Drug and Alcohol Use Testing Program are being carried out.

a. Records that demonstrate that the collection process conforms to 49 CFR Part 40.25 (Specimen Collection Procedures) are kept for 3 years. These records consist of the employer copy of the chain-of-custody form.

b. Records of employee drug test results that show employees failed a drug test, and the type of test failed, and records that demonstrate rehabilitation, if any, are kept for at least 5 years, and include the following information:

   1. The functions performed by the employee who failed the drug test.
   2. The prohibited drugs that were detected in the specimen of the employee who failed the drug test.
   3. The disposition of the employee who failed the drug test.
   4. The age of each employee who failed a drug test.

c. Records of employee drug test results that show employees passed drug tests shall be kept for at least one year.

d. A record of the number of employees tested by type of test (e.g., random, pre-placement) are kept for at least 5 years.

e. Records confirming that supervisors and employees have been trained as required by 49 CFR Part 40 are kept for least 3 years.

f. Release of an individual's drug test results is prohibited except as identified below:

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1. Upon written request of the individual
2. Upon request by the DOT or a state agency pursuant to:
   a. An accident investigation
   b. Statistical evaluations (with no individual names required)

5.18 SPECIMEN COLLECTION

a. Urine specimens collected under DOT regulations may ONLY be used to test for controlled substances designated or approved for testing by the DOT and shall not be used to conduct any other analysis or test unless otherwise specifically authorized by the DOT.

b. Drug testing custody and control form number DOT 3900.9 or equivalent will be utilized.

c. Collection site personnel provide the specimen donor with a clean single use specimen bottle that is securely wrapped.

d. Collection site personnel provide a tamper-proof sealing system designed in a manner to ensure against undetected opening.

e. A shipping container is provided in which the specimen and associated paperwork is transferred after being sealed and initialed to prevent undetected tampering.

f. Bay West specimen donors are provided written standard instructions setting forth their responsibilities during specimen collection.

g. Bay West has designated and approved collection sites which will have personnel, materials, equipment, facilities, and supervision necessary to provide for collection, security, temporary storage, and shipping of urine specimens to the laboratory.

h. A specimen will be collected at the approved collection site which has an enclosure within which private urination can occur, a toilet for completion of urination (unless a single-use container is used with sufficient capacity to contain the void), and a suitable clean surface for writing. The site must also have a source of water for washing hands, which if practical, should be external to the enclosure where urination occurs.

i. The collection site is not dedicated solely to specimen collection.

j. If continuous physical security is impractical at the collection site from the time the specimen is presented until the sealed mailer is transferred for shipment:

   1. Specimen shall remain under the direct control of a collection site person from submission to its being sealed in the mailer.
   2. Mailer shall be immediately mailed, maintained in secure storage, or remain until mailed under the personal control of a collection site person.

k. If the sample is being collected from an employee in need of medical attention (e.g., as part of a post accident test given in an emergency medical facility), necessary medical attention shall not be delayed in order to collect the specimen.

l. Collection site personnel allow individual privacy unless there is reason to believe that an individual has intent to alter or substitute a specimen. The following circumstances are the

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exclusive grounds constituting a reason to believe that an individual may alter or substitute a specimen.

1. Individual presents a specimen that falls outside the normal temperature range of 32.5C to 37.7C or 95.5F to 99.8F, and
   a. The employee declines to provide a measurement of oral body temperature, or
   b. Oral body temperature varied by more than 1C/1.8F from the temperature of the specimen
2. The last urine specimen provided by the individual was determined by the laboratory to have a specific gravity of less than 1.003 and a creatinine concentration below 0.2g/L.
3. The collection site person observes an attempt to substitute or adulterate the sample
4. Employee has previously tested positive on a drug test and is having a follow-up RETURN TO DUTY test.

m. If the employee refuses to cooperate with the collection process, the collection site person shall inform the employer representative and shall document the non-cooperation on the drug testing custody and control form.

n. Precautions 1 through 26 below are taken to ensure that unadulterated specimens are obtained and correctly identified, and that the procedures identified in items 1 through 26 below are employed at the collection site after a specimen has been provided.

1. Bluing agents in toilet tank and all water sources secured
2. Individual should be positively identified with photo ID
3. Contact the proper authority (S&H Manager) if the individual fails to arrive at the assigned time.
4. The donor shall remove any unnecessary outer garments. Purses or briefcases shall remain with outer garments.
5. Donor shall wash and dry his/her hands.
6. The individual shall remain in the presence of the collection site person and shall not have access to water or any other materials which could be used to adulterate the specimen.
7. The donor shall have individual privacy.
8. Any unusual behavior should be noted on the custody and control form.
9. Provisions have been made if the donor is unable to provide at least 60 milliliters of urine, especially in reference to Post-Accident and Reasonable Cause testing (i.e., donor drinks reasonable quantities of fluid for up to 8 hours)
10. Donor shall be allowed to wash his/her hands after the specimen is collected
11. Temperature of the specimen must be taken within 4 minutes of specimen collection

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12. If specimen temperature is outside the normal range (32.5 Centigrade to 37.7 Centigrade or 90.5 Fahrenheit to 99.8 Fahrenheit), oral temperature may be taken from the donor if the donor agrees
13. Inspect specimen for any contaminants and note findings on custody and control form
14. Specimens suspected of being adulterated must be forwarded to the laboratory for testing
15. If there is a reason to believe the specimen is adulterated or substituted, the donor must, as soon as possible, provide a second specimen under direct observation of a same gender collection person
16. The specimen must be in view at all times before being sealed and labeled
17. Both the specimen donor and the collector are present during the collection process
18. Identification label must be placed on the specimen container
19. Donor must initial the identification label on the specimen bottle
20. The collection site person must enter the identifying information of the specimen on the custody and control form and shall sign the form for certification that Federal requirements have been met
21. The donor reads and signs the custody and control form to verify that the specimen identified is, in fact, the specimen that the donor provided
22. The custody and control form is completed after receipt of the specimen from the donor
23. The specimen and the custody and control form are prepared for shipment or are safeguarded during temporary storage
24. The collector must have control of the "custody and control" documents throughout the performance of the collection procedure. If the collector leaves the workstation the documents and the specimen must go with him/her or they must be secured.
25. The collector shall not leave the workstation between specimen presentation and securement of sample. If collector leaves, the collection is nullified and the collection starts over if the employer elects to do so
26. Collection site personnel shall arrange to ship the collected specimens to the drug testing laboratory by placing the specimens in shipping containers designed to minimize the possibility of damage during shipment, and those containers shall be securely sealed to eliminate the possibility of undetected tampering. On the tape sealing the container, the collection site person shall sign and enter the date specimens were sealed in the containers for shipment. The collection site person shall ensure that the chain-of-custody documentation is attached to each container sealed for shipment to the drug testing laboratory

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5.19 LABORATORY REPORT

The laboratory report submitted to the MRO identifies the following items:

a. The drugs/metabolites tested for

b. The test result: negative or positive

c. Specimen number assigned

d. The drug testing laboratory specimen identification number (accession number)

The laboratory shall report as negative all specimens which are negative on the initial test or negative on the confirmatory test as negative and only specimens confirmed positive shall be reported positive for a specific drug

In the case of a positive report for drug use, the custody and control form is signed by the individual responsible for day-to-day management of the drug testing laboratory or the individual responsible for attesting to the validity of the test reports

Bay West receives a Monthly Statistical Summary containing the following information:

1. Initial testing:
   a. Number of specimens received
   b. Number of specimens reported out
   c. Number of specimens screened positive for:
      - Marijuana metabolites
      - Opiate metabolites
      - Amphetamines
      - Cocaine metabolites
      - Phencyclidine
2. Confirmatory testing:
   a. Number of specimens received for confirmation
   b. Number of specimens confirmed positive for:
      - Marijuana metabolite
      - Morphine, Codeine
      - Amphetamine
      - Cocaine metabolite
      - Phencyclidine
      - Methamphetamine

NOTE: The laboratory will not send the Statistical Report if the report includes data from which it is reasonably likely that information about an individual's tests can be readily inferred. Bay West submits three blind performance test specimens for each 100 drug tests completed up to a maximum of 100 blind performance test specimens submitted per quarter

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5.20 REPORTING POSITIVE AND NEGATIVE TEST RESULTS

After making all reasonable efforts and documenting them, if the MRO is unable to reach the individual directly, the MRO contacts the Safety & Health Specialist or Human Resources Manager who will then direct the individual, in strict confidence, to contact the MRO as soon as possible

The MRO can verify a test as positive without having communicated directly with the employee/job applicant about the test in the following circumstances:

1. The employee/job applicant expressly declines the opportunity to discuss the test
2. The Safety & Health Specialist or Human Resources Manager has successfully made and documented a contact with the employee/job applicant and instructed the employee/job applicant to contact the MRO and more than 5 days have passed since the date the employee/job applicant was successfully contacted.
3. Other circumstances provided for in DOT agency drug testing regulations
4. If an employee/job applicant contacts the MRO after the above mentioned 5 day time period and presents an acceptable explanation as to why previous contact with the MRO was not made, the MRO will reopen the case and allow the individual to present information concerning legal drug use resulting in a confirmed positive test and, if the MRO concludes that there is legal drug use, the MRO will declare the test to be negative
5. If any questions arise as to the accuracy or validity of a positive test result, the MRO is the only person authorized to order a reanalysis of the original sample
6. The MRO will authorize a reanalysis of the original sample if requested to do so by the employee/job applicant's having received actual notice of the positive test
7. Before declaring the test specimen negative the MRO must consider the following:

Request a reanalysis of the original sample performed by the same laboratory

- Request a reanalysis of the original sample to an alternate laboratory which is certified in accordance with the DHHS Guidelines

Receive specific consultation from the drug testing laboratory concerning the drug testing results

8. The MRO does not disclose to Bay West, a DOT agency or other Federal safety agency, or a physician responsible for determining qualification of the employee/job applicant under an applicable DOT agency regulation, any medical information provided by the individual to the MRO as part of the testing verification process except as provided below.

   a. An applicable DOT regulation permits or requires such disclosure

   b. In the MRO's reasonable medical judgement, the information could result in the employee/job applicant being determined to be medically unqualified under an applicable DOT agency rule

   c. In the MRO's reasonable medical judgement, in a situation in which there is no DOT agency rule establishing physical qualification standards applicable to the employee/job

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applicant, the information indicates that continued performance by the employee/job applicant of his or her safety-sensitive function could pose a significant safety risk

9. Before obtaining medical information from the employee/job applicant as part of the verification process, the MRO informs the employee/job applicant that information may be disclosed to third parties as provided in [55] above, and the MRO must identify any third party to whom information may be disclosed

10. The testing laboratory maintains test records in confidence as provided in DOT agency regulations

11. The contract with the testing laboratory provides that the laboratory shall disclose information related to a positive drug test of an individual to the individual, the employer, or the decision-maker in a lawsuit, grievance, or other proceeding initiated by or on behalf of the individual

12. **Upon written request, the employee/job applicant has access to any records relating to his or her drug test and any records relating to the results of any relevant certification, or revocation-of-certification proceedings5.21 BAY WEST DRUG AND ALCOHOL USE TESTING PROGRAM FOR COMMERCIAL MOTOR VEHICLE DRIVERS**

5.21.1 Employees Covered

This addendum is meant to address the Bay West Drug and Alcohol Use Testing Program for Bay West employees who operate commercial motor vehicles.

5.21.2 Definitions

Alcohol: Means the intoxicating agent in beverage alcohol, ethyl alcohol, or other low molecular weight alcohols including methyl and isopropyl alcohol.

Alcohol use: Means the consumption of any beverage, mixture, or preparation, including any medication, containing alcohol.

Commerce means:

a. Any trade, traffic, or transportation within the jurisdiction of the U.S. between a place in a State and a place outside of such State, including a place outside of the United States and

b. Trade, traffic, and transportation in the United States which affects any trade, traffic, and transportation described in paragraph 1) of this definition.

c. Commercial motor vehicle means a motor vehicle or combination of motor vehicles used in commerce to transport passengers of property if the motor vehicle--

   1. Has a gross combination weight rating of 26,001 or more pounds inclusive of a towed unit with a gross vehicle weight rating of more than 10,000 pounds; or

   2. Has a gross vehicle weight rating of 26,001 or more pounds; or

   3. Is designed to transport 16 or more passengers, including the driver; or

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4. Is of any size and used in transportation of materials found to be hazardous for the purposes of the Hazardous Materials Transportation Act and which require the motor vehicle to be placarded under the Hazardous Materials Regulations (49 CFR PART 172, subpart F).

Driver: Means any person who operates a commercial motor vehicle. This includes, but is not limited to: full time, regularly employed drivers and independent, owner-operator contractors who are either directly employed by or under lease to an employer or who operate a commercial motor vehicle at the direction of or with the consent of an employer. For the purpose of pre-employment/pre-duty testing only, the term driver includes a person applying to an employer to drive a commercial motor vehicle.

Safety-sensitive function means: Any of those on-duty functions set forth in §395.2 On-Duty time, 49 CFR part 172, subpart F.

5.21.3 Drivers Subject to Testing

All Bay West employees licensed to operate a Bay West commercial motor vehicle as defined above will be subject to controlled substances testing.

5.21.4 Drug Tests Conducted

As specified in the Bay West Anti-Drug Plan with the following modification:

5.21.4.1 Post-Accident Testing

Following an accident involving a commercial motor vehicle, each employer shall test for controlled substances (drugs) on each surviving driver:

Who was performing safety-sensitive functions with respect to the vehicle, if the accident involved the loss of human life; or

- Who was performing safety-sensitive functions with respect to the vehicle, regardless of whether the accident involved the loss of human life; or
- Who receives a citation under State or local law for a moving traffic violation arising from the accident.

Drivers subject to post accident testing must remain available for such testing. If not, the driver may be deemed to have refused testing. If a post-accident test for alcohol is not administered within two (2) hours of the accident, Bay West will prepare and maintain a record stating why the test was not administered. If a post accident alcohol test cannot be administered within eight (8) hours, Bay West will stop any attempts to administer the test, and will prepare and maintain a record stating why the test was not administered. A driver will be tested for controlled substances no later than thirty-two (32) hours of an above referenced accident. If a post-accident test for drugs is not administered within thirty-two (32) hours of the accident, Bay West will prepare and maintain a record stating why the test was not promptly administered.

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5.21.5 Consequences of a Failed Drug

"Failing a drug test" means the MRO has determined there is no legitimate medical explanation for the confirmed positive test other than unauthorized use of a prohibited drug. If an applicant for a covered position (driver or safety-sensitive position) fails a drug test, his/her conditional offer of employment may be withdrawn. If an employee fails a drug test he/she will be unqualified to drive or perform work in the safety-sensitive position.

5.21.6 Consequences of Refusal to take a Drug Test

An employee or an applicant has the right to refuse to submit to drug testing. If the employee or applicant does not present him/herself at the appointed place and time for drug testing, or if an employee does not remain available for testing after an accident, this will be construed as refusal. If an employee refuses to submit to drug testing, he/she will be unqualified to drive or perform work in the safety-sensitive position, and will be subject to discipline up to and including immediate termination. If an applicant refuses to submit to drug testing, his/her offer of employment may be withdrawn.

"Acknowledgement and Receipt of Anti-Drug Plan" Form

I, _____

have been provided a copy of the Bay West Anti-Drug Plan, and
have received training in the hazards of substance abuse.

_____ _____
Signature of Employee/Applicant Date

Supervisor Training Documentation Form

I, _____,
have received 60 minutes of training
on the health effects of drug use,
treatment options, signs and symptoms
of abuse, and intervention strategies in
the work place.

_____ _____
Signature of Supervisor Date

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Appendix D

Attachment 6
Material Safety Data Sheets

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Material Safety Data Sheet

yno Nobel Inc.
2650 Decker Lake Boulevard, Suite 300
Salt Lake City, Utah 84119
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1126
Date 01/24/05

Supercedes
MSDS # 1126 10/20/03

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): PRIMALINE®
PRIMACORD®
PRIMASHEAR™
OPTICORD®
GEOSEIS®
LOW FLEX™
FIRELINE CORD

Product Class: Detonating Cord

Product Appearance & Odor: Flexible cord of woven textile with a protected explosive core of PETN (white crystalline powder) and covered by a white or colored plastic or textile jacket. May have a waxed finish. No odor.

DOT Hazard Shipping Description: Cord, Detonating 1.1D UN0065 II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

Ingredients	CAS#	%	Occupational Exposure Limits OSHA PEL-TWA	ACGIH TLV-TWA
Pentaerythritol tetranitrate (PETN)	78-11-5	-----*	None[1]	None[2]

[1] Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m^3 ; respirable fraction, 5 mg/m^3.
[2] Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m^3 ; respirable part., 3 mg/m^3.
Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).
* Core powder is 100% PETN. The approximate amount of PETN in a given grade of cord is expressed as that number of grams of PETN per linear meter of cord. Range is from 1 to 280 gram/meter. Example: PRIMALINE® 5 contains approximately 5 grams PETN per meter of cord. (1 gram/meter = 4.7 grains/foot)

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable (PETN decomposes at melting point, about 141°C)
Vapor Pressure: Not Applicable
Vapor Density: (Air = 1) Not Applicable
Percent Volatile by Volume: Not Applicable
Solubility in Water: Insoluble.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Extinguishing Media: (See Special Fire Fighting Procedures section.)
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe, distant location. Allow fire to burn unless it can be fought remotely or with fixed extinguishing systems (sprinklers). For transportation fires involving large quantities of detonating cord, such as a trailer load, evacuate no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning or detonating material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure
This is a packaged product that will not result in exposure to the explosive core material under normal conditions of use.

Eyes: May cause irritation, redness and tearing.
Skin: PETN is not known as a skin irritant or sensitizer.
Ingestion: PETN is moderately toxic if ingested. See systemic effects below.
Inhalation: See systemic effects below.
Systemic or Other Effects: PETN is a known coronary vasodilator, and ingestion or inhalation may result in a lowering of blood pressure, headache or faintness, and a decreased tolerance for grain alcohol. Repeated over-exposure may result in chest pains in the absence of exposure. Systemic effects by ingestion include dermatitis.
Carcinogenicity: No constituents are listed by NTP, IARC or OSHA.

Emergency and First Aid Procedures

Eye: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: Remove to fresh air. If symptoms persist, seek medical attention.
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock.
Materials to Avoid (Incompatibility): Corrosives (strong acids and strong bases or alkalis).
Hazardous Decomposition Products: Nitrogen Oxides (NO_X), Carbon Monoxide (CO)
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate all personnel to a safe distant area and allow to burn or fight fire remotely. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If explosive powder is spilled from damaged detonating cord, remove all other explosives from the spill area. Wet down and clean spilled powder using a damp sponge or rag, avoid applying friction or pressure to the explosive, and place in a (Velostat) electrically conductive bag. Contamination of this material with sand, grit or dirt will render the material more sensitive to detonation. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other

clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Work gloves and work clothing that reduce the possibility of skin abrasion and that would prevent contact with spilled explosive powder is suggested.
Eye Protection: Safety glasses or goggles are recommended.
Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State and local regulations. Only properly qualified and authorized personnel should handle and use explosives. Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock.
Precautions to be taken during use: Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death. Avoid breathing the fumes or gases from detonation of explosives. Detonation in confined or unventilated areas may result in exposure to hazardous fumes or oxygen deficiency.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of plosives Safety Library Publications.

SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number	% By Weight
None		

Disclaimer

Dyno Nobel Inc. and its subsidiaries disclaim any warranties with respect to this product, the safety or suitability thereof, the information contained herein, or the results to be obtained, whether express or implied, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND/OR OTHER WARRANTY. The information contained herein is provided for reference purposes only and is intended only for persons having relevant technical skills. Because conditions and manner of use are outside of our control, the user is responsible for determining the conditions of safe use of the product. Buyers and users assume all risk, responsibility and liability whatsoever from any and all injuries (including death), losses, or damages to persons or property arising from the use of this product or information. Under no circumstances shall either Dyno Nobel Inc. or any of its subsidiaries be liable for special, consequential or incidental damages or for anticipated loss of profits.

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MATERIAL SAFETY DATA SHEET

CAST BOOSTERS

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
ACP Boosters: Orange Cap, Orange Cap R, Red Cap, Black Cap, Brown Cap, Green Cap, Purple Cap, White Cap, Gray Cap, etc.
NDS Boosters, ADP Boosters, Gold Nugget, Silver Nugget, Diamond Nugget, DES Series, DES Pentolite Charges, Rock Crushers, 60 Gram, 90 Gram, 110 Gram, DES Shaped Charges, Prime Gel*, Renforcatuers, HDP 150, HDP 400, HDP 400LP, HDP 450, Doubledet, Ringprime and Snow Launcher Series, Hornet Series, Enviroprime Series and Electro Star Series.

SECTION II HAZARDOUS INGREDIENTS

Formulated with TNT and an explosive sensitizer such as PETN, RDX and/or HMX.

TNT, Trinitrotoluene, $C_7H_5N_3O_6$,	CAS No. 118-96-7	30% to 80% TNT
PETN, Pentaerythritol tetranitrate, $C_5H_8N_4O_{12}$,	CAS No. 78-11-5	20% to 70% PETN, RDX, and/or HMX.
HMX, Cyclotetramethylene tetranitramine, Octogen, $C_4H_8N_8O_8$,	CAS No. 261-41-0	
RDX, Cyclotrimethylene trinitramine, Cyclonite, $C_3H_6N_6O_6$,	CAS No. 121-82-4	
Aluminum, AL	CAS No. 7429-90-5	0% to 20% Aluminum
Pentolite is a 50/50 mixture of PETN and TNT.	CAS No. 8066-33-9	

Orange Cap R and Electro Star boosters contain a brass sleeve.

SECTION III PHYSICAL DATA

BOILING POINT	Decomposes	VAPOR PRESSURE (mm Hg)	Negligible at 20°C
SPECIFIC GRAVITY (H_2O = 1)	1.65	VAPOR DENSITY (Air = 1)	N/A
PERCENT VOLATILE BY VOL. (%)	N/A	EVAPORATION RATE:	N/A
SOLUBILITY IN WATER:	0.15%		

APPEARANCE AND ODOR: Solid yellow-buff cast crystalline material. No odor.

SECTION IV FIRE AND EXPLOSION DATA

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

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: ACGIH: TNT-Skin, 0.1 MG/M^3 PETN-None RDX-Skin, 1.5 MG/M^3 AL-10MG/M^3
OSHA : TNT-Skin, 1.5 MG/M^3 PETN-None RDX-None AL-15MG/M^3
EFFECTS OF OVEREXPOSURE: TNT ingestion may cause headache, weakness, anemia, or liver damage. Excessive skin contact may cause dermatitis and sensitization. PETN is a vasodilator. Ingestion of RDX may cause nervous system disorders or epiliptiform seizures.
EMERGENCY AND FIRST AID PROCEDURES:
FUMES: Remove to fresh air.
IF INGESTED: Obtain medical attention immediately.

MATERIAL SAFETY DATA SHEET

CAST BOOSTERS

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

STABILITY: Stable under normal conditions. May explode when subjected to fire shock or friction.
INCOMPATIBILITY (MATERIALS TO AVOID): Avoid contact with strong acids or alkalies.
Do not exceed 150°F (66°C).
HAZARDOUS DECOMPOSITION PRODUCTS: Gaseous nitrogen oxides and carbon oxides: Toxic decomposition products including carbon monoxide (CO) may migrate to off blast-site areas.
HAZARDOUS POLYMERIZATION 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** for emergencies only: 1-800-424-9300. For 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 under normal conditions.
PROTECTIVE GLOVES:	Not required for normal handling of boosters.
EYE PROTECTION:	Not required under normal conditions.

SECTION IX SPECIAL PRECAUTIONS

COMPLY WITH THE SAFETY LIBRARY PUBLICATION NO. 4 "WARNINGS AND INSTRUCTIONS" 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: Boosters, Without Detonator, 1.1D, UN 0042, PG II
None of the components are listed in the 1987 IARC Monographs, Group 1, 2A, or 2B as a known, probable or possible carcinogen, nor are they listed in the NTP annual report on carcinogens.
The Enviroprime Series contains 4 to 7 % of a bioremediation inoculant consisting of natural food products and a trace of a naturally occurring non-pathogenic bacterium.
*Prime Gel contains both a Cast Booster and Hydromite. Also see the Hydromite MSDS.

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, 25, 30,40 and 50.Detonating Cord C3

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
SPECIFIC GRAVITY (H_2O = 1) 1.76
PERCENT VOLATILE BY VOL. (%) N/A
SOLUBILITY IN WATER: Negligible
VAPOR PRESSURE (mm Hg) Negligible at 20^0C
VAPOR DENSITY (Air = 1) N/A
EVAPORATION RATE: N/A
APPEARANCE AND ODOR: Flexible cord with an explosive core of PETN protected within a textile casing covered by a seamless polyethylene jacket. 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: Toxic decomposition products including carbon monoxide (CO) may migrate to off blast-site areas.
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** for emergencies only: 1-800-424-9300. For 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 THE SAFETY LIBRARY PUBLICATION NO. 4 "WARNINGS AND INSTRUCTIONS" 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 (21.3 grams per meter) 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^{0}F (71^{0}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.

MATERIAL SAFETY DATA SHEET

ELECTRIC DETONATORS

SECTION I

Issued by the Safety and Compliance Dept.

AUSTIN STAR DETONATOR COMPANY
901 CANTU ROAD
BROWNSVILLE, TX 78520

24 HOUR PHONE: 956-831-7751

TRADE NAME AND SYNONYMS
Rock* Star, Time* Star, Coal Mine Delays, Seismic* Star, Static*Star, 3-D Star Seismic Detonators, Electro*Star Electronic Detonators

Electric Blasting Caps

SECTION II HAZARDOUS INGREDIENTS

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

PETN, Pentaerythritol tetranitrate, $C_5H_8N_4O_{12}$	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 polyethylene 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

Austin Star Detonator Company
901 Cantu Road
Brownsville, TX 78520

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: Carbon monoxide 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** for emergencies only: 1-800-424-9300. For 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 THE SAFETY LIBRARY PUBLICATION NO. 4 "WARNINGS AND INSTRUCTIONS" 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: Detonators, Electric, 1.4B, UN0255, PGII or Detonators, Electric, 1.1B, UN0030 PG II

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

HOLSTON DEFENSE CORP -- COMPOSITION B, TYPE 1, GRADE A -- 6850-00N035107
========== Product Identification ==========

Product ID:COMPOSITION B, TYPE 1, GRADE A
MSDS Date:05/24/1986
FSC:6850
NIIN:00N035107
MSDS Number: BQMPJ
=== Responsible Party ===
Company Name:HOLSTON DEFENSE CORP
Address:WEST STONE DR
City:KINGSPORT
State:TN
ZIP:37660
Country:US
Info Phone Num:615-247-9111
Emergency Phone Num:615-247-9111
CAGE:1D893
=== Contractor Identification ===
Company Name:HOLSTON DEFENSE CORPORATION
Address:WEST STONE DRIVE
Box:City:KINGSPORT
State:TN
ZIP:37660
Country:US
Phone:615-247-9111
CAGE:1D893

========== Composition/Information on Ingredients ==========

Ingred Name:ING 12: AVOID SAND, GLASS, GRIT, & METAL FRAGMENTS WHICH MAY SENSITIZE MATL TO IMPACT &/OR FRICTION. WET WITH (ING 14)
RTECS #:9999999ZZ

Ingred Name:ING 13: WATER TO DESENSITIZE.
RTECS #:9999999ZZ

Ingred Name:OTHER PREC:UP ON CONTINUING BASIS. CAUTION: EXPLO MUST BE TESTED FOR COMPATIBILITY W/ANY MATLS WHICH THEY CONT. (ING 16)
RTECS #:9999999ZZ

Ingred Name:ING 15:KEEP CNTNR CLSD.EXTREME CARE SHOULD BE EXERCISED

DURING MAINTENANCE OF EXPLO CONTAMD EQUIP. DECONTAM PROC(ING 17)
RTECS #:9999999ZZ

Ingred Name:ING 16: INCL WASHING/STEAMING. CHEM DECONTAM,& THERM DECONTAM. DECONTAM SHOULD BE PERFORMED PRIOR TO WELDING, (ING 18)
RTECS #:9999999ZZ

Ingred Name:ING 17: CUTTING/GRINDING METAL PARTS. PENETRATING OIL SHOULD BE USED LIBERALLY ON NUTS, BOLTS, & ALL THREADED (ING 19)
RTECS #:9999999ZZ

Ingred Name:ING 18: CONNECTIONS TO AID IN DESENSITIZING HIDDEN EXPLO PRIOR TO DISASSEMBLY. MILITARY HIGH EXPLO. HAS BEEN (ING 20)
RTECS #:9999999ZZ

Ingred Name:ING 19:ASSIGNED THE UNITED NATIONS ORGANIZATION CLASSIFICATION OF 1, DIVISION 1 (MASS DETONATING) BASED ON DEPT (ING 21)
RTECS #:9999999ZZ

Ingred Name:ING 20: OF DEFENSE EXPLOSIVE HAZARD CLASSIFICATION PROCEDURES, ARMY TECHNICAL BULLETIN 700-2.
RTECS #:9999999ZZ

Ingred Name:S-TRIAZINE, HEXAHYDRO-1,3,5-TRINITRO-; (CYCLOTRIMETHYLENETRINITRAMINE)LD50 (ORAL,RAT): 100 MG/KG. MP:401F, (ING 2)
CAS:121-82-4
RTECS #:XY9450000
Fraction by Wt: SEE ING
OSHA PEL:1.5 MG/M3, S
ACGIH TLV:1.5 MG/M3, S

Ingred Name:ING 1: 205C (DECOMPOSITION).
RTECS #:9999999ZZ

Ingred Name:TRINITROTOLUENE. PERCENTAGE (WT): 37.2-41.8. MP: 174F,79C.
CAS:118-96-7
RTECS #:XU0175000
Fraction by Wt: SEE ING
OSHA PEL:S, 1.5 MG/M3
ACGIH TLV:S, 0.5 MG/M3; 9293

Ingred Name:WAX; (SYNTHETIC WAX)
Fraction by Wt: .7-1.3%

ed Name:FIRE FIGHT PROC:SUFF INITIATION SOURCE. NO ATTEMPT TO FIGHT FIRES SHOULD BE MADE EXCEPT FOR MANUAL ACTIVATION OF (ING 6)
RTECS #:9999999ZZ

Ingred Name:ING 5:INSTALLED FIRE EXTING EQUIP.PERS SHOULD LEAVE BUILDING IMMED USING AS MUCH PROT COVER AS POSS & ACTIVATING (ING 7)
RTECS #:9999999ZZ

Ingred Name:ING 6: DELUGE SYSTEMS AND FIRE ALARM EQUIPMENT WHILE ESCAPING.
RTECS #:9999999ZZ

Ingred Name:EXPLO HAZ: OF STRUCTURES, EQUIP,& CNTNRS WHICH HAVE BEEN EXPOS TO EXPLO.PROPERTY WHICH MAY BE CONTAMD BY EXPLO (ING 9)
RTECS #:9999999ZZ

Ingred Name:ING 8: MUST NOT BE SUBJECTED TO HEAT, SPARKS/FLAME. DETONATION CAN OCCUR.THERM DECONTAM UNDER CNTRLD CNDTNS IS (ING 10)
RTECS #:9999999ZZ

Ingred Name:ING 9:RECOM METH FOR COMPLETE DECONTAM.THERM DECONTAM MUST BE PRECEDED BY WASHING/STEAMING & CHEM NEUTRALIZATION(ING 11)
RTECS #:9999999ZZ

Ingred Name:ING 10: OF DISOLUTION. CONTAMINATED PROPERTY MUST NOT BE BURIED.
RTECS #:9999999ZZ

Ingred Name:SPILL PROC: METAL-TO-METAL CONT, IMPACT W/SHARP OBJECTS, FRICTION/OTHER SITUATIONS WHICH MAY INITIATE EXPLO. (ING 13)
RTECS #:9999999ZZ

========== Hazards Identification ==========

LD50 LC50 Mixture:SEE INGREDIENT 1.
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:SKIN/EYES: CAN CAUSE ALLERGIC SKIN REACTION. CAN CAUSE EYE IRRITATION. TNT CAN DISCOLOR SKIN AND HAIR

ON CONTACT. INHALATION & INGESTION: CHRONIC EXPOSURE TO RDX DUST HAS BEEN REPORTED TO CAUSE CONVUL SIONS OR UNCONSCIOUSNESS. CHRONIC LOCALAND SYSTEMIC EFFECTS ARE NOT FULLY KNOWN. INHALATION AND (EFTS OF OVEREXP)

Explanation of Carcinogenicity:NOT RELEVANT.

Effects of Overexposure:HLTH HAZ: INGESTION CAN RESULT IN SYSTEMIC POISONING, USUALLY AFFECTING BONE MARROW (BLOOD-CELL-PRODUCING SYSTEM) AND LIVER. INGESTING TNT CAUSES NAUSEA, VOMITING, ANOREXIA AND CAN CAUSE LIVER AND BLO OD DAMAGE, AND APLASTIC ANEMIA.

Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:EYES:FLUSH W/LRG AMTS OF WATER FOR AT LST 15 MINS. REMOVE CONT LENSES. GET MED ATTN. SKIN:WASH W/SOAP & WARM RUNNING WATER. CLEAN CLTHG THORO & DISP OF CONTAMD SHOES. GET MED ATTN FOR RASH/IRRIT. INHA L: REMOVE TO FRESH AIR, TREAT ANY IRRITSYMP.IF BRTHG IS DFCLT, GIVE OXYGEN. GET MED ATTN. INGEST: IF CONSCIOUS INDUCE VOMIT IMMED BY GIVING 1-2 GLASSES OF WATER & TOUCHING BACK OF THROAT/BY (SUPDAT)

========== Fire Fighting Measures ==========

Extinguishing Media:WATER SPRINKLER/DELUGE SYSTEM RECOMMENDED.

Fire Fighting Procedures:WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP.BURNING EXPLO MAY ACCELERATE TO DETONATION AT ANY TIME WHEN SUBJECTED TO CONFINEMENT, SHOCK/OTHER (ING 5)

Unusual Fire/Explosion Hazard:MUST NOT BE CONFINED IF BURNING.CAN CAUSE DEFLAGRATION/TRANSITION TO DETONATION W/EXTREMELY VIOLENT RSLTS.MAY BE RETAINED IN FISSURES, CRACKS,& CREVICES (ING 8)

========== Accidental Release Measures ==========

Spill Release Procedures:CLEAN UP SPILLS IMMED USING SOFT BRISTLE BRUSH & CONDUCTIVE RUB PAN/RUB SHOVEL.USE CONDUCTIVE CNTNRS & GROUND ALL CNTNRS BEFORE TRANSFERRING EXPLO BETWEEN CNTNRS. TREAT LIKE FLAM SOLV W/REGARD TO ELEC TROSTATIC DISCHARGE. AVOID PINCHING MATL, (ING 12)

Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE IN APPROVED EXPLOSIVES MAGAZINES

IN ACCORDANCE WITH AMCR 385-100.
Other Precautions:STOR & HNDLG MUST BE CARRIED OUT I/A/W APPROP SAFETY AGENCY REGS CONCERNING QUANTITY DISTANCE, BARRICADING,PERS EXPOS & IATL HNDLG EQUIP. RECYCLE/DISP OF USED CNTNRS I/A/W APPROP SAFETY AGENCY REGS.DU ST GEN BY HNDLG MUST BE CLEANED (ING 15)

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:USE NIOSH/MSHA APPROVED RESPIRATOR FOR DUSTS AND PARTICULATES IF EXPOSED TO DUSTING.
Ventilation:LOCAL EXHAUST: HOODS FOR DUSTY OPERATIONS ARE REQUIRED. MECHANICAL: GENERAL. SPECIAL: DUST COLLECTION EQUIP REQUIRED.
Protective Gloves:IMPERVIOUS GLOVES.
Eye Protection:CHEMICAL WORKERS GOGGLES .
Other Protective Equipment:CAPS & COVERALLS FOR FULL BODY PROT. COTTON UNDERWEAR, SOCKS,& CONDUCTIVE SHOES TO AVOID HUMAN STATIC DISCHARGE.(SUPDAT)
Work Hygienic Practices:AS PREC,HNDL ONLY IN WELL-VENT AREAS, CHANGE CLTHS DAILY, BATHE AT END OF WORK PERIOD,& WASH HANDS THORO AFTER HANDLING.
Supplemental Safety and Health
M^ TLS TO AVOID: SENSIT SUCH AS GLASS, SAND,& METAL FRAGMENTS. FIRST AID . ROC: GIVING SYRUP OF IPECAC.NEVER GIVE ANYTHING BY MOUTH TO AN UNCON PERSON.GET MED ATTN.WASTE DISP METH: RESISTANT CLTHG.DISP SHOULD COMPLY W/ALL APPLIC FED, ST,& LOC REGS. OTHER PROT EQUIP: SAFETY SHOWER, EYE BATH, AND WASHING FACILITIES.

========== Physical/Chemical Properties ==========

HCC:E1
Melt/Freeze Pt:M.P/F.P Text:SEE INGS
Vapor Pres:.1 @ 100C
Spec Gravity:1.7 (H*2O=1)
Solubility in Water:INSOLUBLE @ 20C
Appearance and Odor:LIGHT BROWN FLAKED SOLID.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
ALKALIES, ALKOXIDES, AMMONIA, POTASSIUM HYDROXIDE, SODIUM CARBONATE, ODIUM SULFIDE, POTASSIUM METHYLATE, PHYS (SUPDAT)
Stability Condition to Avoid:SHOCK, HEAT, ELECTROSTATIC DISCHARGE, IMPACT, IMPINGEMENT AND FRICTION.

Hazardous Decomposition Products:TOXIC OXIDES OF NITROGEN.

========== Disposal Considerations ==========

Waste Disposal Methods:DESTROY BY OPEN BURNING,BY BURNING IN AN APPRVD INCIN/BY CHEM TREATMENT W/CAUSTICS. SITE SHOULD BE LOCATED TO PROVIDE ADEQ QUANTITY-DISTANCE PROT. EXPLO SHOULD NOT BE BURNED IN CNTNRS, SHOULD BE IGNIT ED REMOTELY. PERS SHOULD WEAR FLAME (SUPP DATA)

Disclaimer (provided with this information by the compiling agencies):
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HOLSTON DEFENSE CORP -- COMPOSITION B, TYPE 1, GRADE A -- 6850-00N035107
========== Product Identification ==========

Product ID:COMPOSITION B, TYPE 1, GRADE A
MSDS Date:05/24/1986
FSC:6850
NIIN:00N035107
MSDS Number: BQMPJ
=== Responsible Party ===
Company Name:HOLSTON DEFENSE CORP
Address:WEST STONE DR
City:KINGSPORT
State:TN
ZIP:37660
Country:US
Info Phone Num:615-247-9111
Emergency Phone Num:615-247-9111
CAGE:1D893
=== Contractor Identification ===
Company Name:HOLSTON DEFENSE CORPORATION
Address:WEST STONE DRIVE
Box:City:KINGSPORT
State:TN
ZIP:37660
Country:US
Phone:615-247-9111
CAGE:1D893

========== Composition/Information on Ingredients ==========

Ingred Name:ING 12: AVOID SAND, GLASS, GRIT, & METAL FRAGMENTS WHICH MAY SENSITIZE MATL TO IMPACT &/OR FRICTION. WET WITH (ING 14)
RTECS #:9999999ZZ

Ingred Name:ING 13: WATER TO DESENSITIZE.
RTECS #:9999999ZZ

Ingred Name:OTHER PREC:UP ON CONTINUING BASIS. CAUTION: EXPLO MUST BE TESTED FOR COMPATIBILITY W/ANY MATLS WHICH THEY CONT. (ING 16)
RTECS #:9999999ZZ

Ingred Name:ING 15:KEEP CNTNR CLSD.EXTREME CARE SHOULD BE EXERCISED

DURING MAINTENANCE OF EXPLO CONTAMD EQUIP. DECONTAM PROC(ING 17)
RTECS #:9999999ZZ

Ingred Name:ING 16: INCL WASHING/STEAMING. CHEM DECONTAM,& THERM DECONTAM. DECONTAM SHOULD BE PERFORMED PRIOR TO WELDING, (ING 18)
RTECS #:9999999ZZ

Ingred Name:ING 17: CUTTING/GRINDING METAL PARTS. PENETRATING OIL SHOULD BE USED LIBERALLY ON NUTS, BOLTS, & ALL THREADED (ING 19)
RTECS #:9999999ZZ

Ingred Name:ING 18: CONNECTIONS TO AID IN DESENSITIZING HIDDEN EXPLO PRIOR TO DISASSEMBLY. MILITARY HIGH EXPLO. HAS BEEN (ING 20)
RTECS #:9999999ZZ

Ingred Name:ING 19:ASSIGNED THE UNITED NATIONS ORGANIZATION CLASSIFICATION OF 1, DIVISION 1 (MASS DETONATING) BASED ON DEPT (ING 21)
RTECS #:9999999ZZ

Ingred Name:ING 20: OF DEFENSE EXPLOSIVE HAZARD CLASSIFICATION PROCEDURES, ARMY TECHNICAL BULLETIN 700-2.
RTECS #:9999999ZZ

Ingred Name:S-TRIAZINE, HEXAHYDRO-1,3,5-TRINITRO-; (CYCLOTRIMETHYLENETRINITRAMINE)LD50 (ORAL,RAT): 100 MG/KG. MP:401F, (ING 2)
CAS:121-82-4
RTECS #:XY9450000
Fraction by Wt: SEE ING
OSHA PEL:1.5 MG/M3, S
ACGIH TLV:1.5 MG/M3, S

Ingred Name:ING 1: 205C (DECOMPOSITION).
RTECS #:9999999ZZ

Ingred Name:TRINITROTOLUENE. PERCENTAGE (WT): 37.2-41.8. MP: 174F,79C.
CAS:118-96-7
RTECS #:XU0175000
Fraction by Wt: SEE ING
OSHA PEL:S, 1.5 MG/M3
ACGIH TLV:S, 0.5 MG/M3; 9293

Ingred Name:WAX; (SYNTHETIC WAX)
Fraction by Wt: .7-1.3%

ed Name:FIRE FIGHT PROC:SUFF INITIATION SOURCE. NO ATTEMPT TO FIGHT FIRES SHOULD BE MADE EXCEPT FOR MANUAL ACTIVATION OF (ING 6)
RTECS #:9999999ZZ

Ingred Name:ING 5:INSTALLED FIRE EXTING EQUIP.PERS SHOULD LEAVE BUILDING IMMED USING AS MUCH PROT COVER AS POSS & ACTIVATING (ING 7)
RTECS #:9999999ZZ

Ingred Name:ING 6: DELUGE SYSTEMS AND FIRE ALARM EQUIPMENT WHILE ESCAPING.
RTECS #:9999999ZZ

Ingred Name:EXPLO HAZ: OF STRUCTURES, EQUIP,& CNTNRS WHICH HAVE BEEN EXPOS TO EXPLO.PROPERTY WHICH MAY BE CONTAMD BY EXPLO (ING 9)
RTECS #:9999999ZZ

Ingred Name:ING 8: MUST NOT BE SUBJECTED TO HEAT, SPARKS/FLAME. DETONATION CAN OCCUR.THERM DECONTAM UNDER CNTRLD CNDTNS IS (ING 10)
RTECS #:9999999ZZ

Ingred Name:ING 9:RECOM METH FOR COMPLETE DECONTAM.THERM DECONTAM MUST BE PRECEDED BY WASHING/STEAMING & CHEM NEUTRALIZATION(ING 11)
RTECS #:9999999ZZ

Ingred Name:ING 10: OF DISOLUTION. CONTAMINATED PROPERTY MUST NOT BE BURIED.
RTECS #:9999999ZZ

Ingred Name:SPILL PROC: METAL-TO-METAL CONT, IMPACT W/SHARP OBJECTS, FRICTION/OTHER SITUATIONS WHICH MAY INITIATE EXPLO. (ING 13)
RTECS #:9999999ZZ

========== Hazards Identification ==========

LD50 LC50 Mixture:SEE INGREDIENT 1.
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:SKIN/EYES: CAN CAUSE ALLERGIC SKIN REACTION. CAN CAUSE EYE IRRITATION. TNT CAN DISCOLOR SKIN AND HAIR

ON CONTACT. INHALATION & INGESTION: CHRONIC EXPOSURE TO RDX DUST HAS BEEN REPORTED TO CAUSE CONVUL SIONS OR UNCONSCIOUSNESS. CHRONIC LOCALAND SYSTEMIC EFFECTS ARE NOT FULLY KNOWN. INHALATION AND (EFTS OF OVEREXP)

Explanation of Carcinogenicity:NOT RELEVANT.

Effects of Overexposure:HLTH HAZ: INGESTION CAN RESULT IN SYSTEMIC POISONING, USUALLY AFFECTING BONE MARROW (BLOOD-CELL-PRODUCING SYSTEM) AND LIVER. INGESTING TNT CAUSES NAUSEA, VOMITING, ANOREXIA AND CAN CAUSE LIVER AND BLO OD DAMAGE, AND APLASTIC ANEMIA.

Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:EYES:FLUSH W/LRG AMTS OF WATER FOR AT LST 15 MINS. REMOVE CONT LENSES. GET MED ATTN. SKIN:WASH W/SOAP & WARM RUNNING WATER. CLEAN CLTHG THORO & DISP OF CONTAMD SHOES. GET MED ATTN FOR RASH/IRRIT. INHA L: REMOVE TO FRESH AIR, TREAT ANY IRRITSYMP.IF BRTHG IS DFCLT, GIVE OXYGEN. GET MED ATTN. INGEST: IF CONSCIOUS INDUCE VOMIT IMMED BY GIVING 1-2 GLASSES OF WATER & TOUCHING BACK OF THROAT/BY (SUPDAT)

========== Fire Fighting Measures ==========

Extinguishing Media:WATER SPRINKLER/DELUGE SYSTEM RECOMMENDED.

Fire Fighting Procedures:WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP.BURNING EXPLO MAY ACCELERATE TO DETONATION AT ANY TIME WHEN SUBJECTED TO CONFINEMENT, SHOCK/OTHER (ING 5)

Unusual Fire/Explosion Hazard:MUST NOT BE CONFINED IF BURNING.CAN CAUSE DEFLAGRATION/TRANSITION TO DETONATION W/EXTREMELY VIOLENT RSLTS.MAY BE RETAINED IN FISSURES, CRACKS,& CREVICES (ING 8)

========== Accidental Release Measures ==========

Spill Release Procedures:CLEAN UP SPILLS IMMED USING SOFT BRISTLE BRUSH & CONDUCTIVE RUB PAN/RUB SHOVEL.USE CONDUCTIVE CNTNRS & GROUND ALL CNTNRS BEFORE TRANSFERRING EXPLO BETWEEN CNTNRS. TREAT LIKE FLAM SOLV W/REGARD TO ELEC TROSTATIC DISCHARGE. AVOID PINCHING MATL, (ING 12)

Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE IN APPROVED EXPLOSIVES MAGAZINES

IN ACCORDANCE WITH AMCR 385-100.
Other Precautions:STOR & HNDLG MUST BE CARRIED OUT I/A/W APPROP SAFETY AGENCY REGS CONCERNING QUANTITY DISTANCE, BARRICADING,PERS EXPOS & 1ATL HNDLG EQUIP. RECYCLE/DISP OF USED CNTNRS I/A/W APPROP SAFETY AGENCY REGS.DU ST GEN BY HNDLG MUST BE CLEANED (ING 15)

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:USE NIOSH/MSHA APPROVED RESPIRATOR FOR DUSTS AND PARTICULATES IF EXPOSED TO DUSTING.
Ventilation:LOCAL EXHAUST: HOODS FOR DUSTY OPERATIONS ARE REQUIRED. MECHANICAL: GENERAL. SPECIAL: DUST COLLECTION EQUIP REQUIRED.
Protective Gloves:IMPERVIOUS GLOVES.
Eye Protection:CHEMICAL WORKERS GOGGLES .
Other Protective Equipment:CAPS & COVERALLS FOR FULL BODY PROT. COTTON UNDERWEAR, SOCKS,& CONDUCTIVE SHOES TO AVOID HUMAN STATIC DISCHARGE.(SUPDAT)
Work Hygienic Practices:AS PREC,HNDL ONLY IN WELL-VENT AREAS, CHANGE CLTHS DAILY, BATHE AT END OF WORK PERIOD,& WASH HANDS THORO AFTER HANDLING.
Supplemental Safety and Health
M^TLS TO AVOID: SENSIT SUCH AS GLASS, SAND,& METAL FRAGMENTS. FIRST AID . ROC: GIVING SYRUP OF IPECAC.NEVER GIVE ANYTHING BY MOUTH TO AN UNCON PERSON.GET MED ATTN.WASTE DISP METH: RESISTANT CLTHG.DISP SHOULD COMPLY W/ALL APPLIC FED, ST,& LOC REGS. OTHER PROT EQUIP: SAFETY SHOWER, EYE BATH, AND WASHING FACILITIES.

========== Physical/Chemical Properties ==========

HCC:E1
Melt/Freeze Pt:M.P/F.P Text:SEE INGS
Vapor Pres:.1 @ 100C
Spec Gravity:1.7 (H*2O=1)
Solubility in Water:INSOLUBLE @ 20C
Appearance and Odor:LIGHT BROWN FLAKED SOLID.

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
ALKALIES, ALKOXIDES, AMMONIA, POTASSIUM HYDROXIDE, SODIUM CARBONATE, ODIUM SULFIDE, POTASSIUM METHYLATE, PHYS (SUPDAT)
Stability Condition to Avoid:SHOCK, HEAT, ELECTROSTATIC DISCHARGE, IMPACT, IMPINGEMENT AND FRICTION.

Hazardous Decomposition Products:TOXIC OXIDES OF NITROGEN.

========== Disposal Considerations ==========

Waste Disposal Methods:DESTROY BY OPEN BURNING,BY BURNING IN AN APPRVD INCIN/BY CHEM TREATMENT W/CAUSTICS. SITE SHOULD BE LOCATED TO PROVIDE ADEQ QUANTITY-DISTANCE PROT. EXPLO SHOULD NOT BE BURNED IN CNTNRS, SHOULD BE IGNIT ED REMOTELY. PERS SHOULD WEAR FLAME (SUPP DATA)

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MSDS SUMMARY SHEET

Manufacturer:
Name: PHILLIPS PETROLEUM COMPANY
Address 1:
Address 2:
Address 3:
CSZ: BARTLESVILLE **State:** OK **Zipcode:** 74004
Emergency phone: (800) 424-9300
Business phone: 800-762-0942

Product:

Ferndale MSDS#: 1354 **Version # :** 6
Manufacturer MSDS#: 0041
Current? : 2002
Name:

NO. 2 DIESEL FUEL

Synonyms:

CARB **Diesel** TF3
CARB **Diesel**
CARB **Diesel** 10%
Diesel Fuel Oil
EPA Low Sulfur **Diesel** Fuel
EPA Low Sulfur **Diesel** Fuel – Dyed
EPA Off Road High Sulfur **Diesel** – Dyed
Fuel Oil No. 2 – CAS # 68476-30-2
No. 2 **Diesel** Fuel Oil
No. 2 Fuel Oil – Non Hiway – Dyed
No. 2 High Sulfur **Diesel** – Dyed
No. 2 Low Sulfur **Diesel** - Dyed
No. 2 Low Sulfur **Diesel** - Undyed
Crude column 3rd IR
Crude column 3rd side cut
Atmospheric tower 3rd side cut
Ultra Low Sulfur **Diesel** No. 2
Finished **Diesel**
DHT Reactor Feed
Straight Run **Diesel**
Diesel
Middle Distillate

Product/Catalog Numbers:
MSDS Date: 01/01/2002 **(received:** 01/14/2002**)**

NFPA codes:
Health: 0 **Flammability:** 2 **Reactivity:** 0

MATERIAL SAFETY DATA SHEET
No. 2 Diesel Fuel

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: No. 2 Diesel Fuel
Product Code: Multiple
SAP Code:
Synonyms:
1354
CARB Diesel TF3
CARB Diesel
CARB Diesel 10%
Diesel Fuel Oil
EPA Low Sulfur Diesel Fuel
EPA Low Sulfur Diesel Fuel – Dyed
EPA Off Road High Sulfur Diesel – Dyed
Fuel Oil No. 2 – CAS # 68476-30-2
No. 2 Diesel Fuel Oil
No. 2 Fuel Oil – Non Hiway – Dyed
No. 2 High Sulfur Diesel – Dyed
No. 2 Low Sulfur Diesel - Dyed
No. 2 Low Sulfur Diesel – Undyed
No. 2 Ultra Low Sulfur Diesel – Dyed
No. 2 Ultra Low Sulfur Diesel - Undyed
Intended Use: Fuel
Chemical Family:
Responsible Party: Phillip's Petroleum Company
Bartlesville, Oklahoma 74004
For Additional MSDSs: 800-762-0942
Technical Information:

The intended use of this product is indicated above. If any additional use is known, please contact us at the Technical Information number listed.

EMERGENCY OVERVIEW

24 Hour Emergency Telephone Numbers:
Spill, Leak, Fire or Accident
Call CHEMTREC
North America: (800) 424-9300
Others: (703) 527-3887 (collect)

California Poison Control System: 800-356-3120

Health Hazards/Precautionary Measures: Causes severe skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Do not taste or swallow. Wash thoroughly after handling.

Physical Hazards/Precautionary Measures: Flammable liquid and vapor. Keep away from heat, sparks, flames, static electricity or other sources of ignition.

Appearance: Straw-colored to dyed red
Physical Form: Liquid
Odor: Characteristic petroleum

HFPA Hazard Class:
Health: 0 (Least)
Flammability: 2 (Moderate)
Reactivity: 0 (Least)

HMIS Hazard Class
Not Evaluated

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	% VOLUME	EXPOSURE GUIDELINE		
		Limits	Agency	Type
Diesel Fuel No. 2 CAS# 68476-34-6	100	100* mg/m3	ACGIH	TWA-SKIN
Naphthalene CAS# 91-20-3	<1	10ppm	ACGIH	TWA
		15ppm	ACGIH	STEL
		10ppm	OSHA	TWA
		250ppm	NIOSH	IDLH

All components are listed on the TSCA inventory

Tosco Low Sulfur No. 2 Diesel meets the specifications of 40 CFR 60.41 for low sulfur diesel fuel.

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

*Proposed ACGIH (1999)

3. HAZARDS IDENTIFICATION

Potential Health Effects:

Eye: Contact may cause mild eye irritation including stinging, watering, and redness.

Skin: Severe skin irritant. Contact may cause redness, itching, burning, and severe skin damage. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin, leading to dermatitis (inflammation). Not actually toxic by skin absorption, but prolonged or repeated skin contact may be harmful (see Section 11).

Inhalation (Breathing): No information available. Studies by other exposure routes suggest a low degree of toxicity by inhalation.

Ingestion (Swallowing): Low degree of toxicity by ingestion. ASPIRATION HAZARD – This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.

Signs and Symptoms: Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, nausea, diarrhea and transient excitation followed by signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue).

Cancer: Possible skin cancer hazard (see Sections 11 and 14).

Target Organs: There is limited evidence from animal studies that overexposure may cause injury to the kidney (see Section 11).

Developmental: Inadequate data available for this material.

Pre-Existing Medical Conditions: Conditions aggravated by exposure may include skin disorders and kidney disorders.

4. FIRST AID MEASURES

Eye: If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.

Skin: Immediately remove contaminated shoes, clothing, and constrictive jewelry and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek immediate medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water. If irritation or redness develops, seek immediate medical attention.

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard; Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

5. FIRE FIGHTING MEASURES

Flammable Properties:

Flash Point: >125°F/>52°
OSHA Flammability Class: Combustible liquid
LEL %: 0.3 / UEL %; 10.0
Autoignition Temperature: 500°F/260°C

Unusual Fire & Explosion Hazards: This material is flammable and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Move undamaged containers from immediate hazard area if it can be done with minimal risk.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes.

6. ACCIDENTAL RELEASE MEASURES

Flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof equipment is recommended.

Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Dike far ahead of spill for later recovery or disposal. Use foam on spills to minimize vapors (see Section 5). Spilled material may be absorbed into an appropriate material.

Notify fire authorities and appropriate federal, state, and local agencies. Immediate cleanup of any spill is recommended. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, notify the National Response Center (phone number 800-424-8802).

7. HANDLING AND STORAGE

Handling: Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel to another. Can accumulate static charge by flow or agitation. Can be ignited by static discharged. The use of explosion-proof equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames. Use good personal hygiene practices.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing or high pressure hydraulic oil equipment.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSIZ49.1 and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Storage: Keep container(s) tightly closed. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentration below the established exposure limits (see Section 2), additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

Personal Protective Equipment (PPE):

Respiratory: A NIOSH certified air purifying respirator with an organic vapor cartridge maybe used under conditions where airborne concentrations are expected to exceed exposure limits (see Section 2).

Protection provided by air purifying respirators is limited (see manufacturer's respirator selection guide). Use a positive pressure air supplied respirator if there is a potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrants a respirator's use.

Skin: The use of gloves impervious to the specific material handled is advised to prevent skin contact, possible irritation and skin damage (see glove manufacturer literature for information on permeability). Depending on conditions of use, apron and/or arm covers may be necessary.

Eyes/Face: Approved eye protection to safeguard against potential eye contact, irritation, or injury is recommended. Depending on conditions of use, a face shield may be necessary.

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse. It is recommended that impervious clothing be worn when skin contact is possible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1atm).

Appearance: Straw-colored to dyed red
Physical State: Liquid
Odor: Characteristic petroleum
pH: unavailable
Vapor Pressure (mm Hg): 0.40
Vapor Densisty (air=1):>3
Boiling Point/Range: 320-700°F /160-371°C
Freezing/Melting Point: No Data
Solubility in Water: Negligible
Specific Gravity: 0.81-0.88 @ 60°F
Percent Volatile: Negligible
Evaporation Rate (nBuAc=1): <1
Viscosity: 32.6-40.0 SUS @ 100°F
Bulk Density: 7.08 lbs/gal
Flash Point: >125°F / >52°C
Flammable/Expolsive Limits (%): LEL: 0.3 / UEL: 10.0

10. STABILITY AND REACTIVITY

Stability: Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure. Flammable liquid and vapor. Vapor can cause flash fire.

Conditions To Avoid: Avoid all possible sources of ignition (see Sections 5 and 7).

Materials to Avoid (Incompatible Materials): Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc.

Hazardous Decomposition Products: The use of hydrocarbon fuels in an area without adequate ventilation may result in hazardous levels of combustion products (e.g., oxides of carbon, sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels. ACGIH has included a TLV of 0.05 mg/m3 TWA for diesel exhaust particulate on its 1999 Notice of Intended Changes. See Section 11 for additional information on hazards of engine exhaust.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Diesel Fuel No. 2 (CAS# 68476-34-6)

Carcinogenicity: Chronic dermal application of certain middle distillate streams contained in diesel fuel No. 2 resulted in an increased incidence of skin tumors in mice. This material has not been identified as carcinogen by NTP, IARC, or OSHA. Diesel exhaust is a probable cancer hazard based on tests with laboratory animals.

Target Organ(s): Limited evidence of renal impairment has been noted from a few case reports involving excessive exposure to diesel fuel No. 2.

Naphthalene (CAS# 91-20-3)

Carcinogenicity: Naphthalene has been evaluated in two year inhalation studies in both rats and mice. The National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial neuroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has not been identified as a carcinogen by IARC or OSHA.

12. ECOLOGICAL INFORMATION

Not evaluated at this time

13. DISPOSAL CONSIDERATIONS

This material, if discarded as produced, would be a RCRA "characteristic" hazardous waste due to the characteristic(s) of ignitability (D001) and benzene (D018). If the material is spilled to soil or water, characteristic testing of the contaminated materials is recommended. Further, this material, once it becomes a waste, is subject to the land disposal restrictions in 40 CFR 268.40 and may require treatment prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent then the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container ?insate? could be considered a RCRA hazardous waste and must be disposed of with care and in compliance with federal, state and local regulations. Large empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller containers, consult with state and local regulations and disposal authorities.

14. TRANSPORT INFORMATION

DOT Shipping Description: Diesel Fuel, NA1983
Non-Bulk Package Marking: Diesel Fuel, 3, NA 1993, III

15. REGULATORY INFORMATION

EPA SARA 311/312 (Title III Hazard Categories):

Acute Health:	Yes
Chronic Health:	Yes
Fire Hazard:	Yes
Pressure Hazard:	No
Reactive Hazard:	No

SARA 313 and 40 CFR 372:
This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:

Component	CAS Number	Weight %
-- None known --		

California Proposition 65:
Warning: This material contains the following chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

Component	Effect
Benzene	Cancer, Developmental and Reproductive Toxicant
Toluene	Developmental Toxicant

Diesel engine exhaust, while not a component of this material, is on the Proposition 65 list of chemicals known to the State of California to cause cancer.

Carcinogen Identification:
This material has not been identified as a carcinogen by NTP, IARC, or OSHA. See Section 11 for carcinogenicity information of individual components, if any. Diesel exhaust is a probable cancer hazard based on tests in laboratory animals. It has been identified as carcinogen by IARC.

EPA (CERCLA Reportable Quantity: None

16. OTHER INFORMATION

Issue Date: 01/01/02
Previous Issue Date: 05/15/01
Product Code: Multiple
Revised Sections: None
Previous Product Code: Multiple
MSDS Number: 0041

Disclaimer of Expressed and Implied Warranties:

The information presented in this Material Data Safety Sheet is based on data believed to be accurate as of the date this Material Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THE PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

Tosco Refining Company ***Ferndale Refinery***

UltraLow Sulfur Diesel Product Specification

Ferndale Product Code:34380xx (5) Product Code: ULSD2

(COMETS)

Specification	Unit	Limit	Test Procedure	Typical
Appearance				
Water & Sediment	Vol %	0.05 Max	D 2709	
Color	Number	3.0 Max	D 1500	
Haze Rating	Rating	2 Max	D 4176	
Composition				
Carbon Residue (Ramsbottom)	Wt %	0.35 Max	D 524, D 189	
Volatility				
90% Recovered	Deg; F	540 Min	D 86	
	Deg; F	640 Min	D 86	
Flash Point	Deg; F	125 Min (1)	D 93	130 F
Gravity	API	30 Min	D 287, D4052	
Fluidity				
Pour Point	Deg; F	See Season Table (6)	D 97	
Cloud Point	Deg; F	See Season Table (6)	D 2500	10 F
Viscosity @ 104F	cSt	1.9 Min	D 445	
	cSt	4.1 Max	D 445	
Lubricity, SLBOCLE	grams	3100 Min	D 6078	3300gm
Lubricity, HFRR	mm	.45	D 6079	
Combustion				
Cetane Index or Cetane Number (3,4)	Number	40.0 Min	D 976, D613	47.0
Corrosion				
Copper Strip, 3hr @ 50 deg C	Number	3 Max (2)	D 130	
Aromatics (4)	Vol %	35 Max	D 1319	25 %
Contaminants				
Total Sulfur	PPM	30 Max	D 2622, D4294	15-20ppm
Water & Sediment	Vol %	0.05 Max	D 1796	
Ash	Wt %	0.01 Max	D 482	
Additives				
Cetane Improver	Lb/MBbl	675 Max		
Dye		Undyed		

1. Minimum release specification is 125 deg. F. The refinery should target 135 deg. F.
2. Test result reported as a number and letter (e.g. 1a). Any letter is allowable as long as the number meets the spec shown.
3. Either specification must be met.
4. Either cetane index minimum or aromatics maximum must be met.
5. Winter cloud and pour specifications may be relaxed to the summer specifications by agreement with the customer.
6. Season Table

Month	Product Code	Pour Point	Cloud Point
Jan, Feb, Nov, Dec	WI	0 max (5)	14 max (5)
Mar - Oct	SU	15 max	24 max

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Material Safety Data Sheet

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CANUTEC (CANADA) 613-996-6666

MSDS # 1076
Date 10/25/07

Supercedes
MSDS # 1076 01/24/05

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): ELECTRIC SUPER™ COAL
ELECTRIC SUPER™ LP
ELECTRIC SUPER™ SP
ELECTRIC SUPER™ SEISMIC
ELECTRIC SUPER™ INSTANT
DiPED™

Product Class: Detonators, Electric

Product Appearance & Odor: Metal cylinder with varying length of attached plastic coated wires.

DOT Hazard Shipping Description: Detonators, Electric 1.1B UN0030 II
Or
Detonators, Electric 1.4B UN0255 II
Or
Detonators, Electric 1.4S UN0456 II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

Ingredients	CAS#	EXPOSURE LIMITS OSHA PEL-TWA	EXPOSURE LIMITS ACGIH TLV-TWA
Tungsten	7440-33-7	None[1]	5 mg/m^3 (TWA) 10 mg/m^3 (STEL)
Barium Chromate	10294-40-3	1 mg (CrO_3)/10m^3 (ceiling) 0.5 mg (Ba)/m^3	0.01 mg (Cr)/m^3 0.5 mg (Ba)/m^3
Lead Compounds	----------	0.5 mg (Pb)/m^3	0.5 mg (Pb)/m^3
Pentaerythritol Tetranitrate (PETN)	78-11-5	None[1]	None[2]
Boron	7440-42-8	No Value Established	No Value Established
Potassium Perchlorate[3]	7778-74-7	None[1]	None[2]
Diazodinitrophenol (DDNP)	4682-03-5	No Value Established	No Value Established
Nitrocellulose	9004-70-0	No Value Established	No Value Established

[1] Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m^3 ; respirable fraction, 5 mg/m^3 .
[2] Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m^3 ; respirable part., 3 mg/m^3 .
[3] Not all delay periods contain perchlorate. Those that do contain between from about 4 to a maximum of about 25 mg perchlorate per detonator.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: Not Applicable
Percent Volatile by Volume: Not Applicable
Vapor Pressure: Not Applicable
Density: Not Applicable
Solubility in Water: Not Applicable

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable
Flammable Limits: Not Applicable
Extinguishing Media: None
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

This is a packaged product that will not result in exposure to the explosive material under normal conditions of use. Exposure concerns are primarily with post-detonation reaction products, particularly heavy metal compounds.

Eyes: No exposure to chemical hazards anticipated with normal handling procedures. Particulates in the eye may cause irritation, redness and tearing.
Skin: No exposure to chemical hazards anticipated with normal handling procedures.
Ingestion: No exposure to chemical hazards anticipated with normal handling procedures.
Inhalation: Not a likely route of exposure.
Systemic or Other Effects: None anticipated with normal handling procedures. Repeated inhalation or ingestion of post-detonation reaction products may lead to systemic effects such as respiratory tract irritation, ringing of the ears, dizziness, elevated blood pressure, blurred vision and tremors. Heavy metal (lead) poisoning can occur.
Carcinogenicity: ACGIH classifies Lead as a "Suspected Human Carcinogen" and insoluble Chromium VI as "Confirmed Human Carcinogen". NTP, OSHA, and IARC consider components contained in this detonator carcinogenic.
Perchlorate: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: Not applicable.
Special Considerations: None

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, ignition sources, strong shock and electrical impulse. Do not attempt to disassemble.
Materials to Avoid (Incompatibility): Corrosives (acids and bases)
Hazardous Decomposition Products: Carbon Monoxide (CO), Nitrous Oxides (NO_x), Lead (Pb) and various oxides and complex oxides of metals.
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Cotton clothing is suggested.
Eye Protection: Safety glasses are recommended.
Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Keep away from heat, flame, ignition sources, strong shock, and electrical impulses.
Precautions to be taken during use: Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

Material Safety Data Sheet

SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number (Use Toxic Chemical Category Code)	% By Weight
Barium Compounds	N040	1.2
Lead Compounds	N420	0 – 0.59
Chromium Compounds	N090	1.2

Amount of Lead in Detonator Product Line *				
Product	**Pb compounds in detonator [grams]**	**Pb compounds in detonator [Wt.%]**	**Pb in detonator [grams]**	**Pb in detonator [Wt. %]**
Electric Super SP	**0.0412**	**0.588%**	**0.0357**	**0.5093%**
Electric Super LP	**0.0412**	**0.588%**	**0.0357**	**0.5093%**
Electric Super Coal	**0.0412**	**0.588%**	**0.0357**	**0.5093%**
Electric Super Seismic	**0.0000**	**0.0000%**	**0.0000**	**0.0000%**
Electric Super Instant	**0.0000**	**0.0000%**	**0.0000**	**0.0000%**

*Applies to only the detonator (source of lead). Do not use case weight or weight of any other component.

Disclaimer

Dyno Nobel Inc. and its subsidiaries disclaim any warranties with respect to this product, the safety or suitability thereof, the information contained herein, or the results to be obtained, whether express or implied, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND/OR OTHER WARRANTY. The information contained herein is provided for reference purposes only and is intended only for persons having relevant technical skills. Because conditions and manner of use are outside of our control, the user is responsible for determining the conditions of safe use of the product. Buyers and users assume all risk, responsibility and liability whatsoever from any and all injuries (including death), losses, or damages to persons or property arising from the use of this product or information. Under no circumstances shall either Dyno Nobel Inc. or any of its subsidiaries be liable for special, consequential or incidental damages or for anticipated loss of profits.

Material Safety Data Sheet

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Or
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Or
Detonators, Electric 1.4S UN0456 II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

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Lead Compounds	----------	0.5 mg (Pb)/m^3	0.5 mg (Pb)/m^3
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Vapor Density: Not Applicable
Percent Volatile by Volume: Not Applicable
Vapor Pressure: Not Applicable
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Flammable Limits: Not Applicable
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SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

This is a packaged product that will not result in exposure to the explosive material under normal conditions of use. Exposure concerns are primarily with post-detonation reaction products, particularly heavy metal compounds.

Eyes: No exposure to chemical hazards anticipated with normal handling procedures. Particulates in the eye may cause irritation, redness and tearing.
Skin: No exposure to chemical hazards anticipated with normal handling procedures.
Ingestion: No exposure to chemical hazards anticipated with normal handling procedures.
Inhalation: Not a likely route of exposure.
Systemic or Other Effects: None anticipated with normal handling procedures. Repeated inhalation or ingestion of post-detonation reaction products may lead to systemic effects such as respiratory tract irritation, ringing of the ears, dizziness, elevated blood pressure, blurred vision and tremors. Heavy metal (lead) poisoning can occur.
Carcinogenicity: ACGIH classifies Lead as a "Suspected Human Carcinogen" and insoluble Chromium VI as "Confirmed Human Carcinogen". NTP, OSHA, and IARC consider components contained in this detonator carcinogenic.
Perchlorate: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: Not applicable.
Special Considerations: None

Material Safety Data Sheet

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, ignition sources, strong shock and electrical impulse. Do not attempt to disassemble.
Materials to Avoid (Incompatibility): Corrosives (acids and bases)
Hazardous Decomposition Products: Carbon Monoxide (CO), Nitrous Oxides (NO_x), Lead (Pb) and various oxides and complex oxides of metals.
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Cotton clothing is suggested.
Eye Protection: Safety glasses are recommended.
Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Keep away from heat, flame, ignition sources, strong shock, and electrical impulses.
Precautions to be taken during use: Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

Material Safety Data Sheet

SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number (Use Toxic Chemical Category Code)	% By Weight
Barium Compounds	N040	1.2
Lead Compounds	N420	0 – 0.59
Chromium Compounds	N090	1.2

Amount of Lead in Detonator Product Line *				
Product	**Pb compounds in detonator [grams]**	**Pb compounds in detonator [Wt.%]**	**Pb in detonator [grams]**	**Pb in detonator [Wt. %]**
Electric Super SP	**0.0412**	**0.588%**	**0.0357**	**0.5093%**
Electric Super LP	**0.0412**	**0.588%**	**0.0357**	**0.5093%**
Electric Super Coal	**0.0412**	**0.588%**	**0.0357**	**0.5093%**
Electric Super Seismic	**0.0000**	**0.0000%**	**0.0000**	**0.0000%**
Electric Super Instant	**0.0000**	**0.0000%**	**0.0000**	**0.0000%**

*Applies to only the detonator (source of lead). Do not use case weight or weight of any other component.

Disclaimer

Dyno Nobel Inc. and its subsidiaries disclaim any warranties with respect to this product, the safety or suitability thereof, the information contained herein, or the results to be obtained, whether express or implied, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND/OR OTHER WARRANTY. The information contained herein is provided for reference purposes only and is intended only for persons having relevant technical skills. Because conditions and manner of use are outside of our control, the user is responsible for determining the conditions of safe use of the product. Buyers and users assume all risk, responsibility and liability whatsoever from any and all injuries (including death), losses, or damages to persons or property arising from the use of this product or information. Under no circumstances shall either Dyno Nobel Inc. or any of its subsidiaries be liable for special, consequential or incidental damages or for anticipated loss of profits.

HERCULES INCORPORATED -- TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM -- 1376-00N018210

========== Product Identification ==========

Product ID:TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM
MSDS Date:07/02/1991
FSC:1376
NIIN:00N018210
MSDS Number: BKZPP
=== Responsible Party ===
Company Name:HERCULES INCORPORATED
Address:RADFORD ARMY AMMUNITION PLANT
City:RADFORD
State:VA
ZIP:24141
Country:US
Info Phone Num:703-639-7294
Emergency Phone Num:703-639-7294
CAGE:2D295
=== Contractor Identification ===
Company Name:HERCULES INC
Address:RADFORD ARMY AMMUNITION PLANT
Box:City:RADFORD
State:VA
ZIP:24141
Country:US
Phone:703-639-7294
CAGE:2D881
Company Name:HERCULES INCORPORATED
Address:84 5TH AVE
City:NEW YORK
State:NY
ZIP:10011-7603
Country:US
CAGE:2D295

========== Composition/Information on Ingredients ==========

Ingred Name:2,4,6-TRINITROTOLUENE (TNT)
CAS:118-96-7
RTECS #:XU0175000
Fraction by Wt: 99%

OSHA PEL:S, 1.5 MG/M3
ACGIH TLV:S, 0.5 MG/M3; 9293

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:NO Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ALLERGENIC, CAN CAUSE DERMATITIS. DISCOLOR SKIN AND HAIR PALE YELLOW. CAUSES NAUSEA, VOMITING AND ANOREXIA ALSO LIVER AND BLOOD DAMAGE, AND APLASTIC ANEMIA.
Explanation of Carcinogenicity:NOT RELEVANT.
Effects of Overexposure:SEE HEALTH HAZARDS.
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

========== First Aid Measures ==========

First Aid:EYE:IMEEDIATELY FLUSH THOROUGHLY WITH LARGE AMOUNTS OF LOW PRESSURE WATER FOR AT LEAST 25 MINUTES. REMOVE CONTACT LENSES TO ASSURE THOROUGH FLUSHING. CALL MD. SKIN:WASH WITH TNT INDICATOR SOAP AND RUN NING WATER. INHAL:REMOVE TO FRESH AIR. TREAT ANY IRRITATION SYMPTOMATICALLY. CALL MD. INGEST:CALL MD IMMEDIATELY .

========== Fire Fighting Measures ==========

Flash Point:EXPLODES
Extinguishing Media:DELUGE WITH WATER-USE LARGE QUANTITIES.
Fire Fighting Procedures:WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT . EVACUATE THE AREA.
Unusual Fire/Explosion Hazard:HIGHLY DANGEROUS-SHOCK WILL EXPLODE IT. WILL DETONATE IF CONFINED AND EXPOSED TO EXTRME HEAT.

========== Accidental Release Measures ==========

Spill Release Procedures:CLEAN UP SPILL IMMEDIATELY USING A SOFT BRISTLE BRUSH AND A CONDUCTIVE RUBBER OR PLASTIC SHOVEL.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:NONE SPECIFIED BY MANUFACTURER.
Other Precautions:NONE SPECIFIED BY MANUFACTURER.

========== Exposure Controls/Personal Protection ==========

Re atory Protection:NIOSH/MSHA APPROVED RESPIRATOR FOR DUSTS.
Ventilation:MECHANICAL (GENERAL) VENTILATION.
Protective Gloves:COTTON OR LEATHER GLOVES.
Eye Protection:CHEMICAL WORKERS GOGGLES .
Other Protective Equipment:FLAME-PROOF COVERALLS AND CONDUCTIVE SHOES.
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health
NONE SPECIFIED BY MANUFACTURER.

========== Physical/Chemical Properties ==========

HCC:E1
Boiling Pt:B.P. Text:464F,240C
Spec Gravity:1.5-1.6
Solubility in Water:0.01% @ 25C
Appearance and Odor:FLAKES, PALE YELLOW IN COLOR.
Percent Volatiles by Volume:<0.1

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
SODIUM HYDROXIDE, POTASSIUM HYDROXIDE AND OTHER HIGHLY ALKALINE MATERIALS.
Stability Condition to Avoid:AVOID CONTACT WITH ALKALINE MATERIALS. WILL DETONATE IF CONFINED AND EXPOSED TO EXTREME HEAT.
Hazardous Decomposition Products:NOX.

========== Disposal Considerations ==========

Waste Disposal Methods:BURN ON OPEN BURNING GROUND IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS. MAY ALSO BE BURNED IN AN INCINERATOR APPROVED FOR EXPLOSIVES. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULAT IONS .

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HERCULES INCORPORATED -- TRINITROTOLUENE (TNT) TYPE 1 FLAKE FORM -- 1376-00N018210

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Spill Release Procedures:CLEAN UP SPILL IMMEDIATELY USING A SOFT BRISTLE BRUSH AND A CONDUCTIVE RUBBER OR PLASTIC SHOVEL.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

========== Handling and Storage ==========

Handling and Storage Precautions:NONE SPECIFIED BY MANUFACTURER.
Other Precautions:NONE SPECIFIED BY MANUFACTURER.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:NIOSH/MSHA APPROVED RESPIRATOR FOR DUSTS.
tilation:MECHANICAL (GENERAL) VENTILATION.
Protective Gloves:COTTON OR LEATHER GLOVES.
Eye Protection:CHEMICAL WORKERS GOGGLES .
Other Protective Equipment:FLAME-PROOF COVERALLS AND CONDUCTIVE SHOES.
Work Hygienic Practices:NONE SPECIFIED BY MANUFACTURER.
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particular situation.

AMERADA HESS CORPORATION

MATERIAL SAFETY DATA SHEET

Gasoline, All Grades **MSDS No. 9950**

EMERGENCY OVERVIEW
DANGER!
EXTREMELY FLAMMABLE - EYE AND MUCOUS MEMBRANE IRRITANT - EFFECTS CENTRAL NERVOUS SYSTEM - HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD

NFPA 704 (Section 16)

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs). Contact may cause eye, skin and mucous membrane irritation. Harmful if absorbed through the skin. Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects.

Long-term exposure may cause effects to specific organs, such as to the liver, kidneys, blood, nervous system, and skin. Contains benzene, which can cause blood disease, including anemia and leukemia.

1. CHEMICAL PRODUCT and COMPANY INFORMATION (rev. Jan-04)

Amerada Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): **CHEMTREC (800)424-9300**
COMPANY CONTACT (business hours): Corporate Safety (732)750-6000
MSDS Internet Website www.hess.com/about/environ.html

SYNONYMS: Hess Conventional (Oxygenated and Non-oxygenated) Gasoline; Reformulated Gasoline (RFG); Reformulated Gasoline Blendstock for Oxygenate Blending (RBOB); Unleaded Motor or Automotive Gasoline

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and INFORMATION ON INGREDIENTS * (rev. Jan-04)

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Gasoline (86290-81-5)	100
Benzene (71-43-2)	0.1 - 4.9 (0.1 - 1.3 reformulated gasoline)
n-Butane (106-97-8)	< 10
Ethyl Alcohol (Ethanol) (64-17-5)	0 - 10
Ethyl benzene (100-41-4)	< 3
n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Tertiary-amyl methyl ether (TAME) (994-05-8)	0 to 17.2
Toluene (108-88-3)	1 - 25
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 - 15

A complex blend of petroleum-derived normal and branched-chain alkane, cycloalkane, alkene, and aromatic hydrocarbons. May contain antioxidant and multifunctional additives. Non-oxygenated Conventional Gasoline and RBOB do not have oxygenates (Ethanol or MTBE and/or TAME). Oxygenated Conventional and Reformulated Gasoline will have oxygenates for octane enhancement or as legally required.

3. HAZARDS IDENTIFICATION (rev. Dec-97)

EYES
Moderate irritant. Contact with liquid or vapor may cause irritation.

SKIN
Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION
Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
Contains benzene, a regulated human carcinogen. Benzene has the potential to cause anemia and other blood diseases, including leukemia, after repeated and prolonged exposure. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with systemic toxicity. See also Section 11 - Toxicological Information.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash). Chronic respiratory disease, liver or kidney dysfunction, or pre-existing central nervous system disorders may be aggravated by exposure.

4. FIRST AID MEASURES (rev. Dec-97)

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES (rev. Dec-97)

FLAMMABLE PROPERTIES:

FLASH POINT:	-45 °F (-43°C)
AUTOIGNITION TEMPERATURE:	highly variable; > 530 °F (>280 °C)
OSHA/NFPA FLAMMABILITY CLASS:	1A (flammable liquid)
LOWER EXPLOSIVE LIMIT (%):	1.4%
UPPER EXPLOSIVE LIMIT (%):	7.6%

FIRE AND EXPLOSION HAZARDS

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

During certain times of the year and/or in certain geographical locations, gasoline may contain MTBE and/or TAME. Firefighting foam suitable for polar solvents is recommended for fuel with greater than 10% oxygenate concentration - refer to NFPA 11 "Low Expansion Foam - 1994 Edition."

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES (rev. Dec-97)

ACTIVATE FACILITY SPILL CONTINGENCY or EMERGENCY PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product

vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE (rev. Dec-97)

HANDLING PRECAUTIONS

******USE ONLY AS A MOTOR FUEL******
******DO NOT SIPHON BY MOUTH******

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

STORAGE PRECAUTIONS

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION (rev. Jan-04)

EXPOSURE LIMITS

Component (CAS No.)	Exposure Limits			
	Source	TWA (ppm)	STEL (ppm)	Note
Gasoline (86290-81-5)	ACGIH	300	500	A3
Benzene (71-43-2)	OSHA	1	5	Carcinogen
	ACGIH	0.5	2.5	A1, skin
	USCG	1	5	
n-Butane (106-97-8)	ACGIH	800	--	2003 NOIC: 1000 ppm (TWA) Aliphatic Hydrocarbon Gases Alkane (C1-C4)
Ethyl Alcohol (ethanol) (64-17-5)	OSHA	1000	--	
	ACGIH	1000	--	A4
Ethyl benzene (100-41-4)	OSHA	100	--	
	ACGIH	100	125	A3

Component (CAS No.)	Source	TWA (ppm)	STEL (ppm)	Exposure Limits Note
n-Hexane (110-54-3)	OSHA	500	--	
	ACGIH	50	--	skin
Methyl-tertiary butyl ether [MTBE] (1634-04-4)	ACGIH	50		A3
Tertiary-amyl methyl ether [TAME] (994-05-8)				None established
Toluene (108-88-3)	OSHA	200		Ceiling: 300 ppm; Peak: 500 ppm (10 min.)
	ACGIH	50	--	A4 (skin)
1,2,4- Trimethylbenzene (95-63-6)	ACGIH	25	--	
Xylene, mixed isomers (1330-20-7)	OSHA	100	--	
	ACGIH	100	150	A4

ENGINEERING CONTROLS

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Gloves constructed of nitrile or neoprene are recommended. Chemical protective clothing such as that made of of E.I. DuPont Tychem ®, products or equivalent is recommended based on degree of exposure.

Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION

A NIOSH-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES (rev. Jan-04)

APPEARANCE

A translucent, straw-colored or light yellow liquid

ODOR

A strong, characteristic aromatic hydrocarbon odor. Oxygenated gasoline with MTBE and/or TAME may have a sweet, ether-like odor and is detectable at a lower concentration than non-oxygenated gasoline.

ODOR THRESHOLD

	Odor Detection	Odor Recognition
Non-oxygenated gasoline:	0.5 - 0.6 ppm	0.8 - 1.1 ppm
Gasoline with 15% MTBE:	0.2 - 0.3 ppm	0.4 - 0.7 ppm
Gasoline with 15% TAME:	0.1 ppm	0.2 ppm

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	85 to 437 °F (39 to 200 °C)
VAPOR PRESSURE:	6.4 - 15 RVP @ 100 °F (38 °C) (275-475 mm Hg @ 68 °F (20 °C)
VAPOR DENSITY (air = 1):	AP 3 to 4
SPECIFIC GRAVITY (H_2O = 1):	0.70 – 0.78
EVAPORATION RATE:	10-11 (n-butyl acetate = 1)
PERCENT VOLATILES:	100 %

SOLUBILITY (H_2O): Non-oxygenated gasoline - negligible (< 0.1% @ 77 °F). Gasoline with 15% MTBE - slight (0.1 - 3% @ 77 °F); ethanol is readily soluble in water

10. STABILITY and REACTIVITY (rev. Dec-94)

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources

INCOMPATIBLE MATERIALS

Keep away from strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

11. TOXICOLOGICAL PROPERTIES (rev. Dec-97)

ACUTE TOXICITY

Acute Dermal LD50 (rabbits): > 5 ml/kg
Acute Oral LD50 (rat): 18.75 ml/kg
Primary dermal irritation (rabbits): slightly irritating
Draize eye irritation (rabbits): non-irritating
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY

Carcinogenicity: OSHA: NO IARC: YES - 2B NTP: NO ACGIH: YES (A3)

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

This product may contain methyl tertiary butyl ether (MTBE): animal and human health effects studies indicate that MTBE may cause eye, skin, and respiratory tract irritation, central nervous system depression and neurotoxicity. MTBE is classified as an animal carcinogen (A3) by the ACGIH.

12. ECOLOGICAL INFORMATION (rev. Jan-04)

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations. If released, oxygenates such as ethers and alcohols will be expected to exhibit fairly high mobility in soil, and therefore may leach into groundwater. The API (www.api.org) provides a number of useful references addressing petroleum and oxygenate contamination of groundwater.

13. DISPOSAL CONSIDERATIONS (rev. Dec-97)

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION (rev. Jan-04)

DOT PROPER SHIPPING NAME:	Gasoline
DOT HAZARD CLASS and PACKING GROUP:	3, PG II
DOT IDENTIFICATION NUMBER:	UN 1203
DOT SHIPPING LABEL:	FLAMMABLE LIQUID

PLACARD:

15. REGULATORY INFORMATION (rev. Jan-04)

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow-up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION WT. PERCENT
Benzene (71-43-2)	0.1 to 4.9 (0.1 to 1.3 for reformulated gasoline)
Ethyl benzene (100-41-4)	< 3
n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Toluene (108-88-3)	1 to 15
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 to 15

US EPA guidance documents (www.epa.gov/tri) for reporting Persistent Bioaccumulating Toxics (PBTs) indicate this product may contain the following deminimis levels of toxic chemicals subject to Section 313 reporting:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION - Parts per million (ppm) by weight
Polycyclic aromatic compounds (PACs)	17
Benzo (g,h,i) perylene (191-24-2)	2.55
Lead (7439-92-1)	0.079

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 2 (Flammable Liquid)
Class D, Division 2A (Very toxic by other means) and Class D, Division 2B (Toxic by other means)

16. OTHER INFORMATION (rev. Jan-04)

NFPA® HAZARD RATING	HEALTH:	1	Slight
	FIRE:	3	Serious
	REACTIVITY:	0	Minimal
HMIS® HAZARD RATING	HEALTH:	1 *	Slight
	FIRE:	3	Serious
	REACTIVITY:	0	Minimal
	* CHRONIC		

SUPERSEDES MSDS DATED: 12/30/97

ABBREVIATIONS:

AP = Approximately < = Less than > = Greater than
N/A = Not Applicable N/D = Not Determined ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute (212)642-4900
API	American Petroleum Institute (202)682-8000
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation [General Info: (800)467-4922]
EPA	U.S. Environmental Protection Agency
HMIS	Hazardous Materials Information System
IARC	International Agency For Research On Cancer
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association (617)770-3000
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	Self-Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short-Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Workplace Hazardous Materials Information System (Canada)

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

MATERIAL SAFETY DATA SHEET

Kidde 55 Multi-Purpose Dry Chemical (Fire Extinguishing Agent)

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	Kidde 55 Multi –Purpose Dry Chemical (Fire Extinguishing Agent)
Other Trade Names	ABC, Ammonium Phosphate, Monoammonium Phosphate
Manufacturer/Supplier	Kidde – Residential and Commercial
Address	1394 S. Third Street Mebane, NC 27302 USA
Phone Number	(919) 563-5911 (919) 304-8200
Chemtrec Number (for emergencies only)	(800) 424-9300 (703) 527-3887 (International)
Revision Date:	
MSDS Date:	January 15, 2007

This MSDS has been compiled in accordance with - EC Directive 91/155/EC - OSHA's Hazcom Standard (29 CFR 1910.1200)

2. COMPOSITION/INFORMATION ON THE COMPONENTS

Component Name	CAS#/Codes	Concentration	R Phrases	EU Classification
Monoammonium Phosphate	7722-76-1 EC#2317645	55 - 65%	None	None
Ammonium Sulfate	7783-20-2 EC#2319841	30 - 40%	None	None
Mica	12001-26-2	1 - 4%	None	None
Clay	8031-18-3	<2%	None	None
Amorphous Silica	7631-86-9 EC#2315454	<2%	None	None
Dye	NA	<0.1%	None	None

3. HAZARD IDENTIFICATION

EU Main Hazards
Non Hazardous Powder

Routes of Entry
- Eye contact - Inhalation - Skin contact

Carcinogenic Status
See Section 11 - Toxicity

Target Organs
- Respiratory System - Skin - Eye

Health Effects - Eyes
Contact for short periods of time may cause irritation.

Health Effects - Skin
Contact may cause mild irritation.

3. HAZARD IDENTIFICATION

Health Effects - Ingestion
Ingestion is not an expected route of exposure.

Health Effects - Inhalation
May irritate the respiratory tract. May cause transient cough and shortness of breath.

4. FIRST AID MEASURES

Eyes
Immediately flood the eye with plenty of water of warm water for at least 15 minutes, holding the eye open. Obtain medical attention if soreness or redness persists.

Skin
Wash affected area with soap and water. Obtain medical attention if irritation persists.

Ingestion
Dilute by drinking large quantities of water and obtain medical attention.

Inhalation
Move victim to fresh air. Obtain medical attention immediately for any breathing difficulty.

Advice to Physicians
Treat symptomatically.

5. FIRE FIGHTING MEASURES

Extinguishing Media
This preparation is used as an extinguishing agent and therefore is not a problem when trying to control a blaze. Use extinguishing agent appropriate to other materials involved. Keep pressurized extinguishers and surroundings cool with water spray as they may rupture or burst in the heat of a fire.

Unusual Fire and Explosion Hazards
Pressurized containers may explode in heat of fire.

Protective Equipment for Fire-Fighting
Wear full protective clothing and self-contained breathing apparatus as appropriate for specific fire conditions.

6. ACCIDENTAL RELEASE MEASURES

Sweep up or vacuum. Prevent skin and eye contact. Wear appropriate protective equipment.

7. HANDLING AND STORAGE

Pressurized extinguishers should be properly stored and secured to prevent falling or being knocked over. Do not drag, slide or roll extinguishers. Do not drop extinguishers or permit them to strike against each other. Never apply flame or localized heat directly to any part of the extinguisher or plastic container. Store pressurized extinguishers and plastic containers away from high heat sources. Storage area should be: - cool - dry - well ventilated - under cover - out of direct sunlight

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Standards
Occupational exposure limits are listed below, if they exist.
Mica
ACGIH TLV: 3 mg/m3 TWA, measured as respirable fraction of the aerosol.
OSHA PEL: 20 mppcf, <1% crystalline silica
Nuisance Dust Limit
OSHA PEL: 50 mppcf or 15 mg/m3 TWA, total dust
15 mppcf or 5 mg/m3 TWA, respirable fraction

Engineering Control Measures
Use with adequate ventilation. There should be local procedures for the selection, training, inspection and maintenance of this equipment. When used in large volumes, use local exhaust ventilation.

Respiratory Protection
Not normally required. Use dust mask where dustiness is prevalent, or TLV is exceeded.

Hand Protection
Not normally needed when used as a portable fire extinguisher. Use gloves if irritation occurs.

Eye Protection
Chemical goggles or safety glasses with side shields.

Body Protection
Normal work wear.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Powder
Color	Pale Yellow
Odor	Odorless
Specific Gravity	Not available
Boiling Range/Point (°C/F)	Not applicable
Flash Point (PMCC) (°C/F)	Not Flammable
Solubility in Water	Not applicable
Vapor Density (Air = 1)	Heavier than air.
Vapor Pressure	Not applicable
Evaporation Rate	Not applicable

10. STABILITY AND REACTIVITY

Stability
Stable under normal conditions.

Conditions to Avoid
- Heat - High temperatures - Exposure to direct sunlight

Materials to Avoid
- Strong oxidizing agents - strong acids - sodium hypochlorite

10. STABILITY AND REACTIVITY

Hazardous Polymerization
Will not occur.

Hazardous Decomposition Products
- oxides of carbon - ammonia – oxides of phosphorus – nitrogen oxides

11. TOXICOLOGICAL INFORMATION

Acute Toxicity
Low order of acute toxicity.

Chronic Toxicity/Carcinogenicity
This product is not expected to cause long term adverse health effects.

Mica and clay may contain small quantities of quartz (crystalline silica) as an impurity. Prolonged exposure to respirable crystalline silica dust at concentrations exceeding the occupational exposure limits may increase the risk of developing a disabling lung disease known as silicosis. IARC found limited evidence for pulmonary carcinogenicity of crystalline silica in humans.

Genotoxicity
This product is not expected to cause any mutagenic effects.

Reproductive/Developmental Toxicity
This product is not expected to cause adverse reproductive effects.

12. ECOLOGICAL INFORMATION

Mobility
No relevant studies identified.

Persistence/Degradability
No relevant studies identified.

Bio-accumulation
No relevant studies identified.

Ecotoxicity
No relevant studies identified.

13. DISPOSAL

Dispose of container in accordance with all applicable local and national regulations. Do not cut, puncture or weld on or near to the container. No harm to the environment is expected from this preparation.

14. TRANSPORT INFORMATION

DOT CFR 172.101 Data	Not regulated
UN Proper Shipping Name	Not regulated
UN Class	None
UN Number	None
UN Packaging Group	None

15. REGULATORY INFORMATION

EU Label Information

Classification and labelling have been performed according to EU directives 67/548/EEC and 99/45/EC including amendments.

EU Hazard Symbol and Indication of Danger.

This preparation is not classified as dangerous.

R phrases

None

S phrases

None.

US REGULATIONS (Federal, State) and INTERNATIONAL CHEMICAL REGISTRATION LAWS

TSCA Listing

This product contains ingredients that are listed on or exempt from listing on the EPA Toxic Substance Control Act Chemical Substance Inventory.

EINECS Listing

All ingredients in this product have not been verified for listing on the European Inventory of Existing Commercial Chemical Substances (EINECS) or the European List of New Chemical Substances (ELINCS).

DSL/NDSL (Canadian) Listing

All ingredients in this product are listed on the Domestic Substance List (DSL) or the Non-Domestic Substance List (NDSL) or are exempt from listing.

WHMIS Classification

D2B

This product was classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations and the MSDS contains all the information required by these regulations.

MA Right To Know Law

All components have been checked for inclusion on the Massachusetts Substance List (MSL). Those components present at or above the de minimus concentration include: - Mica (12001-26-2) 1-4% - Amorphous Silica (7631-86-9) <2% - Ammonium Sulfate (7783-20-2) 30 - 40%

PA Right To Know Law

This product contains the following chemicals found on the Pennsylvania Hazardous Substance List: - Mica (12001-26-2) 1-4% - Amorphous Silica (7631-86-9) <2% - Ammonium Sulfate (7783-20-2)

30 - 40%

NJ Right To Know Law

This product contains the following chemicals found on the NJ Right To Know Hazardous Substance List: - Mica (12001-26-2) 1-4% - Amorphous Silica (7631-86-9) <2%

California Proposition 65

This product does not contain materials which the State of California has found to cause cancer, birth defects or other reproductive harm.

SARA Title III Sect. 302 (EHS)

This product does not contain any chemicals subject to SARA Title III Section 302.

SARA Title III Sect. 304

This product does not contain any chemicals subject to SARA Title III Section 304.

15. REGULATORY INFORMATION

SARA Title III Sect. 311/312 Categorization
- Immediate (Acute) Health Hazard

SARA Title III Sect. 313
This product does not contain any chemicals that are listed in Section 313 at or above de minimis concentrations.

16. OTHER INFORMATION

NFPA Ratings
NFPA Code for Health - 1
NFPA Code for Flammability - 0
NFPA Code for Reactivity - 0
NFPA Code for Special Hazards - None

HMIS Ratings
HMIS Code for Health - 1
HMIS Code for Flammability - 0
HMIS Code for Reactivity - 0
HMIS Code for Personal Protection - See Section 8

Abbreviations
N/A: Denotes no applicable information found or available
CAS#: Chemical Abstracts Service Number
ACGIH: American Conference of Governmental Industrial Hygienists
OSHA: Occupational Safety and Health Administration
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
STEL: Short Term Exposure Limit
NTP: National Toxicology Program
IARC: International Agency for Research on Cancer
R: Risk
S: Safety

Prepared By: EnviroNet LLC.

The information contained herein is based on data believed to be accurate. However, no representation, warranty, or guarantee is made to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for its own particular use. Badger Fire Protection assumes no responsibility for personal injury or property damage resulting from use, handling or from contact with this product.

LIQUINOX MSDS

Section 1 : PRODUCT AND COMPANY IDENTIFICATION

Chemical family: Detergent.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
813-248-0585 (outside of the United States).

Supplier: Same as manufacturer.

Product name: Liquinox

Section 2 : INGREDIENT INFORMATION

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE

Section 3 : HAZARD IDENTIFICATION

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of acute exposure

Eye contact: May cause irritation.

Skin contact: Prolonged and repeated contact may cause irritation.

Inhalation: May cause headache and nausea.

Ingestion: May cause vomiting and diarrhea.
May cause gastric distress.

Effects of chronic exposure: See effects of acute exposure.

Section 4 : FIRST AID MEASURES

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

Eye contact: Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.

Inhalation: Remove victim to fresh air.
If irritation persists, seek medical attention.

Ingestion: Do not induce vomiting, seek medical attention.
Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.

Section 5 : FIRE FIGHTING MEASURES

Flammability: Not flammable.

Conditions of flammability: Surrounding fire.

Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.

Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.
Use water spray to cool fire exposed containers.

Auto-ignition temperature: Not available.

Flash point (°C), method: None

Lower flammability limit (% vol): Not applicable.

Upper flammability limit (% vol): Not applicable.

Explosion Data

Sensitivity to static discharge: Not available.

Sensitivity to mechanical impact: Not available.

Hazardous combustion products: Oxides of carbon (COx).
Hydrocarbons.

Rate of burning: Not available.

Explosive power: Containers may rupture if exposed to heat or fire.

Section 6 : ACCIDENTAL RELEASE MEASURES

Leak/Spill: Contain the spill.
Prevent entry into drains, sewers, and other waterways.
Wear appropriate protective equipment.
Small amounts may be flushed to sewer with water.
Soak up with an absorbent material.
Place in appropriate container for disposal.
Notify the appropriate authorities as required.

Section 7 : HANDLING AND STORAGE

Handling procedures and equipment: Protect against physical damage.
Avoid breathing vapors/mists.
Wear personal protective equipment appropriate to task.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Avoid extreme temperatures.
Launder contaminated clothing prior to reuse.

Storage requirements: Store away from incompatible materials.
Keep containers closed when not in use.

Section 8 : EXPOSURE CONTROLS / PERSONAL PROTECTION

Precautionary Measures

Gloves/Type:

Wear appropriate gloves.

Respiratory/Type: None required under normal use.

Eye/Type:

Safety glasses recommended.

Footwear/Type: Safety shoes per local regulations.

Clothing/Type: As required to prevent skin contact.

Other/Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

Exposure limit of material: Not available.

Section 9 : PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Liquid.

Appearance & odor: Odourless.
Pale yellow.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): @ 20°C (68°F).
17

Vapour density (air=1): >1

Volatiles (%)

By volume: Not available.

Evaporation rate (butyl acetate = 1): < 1.

Boiling point (°C): 100 (212F)

Freezing point (°C): Not available.

pH: 8.5

Specific gravity @ 20 °C: (water = 1).
1.083

Solubility in water (%): Complete.

Coefficient of water\oil dist.: Not available.

VOC: None

Chemical family: Detergent.

Section 10 : STABILITY AND REACTIVITY

Chemical stability: Product is stable under normal handling and storage conditions.

Conditions of instability: Extreme temperatures.

Hazardous polymerization: Will not occur.

Incompatible substances: Strong acids.
Strong oxidizing agents.

Hazardous decomposition products: See hazardous combustion products.

Section 11 : TOXICOLOGICAL INFORMATION

LD50 of product, species & route: > 5000 mg/kg rat oral.

LC50 of product, species & route: Not available.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Section 12 : ECOLOGICAL INFORMATION

Environmental toxicity: No data at this time.

Environmental fate: No data at this time.

Section 13 : DISPOSAL CONSIDERATIONS

Waste disposal: In accordance with local and federal regulations.

Section 14 : TRANSPORT INFORMATION

D.O.T. CLASSIFICATION: Not regulated.

Special shipping information: Not regulated.

Section 15 : REGULATORY INFORMATION

Canadian Regulatory Information

WHMIS classification: Not controlled.

DSL status: Not available.

USA Regulatory Information

SARA hazard catagories sections 311/312: Immediate (Acute) Health Hazard: No.
Delayed (Chronic) Health Hazard: No.
Fire Hazard: No.
Sudden Release of Pressure: No.
Reactive: No.

SARA Section 313: None

TSCA inventory: All components of this product are listed on the TSCA inventory.

NFPA

Health Hazard: 1

Flammability: 0

Reactivity: 0

HMIS

Health Hazard: 1

Flammability: 0

Physical hazard: 0

PPE: A

Section 16 : OTHER INFORMATION

Supplier MSDS date: 2006/07/14

Data prepared by: Global Safety Management
3340 Peachtree Road, #1800
Atlanta, GA 30326

Phone: 877-683-7460
Fax: (877) 683-7462

Web: www.globalsafetynet.com
Email: info@globalsafetynet.com.

General note: This material safety data sheet was prepared from information obtained from various sources, including product suppliers and the Canadian Center for Occupational Health and Safety.

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WD-40 Company

Material Safety Data Sheet

1 - Chemical Product and Company Identification

Manufacturer: WD-40 Company	**Chemical Name:** Organic Mixture
Address: 1061 Cudahy Place (92110) P.O. Box 80607 San Diego, California, USA 92138 –0607	**Trade Name:** WD-40 Aerosol **Product Use:** Cleaner, Lubricant, Penetrant
Telephone: 1-800-448-9340 **Emergency only:** 1-888-324-7596 (PROZAR) **Information:** 1-888-324-7596	**MSDS Date Of Preparation:** 5/16/07

2 – Hazards Identification

Emergency Overview:
DANGER! Harmful or fatal if swallowed. Flammable aerosol. Contents under pressure. Avoid eye contact. Use with adequate ventilation. Keep away from heat, sparks and all other sources of ignition.

Symptoms of Overexposure:
Inhalation: High concentrations may cause nasal and respiratory irritation and central nervous system effects such as headache, dizziness and nausea. Intentional abuse may be harmful or fatal.
Skin Contact: Prolonged and/or repeated contact may produce mild irritation and defatting with possible dermatitis.
Eye Contact: Contact may be mildly irritating to eyes. May cause redness and tearing.
Ingestion: This product has low oral toxicity. Swallowing may cause gastrointestinal irritation, nausea, vomiting and diarrhea. The liquid contents are an aspiration hazard. If swallowed, can enter the lungs and may cause chemical pneumonitis.
Chronic Effects: None expected.
Medical Conditions Aggravated by Exposure: Preexisting eye, skin and respiratory conditions may be aggravated by exposure.

Suspected Cancer Agent:
Yes No X

3 - Composition/Information on Ingredients

Ingredient	CAS #	Weight Percent
Aliphatic Hydrocarbon	64742-47-8 64742-48-9 64742-88-7	45-50
Petroleum Base Oil	64742-65-0	15-25
LVP Aliphatic Hydrocarbon	64742-47-8	12-18
Carbon Dioxide	124-38-9	2-3
Non-Hazardous Ingredients	Mixture	<10

4 – First Aid Measures

Ingestion (Swallowed): Aspiration Hazard. DO NOT induce vomiting. Call physician, poison control center or the WD-40 Safety Hotline at 1-888-324-7596 immediately.
Eye Contact: Flush thoroughly with water. Get medical attention if irritation persists.
Skin Contact: Wash with soap and water. If irritation develops and persists, get medical attention.

Inhalation (Breathing): If irritation is experienced, move to fresh air. Get medical attention if irritation or other symptoms develop and persist.

5 – Fire Fighting Measures

Extinguishing Media: Use water fog, dry chemical, carbon dioxide or foam. Do not use water jet or flooding amounts of water. Burning product will float on the surface and spread fire.
Special Fire Fighting Procedures: Firefighters should always wear positive pressure self-contained breathing apparatus and full protective clothing. Cool fire-exposed containers with water. Use shielding to protect against bursting containers.
Unusual Fire and Explosion Hazards: Contents under pressure. Aerosol containers may burst under fire conditions. Vapors are heavier than air and may travel along surfaces to remote ignition sources and flash back.

6 – Accidental Release Measures

Wear appropriate protective clothing (see Section 8). Eliminate all sources of ignition and ventilate area. Leaking cans should be placed in a plastic bag or open pail until the pressure has dissipated. Contain and collect liquid with an inert absorbent and place in a container for disposal. Clean spill area thoroughly. Report spills to authorities as required.

7 – Handling and Storage

Handling: Avoid contact with eyes. Avoid prolonged contact with skin. Avoid breathing vapors or aerosols. Use with adequate ventilation. Keep away from heat, sparks, hot surfaces and open flames. Wash thoroughly with soap and water after handling. Do not puncture or incinerate containers. Keep can away from electrical current or battery terminals. Electrical arcing can cause burn-through (puncture) which may result in flash fire, causing serious injury. Keep out of the reach of children.
Storage: Do not store above 120°F or in direct sunlight. U.F.C (NFPA 30B) Level 3 Aerosol.

8 – Exposure Controls/Personal Protection

Chemical	Occupational Exposure Limits
Aliphatic Hydrocarbon	100 ppm TWA (ACGIH) 1200 mg/m3 TWA (manufacturer recommended)
Petroleum Base Oil	5 mg/m3 TWA (OSHA/ACGIH)
LVP Aliphatic Hydrocarbon	1200 mg/m3 TWA (manufacturer recommended)
Carbon Dioxide	5000 ppm TWA (OSHA/ACGIH), 30,000 ppm STEL (ACGIH)
Non-Hazardous Ingredients	None Established

The Following Controls are Recommended for Normal Consumer Use of this Product
Engineering Controls: Use in a well-ventilated area.
Personal Protection:
Eye Protection: Avoid eye contact. Safety glasses or goggles recommended.
Skin Protection: Avoid prolonged skin contact. Chemical resistant gloves recommended for operations where skin contact is likely.
Respiratory Protection: None needed for normal use with adequate ventilation.

For Bulk Processing or Workplace Use the Following Controls are Recommended
Engineering Controls: Use adequate general and local exhaust ventilation to maintain exposure levels below that occupational exposure limits.
Personal Protection:
Eye Protection: Safety goggles recommended where eye contact is possible.
Skin Protection: Wear chemical resistant gloves.
Respiratory Protection: None required if ventilation is adequate. If the occupational exposure limits are exceeded, wear a NIOSH approved respirator. Respirator selection and use should be

based on contaminant type, form and concentration. Follow OSHA 1910.134, ANSI Z88.2 and good Industrial Hygiene practice.
Work/Hygiene Practices: Wash with soap and water after handling.

9 – Physical and Chemical Properties

Boiling Point:	323°F (minimum)	Specific Gravity:	0.817 @ 72°F
Solubility in Water:	Insoluble	pH:	Not Applicable
Vapor Pressure:	110 PSI @ 70°F	Vapor Density:	Greater than 1
Percent Volatile:	74%	VOC:	412 grams/liter (49.5%)
Coefficient of Water/Oil Distribution:	Not Determined	Appearance/Odor	Light amber liquid/mild odor
Flash Point:	131°F (concentrate) Tag Closed Cup	Flammable Limits: (Solvent Portion)	LEL: 1.1% UE:: 8.9%

10 – Stability and Reactivity

Stability: Stable
Hazardous Polymerization: Will not occur.
Conditions to Avoid: Avoid heat, sparks, flames and other sources of ignition. Do not puncture or incinerate containers.
Incompatibilities: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide and carbon dioxide.

11 – Toxicological Information

The oral toxicity of this product is estimated to be greater than 5,000 mg/kg based on an assessment of the ingredients. This product is not classified as toxic by established criteria. It is an aspiration hazard.
None of the components of this product is listed as a carcinogen or suspected carcinogen or is considered a reproductive hazard.

12 – Ecological Information

No data is currently available.

13 - Disposal Considerations

If this product becomes a waste, it would be expected to meet the criteria of a RCRA ignitable hazardous waste (D001). However, it is the responsibility of the generator to determine at the time of disposal the proper classification and method of disposal. Dispose in accordance with federal, state, and local regulations.

14 – Transportation Information_

DOT Surface Shipping Description: Consumer Commodity, ORM-D
IMDG Shipping Description: Aerosols, 2, UN1950

15 – Regulatory Information

U.S. Federal Regulations:
CERCLA 103 Reportable Quantity: This product is not subject to CERCLA reporting requirements, however, oil spills are reportable to the National Response Center under the Clean Water Act and many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.
SARA TITLE III:
Hazard Category For Section 311/312: Acute Health, Fire Hazard, Sudden Release of Pressure

Section 313 Toxic Chemicals: This product contains the following chemicals subject to SARA Title III Section 313 Reporting requirements: None
Section 302 Extremely Hazardous Substances (TPQ): None
EPA Toxic Substances Control Act (TSCA) Status: All of the components of this product are listed on the TSCA inventory
Canadian Environmental Protection Act: All of the ingredients are listed on the Canadian Domestic Substances List or exempt from notification
Canadian WHMIS Classification: Class B-5 (Flammable Aerosol)
This MSDS has been prepared according to the criteria of the Controlled Products Regulation (CPR) and the MSDS contains all of the information required by the CPR.

16 – Other Information:

HMIS Hazard Rating:
Health – 1 (slight hazard), Fire Hazard – 4 (severe hazard), Reactivity – 0 (minimal hazard)

SIGNATURE: Peter P. L TITLE: Director of Global Quality Assurance

REVISION DATE: Revision Date: May 2007 SUPERSEDES: December 2004

CONSOLIDATED CONTROLS CORP. -- RDX(CYCLONITE) -- 6850-00D000069

========== Product Identification ==========

Product ID:RDX(CYCLONITE)
MSDS Date:01/01/1985
FSC:6850
NIIN:00D000069
MSDS Number: BBCFM
=== Responsible Party ===
Company Name:CONSOLIDATED CONTROLS CORP.
Emergency Phone Num:213-772-5301
CAGE:09790
=== Contractor Identification ===
Company Name:CONSOLIDATED CONTROLS CORPORATION
CAGE:09790

========== Composition/Information on Ingredients ==========

Ingred Name:CYCLONITE
CAS:121-82-4
RTECS #:XY9450000
Fraction by Wt: 100%.
OSHA PEL:S, 1.5 MG/M3
ACGIH TLV:S, 1.5MG/M3; 9192

========== Fire Fighting Measures ==========

Lower Limits:400F
Fire Fighting Procedures:ISOLATION

========== Accidental Release Measures ==========

Spill Release Procedures:NO

========== Handling and Storage ==========

Handling and Storage Precautions:STANDARD CCC PROCEDURE S-2081 FOR HANDLING & STORING CLASS C EXPLOSIVES.NORMAL HANDLING FOR CL C EXPLOSIVES.
Other Precautions:NONE

========== Exposure Controls/Personal Protection ==========

Supplemental Safety and Health
ITEM IS A 1.5 GRAM EXPLOSIVE IS CONTAINED IN AN ASSEMBLY P/N 200WSS-6

========== Physical/Chemical Properties ==========

HCC:E2
Appearance and Odor:SOLID 1.5 GM EXPLOSIVE

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
Stability Condition to Avoid:UNIT CAN ONLY BE IGNITED BY APPLICATION OF 4 AMPS DC TO CIRS

Disclaimer (provided with this information by the compiling agencies):
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Fire Fighting Procedures:ISOLATION

========== Accidental Release Measures ==========

Spill Release Procedures:NO

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Handling and Storage Precautions:STANDARD CCC PROCEDURE S-2081 FOR HANDLING & STORING CLASS C EXPLOSIVES.NORMAL HANDLING FOR CL C EXPLOSIVES.
Other Precautions:NONE

========== Exposure Controls/Personal Protection ==========

Supplemental Safety and Health
ITEM IS A 1.5 GRAM EXPLOSIVE IS CONTAINED IN AN ASSEMBLY P/N 200WSS-6

========== Physical/Chemical Properties ==========

HCC:E2
Appearance and Odor:SOLID 1.5 GM EXPLOSIVE

========== Stability and Reactivity Data ==========

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Stability Condition to Avoid:UNIT CAN ONLY BE IGNITED BY APPLICATION OF 4 AMPS DC TO CIRS

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Material Safety Data Sheet

24 Hour Assistance:
1-847-367-7700
Rust-Oleum Corp.
www.rustoleum.com

Section 1 - Chemical Product / Company Information

Product Name:	Industrial Choice Aerosol - Solvent Based Inverted Marking Paint	Revision Date:	03/22/2007
Identification Number:	203022, 203024, 203025, 203026, 203029, 203030, 1634838, 1668838, 1675838, 201516, 1652838, 239007, 1663838		
Product Use/Class:	Industrial Choice - Precision Line Marking Paint/Aerosol		
Supplier:	Rust-Oleum Corporation 11 Hawthorn Parkway Vernon Hills, IL 60061 USA	Manufacturer:	Rust-Oleum Corporation 11 Hawthorn Parkway Vernon Hills, IL 60061 USA
Preparer:	Department, Regulatory		

Section 2 - Composition / Information On Ingredients

Chemical Name	CAS Number	Weight % Less Than	ACGIH TLV-TWA	ACGIH TLV-STEL	OSHA PEL-TWA	OSHA PEL-CEILING
Liquefied Petroleum Gas	68476-86-8	35.0	1000 PPM	N.E.	1000 PPM	N.E.
Acetone	67-64-1	30.0	500 PPM	750 PPM	750 PPM	N.E.
Toluene	108-88-3	20.0	50 PPM	150 PPM	200 PPM	300 PPM
Aliphatic Hydrocarbon	64742-89-8	15.0	300 PPM	N.E.	300 PPM	N.E.
Xylene	1330-20-7	15.0	100 PPM	150 PPM	100 PPM	N.E.
Titanium Dioxide	13463-67-7	15.0	10 mg/m3	N.E.	10 mg/m3	N.E.
N-Butyl Acetate	123-86-4	15.0	150 PPM	200 PPM	150 PPM	N.E.
Aliphatic Petroleum Distillates	64742-48-9	10.0	400 PPM	N.E.	400 PPM	N.E.
Naphtha	8032-32-4	10.0	300 PPM	N.E.	N.E.	N.E.
Magnesium Silicate	14807-96-6	5.0	10 mg/m3	N.E.	15 mg/m3	N.E.
Ethylbenzene	100-41-4	5.0	100 PPM	125 PPM	100 PPM	N.E.
Aluminum Flake	7429-90-5	5.0	10 mg/m3	N.E.	15 mg/m3	N.E.
Pigment Black 7	1333-86-4	5.0	3.5 mg/m3	N.E.	3.5 mg/m3	N.E.
Calcined Aluminum Silicate	1332-58-7	5.0	2 mg/m3	N.E.	5 mg/m3	N.E.
Pigment Red 122	980-26-7	1.0	15mg/m3	N.E.	5mg/m3	N.E.
Microcrystalline Silica	14808-60-7	1.0	0.025 mg/m3	N.E.	0.10 mg/m3 respirable quartz	N.E.

Section 3 - Hazards Identification

*** Emergency Overview ***: Contents Under Pressure. Harmful if inhaled. May affect the brain or nervous system causing dizziness, headache or nausea. Vapors may cause flash fire or explosion. Extremely flammable liquid and vapor. Harmful if swallowed.

Effects Of Overexposure - Eye Contact: Causes eye irritation.

Effects Of Overexposure - Skin Contact: Prolonged or repeated contact may cause skin irritation. Substance may cause slight skin irritation.

Effects Of Overexposure - Inhalation: High vapor concentrations are irritating to the eyes, nose, throat and lungs. Avoid breathing vapors or mists. High gas, vapor, mist or dust concentrations may be harmful if inhaled. Harmful if

inhaled.

Effects Of Overexposure - Ingestion: Aspiration hazard if swallowed; can enter lungs and cause damage. Substance may be harmful if swallowed.

Effects Of Overexposure - Chronic Hazards: IARC lists Ethylbenzene as a possible human carcinogen (group 2B). May cause central nervous system disorder (e,g.,narcosis involving a loss of coordination, weakness, fatigue, mental confusion, and blurred vision) and/or damage. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Overexposure to xylene in laboratory animals has been associated with liver abnormalities, kidney, lung, spleen, eye and blood damage as well as reproductive disorders. Effects in humans, due to chronic overexposure, have included liver, cardiac abnormalities and nervous system damage. Overexposure to toluene in laboratory animals has been associated with liver abnormalities, kidney, lung and spleen damage. Effects in humans have included liver and cardiac abnormalities.
Contains carbon black. Chronic inflammation, lung fibrosis, and lung tumors have been observed in some rats experimentally exposed for long periods of time to excessive concentrations of carbon black and several insoluble fine dust particles. Tumors have not been observed in other animal species (i.e., mouse and hampster) under similar circumstances and study conditions. Epidemiological studies of North American workers show no evidence of clinically significant adverse health effects due to occupational exposure to carbon black.
Carbon black is listed as a Group 2B-"Possibly carcinogenic to humans" by IARC and is proposed to be listed as A4- "not classified as a human carcinogen" by the American Conference of Govermental Industrial Hygienists. Significant exposure is not anticipated during brush application or drying. Risk of overexposure depends on duration and level of exposure to dust from repeated sanding of surfaces or spray mist and the actual concentration of carbon black in the formula. Contains crystalline silica as silicon dioxide. Excessive inhalation of respirable crystalline silica dust may cause lung disease, silicosis or lung cancer. Significant exposure is not anticipated during brush or trowel application or drying. Risk of overexposure depends on the duration and level of exposure to dust from repeated sanding of surfaces, mechanical abrasion or spray mist and actual concentration of crystalline silica in the formula. Crystalline silica is listed as Group 1 "carcinogenic to humans" by the International Agency for Research on Cancer (IARC,) and Group 2, "reasonably anticipated to be a carcinogen" by the National Toxicology Program (NTP)

Primary Route(s) Of Entry: Skin Contact, Skin Absorption, Inhalation, Eye Contact

Section 4 - First Aid Measures

First Aid - Eye Contact: Hold eyelids apart and flush with plenty of water for at least 15 minutes. Get medical attention.

First Aid - Skin Contact: Wash with soap and water. Get medical attention if irritation develops or persists.

First Aid - Inhalation: If you experience difficulty in breathing, leave the area to obtain fresh air. If continued difficulty is experienced, get medical assistance immediately.

First Aid - Ingestion: Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. Get immediate medical attention.

Section 5 - Fire Fighting Measures

Flash Point: -156 F
(Setaflash)

LOWER EXPLOSIVE LIMIT: 0.7 %
UPPER EXPLOSIVE LIMIT : 12.8 %

Extinguishing Media: Dry Chemical, Foam, Water Fog

Unusual Fire And Explosion Hazards: FLASH POINT IS LESS THAN 20 °. F. - EXTREMELY FLAMMABLE LIQUID AND VAPOR! Water spray may be ineffective. Closed containers may explode when exposed to extreme heat.

Vapors may form explosive mixtures with air. Vapors can travel to a source of ignition and flash back. Perforation of the pressurized container may cause bursting of the can. Keep containers tightly closed. Isolate from heat, electrical equipment, sparks and open flame.

Special Firefighting Procedures: Evacuate area and fight fire from a safe distance.

Section 6 - Accidental Release Measures

Steps To Be Taken If Material Is Released Or Spilled: Remove all sources of ignition, ventilate area and remove with inert absorbent and non-sparking tools. Contain spilled liquid with sand or earth. DO NOT use combustible materials such as sawdust. Dispose of according to local, state (provincial) and federal regulations. Do not incinerate closed containers.

Section 7 - Handling And Storage

Handling: Wash hands before eating. Wash thoroughly after handling. Avoid breathing vapor or mist. Use only in a well-ventilated area. Follow all MSDS/label precautions even after container is emptied because it may retain product residues.

Storage: Contents under pressure. Do not expose to heat or store above 120 ° F. Do not store above 120 ° F. Store large quantities in buildings designed and protected for storage of NFPA Class I flammable liquids. Keep containers tightly closed. Isolate from heat, electrical equipment, sparks and open flame.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Prevent build-up of vapors by opening all doors and windows to achieve cross-ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof ventilation equipment.

Respiratory Protection: A respiratory protection program that meets OSHA 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use. A NIOSH/MSHA approved air purifying respirator with an organic vapor cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits.

Protection provided by air purifying respirators is limited. Use a positive pressure air supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

Skin Protection: Nitrile or Neoprene gloves may afford adequate skin protection. Use impervious gloves to prevent skin contact and absorption of this material through the skin.

Eye Protection: Use safety eyewear designed to protect against splash of liquids.

Other protective equipment: Refer to safety supervisor or industrial hygienist for further information regarding personal protective equipment and its application.

Hygienic Practices: Wash thoroughly with soap and water before eating, drinking or smoking.

Section 9 - Physical And Chemical Properties

Boiling Range:	-34 - 900 F	Vapor Density:	Heavier than air
Odor:	Solvent Like	Odor Threshold:	ND

Appearance:	Liquid	Evaporation Rate:	Faster than Ether
Solubility in H2O:	Slight		
Freeze Point:	ND	Specific Gravity:	
Vapor Pressure:		PH:	NE
Physical State:	Liquid		

(See section 16 for abbreviation legend)

Section 10 - Stability And Reactivity

Conditions To Avoid: Avoid temperatures above 120 ° F. Avoid all possible sources of ignition. Flammable hydrogen gas will evolve when product comes in contact with water or damp air. Heat will be generated. The amount of heat generated will depend upon the volume of material in contact.

Incompatibility: Incompatible with strong oxidizing agents, strong acids and strong alkalies.

Hazardous Decomposition: When heated to decomposition, it emits acrid smoke and irritating fumes. By open flame, carbon monoxide and carbon dioxide.

Hazardous Polymerization: Will not occur under normal conditions.

Stability: This product is stable under normal storage conditions.

Section 11 - Toxicological Information

Product LD50: ND

Product LC50: ND

Chemical Name	LD50	LC50
Liquefied Petroleum Gas	N.D.	N.D.
Acetone	N.D.	N.D.
Toluene	N.D.	N.D.
Aliphatic Hydrocarbon	N.D.	N.D.
Xylene	N.D.	N.D.
Titanium Dioxide	>7500 mg/kg (ORAL, RAT)	N.D.
N-Butyl Acetate	13100 mg/kg (ORAL, RAT)	2000 PPM (INH 4 Hr, RAT)
Aliphatic Petroleum Distillates	N.D.	N.D.
Naphtha	>5000 mg/kg (ORAL, RAT)	N.D.
Magnesium Silicate	N.D.	TCLo:11mg/m3 inh.
Ethylbenzene	3500 mg/kg (ORAL, RAT)	N.D.
Aluminum Flake	N.D.	N.D.
Pigment Black 7	>8000 mg/kg (ORAL, RAT)	N.D.
Calcined Aluminum Silicate	5000 mg/kg (oral Rat)	N.D.
Pigment Red 122	N.D.	N.D.
Microcrystalline Silica	N.D.	N.D.

Section 12 - Ecological Information

Ecological Information: Product is a mixture of listed components.

Section 13 - Disposal Information

Disposal Information: Dispose of material in accordance to local, state and federal regulations and ordinances. Do not allow to enter storm drains or sewer systems.

Section 14 - Transportation Information

DOT Proper Shipping Name:	Aerosol	Packing Group:	---
DOT Technical Name:	---	Hazard Subclass:	---
DOT Hazard Class:	2.1	Resp. Guide Page:	126
DOT UN/NA Number:	UN1950		

Section 15 - Regulatory Information

CERCLA - SARA Hazard Category

This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

IMMEDIATE HEALTH HAZARD, CHRONIC HEALTH HAZARD, FIRE HAZARD

SARA Section 313:

Listed below are the substances (if any) contained in this product that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR part 372:

Chemical Name	CAS Number
Toluene	108-88-3
Xylene	1330-20-7
Ethylbenzene	100-41-4

Toxic Substances Control Act:

Listed below are the substances (if any) contained in this product that are subject to the reporting requirements of TSCA 12(B) if exported from the United States:

None known

U.S. State Regulations: As follows -

New Jersey Right-to-Know:

The following materials are non-hazardous, but are among the top five components in this product.

Chemical Name	CAS Number
Calcium Carbonate	1317-65-3
C-9 HYDROCARBON RESIN UNSATURATED	71302-83-5

Pennsylvania Right-to-Know:

The following non-hazardous ingredients are present in the product at greater than 3%.

Chemical Name	CAS Number
Calcium Carbonate	1317-65-3
C-9 HYDROCARBON RESIN UNSATURATED	71302-83-5
Modified Alkyd	PROPRIETARY
Modified Alkyd	PROPRIETARY
Water	7732-18-5
Barium Sulfate	7727-43-7

California Proposition 65:

Warning: The following ingredients present in the product are known to the state of California to cause Cancer:

Chemical Name	CAS Number
Ethylbenzene	100-41-4
Microcrystalline Silica	14808-60-7
Benzene	71-43-2
Lead Compounds	NOT SPECIFIED
Formaldehyde	50-00-0
Cadmium Compounds	NOT SPECIFIED
Arsenic Compounds	NOT SPECIFIED
Nickel Compounds	NOT SPECIFIED
Acetaldehyde	75-07-0

Warning: The following ingredients present in the product are known to the state of California to cause birth defects, or other reproductive hazards.

Chemical Name	CAS Number
Toluene	108-88-3
Benzene	71-43-2
Mercury Compounds	NOT SPECIFIED
Lead Compounds	NOT SPECIFIED
Cadmium Compounds	NOT SPECIFIED
Arsenic Compounds	NOT SPECIFIED

International Regulations: As follows -

CANADIAN WHMIS:

This MSDS has been prepared in compliance with Controlled Product Regulations except for the use of the 16 headings.

CANADIAN WHMIS CLASS: AB5, D2A, D2B

Section 16 - Other Information

HMIS Ratings:

Health: 2 Flammability: 4 Reactivity: 0 Personal Protection: X

VOLATILE ORGANIC COMPOUNDS, g/l: NA

REASON FOR REVISION:

Legend: N.A. - Not Applicable, N.E. - Not Established, N.D. - Not Determined

The information contained on this MSDS has been checked and should be accurate. However, it is the responsibility of the user to comply with all Federal, State, and Local laws and regulations.

Shell Branded MSDS

Shell Branded MSDS

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Material Safety Data Sheet

Dyno Nobel Inc.
2650 Decker Lake Boulevard, Suite 300
Salt Lake City, Utah 84119
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1108
Date 01/23/06

Supercedes
MSDS # 1108 01/24/05

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): DYNO® Cast BOOSTERS - D10, D15, D25, D35, D45, D65, D90, D135
DYNO® Cast BOOSTERS – C30, C35, C40, C45, C90
DYNO® SLIDER BOOSTERS - DS35, DS45, DS90
DYNO® CORD SENSITIVE BOOSTERS - CS35, CS45, CS90, CS135
SEIS X®
DYNO® STINGER
TROJAN® SPARTAN®
TROJAN® SPARTAN® Slider
TROJAN® Stinger
TROJAN® NB
TROJAN® Twinplex
TROJAN® OPTIPRIME®

Product Class: Cast Boosters

Product Appearance & Odor: Tan to brown solid with no odor. May also be silvery gray. Packaged in paper or plastic tube.

DOT Hazard Shipping Description: Booster 1.1D UN0042 II

NFPA Hazard Classification: Not Available (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

			Occupational Exposure Limits	
Ingredients:	**CAS#**	**% (Range)**	**ACGIH TLV-TWA**	**OSHA PEL-TWA**
Pentaerythritol Tetranitrate (PETN)	78-11-5	30-70	None Established	None Established
Trinitrotoluene	118-96-7	30-60	0.1 mg/m^3 (skin)	1.5 mg/m^3 (skin)
RDX	121-82-4	0-30	0.5 mg/m^3 (skin)	1.5 mg/m^3 (skin)
HMX	2691-41-0	0-10	None Established	None Established
Aluminum	7429-90-5	0-15	10 mg/m^3 (dust)	15 mg/m^3 (total)

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

Material Safety Data Sheet

SECTION III - PHYSICAL DATA

Melting Point: 176° F (80° C) (TNT)
Vapor Density: Not applicable
Percent Volatile by Volume: Not applicable
Evaporation Rate (Butyl Acetate = 1): Not applicable
Vapor Pressure: 0.042mm Hg at 80° C (TNT)
Density: 1.55 - 1.65 g/cc
Solubility in Water: < 0.01%

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not applicable
Flammable Limits: Not applicable
Extinguishing Media: (See Special Fire Fighting Procedures section).
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Eyes: Particulates in the eye may cause irritation, redness, and tearing. Prolonged or repeated contact may cause cataracts, optic neuritis, blurred vision or amblyopia.
Skin: Prolonged contact may cause irritation, severe eczema and sensitization dermatitis. TNT may be absorbed through the skin, which may be indicated by orange staining on exposed skin. See systemic effects below.
Ingestion: Harmful if swallowed. See systemic effects below.
Inhalation: Inhalation of dusts may cause irritation, sneezing or coughing. See systemic effects below.
Systemic or Other Effects: TNT is an irritant, neurotoxin, hepatotoxin, nephrotoxin and bone marrow depressant. Although exposure is unlikely, acute or chronic exposure may cause sensitization dermatitis, headache, dizziness, jaundice, lethargy, or problems with the liver or blood such as toxic nephritis, aplastic anemia, hemolytic anemia or methemoglobin formation. **PETN** is a known coronary vasodilator, and ingestion or inhalation may result in a lowering of blood pressure, headache or faintness, and a decreased tolerance for grain alcohol. Repeated over-exposure may result in chest pains in the absence of exposure.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Remove contaminated clothing. Wash skin thoroughly with soap and water.
Ingestion: Seek medical attention.
Inhalation: In case of irritation, remove to fresh air. Seek medical attention if chronic symptoms occur.
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, friction, impact, ignition sources and strong shock.
Materials to Avoid (Incompatibility): Corrosives (strong acids and bases or alkalis).
Hazardous Decomposition Products: Nitrogen Oxides (NO_X), Carbon Monoxide (CO)
Hazardous Polymerization: Will not occur.

Material Safety Data Sheet

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Non-permeable gloves and work clothing that reduce skin contact are recommended.
Eye Protection: Safety glasses are recommended.
Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry location. Store in compliance with all Federal, State and local regulations. Keep away from heat, flame, ignition sources or strong shock.
Precautions to be taken during use: Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
Other Precautions: It is recommended that users of explosives material be familiar with the Institute of Makers of Explosives Safety Library publications.

SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number	% By Weight
None Applicable		

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STA-LUBE INC -- 3150-3360 SUPER WHITE MULTI-PURPOSE GREASE -- 9150-00F010051

========== Product Identification ==========

Product ID:3150-3360 SUPER WHITE MULTI-PURPOSE GREASE
MSDS Date:03/01/1993
FSC:9150
NIIN:00F010051
MSDS Number: CFFMM
=== Responsible Party ===
Company Name:STA-LUBE INC
Address:3039 ANA ST
City:RANCHO DOMINGUEZ
State:CA
ZIP:90221
Country:US
Info Phone Num:213-664-2121
Emergency Phone Num:213-537-5650
Preparer's Name:JORGENSEN ENVIRONMENTAL
CAGE:33876
=== Contractor Identification ===
Company Name:STA-LUBE INC
Address:3039 ANA ST
Box:City:RANCHO DOMINGUEZ (PART OF COMPTON)
State:CA
ZIP:90221
Country:US
Phone:310-664-2121/800-424-9300(CHEMTREC)
CAGE:33876

========== Composition/Information on Ingredients ==========

Ingred Name:MINERAL OIL, PETROLEUM DISTILLATES, SOLVENT-REFINED HEAVY NAPHTHENIC DISTILLATE *97-1*
CAS:64741-96-4
RTECS #:PY8040000

Ingred Name:LITHIUM SOAP

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:NO Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO

Health Hazards Acute and Chronic:EYES: IRRITATION. SKIN: IRRITATION & DERMATITIS. INHALATION: MAY IRRITATE THE NOSE, THROAT & UPPER RESPIRATORY TRACT. INGESTION: CAN CAUSE IRRITATION OF THE STOMACH & INTESTINAL TRACT.
Explanation of Carcinogenicity:NONE
Effects of Overexposure:IRRITATION, BURNING, TEARING, REDNESS.
Medical Cond Aggravated by Exposure:PRE-EXISTING SKIN & RESPIRATORY CONDITIONS.

========== First Aid Measures ==========

First Aid:EYES: FLUSH W/WATER. SKIN: THOROUGHLY WASH W/SOAP & WATER. USE A WATERLESS CLEANSER IF NECESSARY. INHALATION: REMOVE TO FRESH AIR. INGESTION: IF CONSCIOUS & ALERT, GIVE MILK/WATER TO DRINK. OBTAIN MED ICAL ATTENTION IN ALL CASES.

========== Fire Fighting Measures ==========

Flash Point Method:TCC
Flash Point:>400F
Lower Limits:NEGLIGIBLE
Upper Limits:NEGLIGIBLE
Extinguishing Media:CO2, DRY CHEMICAL, FOAM/WATER SPRAY.
Fire Fighting Procedures:WEAR PROTECTIVE EQUIPMENT & CLOTHING. USE A SCBA FOR ENCLOSED SPACES. WATER SPRAY MAY CAUSE FROTHING. USE WATER SPRAY TO COOL CONTAINERS.
Unusual Fire/Explosion Hazard:MATERIAL CAN IGNITE & BURN WHEN HEATED > IT'S FLASH POINT. EMPTY TANKS/CONTAINERS RETAIN MATERIAL RESIDUE, WHICH CAN IGNITE/EXPLODE. AUTOIGNITION TEMP: >400F.

========== Accidental Release Measures ==========

Spill Release Procedures:WEAR PROTECTIVE CLOTHING & EQUIPMENT. USE ADEQUATE VENTILATION. DON'T ALLOW TO ENTER SEWERS, STREAMS/SURFACE WATERS. DIKE & CONTAIN. PICKUP FOR LATER RECLAMATION & DISPOSAL. USE AN INERT ABSORBENT TO PICKUP RESIDUE & COLLECT FOR LATER DISPOSAL.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE CLOSED CONTAINERS IN A COOL, DRY, WELL VENTILATED AREA AWAY FROM HEAT & STRONG OXIDIZING AGENTS. PROTECT CONTAINERS FROM PHYSICAL DAMAGE.

Other Precautions:USE IN A WELL VENTILATED AREA & WEAR RECOMMENDED PROTECTIVE CLOTHING & EQUIPMENT. AVOID BREATHING MISTS/FUMES. AVOID PROLONGED SKIN CONTACT. LABEL ALL UNATTENDED CONTAINERS.

========== Exposure Controls/Personal Protection ==========

Other Protective Equipment:PROTECTIVE CLOTHING & EQUIPMENT.
Work Hygienic Practices:REMOVE/LAUNDER CONTAMINATED CLOTHING & SHOES BEFORE REUSE. WASH THOROUGHLY AFTER HANDLING.
Supplemental Safety and Health

========== Physical/Chemical Properties ==========

Boiling Pt:B.P. Text:>600F
Vapor Pres:NEGLIGIBLE
Vapor Density:>1
Spec Gravity:0.9-1
Evaporation Rate & Reference:NEGLIGIBLE
Solubility in Water:NEGLIGIBLE
Appearance and Odor:WHITE SEMI-SOLID TO SOLID GREASE W/A FAINT PETROLEUM ODOR
P ·cent Volatiles by Volume:<0.1

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
INCOMPATIBLE W/STRONG OXIDIZING AGENTS.
Stability Condition to Avoid:HEAT.
Hazardous Decomposition Products:CO2, CO, TRACE AMOUNTS OF OXIDES OF SULFUR & NITROGEN.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSED MATERIAL SHOULD BE HANDLED & TRANSPORTED OFFSITE IAW/FEDERAL, STATE & LOCAL REGULATIONS. EMPTY TANKS & CONTAINERS SHOULD BE COMMERCIALLY CLEANED & RECONDITIONED BEFORE USE.

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Evaporation Rate & Reference:NEGLIGIBLE
Solubility in Water:NEGLIGIBLE
Appearance and Odor:WHITE SEMI-SOLID TO SOLID GREASE W/A FAINT PETROLEUM ODOR
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========== Stability and Reactivity Data ==========

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Stability Condition to Avoid:HEAT.
Hazardous Decomposition Products:CO2, CO, TRACE AMOUNTS OF OXIDES OF SULFUR & NITROGEN.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSED MATERIAL SHOULD BE HANDLED & TRANSPORTED OFFSITE IAW/FEDERAL, STATE & LOCAL REGULATIONS. EMPTY TANKS & CONTAINERS SHOULD BE COMMERCIALLY CLEANED & RECONDITIONED BEFORE USE.

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Attachment 7

Hazard Control Plan

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APPENDIX D

ATTACHMENT 7
HAZARD CONTROL PLAN

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APPENDIX D
ATTACHMENT 7
HAZARD-BASED HAZARD CONTROL PLAN, OPERATION WORK PLAN (OWP)

D7.0 MUNITIONS DEBRIS BURIAL PIT CLEAN-UP, LANDFILL 29, HOLLOMAN AFB, ALAMOGORDO, NEW MEXICO.

D7.1 Point of Contact

Wayne Martrildonno, Bay West, Inc. UXO Technical Manager, 651-248-9551.

D7.2 Definition of Work

BW shall provide the necessary personnel and equipment to provide removal, inspection, and disposal of MEC at Landfill 29. All MEC encountered will be accounted for to include identification, condition, depth, location and disposition. All MEC scrap, MPPEH and MD will be handled IAW the SOW.

D7.3 Identification of Principal Hazards

- Munitions and Explosives of Concern;
- Unexploded Ordnance Identification and Disposal;
- Munitions Potentially Presenting an Explosive Hazard (MPPEH); and
- Transportation of explosives.

D7.4 Risk Evaluation

MEC is a safety hazard and may constitute an imminent and substantial endangerment to site personnel and the local populous. It is the Government's intent that BW identifies **all MEC/UXO encountered on-site and disposes of it by demolition.** All work will be performed IAW the Comprehensive Environment Response, Compensation, and Liability Act (CERCLA), Section 104 and the National Contingency Plan (NCP), Sections 300.120(d) and 300.400(e).

D7.4.1 Basis of Evaluation

- Exposure to hazards associated with MEC/UXO. These items, if moved or handled improperly, could detonate, either killing or seriously injuring personnel at the work site;
- Exposure to explosive hazards associated with demolition operations;
- Transportation hazards inherent in the driving of vehicles and movement of MEC and/or demolition materials; and
- Hazards associated with the collection, inspection, and movement of MPPEH.

Initial Risk Without Controls (Check One) ☐ High ☐ Medium ☒ Low ☐ Minimal

Note: High or medium risks require risk analysis.

Residual Risk With Controls (Check One) ☐ High ☐ Medium ☐ Low ☒ Minimal

Approved By: BW Certified Industrial Hygienist

Doug Hickey, CIH
Name

on 25 August 2008
Date

D7.5 Authorization Responsibility

Table 7-1 Outlines those persons responsible for evaluating work site hazards and approving hazard controls.

Table 7-1: Authorization Responsibility

Work Authorization			Worker Authorization	
	Initial Risk	**Residual Risk**		**Residual Risk**
Minimal	No Review	Supervisor Approval	**Minimal**	Supervisor
Low	S & H Consultation	Corporate Safety Approval	**Low**	Corporate Safety Approval
Medium	S & H Concurrence	CIH Approval	**Medium**	CIH Approval
High	S & H/Peer Concurrence	Will Not Be Approved. Full Review Required.	**High**	Worker Will Not Be Approved

D7.6 Hazard Control

This portion of the Hazard Control Plan (HCP), when approved, defines the manner in which each hazard will be controlled to an acceptable level, thus certifying the adequacy of the controls. The hierarchy of controls (engineering, administrative, and personal protective equipment as a last resort) has been utilized in identifying and employing control systems. **Tables 7-1** through **7-6** describe the control for each hazard scenario.

Table 7-2: MEC/UXO

Task	Hazard Scenario	Hazard Control
MEC/UXO Location	Improper handling or marking of MEC/UXO during investigation of project area.	Training and supervision of personnel. Only UXO qualified personnel will handle MEC/UXO items. Marking of items will be done IAW the approved work plan. EZ distances will be enforced at all times.

Table 7-3: MEC/UXO Identification

Task	Hazard Scenario	Hazard Control
Identification of MEC/UXO	Mis-Identification and handling of MEC/UXO.	Only UXO qualified personnel will handle or identify MEC/UXO. Identification of UXO will be made by two UXO qualified personnel. UXO will not be moved or handled unnecessarily, regardless of markings or apparent condition. Do not rely on color code for positive identification of ordnance item(s) nor their contents. Always assume ordnance items contain a live charge until it can be ascertained otherwise. EZ distances will be enforced at all times.

Table 7-4: MEC/UXO Removal

Task	Hazard Scenario	Hazard Control
Excavation and Removal of MEC/UXO	Intentional contact with MEC during excavation and removal MEC/UXO.	Only UXO qualified personnel will handle or investigate anomalies suspected to be MEC/UXO. Identification of UXO will be made by two UXO qualified personnel. Excavation will either be guided with the aid of metal detectors and/or probes or be unguided with the use of shielded earth moving machinery. UXO will not be moved or handled unnecessarily, regardless of markings

Table 7-4: MEC/UXO Removal

Task	Hazard Scenario	Hazard Control
		or apparent condition. Do not rely on color code for positive identification of ordnance item(s) nor their contents. Always assume ordnance items contain a live charge until it can be ascertained otherwise. DDESB approved engineering controls may be applied to decrease exclusion zones during intentional detonations. EZ distances will be enforced at all times.

Table 7-5: MPPEH Identification and Storage

Task	Hazard Scenario	Hazard Control
Inspection of MPPEH	Mis-Identification of MPPEH, Improper Storage of Material.	UXO qualified personnel will inspect MPPEH. The Technician III, SUXOS, UXOSO, and UXOQCS will perform additional inspections of material. Proper documentation will be maintained for containerized material, to include labels and seals. Proper PPE will be worn at all times while handling material. Shipping documents will reflect accurate information. Bins of inspected materials will be secured against accidental co-mingling with other scrap or live items.

Table 7-6:Transportation of Explosives

Task	Hazard Scenario	Hazard Control
Transporting donor explosives from the magazine to the work site.	Road traffic, vehicle fires and shifting loads.	Inspect vehicle for mechanical defects, drive defensively, follow approved explosives transportation route, do not smoke, secure the load and comply with traffic laws.

D7.7 Performing the Work Safely

Fill out each section below. If a section is not applicable to your project, type in "NA."

D7.7.1 Training Requirements

Individual training records and certifications are maintained on the project site for review and inspection:

- 40-hour HAZWOPER training;
- 8-hour HAZWOPER refresher training, as required annually;
- 8-hour Supervisors training (UXO Technicians III and above);
- EOD/UXO training and certification for UXO personnel;
- MEC/UXO identification, hazards, and precautions; and
- First Aid and CPR training for selected personnel (two minimum on-site).

D7.7.2 Applicable Institutional Requirements

NA

D7.7.3 Operating Procedures

Operating procedures are outlined in the approved work plan, APP and SSHP

D7.7.4 Waste Information

Consult with the BW Project Manager for proper evaluation and/or disposal of waste, if generated by personnel or operations.

D7.7.5 Emergency Procedures

In the event of an emergency (injury or illness), refer to the procedures and contacts listed in the APP/SSHP and **Attachment 3c**.

D7.7.6 National Environmental Protection Act (NEPA)/ESH Identification (ID):

NA

D7.7.7 NEPA Tracking Number:

NA

D7.7.8 ESH ID Tracking Number:

NA

D7.7.9 Sampling Results (Data):

Air monitoring NA

D7.7.10 Required Permits:

NA

D7.7.11 Steps for Safe Shutdown:

NA

D7.8 Review and Improvement

The review cycle for this HCP is one year. At the end of a year, the system will be evaluated for changes in the scope of work, the potential hazards, or other conditions that might warrant revision of the HCP system. Any significant modifications that impact the safety envelope of the activity at any time require updating the HCP and reauthorization.

Change control of this document is accomplished by retaining the master HCP document Bay West, Inc.

Appendix E
Munitions Constituents (MC) Sampling and Analysis Plan

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SIGNATURE PAGE

Prepared by: _____ August 29, 2008
Peter Jacobs
Chemical QC Officer
Bay West, Inc.

Date

Reviewed by: _____ August 29, 2008
Tim Salane, PE
Sr. Project Manager
Bay West, Inc.

Date

_____ August 29, 2008
Brad Kulberg
Corporate QA/QC Manager
Bay West, Inc.

Date

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SAMPLING AND ANALYSIS PLAN

PART I

Field Sampling Plan

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Field Sampling Plan (FSP)

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ACRONYMS AND ABBREVIATIONS

Bay West... Bay West, Inc.
bgs..... Below Ground Surface
BIP..... Blow-in-Place
CAR..... Corrective Action Request
COC ..... Chain-of-Custody
COR ..... Contracting Officer's Representative
CRREL ..... Cold Regions Research & Engineering Laboratory
CQCO..... Chemical Quality Control Officer
DQCR..... Daily Quality Control Report
°C ..... Degrees Centigrade
DMM..... Discarded Military Munitions
DQO ..... Data Quality Objective
EM ..... Engineer Manual
EPA ..... U.S. Environmental Protection Agency
ERDC ..... Economic Research and Development Center
ERS ..... Environmental Remediation Services
FS..... Feasibility Study
FSP ..... Field Sampling Plan
FQCC ..... Field Quality Control Coordinator
GB ..... Sarin
HGL ..... Hydrogeologic Incorporated
IAW..... In Accordance With
IDW ..... Investigation Derived Waste
Lbs..... Pounds
LF-29 ..... Landfill 29
MC..... Munitions Constituents
MD..... Munitions Debris
MEC ..... Munitions and Explosives of Concern
MPPEH ..... Materiel Potentially Presenting an Explosive Hazard
MRA ..... Munitions Response Area
MRS ..... Munitions Response Site
MS..... Matrix Spike
MSD ..... Matrix Spike Duplicate
PE ..... Professional Engineer
PG..... Professional Geologist
PI..... Preliminary Investigation
QA..... Quality Assurance
QAPP ..... Quality Assurance Project Plan
QC..... Quality Control
RA ..... Remedial Action
RI ..... Remedial Investigation
RCRA..... Resource Conservation and Recovery Act
RPD ..... Relative Percent Difference
SA ..... Site Assessment
SAP..... Sampling and Analysis Plan
SRFI..... Supplemental RCRA Facilities Investigation
SWMU..... Solid Waste Management Unit
TE ..... Technical Escort
TestAmerica..... TestAmerica, Inc.
TO ..... Task Order
TPH..... Total Petroleum Hydrocarbons
UPS..... United Parcel Service
U.S. ..... United States
USACE..... U.S. Army Corps of Engineers
UXO Unexploded Ordnance

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) is composed of the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP). The SAP addresses sampling and analysis for munitions constituents (MC). Bay West, Inc. (Bay West) has been contracted by the United States (U.S.) Army Corps of Engineers (USACE), Omaha District, to provide a Munitions and Explosives of Concern (MEC) removal at a munitions response area (MRA) known as Landfill-29 (LF-29) and also known as Solid Waste Management Unit (SWMU) 104. This work is being performed under Environmental Remediation Services (ERS) Contract No. W9128F-04-D-0004, Task Order (TO) 0043. The purpose of the SAP is to assure production of high quality data that meets the project objectives and requirements and accurately characterize measurement parameters. It provides the protocol for collection of soil samples for laboratory analysis, measuring and controlling data, and documenting field and laboratory data so that the data are technically and legally defensible.

The SAP has two components: Part I – FSP; and Part II – QAPP. The FSP presents the detailed scope of work associated with field activities (e.g., sample types, sample locations, etc.) and specifies the procedures to be used for sampling and other field operations. The QAPP describes the analytical data quality objectives (DQOs), laboratory analytical procedures, quality assurance/quality control (QA/QC) procedures, and data quality evaluation criteria.

1.1 Project Background

LF-29 was used by the Army from the 1950s to 1975 for the disposal of spent munitions and construction debris. It is located near the North Base Building Area, approximately 450 ft northwest of Building 1001. LF-29 is defined by a small berm that extends 400 ft north-south and 350 ft east-west, accounting for approximately 4.28 acres. Some materials may also have been disposed of outside of this berm along the borders so a buffer zone extending 45 ft to the north and south and 35 ft to the east and west of the berm has been created and will be investigated. Including the buffer zone, the entire area of the LF-29 munitions response site (MRS) encompasses approximately 6 acres.

The site topography slopes gently to the southwest. Vegetation consists primarily of grasses, sagebrush, other bushes and small trees. The uppermost unit of groundwater is a shallow unconfined aquifer encountered at approximately 15 to 20 ft below ground surface (bgs).

Previous investigations at this site include a Preliminary Investigation and Site Assessment (PI/SA) conducted in 1983, followed by a Remedial Investigation (RI) Recommendations Report in 1992, a Decision Document in 1993 and a Supplemental RCRA Facility Investigation (SRFI) in 2006. There is a network of four monitoring wells in-place around the landfill, with three wells located in the assumed downgradient and one in the upgradient locations with respect to the landfill. No explosives have been detected from groundwater sampling (HGL, 2007).

During a site reconnaissance for the SRFI project, some munitions debris (MD) discovered on the ground surface was tentatively identified as biological warfare bomblets. A removal of approximately 171 pieces of surface MD was performed under command of 110th Technical Escort (TE) in June 2007. According to the Explosive Ordnance Incident Report prepared by the 110th TE, the MD was identified as E61R4 Biological warfare bomblets. TE's research indicated that these items were used for fuze testing and the likely filler was water or water/simulant slurry. Soil samples were tested for the presence of biological warfare material and were confirmed as having no biological agent present (TE, 2007).

Presently, plastic basins containing the E61R4 submunitions, M125 chemical bombs and various items that appear to be MD are on the surface of the site. Some M125s appear to be intact while others appear to have been detonated. A full up live M125 contains 2.6 pounds (lbs) of nerve agent Sarin (GB).

Practice versions may be empty or contain simulant filler such as anti-freeze. It is unknown if the intact bombs at LF-29 contain a filler of any nature and there is no record of the evaluation of such. However, it is doubtful that ordnance with live explosives or live chemical agents would be left in an unsecured area. Nevertheless, these M125s will be treated as MEC before certifying them as MD.

The amount and type of MEC buried within the landfill is unknown. The landfill was ostensibly used for disposal of "spent" munitions; therefore, the presence of buried MEC is possible, but not likely.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

A listing of key personnel involved in site activities and their primary responsibilities are provided in **Table 2-1** – refer to the project Work Plan for additional personnel not directly involved in the sampling and analysis associated with the MC component of the project.

Table 2-1: Project Personnel

Personnel	Project Title	QA/QC Responsibility	Affiliation	Phone / Email
Marty Wangensteen, PE, PG	Program Manager	Management of the munitions response program.	Bay West	(651) 291-3475 martyw@baywest.com
Brad Kulberg	QA/QC Manager	Developing, refining, and implementing the Bay West, Inc. Quality Management Plan and the Chemical QA/QC Plan.	Bay West	(651) 291-3444 bradk@baywest.com
Tim Salane, PE	Project Manager	Project Management. Responsible for planning and oversight of project.	Bay West	(651) 291-3470 tims@baywest.com
Peter Jacobs	Chemical Quality Control Officer	Ensuring that all chemistry-related objectives are attained.	Bay West	(507) 434-7764 peterj@baywest.com
To Be Determined	Field Quality Control Coordinator/ Sampler	Responsible for overseeing the implementation of QA/QC procedures on a daily basis.	Bay West	(651) 291-0456
Robert C. Hanisch	Laboratory Project Manger	Responsible for overseeing the laboratory performance on this project.	TestAmerica-Denver	(303) 736-0100
Karen Kuopalla	Laboratory QA Manager	Responsible for implementing laboratory quality system.	TestAmerica-Denver	(303) 736-0184

Program Manager: The Program Manager is responsible for overall management of the ERS Program. The Program Manager serves as the liaison between the TO management team and the Bay West executive team. The Program Manager is Martin Wangensteen, Professional Engineer (PE), Professional Geologist (PG), Bay West, Inc., 5 Empire Drive, St. Paul, Minnesota, 55103, (651) 291-3475, (651) 341-3265 [cell], (651) 291-0099 [fax], martyw@baywest.com [e-mail].

QA/QC Manager: The Bay West Corporate QA/QC Manager is responsible for developing, refining, and implementing the Bay West Quality Management Plan and the Chemical QA/QC Plan. The QA/QC Manager conducts QA performance audits, provides oversight of analytical QA/QC activities, and ensures that training of team members and subcontractors is properly conducted. The QA/QC Manager remains independent of project line management and ensures enforcement of quality corrective actions. The QA/QC Manager communicates with the PM to ensure corporate and project QA/QC compliance. The QA/QC Manager is Brad Kulberg, PE, Bay West, Inc., 5 Empire Drive, St. Paul, Minnesota, 55103, (651) 291-3444, (651) 775-7688 [cell], (651) 291-0099 [fax], bradk@baywest.com [e-mail].

Project Manager: The Project Manager has overall responsibility for completion of the project in accordance with contract and regulatory requirements. The Project Manager is responsible for planning and oversight of the project activities and acts as an interface between the field staff and corporate office. The Project Manager has ultimate responsibility for the implementation of the project tasks and the safety/ health of project workers. The Project Manager is responsible for development of work plans, field activities and implementing the Work Plan of the TO. The Project Manager is responsible for the preparation of submittals, coordination of schedules, cost tracking, and serves as the primary contact.

The Project Manager is Tim Salane, PE, Bay West, Inc., 5 Empire Drive, St. Paul, Minnesota, 55103, (651) 291-3470, (651) 341-3249 [cell], (651) 291-0099 [fax], tims@baywest.com [e-mail].

Chemical Quality Control Officer (CQCO): The CQCO is responsible for overseeing the performance of off-site analyses and QA/QC in accordance with the FSP/QAPP contained in the SAP. These responsibilities include work plan preparation, data validation and final project reports. The CQCO is responsible for verifying proper sample containers, shipment methods, complete chain-of-custody (COC) paperwork, and laboratory reports including the analytical sample results. The CQCO is Peter Jacobs, Bay West, Inc., 5 Empire Drive, St. Paul, Minnesota, 55103, (507) 434-7764, (612) 710-0543 [cell], (651) 291-0099 [fax], peterj@baywest.com [e-mail].

Field Quality Control Coordinator (FQCC)/Environmental Sampler: The Environmental Sampler will be responsible for overseeing quality control in the field and perform all soil sampling, compositing, packaging and shipping in accordance with (IAW) the project plans and the SAP. The FQCC/Environmental Sampler is a yet to be determined Bay West employee.

Laboratory Project Manager: The Laboratory Project Manager is responsible for overseeing the performance of the off-site analysis and QA/QC in accordance with the SAP. Duties also include verifying proper sample containers, shipment methods, complete COC paperwork, and laboratory reports including the analytical sample results. The laboratory project manager is Robert C. Hanisch, TestAmerica–Denver, 4955 Yarrow Street, Arvada, CO 80002, (303) 736-0100.

Laboratory Quality Assurance (QA) Manager: The Laboratory QA Manager is responsible for establishing, implementing, maintaining, and documenting a quality system to meet the requirements of state and federal regulatory programs which deal with the analysis of environmental samples. The QA Manager is responsible for the communication of project-specific QA requirements into the laboratory and for the verification that sample analyses were performed IAW the SAP. The laboratory QA Manager is Karen Kuopalla, TestAmerica–Denver, 4955 Yarrow Street, Arvada, CO 80002, (303) 736-0184.

2.1 Scope and Objectives

The primary goal of the MEC removal action is to eliminate the risks posed by potential MEC at LF-29 The MEC removal action will address MEC hazards (including both Unexploded Ordnance [UXO] and Discarded Military Munitions [DMM]), as well as MC). Based on the SRFI and subsequent discussions with the USACE and Holloman AFB, Bay West understands that evaluation of media will be limited to soil. Based on the results of the SRFI, MC delineation is not anticipated to be necessary. The SAP is limited to field and laboratory procedures associated with the MC component of the MEC removal action. The objective of soil sampling on during this field effort is to determine if MC has been released from an in-place MEC item or from project disposal activities. When results of soil analysis are available they will be reported to Holloman AFB Environmental Restoration Section along with a request for a determination if any further action is necessary.

Per USACE program guidance in Engineer Manual 1110-1-4009, Bay West will collect soil samples for all items requiring management/disposal as MEC. Bay West will also sample stained soil, which is suspected to contain MC; this stained soil will also be analyzed for Total Petroleum Hydrocarbons (TPH). Although the number of anomalies, and therefore the number of samples, is unknown, it is estimated that 25 soil samples will be collected, including one sample at each detonation location, background, and QC samples. Groundwater and surface water sampling are not within the scope of this project.

3.0 SAMPLING FIELD ACTIVITIES

3.1 Soil Sampling for Metals and Explosives

Bay West will collect soil samples at all locations where MEC or stained soils are encountered as well as collecting pre-detonation and post-detonation samples when disposal of MEC by detonation is necessary. MEC includes DMM, pieces of high explosive and UXO. **Table 3-1** outlines the reasons and locations from which soil samples will be collected. IAW the Military Munitions Center of Expertise Technical Update entitled *Munitions Constituent Sampling* (March 2005), the sample depth will be 0-6 inches bgs for any surficial MEC.

Table 3-1: MC Sampling Protocol

Reason For Sample	Location of Sample	Time of Sample
MEC will be detonated in place	As close to the item as safely possible	Before detonation
MEC will be moved for consolidated disposal shot	Footprint of item	After removal of item
Consolidated disposal shot	Planned location of the consolidated shot	Before-Detonation
Post Detonation	Within resultant crater	After-Detonation*
Stained Soil	Within the stain	Any time feasible

** If a location is to be used multiple times the post-detonation sample need be collected only after the final use.*

All soil samples will be biased discrete soil samples. Although more recent guidance entitled *Protocols for Collection of Surface Soil Samples at Military Training and Testing Ranges for the Characterization of Energetic Munitions Constituents* (Economic Research and Development Center [ERDC]/ Cold Regions Research and Engineering Laboratory [CRREL] TR-07-10) generally recommends the use of a multi-increment sampling strategy with a systematic random (random grid) sampling design to obtain a sample or replicate samples of approximately one kilogram of mass. This method is not considered feasible due to the likelihood of MC being concentrated directly beneath the MEC and within the detonation crater.

UXO avoidance support will be provided during soil sampling. A discrete soil sample (grab sample) will be collected using a decontaminated stainless steel scoop or spoon and packed directly into glass jars. Stones and woody material will be removed. Samplers will use dedicated sampling gloves for each sample.

IAW Engineer Manual 1110-1-4009, "Military Munitions Response Actions", the soil samples will be analyzed for Resource Conservation and Recovery Act (RCRA) metals using U.S. Environmental Protection Agency (EPA) Methods 6010B, and total explosives using EPA Method 8330B. Stained soil will also be analyzed for TPH using EPA Method 4030. Analysis for RCRA metals will be based on the metal content of the MEC, if the metal content can be ascertained by the study of munitions technical data. If the metal content is unknown the samples will be analyzed for the full suite. Because some missile components contain mercury, it may be included in the analysis. The basis for this decision is a munition known to contain mercury or encountering a substance which appears to be mercury. QA/QC samples will also be collected and analyzed for the same constituents, with the actual number determined according to the frequencies presented in the following section.

The sample containers will be labeled with the appropriate markings. Sample containers and hold times are summarized in **Table 3-2**.

Table 3-2: Sample Containers, Preservation And Hold Times - Soil

Analysis	Matrix	Analytical Methods	Container type* and Preservation	Holding Time (Days)
RCRA Metals	Soil	EPA Method 6010B	4-oz glass jar, ice to 4°C	180 days (including digestion and analysis)
Explosives	Soil	EPA Method 8330B	4-oz glass jar, ice to 4°C	14 days to extraction, then 40 days from extraction to analysis
TPH	Soil	EPA Method 4030	As supplied with test kit	Per test kit instructions

Note: RCRA metals and explosives, as well as any MS/MSD volume required can be taken from one 4-oz jar due to the small sample volume required for analysis.

3.2 Field Quality Assurance/Quality Control Sample Collection Summary

Field duplicates will be collected for each method at a rate of at least 10% of the collected samples. The locations for the field duplicates will be randomly selected in the field. Duplicates will be taken as splits of field samples. Blind duplicates will be submitted to the laboratory as field QC samples. The samples will be uniquely identified, as detailed in Section 5.2 of the FSP. Relative Percent Differences (RPDs) will be calculated for the duplicates.

Additional sample volume for matrix spike/matrix spike duplicates (MS/MSDs) will also be collected at a rate of 1 per 20 samples.

QA/QC sample frequencies are summarized in **Table 3-3**, with the actual number to be based on the results of the anomaly identification:

Table 3-3: Quality Control Samples

SOIL SAMPLES		
QC Sample	**Frequency**	**Subtotal assuming 22 soil samples**
Blind Field Duplicate	1 per 10 samples	2
Matrix Spike and Matrix Spike Duplicate	1 per 20 samples	1
	Totals	**3**

Note: MS/MSD can be taken from the same volume of soil sample for metals and explosives, but are listed as separate analytical samples

3.3 Analytical Summary

Soil, samples will be analyzed for total metals using SW-846 Method 6010B for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Explosives will be analyzed by SW-846 Method 8330B. TPH will be analyzed by Method 4030.

3.4 Decontamination Procedures

The objectives of decontamination are to prevent the introduction of contaminants into samples from sampling equipment or other samples. Any non-dedicated or non-disposable sampling equipment that comes in contact with soil will be decontaminated before and after each use. An *Alconox* solution (mild detergent) and clean rinse will be used for decontamination. Analyte-free water will be used as a final rinse. Chemical rinses such as solvents or acids are not considered necessary, based on historical sampling results that indicate low to non-detect concentrations of target analytes.

4.0 SAMPLE DOCUMENTATION/CHAIN-OF-CUSTODY

4.1 Field Logbook

Hard-cover bound field logbooks with sequentially numbered pages will be used to document field investigation activities. The logbooks will contain the actual field data or references to other field documents that contain a specific description of every activity that has occurred in the field on any given day. All entries into the logbook will be signed and dated. In general, all documents will be completed in ink. Errors will be corrected by crossing out with a single line and then dating and initialing the correction. The use of correction fluid will not be permissible. The following is a partial list of the types of information to be recorded:

- Date and time of entry;
- Names of personnel on-site;
- Number of samples taken;
- Sample collection method;
- Description of all sampling points (field screening and clearance sampling);
- Date and time of collection;
- Sample identification numbers;
- Sample start and finish time;
- Photograph references and site sketches;
- Summary of field task related to sampling;
- Decontamination procedures;
- Records of telephone conversations;
- Calibration of equipment used; and
- Field corrective actions taken.

4.2 Sample Numbering System

A unique sample numbering system will identify each sample. Field sampling personnel will properly identify all samples taken in the field with an adhesive sample label attached to the sample container. The sample label will contain the site name, field identification number, date, time, and location of the sample collection, and identification of preservatives used. The labels will be placed on the bottles so as not to obscure any data. Sample information will be legibly printed with waterproof ink. The sample identification numbers will be used on all field sheets, COC forms, and all other documentation records. An example of the sample identification scheme is:

Project Code	-Year	- Month	- Type	- Sample No.	- Depth
Holloman -	08	- 11	- S	- 001	- 0-2"

Project Code:	Holloman (HAFB is not used to preclude confusion with other projects)
Year:	08 for 2008
Month:	12 for December, 1 for January
Type:	S for soil.
Sample No:	001 - The number characters will signify the overall project sequential number and will be identified as 001 for the first sample, 002 for the second sample and so on.
Depth:	0-6" – zero to six inches'

Sampling locations (including depth of sample) will be recorded in the logbook.

Duplicate and quality control samples will be numbered in the same sequence. In this manner, they will be unidentifiable to the laboratory. The location of all samples and numbers of all duplicates will be listed in the field logbook.

4.3 Chain-of-Custody (COC) Documentation

The sample custody procedures will be implemented in accordance with Engineer Manual (EM) 200-1-3. Sample custody will be managed from time of collection through analysis and through final sample disposition. Any inconsistencies and/or problems will be reported to the contracting officer's representative (COR). This custody is in three parts: (1) sample collection; (2) laboratory analysis; and (3) final evidence files. Final evidence files, including all originals of laboratory reports, are maintained under document control in a secure area.

A sample or evidence file is under your custody if it meets any of the following criteria:

- It is in your possession;
- It is in your view, after being in your possession;
- It is in your possession and you place it in a secured location; and
- It is in a designated secured area.

The sample packaging and shipment procedures summarized below ensure that the samples arrive at the laboratory with the COC form. A sample COC form is included in Attachment 1.

Field Procedures

a. The field sampler will be personally responsible for care and custody of the samples until they are transferred or properly dispatched.

b. All samples will be labeled with sample identification numbers and locations.

c. Sample labels will be completed for each sample using waterproof ink.

Transfer of Custody and Shipment Procedures

a. Samples will be accompanied by a properly completed COC form. The sample numbers and locations will be listed on the COC form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record will document transfer of custody of samples from the sampler to another person, to the laboratory, to a delivery service, or to/from a secured storage area.

b. Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis with a separate signed COC enclosed in each sample box or cooler. Shipping containers will be sealed and secured with strapping tape and custody seals for shipment. The preferred procedure will include the use of a custody seal attached to the front right and back left of the container. The custody seals will be covered with clear plastic tape and the container strapped shut with strapping tape in at least two locations.

c. All shipments will be accompanied by the COC record identifying the contents. The original record will accompany the shipment, and a carbon copy will be retained by the sampler for return to the home office.

d. If the samples will be sent by common carrier, a bill of lading will be used. Bill of lading receipts will be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the COC form if it is sealed inside the sample container and the custody seal is intact.

5.0 SAMPLE PACKAGING AND SHIPPING

Samples will be shipped in metal or plastic-composite equivalent strength, ice chests, or coolers. Coolers without drain plugs are used. New, clean, heavy-duty garbage-type bags will be used as protective liners inside the coolers. Each container will be wrapped with "bubble wrap" or placed in foam sample holders and placed in a Ziploc®-type bag with the label side facing outward so the label is easy to read. The seal on the Ziploc®-type bag will be closed and the bag and container placed in a cooler.

To prepare the cooler for shipment, inert, absorbent, and cushioning material, such as vermiculite or Styrofoam, will be placed on the bottom of the cooler. Containers will be placed upright in the cooler so they do not touch. Additional inert packing material shall be put in the cooler to partially cover the sample bottles. Any remaining voids will be filled with inert packing material.

Completed COC forms will be placed in a plastic bag and taped to the inside lid of the cooler. "This Side Up" and "Fragile" labels should be placed on at least two sides of each cooler.

Sample Shipment

Samples will be shipped (for overnight delivery) on the day of collection. All samples will be shipped overnight by a cargo-only freight service. Samples will not be shipped by commercial passenger surface or air carriers. An airbill will be completed for each cooler with the airbill number recorded in the field logbook for each set of samples shipped to the analytical laboratory. Bay West will use United Parcel Service (UPS), or equivalent, to ship samples.

All samples for off-site analysis will be shipped to:

TestAmerica - Denver
4955 Yarrow Street
Arvada, CO 80002
Phone: 303-736-0100

6.0 INVESTIGATION DERIVED WASTE

Investigation Derived Waste (IDW) will be disposed of in accordance with the 1991 document "Management of Investigation Derived Wastes," EPA 540-G-91-009, and in compliance with all applicable local and Federal requirements. Because of the shallow depth of sampling, a small volume of IDW is expected, and the option to implement the remedial action (RA) recommended in the RI/Feasibility Study (FS) and Decision Documents under this TO, IDW generated during sampling will be left at or in the location from which it originated.

7.0 CONTRACTOR CHEMICAL QUALITY CONTROL

Bay West has identified two distinct activities for QC under this project:

- Field measurements/sample collection and;
- Sample analysis.

Bay West's Quality Control methods will accomplish the following:

- Produce quality data on time and in compliance with the contract;
- Establish a QC program that is appropriate for the anticipated sampling; and
- Produce and maintain acceptable records of quality control activities associated with data collection.

These QC requirements will be implemented using the three phases of control. Preparatory phase control will be used to establish quality prior to mobilization and commencement of investigative activities. Initial phase control will verify that all necessary procedures have been instituted to ensure the data will be in conformance with the DQOs outlined in the QAPP. Follow-up phase control will include daily checks and documentation of contract requirements to ensure that quality data will be produced throughout the duration of this project.

7.1 Preparatory Phase

This phase will include the preparation of all preliminary documents relating to the soil sample collection and analysis. These documents include the Work Plan, FSP, and the QAPP, both of which have been combined in the SAP. Preparation of the SAP ensures that Bay West will be cognizant of all requirements associated with data quality and project objectives. The SAP will also serve as a reference for all field personnel and will ensure that the proper information is available to all individuals engaging in the soil sample collection and analysis activities. The following activities will be performed during the preparatory phase:

- Obtain approval for all pre-work submittals;
- Perform a physical check of materials and equipment on site and compare against the project requirements; and
- Perform safety checks on all pieces of equipment to be used at the site prior to usage.

7.2 Initial Phase

The initial phase will begin following mobilization and prior to collecting the first sample. The following activities will be performed during the initial phase:

- Review the selected sample locations;
- Preparation of supplies necessary to collect, package and ship all samples; and
- Coordination with the off-site laboratory for analysis as necessary.

7.3 Follow-up Phase

The follow-up phase will include the time period during which all sampling activities are on-going and consist of the following items:

- Coordination with the laboratories to identify any problems or deficiencies regarding sample collection, packaging, shipping or analysis;
- Completion of field logbook;
- Completion of Daily Construction Quality Control Report (DCQCR); and
- Preparation of the final report.

8.0 DAILY QUALITY CONTROL REPORTS

In addition to the field logbook, sampling and equipment data will be documented daily in the form of Daily Quality Control Reports (DQCR). The environmental sampler will complete the DCQCR. Items to be documented include the following:

- Sampling date(s);
- Name of sampling personnel involved in sampling procedures that day;
- Weather: Listing approximate temperature in degrees centigrade (°C); approximate percentage of cloud cover (<25%, 25-75%, >75%); approximate inches of rain in past 24 hours (if applicable); and wind velocity (low, medium, high);
- Number of samples taken during the day;
- Field instruments used;
- Identification number of the field instruments used;
- Date of last calibration;
- Equipment calibrated and functioning correctly? (yes or no);
- On-site sampler signature and date; and
- Copy of field logbook notes shall be attached daily to the DQCR.

9.0 CORRECTIVE ACTIONS

An important part of a quality assurance program is a well-defined, effective policy for correcting problems. Corrective actions will be taken when results appear questionable, or when limits of acceptability are exceeded. These "quality problems" will require on-the-spot immediate or long-term corrective action.

Immediate Corrective Action

Instrument and equipment malfunctions are most amenable to this type of action. If a corrective action can be taken at this point as part of normal operating procedures, the collection of poor quality data can be avoided. Immediate corrective action for a quality problem in the field generally will involve a telephone call to appropriate management personnel (i.e., Project Manager) to approve suggested corrective action. Documentation of the corrective action will be made in the logbook.

Long-Term Corrective Action

The need for this action will be identified by standard QC procedures, performance or system audits, or the employee performing the work. Any quality problem that cannot be solved by immediate corrective action will fall into the long-term category. Long-term corrective action for a quality problem will require completing a Corrective Action Request (CAR) form, which the Project Manager will have overall responsibility for implementing and following through. The Project Manager, through the QA staff, will receive all corrective action requests and will approve all corrective actions taken.

The following are essential steps in the corrective action system:

- Identify and define the problem;
- Assign responsibility for investigating the problem;
- Investigate and determine the cause of the problem;
- Implement the corrective action;
- Verify the corrective action has eliminated the problem, and;
- Document the problem identified, the corrective action taken, its effectiveness in eliminating the problem, and any other activities to be implemented to prevent recurrence of the problem.

10.0 PROJECT SCHEDULE

The proposed schedule relating to chemical data acquisition activities is included in the project Work Plan.

11.0 SAMPLE APPARATUS AND FIELD INSTRUMENTATION

The following field supplies will be required to complete the sampling requirements detailed in this document:

Sampling Supplies

- 1-quart self-sealing Ziploc®-type baggies
- Stainless-steel scoop or spoon
- Sample containers
- Aluminum foil
- Coolers
- Tape (acetate and strapping)
- Custody seals
- COC forms
- Sample labels
- "This Side Up" labels
- "Fragile" labels
- Shipping airbills
- Field logbooks

Personal Protective Equipment

- Gloves (nitrile, disposable)
- Hard hats
- Steel-toed boots
- Safety glasses

Other Equipment/Forms

- DCQCR Form (field screening)
- CAR form

12.0 REFERENCES

HydroGeoLogic, Inc.(HGL, 2007), Supplemental RCRA Facility Investigation, LF-10 (SWMUS 101 And 109) and LF-29 (SWMU 104), Holloman Air Force Base, Alamogordo, New Mexico, 2007.

Cold Regions Research and Engineering Laboratory/U.S. Army Engineer Research and Development Center, Protocols for Collection of Surface Soil Samples at Military Training and Testing Ranges for the Characterization of Energetic Munitions Constituents, ERDC/CRREL TR-07-10, July 2007.

Military Munitions Center of Expertise, *Technical Update, Munitions Constituent Sampling*, March 2005.

USACE, Engineer Manual 1110-1-4009, Military Munitions Response Actions, June 15, 2007

110th Technical Escort Unit Explosive Ordnance Incident Report number 110-002-07 (TE, 2007).

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Attachment 1
Field Sampling Plan
Laboratory Chain-of-Custody Form

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estAmerica Chicago
17 Bond Street
niversity Park, IL 60466
one 708.534.5200 fax 708.534.5363

Chain .. Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager:	Site Contact:	Date:	COC No:
ay West	Tel/Fax:	Lab Contact:	Carrier:	_____ of _____ COCs
Empire Drive	Analysis Turnaround Time			Job No. BW
aint Paul, Minnesota	Calendar (C) or Work Days (W) _____			
51) 291-0456 Phone	TAT if different from Below _____			
51) 291-0099 FAX	☐ 2 weeks			SDG No.
roject Name:	☐ 1 week			
te:	☐ 2 days			
O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample																	Sample Specific Notes:

eservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

ssible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

ecial Instructions/QC Requirements & Comments:

linquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
linquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
linquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

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SAMPLING AND ANALYSIS PLAN

PART II

Quality Assurance Project Plan

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Sampling and Analysis Plan
Part II
Quality Assurance Project Plan (QAPP)

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ACRONYMS AND ABBREVIATIONS

ARAR ..... Applicable or Relevant & Appropriate Requirement
Bay West... Bay West, Inc.
CCV ..... Continuing Calibration Verification
CFR ..... Code of Federal Regulations
CERCLA.... Comprehensive Environmental Response, Compensation, and Liability Act
COC ..... Chain-of-Custody
COE ..... Corps of Engineers
CQCO ..... Chemical Quality Control Officer
CRREL ..... Cold Regions Research and Engineering Laboratory
DCQCR ..... Daily Chemical Quality Control Report
DMM ..... Discarded Military Munitions
DoD ..... Department of Defense
DQO ..... Data Quality Objective
EDD ..... Electronic Data Deliverable
EM ..... Engineer Manual
EPA ..... United States Environmental Protection Agency
ERIS ..... Environmental Restoration Information System
ERS ..... Environmental Remediation Service
FQCC ..... Field Quality Control Coordinator
FSP ..... Field Sampling Plan
ICAL ..... Initial Calibration
ICV ..... Second Source Initial Calibration Verification
ICS ..... Interference Check Sample
ID ..... Identification
IDL ..... Instrument Detection Limit
IS ..... Internal Standard
LCS ..... Laboratory Control Sample
LCSD ..... Laboratory Control Sample Duplicate
LF-29 ..... Landfill 29
LIMS ..... Laboratory Information Management Systems
LRB ..... Laboratory Reagent Blank
MB ..... Method Blank
MC ..... Munitions Constituents
MD ..... Munitions Debris
MDL ..... Method Detection Limit
MEC ..... Munitions and Explosives of Concern
MQL ..... Method Quantification Limit
MRS ..... Munitions Response Site
MS ..... Matrix Spike
MSD ..... Matrix Spike Duplicate
NELAC ..... National Environmental Laboratory Accreditation Conference
NFG ..... National Functional Guideline
NIST ..... National Institute of Standards and Technology
NMED ..... New Mexico Environment Department
PG ..... Professional Geologist
PE ..... Performance Evaluation
PE ..... Professional Engineer
%RSD ..... Relative Standard Deviation
PETN ..... Pentaerythritol Tetranitrate
PRG ..... Preliminary Remediation Goal
PQL ..... Practical Quantitation Limit
QA ..... Quality Assurance
QAPP ..... Quality Assurance Project Plan
QAM ..... Quality Assurance Manual
QC ..... Quality Control
QSM ..... Quality Systems Manual
RF ..... Response Factor
RL ..... Reporting Limit
RPD ..... Relative Percent Difference
SAP ..... Sampling and Analysis Plan
SARM ..... Standard Analytical Reference Materials
SOP ..... Standard Operating Procedure
SWMU ..... Solid Waste Management Unit
TestAmerica ..... TestAmerica, Inc. of Chicago, Illinois
TO ..... Task Order
USACE ..... United States Army Corps of Engineers
UXO ..... Unexploded Ordnance

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1.0 PROJECT DESCRIPTION

This Quality Assurance Project Plan (QAPP), Part II of the Sampling and Analysis Plan (SAP), has been prepared by Bay West, Inc. (Bay West) in accordance with the content and format presented in *Guidance for Conducting Remedial Investigations and Feasibility Studies Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)* (United States Environmental Protection Agency [EPA], 1998a), *EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5* (EPA, 1998b), and *Requirements for the Preparation of Sampling and Analysis Plans, Engineer Manual (EM) 200-1-3* (United States Army Corps of Engineers [USACE], 2001). This QAPP defines the general procedures that will be observed in any sample collection and analysis as part of a Munitions and Explosives of Concern Removal at the munitions response sites (MRS) known as Landfill 29 (LF-29) and also known as Solid Waste Management Unit (SWMU) 104. (**Figure 1-1** in **Appendix A**). This work is being performed under Environmental Remediation Services (ERS) Contract No. W9128F-04-D-0004, Task Order (TO) 0043. The specific details for sampling procedures are outlined in the Field Sampling Plan (FSP). This QAPP contains necessary technical detail and directions such that laboratory personnel understand all project sample analysis, quality control, and data reporting requirements. This will include detailed descriptions of analytical methods for various analyses, method required detection limits, and method required quality control (QC) requirements, data validation, and reporting requirements.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

Bay West will use TestAmerica, Inc., of Chicago, Illinois (TestAmerica), to provide the offsite analytical services required for this project. TestAmerica has developed a Quality Assurance Manual (QAM) to ensure that the clients receive high-quality analytical and environmental services that are timely, reliable, and meet the intended purpose in a cost-effective manner. TestAmerica's QAM (Document No. UP-QA_QAM, Rev.0) Table of Contents is included in Attachment 1.

A quality assurance (QA)/QC program has been designed by Bay West to ensure that appropriate QA/QC procedures will be implemented during all stages of the project. The key QA/QC personnel and other key project staff are summarized in **Table 2-1:** Project Personnel. Refer to the project Work Plan for additional personnel not directly involved in the sampling and analysis associated with the munitions constituents (MC) component of the project.

Table 2-1: Project Personnel

Personnel	Project Title	QA/QC Responsibility	Affiliation	Phone / Email
Marty Wangensteen, PE, PG	Program Manager	Management of the munitions response program.	Bay West	(651) 291-3475 martyw@baywest.com
Brad Kulberg	QA/QC Manager	Developing, refining, and implementing the Bay West Quality Management Plan and the Chemical QA/QC Plan.	Bay West	(651) 291-3444 bradk@baywest.com
Tim Salane, PE	Project Manager	Project Management. Responsible for planning and oversight of project.	Bay West	(651) 291-3470 tims@baywest.com
Peter Jacobs	Chemical Quality Control Officer	Ensuring that all chemistry-related objectives are attained.	Bay West	(507) 434-7764 peterj@baywest.com
To Be Determined	Field Quality Control Coordinator/ Sampler	Responsible for overseeing the implementation of QA/QC procedures on a daily basis.	Bay West	(651) 291-0456
Robert C. Hanisch	Laboratory Project Manger	Responsible for overseeing the laboratory performance on this project.	TestAmerica-Denver	(303) 736-0100
Karen Kuopalla	Laboratory QA Manager	Responsible for implementing laboratory quality system.	TestAmerica-Denver	(303) 736-0184

PE – Professional Engineer *PG – Professional Geologist*

The Field Quality Control Coordinator (FQCC) will oversee the implementation of QA/QC procedures on a daily basis and will coordinate with the Chemical Quality Control Officer (CQCO) to identify and resolve any issues potentially affecting the quality of chemical data and to ensure the data quality objectives of this project are met. In the event that the FQCC or CQCO cannot resolve an issue, the CQCO will report to the Project Manager. Additional information on roles and responsibilities is presented in Section 2.0 of the FSP.

2.1 Chemical Quality Control Officer

Responsibilities of the CQCO and support staff will include, but not be limited to, the following:

- Ensuring compliance with specified data quality objectives (DQOs);
- Maintaining QA management of laboratory chemical data;

- Providing guidance and direction to the FQCC;
- Initiating, reviewing, and following up on corrective actions, as necessary; and
- Consulting with the Program Manager as necessary on appropriate QC measures and corrective actions.

2.2 Field Quality Control Coordinator

Responsibilities of the FQCC will include, but not be limited to, the following:

- Consulting with the CQCO, as necessary, on appropriate QC measures and corrective actions;
- Serving as sample custodian;
- Initiating and following up on corrective actions; and
- Completing Daily Chemical Quality Control Reports (DCQCRs).

3.0 QUALITY ASSURANCE OBJECTIVES

The QA objectives for this project are based on a common understanding of the intended use of the data, available laboratory procedures, and available resources.

3.1 Data Quality Objectives

The DQO process is detailed in the EPA document *Guidance on Systematic Planning Using the Data Quality Objectives Process - EPA QA/G-4, EPA/240/B-06/001, February, 2006* (EPA, 2006), which replaced the previous EPA QA/G-4 document EPA/600/R-96/055. The DQO process is used to establish performance or acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of a study. The process steps for the MC sampling component of the project are outlined as follows, and summarized in the following paragraphs:

1. State the Problem;
2. Identify the Goal of the Study;
3. Identify the Information Inputs;
4. Define the Boundaries of the Study;
5. Develop the Analytic Approach;
6. Specify Performance or Acceptance Criteria; and
7. Develop the Plan for Obtaining Data.

Problem Statement: The problem is the possible presence of munitions and explosives of concern (MEC) at LF-29. The Scope of Work for this project calls for the removal of MEC and MD. Specifically regarding MC, there is potential for MC such as metals and explosives to be present in the soil at levels which could pose a risk to human health or the environment. Primary members of the planning team include the Project Manager, the Holloman Air Force base Environmental Flight, CQCO, and the Omaha District Corps of Engineers (COE). Other Stakeholders include the New Mexico Environment Department (NMED), Holloman Air Force Base personnel, and the interested public. Field work and approval of the analytical data forLF-29 is tentatively scheduled to take place between October 2008 and March 2009.

Goal of the Removal Action: The primary goal of the MEC removal is to remove MEC and Munitions Debris (MD) from LF-29. With regard to MC, the objective is to ascertain whether existing MEC recovered or the disposal of MEC has resulted in contamination of soils.

Information Inputs: Information to address the problem will consist of defensible analytical data of MC concentrations in samples collected during the MEC removal, and associated spatial data on where the samples were collected. Additional information will include guidance on sampling and analytical methods, as detailed or incorporated by reference in the FSP and QAPP, respectively.

Boundaries of the Removal Action: The special boundaries of the MEC removal are the bermed area of LF-29 and a buffer zone as depicted in **Figure 1-2** in **Appendix A**.

The Analytic Approach: Determination of MC levels in soil will be based on discrete soil samples. Pre-detonation samples will be located as near to the identified MEC to be detonated as is safe and feasible. Post-detonation samples will be discrete samples. It is not considered feasible at this site to use a multi-increment sampling strategy with a systematic random (random grid) sampling design to obtain a sample or replicate samples of approximately one kilogram of mass. This is due to the discrete locations of MEC and the probable concentration of MC within the detonation crater in the case of post blast samples.

Performance or Acceptance Criteria: MC sampling results need to be assessed to determine if the field sampling is representative of the actual conditions and if the laboratory results are accurate representations of the concentrations of MC in the samples. Acceptance criteria for field sampling will be based on field duplicate relative percent differences (RPDs). Acceptance criteria for analytical methods

will be as prescribed in the SW-846 methods and consistent with the Department of Defense (DoD) Quality Systems Manual (QSM). If the criteria are met, then the concentrations can be compared to the action levels.

Plan for Obtaining Data: As summarized in the above steps, discrete soil sampling will be conducted at the locations of MEC. Referenced sampling methods and standard analytical methods will be used to achieve the QA objectives for chemical data measurement as detailed in the following section. Soil sampling results will be compared to preliminary action levels to characterize the nature and extent of the risks posed by LF-29 to human health and the environment; and to evaluate potential remedial action alternatives.

3.2 QA Objectives for Chemical Data Measurement

Precision: Precision is a measurement of mutual agreement (or variability) among individual measurements of the same property, usually under prescribed similar conditions. The following equation will be used to evaluate the precision:

$$RPD = \frac{S - D}{(S+D)/2} \times 100$$

RPD = Relative Percent Difference
S = first sample value
D = second sample value

Possible QC samples indicative of precision are listed in **Table 3-1**:

Table 3-1: QC Sample Types for Precision

QC Sample Type	Components of Variability Captured (applicable to field and fixed laboratory processes)
Instrument replicate	Instrument response
Laboratory QC sample duplicates (MS/MSD, LCS/LCSD)	Instrument response, sub-sampling and sample prep, spiking technique, plus laboratory homogenization
Laboratory split or (laboratory sample duplicate analysis)	Instrument response, sub-sampling and sample prep, plus laboratory homogenization
Field split or Replicate	Instrument response, sub-sampling and sample prep, laboratory homogenization, plus sample handling and field homogenization
Co-located samples or (field duplicate samples)	Instrument response, sub-sampling and sample prep, laboratory homogenization, plus sample handling, plus field sample acquisition and small scale spatial variability (site)

MS – Matrix Spike *MSD – Matrix Spike Duplicate*
LCS – Laboratory Control Sample *LCSD – Laboratory Control Sample Duplicate*

Precision is usually expressed in terms of the relative standard deviation or RPD, but can be expressed in terms of the variance, range, or other statistical parameters. For this project, precision will be measured as laboratory sample duplicate analysis and field sample replicate analysis.

Accuracy: Accuracy is a measure of the bias in a system or the degree of agreement of a measurement, X (or an average of measurements of the same parameter) with an accepted reference or true value, T. Accuracy is typically expressed as a percentage of the ratio of measurement and accepted value (X/T) 100. Accuracy will be measured using procedures prescribed in the analytical methods.

Possible QC samples indicative of accuracy are listed in **Table 3-2**.

Table 3-2: QC Sample Types for Accuracy

Sample Type	Accuracy/Bias Indicator For
Blank spike	Instrument contamination, calibration
MS	Instrument contamination, calibration, and effectiveness of sample prep
Reference Material Analysis or PE sample	Instrument contamination, calibration, and effectiveness of sample prep. Most representative of performance when the PE sample is of similar matrix
LCS	Instrument contamination, calibration, and effectiveness of sample prep on clean lab matrix
Surrogate standards	The role of surrogates is to mimic the behavior of target analytes and as such provides indications of instrument contamination, calibration, sample prep, matrix effects
Calibration blank	Instrument contamination, calibration
Preparation blank (method blank)	Instrument contamination, calibration, and laboratory contamination
Field blank (equipment/trip)	Instrument contamination, calibration, and laboratory/field/transport/storage contamination

PE – Performance Evaluation

Where applicable, recovery of Matrix Spike/Matrix Spike Duplicate (MS/MSD), Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD), surrogates, and laboratory method blanks will be used to measure accuracy and bias for this project.

Sensitivity: Sensitivity indicators of primary interest to environmental projects are those related to detection and quantification capabilities otherwise known as Method Detection Limits (MDLs) and Practical Quantitation Limits (PQLs), respectively. Sensitivity issues can play a critical role in achieving the DQOs. The method detection limits must be lower than the reporting limits (RLs) for each target compound.

MDLs and RLs for the target analytes are compared to selected regulatory limits in Attachment 2. These regulatory limits, including *NMED Soil Screening Levels* and *EPA Region IX Preliminary Remediation Goals (PRGs)* (EPA, 2004b) are considered to be Applicable or Relevant and Appropriate Requirements (ARARs) and were used as PRGs that may apply to the site. Both residential and non-residential values were used as PRGs. For purposes of the QAPP, these PRGs are used only to determine if the sensitivity requirements can be met using the analytical methods.

The selected analytical methods are commonly-used standard methods that represent current available technology, and are acceptable to both the NMED and the USACE.

Several analytical identifiers have been created to describe approximate sensitivity performance at a specified concentration level (**Table 3-3**).

The table below lists some commonly used sensitivity indicators.

Table 3-3: Commonly Used Sensitivity Indicators

Sensitivity Indicators	Numerical Definition	Definition	Common Use
IDL	Approximately 3 X background noise	Lowest level at which *instrument* can distinguish from zero	Provides basis for MDL estimate
MDL	MDL = t(value @.99) X std. dev. of 7 low-level replicates *(quantitation error +/-100%)*	Minimum conc. Of analyte that can be reported with 99% confidence that analyte conc. *is greater than zero*	Determines lowest quantifiable concentrations for a given method
PQL	PQL ~ 5X or 10X MDL (can also be refined with the low standard on the quantitation curve *(quantitation error +/- 30%)*	Lowest conc. of analyte that can be reliably measured within method specified limits of precision and accuracy	Provides numerical lower limit for critical data
MQL	MQL ~ 5X or 10X MDL, No lower than 3XMDL *(quantitation error +/- 30%)*	Lowest conc. of analyte that can be reliably measured within method specified limits of precision and accuracy	Provides numerical lower limit for critical data
RL	Laboratory defined (often; RL=PQL)	Lowest value reported by laboratory without a "J" flag	Lab basis for reporting data without flags

IDL – Instrument Detection Limit
MDL – Method Detection Limit
PQL – Practical Quantitation Limit
MQL – Method Quantitation Limit
RL – Reporting Limit

Completeness: Completeness is the amount of valid data, including QC sample data, obtained from a measurement system compared to the amount that was expected to be obtained under correct normal operations. It is usually expressed as a percentage. Completeness for usable data is defined as the percentage of the usable data out of the total amount of data generated. The goal for laboratory completeness is 90% and the goal for overall analytical completeness is 90%.

The following table summarizes the data quality indicators used for this project and their respective acceptance criteria, which are also presented in detail in Attachment 3. Poor analyte performers and sporadic marginal failures are acceptable, per the DoD QSM. The measurement quality objectives are presented in **Table 3-4.**

Table 3-4: Measurement Quality Objectives

	RCRA Metals by 6010		Explosives by 8330B	
QC Sample	Frequency	Acceptance Criteria	Frequency	Acceptance Criteria
Method Blank	1 per lab QC Batch	< ½ RL	1 per lab QC Batch	< ½ RL
LCS	1 per lab QC Batch	80-120% Rec	1 per lab QC Batch	Analyte-specific *
MS/MSD	1 MS/MSD pair per 20 field samples	80-120% Rec	1 MS/MSD pair per 20 field samples	Analyte-specific *
Surrogates	NR	NR	Every sample	80-130% Soils 54-158% Waters
Lab Sample Dup.	1 per lab QC Batch (preferably MSD, can be LCSD or sample duplicate)	<20% RPD	1 per lab QC Batch (preferably MSD, can be LCSD or sample duplicate)	<30% RPD Soils <20% RPD Waters
Blind Field Dup.	10% of field samples collected	<50% RPD	10% of field samples collected	<50% RPD

** Analyte-specific recovery limits are presented in Attachment 3.*

Representativeness: Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. The characteristics of representativeness are usually not quantifiable. Subjective factors to be taken into account are as follows:

- Degree of homogeneity of a site;
- Degree of homogeneity of a sample taken from one point in a site; and
- Available information on which a sampling plan is based.

Field duplicates are also used to assess representativeness. Two samples collected at the same location and at the same time are considered to be equally representative of this condition, at a given point in space and time. To maximize representativeness of results, sampling techniques, sample size, and sample location will be carefully chosen so they provide laboratory samples representative of the site and the specific area. For this project, it is expected that the chosen sampling design will reflect a high degree of representativeness. Samples exhibiting obvious non-homogeneity should not be used as replicates. Within the laboratory, precautions are taken to extract from the sample container an aliquot representative of the whole sample.

Comparability: Comparability expresses the confidence with which one data set can be compared to another data set measuring the same property. Comparability is ensured through the use of established and approved sample collection techniques and analytical methods, consistency in the basis of analysis, consistency in reporting units, and analysis of standard reference materials.

The use of standard methods to collect and analyze samples, along with instruments calibrated against Standard Analytical Reference Materials (SARM) which are National Institute of Standards and Technology (NIST)-traceable standards, will also ensure comparability.

Comparability also depends on the other data quality characteristics. Only when data are judged to be representative of the environmental conditions, and when precision and accuracy are known, can data sets be compared with the highest degree of confidence.

3.3 Laboratory QA/QC Samples

Analytical quality control is comprised of the QC procedures, checks, samples, and their respective acceptance limits that will be used during the project to monitor the quality of various aspects of the sampling events. Laboratory QC samples (e.g., method blanks and LCS) shall be included in the preparation batch with the field samples. An analytical batch is a number of samples (not to exceed 20 environmental samples plus the associated laboratory QC samples) that are similar in composition (matrix) and that are extracted at the same time and with the same lot of reagents. MSs and MSDs count as environmental samples. The identity of each analytical batch shall be clearly reported with the analyses so that a reviewer can identify the QC samples and the associated environmental samples. The QC procedures employed at TestAmerica are detailed in the laboratory's QAM. The reliability and credibility of the laboratory results will be corroborated by the inclusion of scheduled QA analyses. The type of QC and the scheduled QA analysis include the following:

Laboratory Control Sample (LCS)

The LCS is an analyte-free solid matrix, consisting of sand for explosives and Teflon strands (boiling grinds) for metals, spiked with all analytes listed in the QC acceptance criteria in the laboratory method standard operating procedure (SOP). If not otherwise specified, each analyte in the LCS shall be spiked at a level less than or equal to the midpoint of the calibration curve for each analyte. (The midpoint is defined as the median point in the curve, not the middle of the range). The LCS shall be carried through the complete sample preparation and analysis procedure.

The LCS is used to evaluate each analytical batch and to determine if the method is in control. The LCS cannot be used as the continuing calibration verification.

One LCS shall be included in every analytical batch. If more than one LCS is analyzed in an analytical batch, results from all LCSs analyzed shall be reported. A QC failure of an analyte in any of the LCSs shall require appropriate corrective action including qualification of the failed analyte in all of the samples as required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

A MS and MSD is an aliquot of an actual sample spiked with known concentrations of all analytes listed in the method and/or project-specific QC acceptance limits. The spiking occurs prior to sample preparation and analysis. If not otherwise specified, each analyte in the MS and MSD shall be spiked at a level less than or equal to the midpoint of the calibration curve for each analyte. The MS/MSD sample will be site-specific and designated on the chain-of-custody (COC) by Bay West field personnel. If an analytical batch is run without an MSD, then an LCSD or a sample duplicate will be run to assess precision. The MS/MSD results and any data qualifiers must be associated or related to samples that are collected from the same site. Therefore, if an MS/MSD causes qualification of the data, the laboratory may qualify all associated samples within the analytical batch. If appropriate, during data validation Bay West may further qualify any additional samples from the same batch or collected from the same site that were not included in the analytical batch, based on professional judgment.

The MS/MSD is used to document the accuracy/bias of a method due to the sample matrix associated with the project. MS/MSDs will be analyzed at a rate of 5% (one spike per 20 samples and one spike duplicate per 20 samples). The performance of the MS and MSD is evaluated against the method and project-specific QC acceptance limits and appropriate analytes (in all related samples) shall be qualified according to the data qualification criteria. The MS recoveries from samples that contain significant native background levels of the target analytes will be evaluated using the professional judgment of the Bay West CQCO for acceptance. Significant native background level is defined as an amount equal to or above that concentration which the laboratory spiked into the sample.

MS recoveries and RPDs will be computed and reported for all laboratory spike pairs along with any analyte- or matrix-specific control limits.

Surrogates

Surrogates are organic compounds that are similar to the target analyte(s) in chemical composition and behavior in the analytical process but that are not normally found in environmental samples. For the scope of work outlined herein, use of surrogates is limited to analysis of explosives by methods 8330B.

Method Blank

A method blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank shall be carried through the complete sample preparation and analytical procedure. The method blank is included in every analytical batch and is used to document contamination resulting from the analytical process.

The presence of analytes in a method blank at concentrations greater than one-half the RL indicates a need for corrective action per the DoD QSM. Corrective action shall be performed to eliminate the source of contamination prior to proceeding with analysis. After the source of contamination has been eliminated, all samples containing the analyte(s) found in the method blank >RL shall be re-prepared and reanalyzed. No analytical data shall be corrected for the presence of analytes in blanks. When an analyte is detected in the method blank and in the associated samples and corrective actions are not performed or are ineffective, the appropriate qualification flag shall be applied to the sample results.

Field Duplicates

A field duplicate sample is a second sample collected at the same location as the original sample. Duplicate samples are collected in immediate succession, using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis. The sample containers are assigned a unique identification number in the field by Bay West field staff.

Field duplicate sample RPD results shall be calculated and used to evaluate overall field and laboratory precision.

Evaluative Procedures

Evaluative procedures will be used to assess the overall measurement error and data usability. They also will serve to reconcile the data with the project DQOs. The evaluative procedures for the above analytical QC are detailed in Section 3.2 of the QAPP. The evaluative measurements to be employed include Precision, Accuracy, Sensitivity, Completeness, Representativeness, and Comparability.

4.0 SAMPLING LOCATIONS AND PROCEDURES

Sampling locations and procedures are defined in Sections 3.0 and 4.0 of the FSP. In general, the number of soil sampling locations will be based on the location of anomalies; therefore, the number and location of the sampling points is not known.

5.0 SAMPLE CUSTODY AND HOLDING TIME

The sample custody procedures are detailed in Section 5.0 of the FSP. Holding times for the individual analytes are summarized in **Table 5-1**.

Table 5-1: Holding Times

Analyte (Matrix)	Holding Time (Days)
RCRA metals by method 6010 (Soil and Water)	180 days (including digestion and analysis)
Explosives by Method 8330B, and (Soil)	14 days to extraction, then 40 days from extraction to analysis
TPH by immunoassay (Method 4030)	Per test kit instructions

6.0 ANALYTICAL PROCEDURES

The analytical procedures for preservation and sample volume requirements are summarized in **Table 6-1.**

Table 6-1: Sample Preservation and Volume Requirements

Analysis	Matrix	Analytical Methods	Container type* and Preservation
RCRA Metals,	Soil	EPA Method 6010B	4-oz plastic jar; ice to 4°C
Explosives (including PETN, nitroglycerin and 3,5-Dinitroanaline	Soil	EPA Methods 8330B	4-oz glass jar, ice to 4°C

**typical container for this analysis – other containers may be used*
Samples for metals are not required to be cooled with ice according to Chapter 3 of SW846.

TestAmericaChicago's analytical National Environmental Laboratory Accreditation Conference (NELAC) accreditation and self-declaration for the DoD QSM are included in Attachment 4. The explosives Method 8330B has recently been approved, but at the time of this QAPP revision, TestAmerica has not yet implemented 8330B. As this is a new method that requires the grinding of a large volume of soils prior to analysis, TestAmerica will use Method 8330B for explosives.

The primary and confirmation conditions for 8330B are cited in Section 4.2.2 of the laboratory SOP. Generally, the laboratory will report the concentration from the 'primary' analysis unless an obvious interference is present which may call for reporting the 'confirmation' result. The peak in question must fall within the expected retention time windows that are specific to the instrument and column for both primary and confirmation analyses. Additionally, the laboratory reviews the percent difference between the columns and overall chromatography for possible positive interferences in making the final decision to report a positive detect for the compound in question.

6.1 Preventative Maintenance

The primary purpose of the maintenance program is to prevent instrument and equipment failure and to minimize down-time. A properly implemented maintenance program increases the reliability of a measurement system.

On-site Equipment: There is not on-site equipment associated with the sampling for MC – refer to the work plan for details regarding unexploded ordnance/discarded military munitions (UXO/DMM) activities.

Laboratory Facilities: The TestAmerica laboratory facility will be adequately maintained with a safe and clean environment. The maintenance activities include appropriate engineering controls such as proper ventilation, lighting, dust control, hoods, air flow, protection from extreme temperatures, waste disposal and a source of stable power.

Preventative maintenance procedures to minimize laboratory equipment downtime are detailed in each analytical method SOP.

6.2 Calibration Procedures and Frequency

Laboratory Equipment: Calibration procedures for TestAmerica are included in their QAM and method-specific analytical SOPs. Each type of instrumentation is calibrated prior to sample analysis according to method criteria. Method-specific criteria for the instrument calibrations must be met before samples may be processed. The specific criteria for calibration are written in each method SOP.

Corrective action must be taken to remedy any out-of-control situations prior to analysis of any samples. Deviations from stated criteria are not acceptable. Hard copy records of all instrument calibrations are maintained in the individual laboratories and must be made available to Bay West upon request. These records are reviewed by the laboratory department managers and/or supervisors and are frequently included in audits performed by the laboratory QA department.

Analytical instruments at the laboratories shall be calibrated using traceable standards in accordance with specified analytical methods and manufacturers' procedures. Calibration procedures, at a minimum, include the equipment to be calibrated, the reference standards used for calibration, the calibration techniques and the sequential actions, acceptable performance tolerances, frequency of calibration, and calibration documentation format. Records of standard preparation and instrument calibration shall be maintained. The analysis logbook, maintained for each analytical instrument, shall include at a minimum 1) the date and time of calibration, 2) the initials of the person performing the calibration, 3) the calibrator reference number, and 4) the concentration. Project laboratory calibration procedures, frequency, and associated corrective actions are further detailed in the method-specific SOPs and TestAmerica's QAM.

6.3 Laboratory Internal QC Checks

Specific laboratory internal QC checks and frequencies are included in TestAmerica's QAM and the specific analytical SOPs.

6.4 Performance and System Audits

Performance and system audits are a component of both internal laboratory QA policy and procedures as well as external certification processes. Performance and system audits continue to be performed on an ongoing basis; however, project-specific audits will not be performed.

6.5 Nonconformance and Corrective Actions

A nonconformance is an unplanned deviation from an established protocol or plan. The deviation may be the result of the actions of TestAmerica, Bay West or the result of events beyond the control of any of these parties. Nonconformances include the following situations:

- Holding item violations due to laboratory error, shipping delays, or other factors;
- Calibrations errors;
- Deviations from SOPs;
- QC sample results outside established limits;
- Elevated RLs; and
- Errors in reports.

Corrective actions range from flagging of data to re-preparation and re-analysis of the affected samples. Actions taken depend on the severity of the nonconformance and the effect on data quality. The laboratory will notify Bay West of any nonconformance which impacts data quality so that Bay West may be involved in the corrective action process.

7.0 DATA REDUCTION, DATA QUALITY INDICATORS CALCULATION AND REPORTING

Data review procedures, defined as a set of computerized and manual checks applied at appropriate levels of the measurement process, are defined for all measurement systems in the QAM. Data review will begin with the reduction or processing of data and will continue through verification of the data and the reporting of analytical results.

Calculations will be checked in the field (if applicable) and at the laboratory from the raw data to the final value prior to reporting results for each group of samples. Data reduction will be performed by the analyst who obtained the data or by another analyst. Data verification will start with the analyst who will perform a 100% review of the data to ensure the work was done correctly the first time.

The complete chemistry data package will be provided to Bay West within 20 business days of sample receipt.

7.1 Data Reduction and Verification

Data reduction and verification may be performed by more than one analyst depending upon the analytical method employed. The preparation and analytical data may be reviewed independently by different analysts. In these instances, each item may not be applicable to the subset of the data verified or an item may be applicable in both instances. It is the responsibility of the analyst to ensure that the verification of data in his or her area is complete. The data reduction and initial verification process must ensure that:

- Sample preparation information is correct and complete including documentation of standard identification, sample amounts, etc.;
- Analysis information is correct and complete, including proper identification of analysis output;
- Analytical results are correct and complete, including calculation or verification or instrument calibration, QC results, and qualitative and quantitative sample results with appropriate qualifiers;
- The appropriate SOPs have been followed and are identified in the project records;
- Proper documentation procedures have been followed;
- All non-conformances have been documented;
- Special sample preparation and analytical requirements have been met; and
- The data generated have been reported with the appropriate number of significant figures as defined by the analytical methods in the laboratory information management systems (LIMSs) or otherwise specified by the client.

In general, data will be processed by an analyst in one of the following ways:

- Manual computation of results directly on the data sheet or on calculation pages attached to the data sheets;
- Input of raw data for computer processing; and
- Direct acquisition and processing of raw data by a computer.

If data are manually processed by an analyst, all steps in the computation shall be provided including equations used and the source of input parameters such as response factors (RFs), dilution factors, and calibration constants. If calculations are not performed directly on the data sheet, they may be attached to the data sheets.

For data that are input by an analyst and processed using a computer, a copy of the input shall be kept and uniquely identified with the project number and other information as needed. The samples analyzed must be clearly identified.

If data are directly acquired from instrumentation and processed, the analyst must verify that the following are correct:

- Project sample numbers;
- Calibration constants and RFs;
- Units; and
- Numerical values used for RLs.

Analysis-specific calculations for methods are provided in SOPs. In cases where computers perform the calculations, software must be validated or verified before it is used to process data.

The data reduction is documented, signed, and dated by the analyst completing the process. Initial verification of the data reduction by the same analyst is documented on a data review checklist, signed, and dated by the analyst.

7.2 Data Verification

Following the completion of the initial verification by the analyst performing the data reduction, a systematic second-level verification of the data is performed by an experienced peer, supervisor, or designee. The second-level reviewer examines the data signed by the analyst. This review includes an evaluation of all items required in the raw data package. Any exceptions noted by the analyst must be reviewed. Included in this review is an assessment of the acceptability of the data with respect to the following:

- Adherence of the procedure used to the requested analytical method SOP;
- Correct interpretation of data;
- Correctness of numerical input when computer programs are used (checked randomly);
- Correct identification and quantification of constituents with appropriate qualifiers;
- Numerical correctness of calculations and formulas (checked randomly);
- Acceptability of QC data;
- Documentation that instruments were operating according to methods specifications (calibrations, performance checks, etc.);
- Documentation of dilution factors, standard concentrations, etc. and;
- Sample holding time assessment.

A case narrative to accompany the final report will be finalized by the laboratory Project Manager. This narrative will include relevant comments collected during the earlier reviews.

7.3 Calculation of Data Quality Indicators

Procedures for calculation of data quality indicators are described in TestAmerica's QAM and the laboratory SOPs, and summarized in Section 3.2 of the QAPP.

7.4 Data Reporting

The following items are included in the data reporting methodology:

Data Reports

TestAmerica is capable of developing a variety of data deliverable reports. In general, data reports contain:

- Cover Letter/Case Narrative: Information on sample types, tests performed, any problems encountered, and other general comments are provided. Additionally, the case narrative will summarize the following project QC elements:
    - Sample condition upon receipt in the laboratory
    - Holding times
    - Instrument initial and continuing calibration
    - Method blanks
    - Surrogate spike recoveries
    - Matrix spikes and laboratory control samples
    - Laboratory sample duplicates
- Analytical Data: Data are reported by sample or by test with the appropriate significant figures and RLs, and have been adjusted for dilution, if appropriate. Pertinent information including dates sampled, received, prepared, extracted, and analyzed are provided.
- Methodology: Reference for analytical methodology used is cited.

The following specific information will be included in the data package:

- Laboratory name and location (city and state);
- Project name and unique identification (ID) number;
- Field sample ID number as written on COC;
- Sample description, laboratory sample ID number, and matrix;
- Sample preservation or condition at receipt;
- Date sample collected, received, extracted/prepared, and analyzed;
- Analysis time when holding time limit is less than 48 hours;
- Method (and SOP) numbers for all preparation, cleanup, and analysis procedures employed;
- Preparation, analysis, and other batch numbers;
- Analyte or parameter;
- Method RLs adjusted for sample-specific factors;
- Method detection and quantitation limits;
- Analytical results with correct number of significant figures;
- Any data qualifiers assigned;
- Concentration units;
- Dilution factors (report both diluted and undiluted runs);
- Percent moisture or percent solids (report solids on dry weight basis);

- Chromatograms, as needed;
- Sample final extract volume and aliquot analyzed; and
- Sample management records (COC and other records generated to document sample custody, transfer, analysis, and disposal).

Verbal Results

If Bay West requests analytical results to be communicated verbally or by facsimile prior to final review, they will be clearly identified as "Preliminary" results. Bay West understands that the data may not have undergone the complete levels of verification and review required and that the data may change.

Reporting Analytical Results

Sample results are reported according to analytical method SOP. The laboratory will normally report results within the calibration; however, any reported results outside of the calibration range will be flagged and documented in the final report.

The laboratory will generate an Electronic Data Deliverable (EDD) in a format such that the analytical data can be submitted into the Environmental Restoration Information System (ERIS).

8.0 DATA ASSESSMENTS AND REVIEW

All chemical data generated will have their quality assessed prior to use. TestAmerica will perform 100% data verification as described in Section 7.2 of the QAPP (Part II of the SAP) prior to release of data. Data verification will ensure the data package is complete, correct, consistent and compliant with the SAP requirements.

Upon receipt of the interim data package including sample and QC sample results, the Bay West CQCO will conduct a data review as described in Section 8.1. Data review will assess the summary QC data provided by the laboratory to ascertain the corresponding project sample data quality. If the data verification and review indicate that the chemical data quality meets the project quality objectives, the data will be used as appropriate to support the project.

Data validation, as described in Section 8.2, will be completed within thirty days of completing work at the site.

8.1 Data Verification

Data verification determines and documents possible effects on the data that result from various QC failures. The following elements of data review will aid the CQCO in assessing whether the data are of acceptable quality:

- Chain-of-Custody forms, analysis requested, sample description/ID
- Sample handling procedures, holding times, preservation
- Confirmation of laboratory data package verification
- Identification of QC samples that may include:
    - Laboratory sample duplicates
    - Blind field duplicates
    - Method blanks, Trip blanks and Equipment blanks
    - LCS/LCSD
    - MS/MSD
    - Surrogate recoveries
- Examination of QC sample data against Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity objectives

8.2 Data Validation

Bay West will perform data validation on 10% of the analytical reports and data packages in accordance with the guidance within the *EPA Contract Laboratory Program National Functional Guidelines (NFGs) for Organic Data Review and Inorganic Data Review EPA540/R-99/008* (EPA, 1999) and *EPA 540-R-04-004* (EPA, 2004a), respectively, and the DoD QSM. The data validation strategy will be consistent with the DQOs.

The primary and confirmation conditions for 8330B are cited in Section 4.2.2 of the laboratory SOP. Generally, the laboratory will report the concentration from the 'primary' analysis unless an obvious interference is present which may call for reporting the 'confirmation' result. The peak in question must fall within the expected retention time windows that are specific to the instrument and column for both primary and confirmation analyses. Additionally, the laboratory reviews the percent difference between the columns and overall chromatography for possible positive interferences in making the final decision to report a positive detect for the compound in question.

Because explosives are not specifically addressed in the NFGs, the organic and inorganic NFGs will be used in a general way, along with the method requirements and the TestAmerica SOPs to serve as guidelines for data validation. This approach is summarized in **Table 8-1**.

Table 8-1: Data Validation of Explosives Using SW-846 Methods 8330B

Review Data	Summary of Criteria/Requirements	Reviewer Qualification Guidelines
I. Preservation and Holding Times	Cool samples to 4 ± 2 °C, extract within 14 days of collection for soils, 7 days for water, 40 days from extraction to analysis	If criteria not met, flag UJ/J* or if grossly exceeded, flag R*.
II. Initial Calibration	%RSD of calibration factors ≤20%, or if r ≥ 0.995, linear regression used.	If criteria not met, ICAL should be repeated – potentially qualify R* or UJ/J* if corrective action not performed.
III. Calibration Verification	Mid level standard within + 15% of predicted response. CCV after ever 10 injections.	If criteria not met and reanalysis not conducted, may flag data J/UJ* or R*.
IV. Blanks	MB < ½ RL	If concentration in blank within 5X of samples, flag U*, consider undetected at elevated RL.
V. Accuracy and Precision	LCS and MS/MSD within statistically-determined limits and RPDs specified in Attachment 3.	Results outside criteria may result in UJ/J* qualification, or R* in cases of very low recovery.
VI. Surrogates	All samples including QC samples spiked with surrogates. Recoveries within statistically determined limits specified in Attachment 3.	Results outside criteria may result in UJ/J* qualification, or R* in cases of very low recovery.
VII. Duplicates	See RPD for MS/MSD (30%) – Sample duplicates also ≤30% for soils. Field duplicates 50% for soils, 25% for waters.	Results outside criteria may result in UJ/J* qualification, depending on other measures of precision.
VIII. Overall Assessment of data	Review of overall data package; evaluate QC measures in relationship to one another. Confirm tentative identifications with second column or GC/MS.	Review to use professional judgment.

Notes :
** - See Data Qualifier Definitions Table, below*
r – Correlation Coefficient
ICS – Interference Check Sample
MB – Method Blank
IS – Internal Standard
ICAL - Initial Calibration
ICV – Second Source Initial Calibration Verification
CCV – Continuing Calibration Verification
LRB – Laboratory Reagent Blank
%RSD – Percent Standard Deviation

Data Validation, according to EPA's definition, is "an evaluation of the technical usability of the verified data with respect to the planned objectives or intention of the project. In addition, data validation can provide a level of overall confidence in the reporting of the data based on the methods used."

The data validation process will consist of:

- Assembling planning documents, laboratory data to be validated and data review documentation;
- Review verified data, and reported sample results collectively for the data set as a whole, including laboratory applied data qualifiers against the requirements the laboratory was expected to meet;
- Summarize data and QC deficiencies and evaluate the impact on the overall data quality. Additionally, given information obtained during the course of the project, an assessment of certain performance criteria may be made;
- Assigning validation qualifiers as appropriate to individual data values giving an indication of potential bias or uncertainty discovered during the validation process. Data qualification will be performed with consideration given to the importance and level of deviation from performance standards; and
- Preparation of analytical data validation report.

All data qualifiers assigned as a result of the data validation process will be consistent with the guidelines and will also reflect the project-specific DQOs. Typical data validation qualifiers can be found in **Table 8-2.** NFGs will be used for the evaluative measurements with non-specified criteria during the data validation process.

Table 8-2: Data Qualifier Definitions

Data Qualifier	Definition
U	The analyte was analyzed for but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high (inorganics only).
J-	The result is an estimated quantity, but the result may be biased low (inorganics only).
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification (organics only).
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration (organics only).
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

9.0 REFERENCES

CODE OF FEDERAL REGULATIONS (CFR):

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Attachment 1

Quality Assurance Project Plan

Laboratory Quality Assurance Manual
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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Quality Assurance Manual

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SOPs AND POLICIES REFERRED TO IN THE QA MANUAL

SOP/Policy Reference	Title	Cited Section No(s)
CA-Q-S-001	Solvent and Acid Lot Testing and Approval	9.3; 22.4
CA-Q-S-002	Acceptable Manual Integration Practices	20.13.2; 20.13.4; 20.13.5; Figure 16-2
CA-Q-S-003	Management of Change Procedure	14.2
CA-Q-S-004	Method Compliance & Data Authenticity Audits	16.2.1.1
CA-Q-S-005	Calibration Curves (General)	21.4.2.1; 21.4.2.3; 21.4.2.7
CW-Q-S-001	Corporate Document Control and Archiving	6.1; 6.3
CW-Q-S-002	Writing a Standard Operating Procedure (SOPs)	20.2; 20.3
CA-L-S-001	Internal Investigation of Potential Data Discrepancies and Determination for Data Recall	5.2; 12.2; 12.3; 13.5; Table 13.1; 16.4; 17.1; 17.3
CA-L-S-002	Subcontracting Procedures	8.1
CA-L-P-001	Ethics Policy	5.2; 18.4
CA-L-P-002	Contract Compliance Policy	7.2
CW-L-P-001	Record Retention	15.1; 15.5.7.3
CW-F-P-002	Authorization Matrix Policy	9.1
CA-C-S-001	Work Sharing Process	8.1; 8.2
CA-T-P-001	Qualified Products List	9.4
CW-F-S-004	Controlled Purchases Policy/Procedure	9.1

SOP/Policy Reference	Title	Cited Section No(s)
UP-DM-002	Data Management: Record Retention & Purging	15.0; 15.1; 15.1.3; 15.1.4
UP-FS-001	Field Services; Groundwater Sampling – Bailing Method	23.1
UP-IS-014	Proc/Processes Entry, Storage, Backup/Retrieval, Mgmt Bench Data	15.1; 15.1.4; 20.13.1
UP-QA-003	Balance Calibration, Care and Use	21.3.1
UP-QA-006	Document Control	3.4.2; 6.1; 6.3; 20.2
UP-QA-014	Training Program: Mechanisms and Documentation Processes Defined by Operational Assessment	18.3
UP-QA-017	Method Detection Limits	20.7; 20.7.4; 20.7.6; 20.7.9; 20.9.1
UP-QA-022	Refrigerated Storage Monitoring Volatile Samples	24.4
UP-QA-032	SOP Change Protocol	3.4.1; 6.3; 20.2
UP-QA-034	Thermometer Calibrations	21.3.3
UP-QA-039	Sample Homogenization Sub Sampling Procedures	23.6
UP-QA-040	Quality Assurance – Measurement Uncertainty	20.12.4
UP-SR-001	Sample Receipt: Handling and Processing Procedures	24.2; 24.2.2; Figure 24-5
UP-WM-001	Laboratory Waste Disposal Procedures	24.7

Attachment 2
Quality Assurance Project Plan
Laboratory MDLs and RLs Compared to Preliminary Remediation Goals

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ATTACHMENT 2
Laboratory MDLs and RLs Compared to Preliminary Remediation Goals

				NMED Soil Screening Levels			EPA Region IX PRGs	
	CAS No.	Lab RL	Lab MDL	Residential Soil	Industrial Occupational Soil	Construction Worker Soil	Residential Soils	Industrial Soils
Analyte		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Arsenic	7440-38-2	1	0.27	3.90 c	17.70	85.20 c	0.39	1.6
Barium	7440-39-3	1.3	0.44	15600.00 n	100000.00	60200.00 n	5,400	67,000
Cadmium	7440-43-9	0.2	0.06	39.00 n	564.00	154.00 n	37	450
Chromium	7440-47-3	1	0.11	NA	NA	NA	210	450
Lead	7439-92-1	0.8	0.24	400	800	800	400	800
Selenium	7782-49-2	1.2	0.38	391.00 n	5680.00	1550.00 n	390	5,100
Silver	7440-22-4	0.5	0.1	391.00 n	5680	1550 n	390	5,100
1,3,5-Trinitrobenzene	99-35-4	0.1	0.0306	NA	NA	NA	--	--
1,3-Dinitrobenzene	99-65-0	0.1	0.0076	NA	NA	NA	--	--
2,4,6-TNT	118-96-7	0.1	0.0114	30.6	342	117	--	--
2,4-Dinitrotoluene	121-14-2	0.1	0.0213	122.00 c	137	466 c	120 (1)	1,200 (1)
2,6-Dinitrotoluene	606-20-2	0.2	0.027	NA c	NA	NA c	61 (1)	620 (1)
2-Amino-4,6-Dinitrotoluene	35572-78-2	0.2	0.0192	NA	NA	NA	12 (2)	120 (2)
4-Amino-2,6-Dinitrotoluene	19406-51-0	0.2	0.0207	NA	NA	NA	12 (2)	120 (2)
2-Nitrotoluene (o-nitrotoluene)	88-72-2	0.2	0.026	10.8	32.3	473	0.88	2.2
3-Nitrotoluene (m nitrotoluene)	99-08-1	0.2	0.039	569	569	569	730	1,000
4-Nitrotoluene (p-nitrotoluene)	99-99-0	0.2	0.0323	136	437	1550	12	30
HMX (Cyclotetramethylenetetranitramine)	2691-41-0	0.2	0.0295	3060	34200	11700	--	--
Nitrobenzene	98-95-3	0.1	0.0116	22.8 n	147	82.8 n	20	100
RDX	121-82-4	0.2	0.0254	44.2	174	699	--	--
Tetryl	479-45-8	0.25	0.0283	NA	NA	NA	--	--
Nitroglycerin	55-63-0	0.4	0.0719	NA	NA	NA	35	120
PETN (Pentaerythritol Tetranitrate)	78-11-5	0.5	0.111	NA	NA	NA	--	--

Notes:
-- - not established or insufficient data to calculate value
c - carcinogenic risk
n - non-carcinogenic risk
NA - Not Available
(1) - Region IX PRG value for dinitrotoluene mixture is 2.5 mg/kg.
(2) - Expressed as aminodinitrotoluene in Region IX PRGs.
NMED - New Mexico Environment Department
PRG - Preliminary Remediation Goal, Region IX EPA
Lab RLs and MDLs for explosives converted to mg/kg to compare to Preliminary Remediation Goals
RL - reporting limit
MDL - method detection limit
bold and italics indicates PRG is below RL.

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Attachment 3
Quality Assurance Project Plan
Laboratory MDLs, RLs and Control Limits

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QAPP Attachment 3
Laboratory MDLs, RL, and Control Limits
TestAmerica-Chicago
Holloman AFB, New Mexico

Analysis Group Description	Method Description	Method Code
Soil Samples	Nitroaromatics and Nitramines by High Performance Liquid Chromatography	8330B
Soil Samples	Nitroaromatics and Nitramines by HPLC/Sonication	8330B

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSRPD - Precision	MSREC - Recovery Low	MSREC - Recovery High	MSRPD - Precision	SUREC - Recovery Low	SUREC - Recovery High
HMX	2691-41-0	200	29.5	ug/Kg	75	125	30	75	125	30		
RDX	121-82-4	200	25.4	ug/Kg	70	135	30	70	135	30		
1,3,5-Trinitrobenzene	99-35-4	100	30.6	ug/Kg	75	125	30	75	125	30		
1,3-Dinitrobenzene	99-65-0	100	7.6	ug/Kg	80	125	30	80	125	30		
Nitrobenzene	98-95-3	100	11.6	ug/Kg	75	125	30	75	125	30		
2,4,6-Trinitrotoluene	118-96-7	100	11.4	ug/Kg	55	140	30	55	140	30		
Tetryl	479-45-8	250	28.3	ug/Kg	10	150	30	10	150	30		
Nitroglycerine												
PETN												
2,4-Dinitrotoluene	121-14-2	100	21.3	ug/Kg	80	125	30	80	125	30		
2,6-Dinitrotoluene	606-20-2	200	27	ug/Kg	80	120	30	80	120	30		
2-Amino-4,6-dinitrotoluene	35572-78-2	200	19.2	ug/Kg	80	125	30	80	125	30		
4-Amino-2,6-dinitrotoluene	19406-51-0	200	20.7	ug/Kg	80	125	30	80	125	30		
2-Nitrotoluene	88-72-2	200	26	ug/Kg	80	125	30	80	125	30		
4-Nitrotoluene	99-99-0	200	32.3	ug/Kg	75	125	30	75	125	30		
3-Nitrotoluene	99-08-1	200	39	ug/Kg	75	120	30	75	120	30		
1,2-Dinitrobenzene	528-29-0			ug/Kg							80	130

Analysis Group Description	Method Description	Method Code
Soil Samples	Inductively Coupled Plasma - Atomic Emission Spectrometry	6010B
Soil Samples	Acid Digestion of Sediments, Sludges, and Soils	3050B

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSRPD - Precision	MSREC - Recovery Low	MSREC - Recovery High	MSRPD - Precision	SUREC - Recovery Low	SUREC - Recovery High
Arsenic	7440-38-2	1	0.27	mg/Kg	80	120	20	80	120	20		
Barium	7440-39-3	1.3	0.44	mg/Kg	80	120	20	80	120	20		
Cadmium	7440-43-9	0.2	0.06	mg/Kg	80	120	20	80	120	20		
Chromium	7440-47-3	1	0.11	mg/Kg	80	120	20	80	120	20		
Lead	7439-92-1	0.8	0.24	mg/Kg	80	120	20	80	120	20		
Selenium	7782-49-2	1.2	0.38	mg/Kg	80	120	20	80	120	20		
Silver	7440-22-4	0.5	0.1	mg/Kg	75	120	20	75	120	20		

Analysis Group Description	Method Description	Method Code
Soil Samples	Percent Moisture	Moisture

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSRPD - Precision	MSREC - Recovery Low	MSREC - Recovery High	MSRPD - Precision	SUREC - Recovery Low	SUREC - Recovery High
Percent Moisture	STL00177	0.1	0.1	%								
Percent Solids	STL00234	0.1	0.1	%								

Analysis Group Description	Method Description	Method Code
Soil Samples	Soil and Waste pH	9045C

Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units	LCSREC - Recovery Low	LCSREC - Recovery High	LCSRPD - Precision	MSREC - Recovery Low	MSREC - Recovery High	MSRPD - Precision	SUREC - Recovery Low	SUREC - Recovery High
pH	STL00204	0.2	0.2	SU								

Note:
The laboratory has sent their renewal application to the IL EPA as well as any effected reciprocal states. No delays are expected at this time and the renewal is expected to be in place on or before April 30, 2008, when

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Attachment 4
Quality Assurance Project Plan
TestAmerica – NELAC Accreditation and Self-Declaration

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Chicago

Self-Declaration Statement for the DoD Quality Systems Manual Final Version 3, dated March 2005

Legal Name of Laboratory:	TestAmerica Chicago
Street Address:	2417 Bond Street
City / State / Zip Code:	University Park, IL 60466
Phone Number:	708-534-5200
Fax Number:	708-534-5211
Web Site:	http://www.stl-inc.com
Name of Owner:	TestAmerica Laboratories, Inc.
Owner Address:	4101 Shuffel Drive N.W.
City / State / Zip Code:	North Canton, OH 44720
Phone Number:	330-497-9396

The undersigned persons understand and acknowledge that:

a. Laboratory operations, which will be utilized for testing in support of environmental analytical testing for USACE, are in full compliance with the DoD QSM (Version 3), including NELAC Standard Chapter 5 and Appendix requirements. All written documentation provided to USACE, accompanying this declaration, accurately reflect policy/practices implemented by laboratory staff.

b. The Laboratory will notify the USACE immediately of change in status of laboratory operations that may affect on-going compliance as declared per item a.

c. The Laboratory acknowledges that USACE may audit the laboratory, relative to policy compliance at any time deemed appropriate; and will allow a designated COR full access to information and facilities to conduct such audit operations.

d. Signatories are authorized to sign this form on behalf of the owner and that there are no misrepresentations in the information provided in the initial laboratory assessment package.

TestAmerica Chicago has reviewed the Department of Defense Quality Systems Manual (DoD QSM) as compared with its quality system, as contained in its Laboratory Quality Manuals and associated Standard Operating Procedures. TestAmerica documents our level of compliance with the QSM and identifies variances between the current laboratory Quality System and the QSM, and we expect project requirements to be negotiated on a project-specific basis. In addition to identified variances with the DoD QSM, instances of noncompliance may be identified during quality assessments and such instances will be addressed via the laboratory's documented corrective action procedures, and as part of TestAmerica's commitment to continuous improvement.

Signature: Michael J Healy Date: 6/21/07

Michael J. Healy
Laboratory Director
mhealy@stl-inc.com

Signature: Terese A. Preston Date: 6/21/07

Terese A. Preston
Quality Assurance Manager
tpreston@stl-inc.com

STATE OF ILLINOIS

ENVIRONMENTAL PROTECTION AGENCY
NELAP - RECOGNIZED
ENVIRONMENTAL LABORATORY ACCREDITATION

is hereby granted to

TESTAMERICA CHICAGO

2417 BOND STREET

UNIVERSITY PARK, IL 60466-3182

NELAP ACCREDITED
ACCREDITATION NUMBER #100201

According to the Illinois Administrative Code, Title 35, Subtitle A, Chapter II, Part 186, ACCREDITATION OF LABORATORIES FOR DRINKING WATER, WASTEWATER AND HAZARDOUS WASTES ANALYSIS, the State of Illinois formally recognizes that this laboratory is technically competent to perform the environmental analyses listed on the scope of accreditation detailed below.

The laboratory agrees to perform all analyses listed on this scope of accreditation according to the Part 186 requirements and acknowledges that continued accreditation is dependent on successful ongoing compliance with the applicable requirements of Part 186. Please contact the Illinois EPA Environmental Laboratory Accreditation Program (IL ELAP) to verify the laboratory's scope of accreditation and accreditation status. Accreditation by the State of Illinois is not an endorsement or a guarantee of validity of the data generated by the laboratory.

Ron Turpin
Manager
Environmental Laboratory Accreditation Program

Scott D. Siders
Accreditation Officer
Environmental Laboratory Accreditation Program

Certificate No.: 001774
Expiration Date: 04/30/2008
Issued On: 06/19/2007

State of Illinois
Environmental Protection Agency

Certificate No.: 001774

Awards the Certificate of Approval

TestAmerica Chicago
2417 Bond Street
University Park, IL 60466-3182

According to the Illinois Administrative Code, Title 35, Subtitle A, Chapter II, Part 186, ACCREDITATION OF LABORATORIES FOR DRINKING WATER, WASTEWATER AND HAZARDOUS WASTES ANALYSIS, the State of Illinois formally recognizes that this laboratory is technically competent to perform the environmental analyses listed on the scope of accreditation detailed below.

The laboratory agrees to perform all analyses listed on this scope of accreditation according to the Part 186 requirements and acknowledges that continued accreditation is dependent on successful ongoing compliance with the applicable requirements of Part 186. Please contact the Illinois EPA Environmental Laboratory Accreditation Program (IL ELAP) to verify the laboratory's scope of accreditation and accreditation status. Accreditation by the State of Illinois is not an endorsement or a guarantee of validity of the data generated by the laboratory.

Drinking Water, Inorganic

SM2320B,20Ed
Alkalinity

SM2330B,18Ed
Corrosivity (Langlier Index)

SM2340B,18Ed
Hardness

SM2510B,20Ed
Conductivity

SM2540C,20Ed
Total Dissolved Solids

SM4500Cl-F,20Ed
Chlorine

SM4500CN-CE,20Ed
Cyanide

SM4500F-C,20Ed
Fluoride

SM4500H-B,20Ed
Hydrogen Ion (pH)

SM4500NO2B,20Ed
Nitrite

SM4500NO3F,20Ed
Nitrate

SM4500P-E,20Ed
Orthophosphate

SM5310C,20Ed
Dissolved Organic Carbon
Total Organic Carbon (TOC)

USEPA150.1
Hydrogen ion (pH)

USEPA200.7R4.4

Aluminum	Arsenic	Barium
Beryllium	Cadmium	Calcium
Chromium	Copper	Hardness (calc.)
Iron	Magnesium	Manganese
Nickel	Silica	Silver

State of Illinois
Environmental Protection Agency

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University Park, IL 60466-3182

Drinking Water, Inorganic	*USEPA200.7R4.4*	Sodium
Zinc		
USEPA200.8R5.4		
Aluminum	Antimony	Arsenic
Barium	Beryllium	Cadmium
Chromium	Copper	Lead
Manganese	Molybdenum	Nickel
Selenium	Silver	Thallium
Zinc		
USEPA200.9R2.2		
Antimony	Arsenic	Cadmium
Chromium	Lead	Selenium
Silver	Thallium	
USEPA245.1R3.0		
Mercury		
USEPA300.0R2.1		
Chloride	Fluoride	Nitrate
Nitrite	Orthophosphate	Sulfate
USEPA353.2R2.0		
Nitrate		
Hazardous and Solid Waste, Inorganic		
1010		
Ignitability		
1311		
TCLP (Organic and Inorganic)		
1312		
Synthetic Precipitation Leaching Procedure		
6010B		
Aluminum	Antimony	Arsenic
Barium	Beryllium	Boron
Cadmium	Calcium	Chromium
Cobalt	Copper	Iron
Lead	Magnesium	Manganese
Molybdenum	Nickel	Potassium
Selenium	Silica	Silver
Sodium	Strontium	Thallium
Tin	Titanium	Vanadium
Zinc		
6020		
Aluminum	Antimony	Arsenic
Barium	Beryllium	Boron
Cadmium	Calcium	Chromium
Cobalt	Copper	Iron
Lead	Magnesium	Manganese
Molybdenum	Nickel	Potassium

TestAmerica Chicago
2417 Bond Street
University Park, IL 60466-3182

Hazardous and Solid Waste, Inorganic

6020

Silver
Vanadium

6020A

Aluminum
Barium
Cadmium
Cobalt
Lead
Molybdenum
Selenium
Thallium

7041

Antimony

7060A

Arsenic

7131A

Cadmium

7191

Chromium

7196A

Chromium VI

7421

Lead

7470A

Mercury

7471A

Mercury

7740

Selenium

7761

Silver

7841

Thallium

9010B

Cyanide

9014

Cyanide

9020B

TOX - Total Organic Halides

9030B

Sulfides

9034

Sodium
Zinc

Antimony
Beryllium
Calcium
Copper
Magnesium
Nickel
Silver
Vanadium

Selenium
Thallium

Arsenic
Boron
Chromium
Iron
Manganese
Potassium
Sodium
Zinc

TestAmerica Chicago
2417 Bond Street
University Park, IL 60466-3182

Hazardous and Solid Waste, Inorganic

9034		Sulfides

9038

Sulfate

9040B

Hydrogen Ion (pH)

9041A

Hydrogen Ion (pH)

9045C

Hydrogen Ion (pH)

9050A

Specific Conductance

9056

Bromide	Chloride	Fluoride
Nitrate	Nitrite	Phosphate
Sulfate		

9060

Total Organic Carbon (TOC)

9066

Phenolics

9071B

Oil and Grease Extractable

9095A

Paint Filter

9251

Chloride

Chapter 7/9014

Reactive Cyanide

Chapter 7/9034

Reactive Sulfide

Hazardous and Solid Waste, Organic

8015B

Diesel range organics (DRO)	Gasoline range organics (GRO)

8081A

4,4'-DDD	4,4'-DDE	4,4'-DDT
Alachlor	Aldrin	alpha-BHC
alpha-Chlordane	Atrazine	beta-BHC
Chlordane - not otherwise specified	delta-BHC	Dieldrin
Endosulfan I	Endosulfan II	Endosulfan sulfate
Endrin	Endrin aldehyde	Endrin ketone
gamma-BHC (Lindane)	gamma-Chlordane	Heptachlor
Heptachlor epoxide	Isodrin	Kepone
Methoxychlor	Simazine	Toxaphene

8082

State of Illinois
Environmental Protection Agency

Certificate No.: 001774

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TestAmerica Chicago
2417 Bond Street
University Park, IL 60466-3182

Hazardous and Solid Waste, Organic	*8082*	PCB-1016
PCB-1221	PCB-1232	PCB-1242
PCB-1248	PCB-1254	PCB-1260
8151A		
2,4,5-T	2,4,5-TP (Silvex)	2,4-D
2,4-DB	4-Nitrophenol	Dalapon
Dicamba	Dichloroprop	Dinoseb
Pentachlorophenol	Picloram	
8260B		
1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene
1,1-Dichloropropene	1,2,3-Trichlorobenzene	1,2,3-Trichloropropane
1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene	1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloroethane
1,2-Dichloropropane	1,3,5-TCB	1,3,5-Trimethylbenzene
1,3-Dichlorobenzene	1,3-Dichloropropane	1,4-Dichlorobenzene
1-Chlorohexane	2,2-Dichloropropane	2-Butanone (Methyl ethyl ketone, MEK)
2-Chloro-1,3-butadiene (Chloroprene)	2-Chloroethyl vinyl ether	2-Chlorotoluene
2-Hexanone	2-Methyl-1-propanol (Isobutyl alcohol)	2-Methylnaphthalene
2-Nitropropane	4-Chlorotoluene	4-Methyl-2-pentanone (Methyl isobutyl ketone
Acetone	Acetonitrile	Acrolein (Propenal)
Acrylonitrile	Allyl chloride	Benzene
Bromobenzene	Bromochloromethane	Bromodichloromethane
Bromoform	Bromomethane	Carbon disulfide
Carbon tetrachloride	Chlorobenzene	Chlorodibromomethane (Dibromochlorometha
Chloroethane	Chloroform	Chloromethane
cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Dibromomethane
Dichlorodifluoromethane	Dichloromethane (Methylene chloride)	Ethyl acetate
Ethyl ether	Ethyl methacrylate	Ethylbenzene
Hexachlorobutadiene	Isopropyl ether	Isopropylbenzene
Malononitrile	Methacrylonitrile	Methyl ethyl ketone
Methyl iodide (Iodmethane)	Methyl isobutyl ketone	Methyl methacrylate
Methyl-t-butyl ether	m-Xylene	Naphthalene
n-Butylbenzene	n-Propylbenzene	o-Toluidine
o-Xylene	Pentachloroethane	p-Isopropyltoluene
Propionitrile (Ethyl cyanide)	p-Xylene	sec-Butylbenzene
Styrene	tert-Butylbenzene	Tetrachloroethene
Tetrahydrofuran	Toluene	trans-1,2-Dichloroethene
trans-1,3-Dichloropropene	trans-1,4-Dichloro-2-butene	Trichloroethene
Trichlorofluoromethane	Trichlorotrifluoroethane	Vinyl acetate
Vinyl chloride	Vinylidene chloride	Xylenes (Total)
8270C		
1,2,4,5-Tetrachlorobenzene	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene
1,2-Diphenylhydrazine	1,3,5-Trinitrobenzene (1,3,5-TNB)	1,3-Dichlorobenzene
1,3-Dinitrobenzene (1,3-DNB)	1,4-Dichlorobenzene	1,4-Dioxane
1,4-Naphthoquinone	1,4-Phenylenediamine	1-Naphthylamine

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Hazardous and Solid Waste, Organic

8270C

2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,3,4,6-Tetrachlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2,4-Dichlorophenol
2,6-Dichlorophenol
2,6-Dinitrotoluene (2,6-DNT)
2,4-Dinitrotoluene (2,4-DNT)
2-Chloronaphthalene
2-Chlorophenol
2-Acetylaminofluorene
2-Methylpyridine (2-Picoline)
2-Naphthylamine
2-Methylnaphthalene
2-Nitrophenol
3,3'-Dichlorobenzidine
2-Nitroaniline
3-Methylcholanthrene
3-Nitroaniline
3,3'-Dimethylbenzidine
4-Aminobiphenyl
4-Bromophenyl phenyl ether
4,6-Dinitro-2-methylphenol
4-Chloroaniline
4-Chlorophenyl phenyl ether
4-Chloro-3-methylphenol
4-Nitrophenol
4-Nitroquinoline-1-oxide
4-Nitroaniline
7,12-Dimethylbenz(a)anthracene
Acenaphthene
5-Nitro-o-toluidine
Acetophenone
alpha,alpha-Dimethylphenethylamine
Acenaphthylene
Anthracene
Aramite
Aniline
Benzo(a)anthracene
Benzo(a)pyrene
Benzidine
Benzo(g,h,i)perlyene
Benzo(k)fluoranthene
Benzo(b)fluoranthene
Benzyl alcohol
Bis(2-chloroethoxy) methane
Benzoic acid
Bis(2-chloroisopropyl) ether
Bis(2-ethylhexyl) phthalate
Bis(2-chloroethyl) ether
Carbazole
Chlorobenzilate
Butyl benzyl phthalate
Diallate
Dibenz(a,h)anthracene
Chrysene
Diethyl phthalate
Dimethyl phthalate
Dibenzofuran
Di-n-octyl phthalate
Dinoseb
Di-n-butyl phthalate
Ethyl methanesulfonate
Fluoranthene
Diphenylamine
Hexachlorobenzene
Hexachlorobutadiene
Fluorene
Hexachloroethane
Hexachlorophene
Hexachlorocyclopentadiene
Indeno(1,2,3-cd) pyrene
Isophorone
Hexachloropropene
m-Cresol (3-Methylphenol)
m-Dinitrobenzene
Isosafrole
Methyl methanesulfonate
Naphthalene
Methapyrilene
N-Nitrosodiethylamine
N-Nitrosodimethylamine
Nitrobenzene
N-Nitrosodi-n-propylamine
N-Nitrosodiphenylamine
N-Nitrosodi-n-butylamine (N-Nitrosodibutylam
N-Nitrosomorpholine
N-Nitrosopiperidine
N-Nitrosomethylethylamine
o-Cresol (2-Methylphenol)
o-Toluidine
N-Nitrosopyrrolidine
p-Cresol (4-Methylphenol)
p-Dimethylaminoazobenzene
Parathion
Pentachloronitrobenzene
Pentachlorophenol
Pentachlorobenzene
Phenanthrene
Phenol
Phenacetin
Pronamide
Pyrene
p-Phenylenediame
Safrole
Pyridine

8310

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Dibenz(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd) pyrene
Naphthalene
Phenanthrene
Pyrene

8330

1,3,5-Trinitrobenzene (1,3,5-TBN)
1,3-Dinitrobenzene (1,3-DNB)
2,4,6-Trinitrotoluene (2,4,6-TNT)
2,4-Dinitrotoluene (2,4-DNT)
2,6-Dinitrotoluene (2,6-DNT)
2-Amino-4,6-dinitrotoluene (2-Am-DNT)

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Hazardous and Solid Waste, Organic

8330

4-Amino-2,6-dinitrotoluene (4-Am-DNT)
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)
m-Nitrotoluene (3-Nitrotoluene, 3-NT)
Nitrobenzene
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
o-Nitrotoluene (2-Nitrotoluene, 2-NT)
p-Nitrotoluene (4-Nitrotoluene, 4-NT)

Wastewater, Inorganic

HACH8000
Chemical Oxygen Demand (COD)

SM2320B,20Ed
Alkalinity

SM2510B,20Ed
Specific Conductance

SM2540B,20Ed
Residue (Total)

SM2540C,20Ed
Residue (TDS)

SM2540D,20Ed
Residue (TSS)

SM3113B,19Ed
Antimony
Arsenic
Cadmium
Chromium
Lead
Selenium
Silver
Thallium

SM3500Cr-B,20Ed
Chromium VI

SM4500CL-E,20Ed
Chloride

SM4500Cl-F,20Ed
Chlorine

SM4500CN-CE,20Ed
Cyanide

SM4500CN-CG,20Ed
Cyanide-amenable to chlorination

SM4500F-C,20Ed
Fluoride

SM4500H-B,20Ed
Hydrogen Ion (pH)

SM4500NH3-C,18Ed
Ammonia
Total Kjeldahl Nitrogen

SM4500NO2B,20Ed
Nitrite

SM4500NO3F,20Ed
Nitrate
Nitrate-Nitrite (sum)

SM4500O-G,20Ed
Oxygen - Dissolved

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Wastewater, Inorganic

SM4500P-E,20Ed
Orthophosphate (as P)
Phosphorus

SM4500S-E,18Ed
Sulfide

SM4500S-F,20Ed
Sulfide

SM5210B,20Ed
Biochemical Oxygen Demand (BOD)
Carbonaceous Biochemical Oxygen Demand (C

SM5310C,20Ed
Total Organic Carbon (TOC)

USEPA120.1
Specific Conductance

USEPA150.1
Hydrogen Ion (pH)

USEPA160.1
Residue (TDS)

USEPA160.2
Residue (TSS)

USEPA160.3
Residue (Total)

USEPA160.4
Residue (Volatile)

USEPA1664RA
Oil and Grease

USEPA200.7R4.4

Aluminum	Antimony	Arsenic
Barium	Beryllium	Boron
Cadmium	Calcium	Chromium
Cobalt	Copper	Hardness (calc.)
Iron	Lead	Magnesium
Manganese	Molybdenum	Nickel
Potassium	Selenium	Silica
Silver	Sodium	Thallium
Tin	Titanium	Vanadium
Zinc		

USEPA200.8R5.4

Aluminum	Antimony	Arsenic
Barium	Beryllium	Boron
Cadmium	Chromium	Cobalt
Copper	Hardness (calc.)	Iron
Lead	Manganese	Molybdenum
Nickel	Selenium	Silver
Thallium	Tin	Vanadium
Zinc		

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Wastewater, Inorganic

USEPA204.2

Antimony

USEPA206.2

Arsenic

USEPA213.2

Cadmium

USEPA218.2

Chromium

USEPA239.2

Lead

USEPA245.1R3.0

Mercury

USEPA270.2

Selenium

USEPA272.2

Silver

USEPA279.2

Thallium

USEPA300.0R2.1

Bromide
Chloride
Fluoride
Nitrate
Nitrate-Nitrite (sum)
Nitrite
Orthophosphate (as P)
Sulfate

USEPA310.1

Alkalinity

USEPA325.2

Chloride

USEPA330.4

Chlorine

USEPA335.1

Cyanide, Amenable

USEPA335.2

Cyanide

USEPA340.2

Fluoride

USEPA350.2

Ammonia

USEPA351.3

Total Kjeldahl Nitrogen

USEPA353.2R2.0

Nitrate (total)
Nitrate-Nitrite (sum)

USEPA354.1

Nitrite

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Wastewater, Inorganic

USEPA360.1

Oxygen

USEPA365.2

Orthophosphate

Phosphorus

USEPA375.4

Sulfate

USEPA376.1

Sulfide

USEPA405.1

Biochemical Oxygen Demand (BOD)

USEPA415.1

Total organic carbon (TOC)

USEPA420.2

Phenolics

USEPA420.4R1.0

Phenolics

Wastewater, Organic

USEPA608

4,4'-DDD	4,4'-DDE	4,4'-DDT
Aldrin	alpha-BHC	beta-BHC
Chlordane	delta-BHC	Dieldrin
Endosulfan I	Endosulfan II	Endosulfan sulfate
Endrin	Endrin aldehyde	gamma-BHC (Lindane)
Heptachlor	Heptachlor epoxide	Methoxychlor
PCB-1016	PCB-1221	PCB-1232
PCB-1242	PCB-1248	PCB-1254
PCB-1260	Toxaphene	

USEPA610

Acenaphthene	Acenaphthylene	Anthracene
Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene
Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene
Dibenz(a,h)anthracene	Fluoranthene	Fluorene
Indeno(1,2,3-cd) pyrene	Naphthalene	Phenanthrene
Pyrene		

USEPA624

1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane
1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichlorobenzene
1,2-Dichloroethane	1,2-Dichloropropane	1,3-Dichlorobenzene
1,4-Dichlorobenzene	2-Chloroethylvinyl ether	Acrolein
Acrylonitrile	Benzene	Bromodichloromethane
Bromoform	Bromomethane	Carbon tetrachloride
Chlorobenzene	Chloroethane	Chloroform
Chloromethane	cis-1,3-Dichloropropene	Dibromochloromethane
Dichloromethane (Methylene chloride)	Ethylbenzene	Tetrachloroethene
Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene

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Wastewater, Organic	*USEPA624*	Trichloroethene
Trichlorofluoromethane	Vinyl chloride	Xylenes (total)
USEPA625		
1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene
1,4-Dichlorobenzene	2,2-Oxybis(1-chloropropane)	2,4,5-Trichlorophenol
2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol
2,4-Dinitrophenol	2,4-Dinitrotoluene (2,4-DNT)	2,6-Dinitrotoluene (2,6-DNT)
2-Chloronaphthalene	2-Chlorophenol	2-Methyl-4,6-dinitrophenol
2-Nitrophenol	3,3'-Dichlorobenzidine	4-Bromophenyl phenyl ether
4-Chloro-3-methylphenol	4-Chlorophenyl phenyl ether	4-Nitrophenol
Acenaphthene	Acenaphthylene	Anthracene
Benzidine	Benzo(a)anthracene	Benzo(a)pyrene
Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene
Benzyl butyl phthalate	Bis(2-chloroethoxy) methane	Bis(2-chloroethyl) ether
Bis(2-ethylhexyl) phthalate	Chrysene	Dibenz(a,h)anthracene
Diethyl phthalate	Dimethyl phthalate	Di-n-butyl phthalate
Di-n-octyl phthalate	Fluoranthene	Fluorene
Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene
Hexachloroethane	Indeno(1,2,3-cd) pyrene	Isophorone
Naphthalene	Nitrobenzene	N-Nitrosodimethylamine
N-Nitrosodi-n-propylamine	N-Nitrosodiphenylamine	Pentachlorophenol
Phenanthrene	Phenol	Pyrene

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Appendix F
Contractor Project Forms

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Bay West

DAILY QUALITY CONTROL REPORT

Contract No.: W9128F-04-D-0004, TO 0016 **Date:** _____ **Rpt. No.:** 000
Project Title & Location: Explosive Ordnance Detonation/Skeet Range, Former Myrtle Beach Air Force Base - Myrtle Beach, South Carolina
Weather: Clear____ Partly Cloudy ____ Cloudy ____ Rainfall ____ (__% of workday)
Temperature During Workday: High degrees F. Low degrees F.

1. WORK PERFORMED BY CONTRACTORS/SUBCONTRACTORS

Contractor	No. of Workers	Crafts	Hours	Description of Work

2. OPERATING EQUIPMENT DATA (Not hand tools)

Equipment	Date of Arrival / Departure	Owned or Rented	Hours Used	Hours Idle	Hours of Rep./Main

3. WORK PERFORMED TODAY (Indicate location and description of work performed by prime and/or subcontractors).

4. QUALITY CONTROL INSPECTIONS AND RESULTS (Include a description of preparatory, initial, and/or follow-up inspections or meetings; check of subcontractors work and materials delivered to site compared to submittals and/or specifications; comments on proper storage of materials; and include comments on corrective actions to be taken).

DAILY QUALITY CONTROL REPORT

Bay West

5. QUALITY CONTROL TESTING AND RESULTS (Comment on tests and attach test reports).

6. DAILY SAFETY INSPECTIONS (Include comments on new hazards to be added to Hazard Analysis and corrective action of any safety issues).

7. REMARKS (Include conversations with or instructions from the Government representatives; delays of any kind that are impacting the job; conflicts in the contract documents; comments on change orders; and environmental considerations; etc.).

8. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All material, equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications except as noted above.

Contractor Quality Control Officer
Bay West, Inc.

BAY WEST, INC.
SAFETY MEETING REPORT

Date:	**Time:**	**Duration of meeting:**	**Job #:** J070527
Location: Holloman AFB		**Project/Group:** MMRP MEC Burial Pit Removal	

Type of meeting: ____ **Daily** ____**Weekly** ____ **Monthly** ____ **Other:**_____

Items/Issues discussed:

1.

2.

3.

4.

5.

6.

7.

8.

Attach minutes of safety meeting if taken.

Safety questions/issues raised:	**Actions/Follow-up needed:**
1.	
2.	
3.	
4.	
5.	
6.	

Remarks:

Meeting conducted by:

Forward a copy of the completed report to Health and Safety.

Docs #84849

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Employee/Visitor Register and Safety Brief
MD Burial Pit Clean-up, Manch Manor, Nellis AFB

Date:

Site Entry/Exit		Name (Printed)	Signature	Company	Exclusion Zone Entry/Exit		Acknowledgement of Site-Specific Briefing / Review of APP
Time In	Time Out				Time In	Time Out	

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APPENDIX D: ACCIDENT PREVENTION PLAN

ACKNOWLEDGEMENT

Site Health and Safety Plan Acknowledgment			
I have read, understand, and agree to abide by the provisions as detailed in this Accident Prevention Plan and Site-Specific Safety and Health Plan prepared by Bay West, Inc. Failure to comply with these provisions may lead to disciplinary action and/or my dismissal from the work site.			
Printed Name	**Company**	**Signature**	**Date**

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BAY WEST, INC.

CERTIFICATION OF PERSONAL PROTECTIVE EQUIPMENT (PPE) TRAINING

SITE INFORMATION	
Site Name:	
Location:	Instructor(s):
Date of Classroom Instruction:	Date of Demonstration:

PPE TRAINING COURSE ATTENDANCE

The following personnel have attended the site PPE training course, and demonstrated, through use, an understanding of the donning/doffing procedures, inspection, cleaning, maintenance, storage, limitations, and proper disposal of the PPE listed on this certificate. These personnel are now qualified to use the site- and task-specific PPE, as required by the SSHP.

Name	Organization	Name	Organization

TYPES AND LEVELS OF PPE ADDRESSED DURING TRAINING

Trainer's Initials	Personal Protective Equipment Reviewed	Trainer's Initials	Personal Protective Equipment Reviewed

CERTIFICATION

I the undersigned do hereby certify that the above listed personnel have received the requisite training and successfully demonstrated their ability to use the PPE listed above, in accordance with the BW Personal Protective Equipment Program.

Name (printed):	Signature:	Date:

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PREPARATORY INSPECTION CHECKLIST

CONTRACT NO: W9128F-04-D-0004, TO No. 0043 **DATE:** _____

PROJECT: MMRP MEC Burial Pit Removal, Holloman AFB New Mexico

MAJOR DEFINABLE SEGMENT OF WORK: _____

A. PERSONNEL PRESENT:

	NAME	POSITION	COMPANY
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

B. ITEMS INVOLVED:

	ITEM	SPECIFICATION OR PLAN SECTION	CONTRACTOR OR GOVERNMENT APPROVAL
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

B-I. Have all items involved been approved?

Yes _____

No _____

Docs# 93033

PREPARATORY INSPECTION CHECKLIST

B-II What items have not been approved?

1. _____
2. _____
3. _____
4. _____
5. _____

C. TESTS REQUIRED IN ACCORDANCE WITH CONTRACT REQUIREMENTS:

	TEST	SPECIFICATION OR PLAN SECTION
1.		
2.		
3.		
4.		
5.		

E. ACCIDENT PREVENTION PREPLANNING - HAZARD CONTROL MEASURES:

Applicable HASP Sections

1. _____
2. _____
3. _____
4. _____
5. _____

_____
QC Manager

INITIAL PHASE INSPECTION CHECKLIST

CONTRACT NO: W9128F-04-D-0004, TO No. 0043 **DATE:** _____

PROJECT: MMRP MEC Burial Pit Removal, Holloman AFB, New Mexico

DESCRIPTION OF WORK INSPECTED: _____

A. PERSONNEL PRESENT:

	NAME	POSITION	COMPANY
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

B. MATERIALS BEING USED ARE IN STRICT COMPLIANCE WITH THE CONTRACT SPECIFICATIONS:

Yes _____

No _____

IF NOT, EXPLAIN: _____

C. PROCEDURES AND/OR WORK METHODS WITNESSED ARE IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF THE CONTRACT SPECIFICATIONS:

Yes _____

No _____

IF NOT, EXPLAIN: _____

INITIAL PHASE INSPECTION CHECKLIST

D. WORKMANSHIP IS ACCEPTABLE:

Yes _____

No _____

STATE AREAS WHERE IMPROVEMENT IS NEEDED: _____

_____

_____

E. SAFETY VIOLATIONS AND CORRECTIVE ACTION TAKEN:

_____

_____

_____

_____

QC Manager

Bay West

INITIAL ENTRY TO SITE SAFETY INSPECTION CHECKLIST FOR CONSTRUCTION EQUIPMENT (Including Cranes, Derricks, and Hoisting Equipment)		
PROJECT: MMRP MEC Burial Pit Removal, Holloman AFB, NM	**CONTRACTOR:** BAY WEST, INC.	**CONTRACT NO.:** W9128F-04-D-0004-0043
TYPE AND MAKE OF EQUIPMENT:	**MODEL:**	**SERIAL NO.:**

Before any machinery or mechanized equipment is placed in sue, it shall be inspected and tested by a competent mechanic and certified to be in good operating condition. Records of tests and inspections shall be maintained as part of the active contract file at Project or Resident Office. Checklist set forth herein requires the application of EM 385-1-1, Safety and Health Requirements Manual, 1 Oct 87.

CHECKLIST	Yes	No	N/A
1. Are adequate and serviceable fire extinguishers provided?			
2. Are all wire rope cables in good condition?			
3. Are wire rope, sockets, splices, thimbles and clips adequate and properly attached?			
4. Are hooks, safety nooks, shackles, rings, etc., in good condition?			
5. Are necessary platforms, footwalks, etc., provided?			
6. Are access steps, platforms, etc., provided with non-slip surfaces?			
7. Is operator protected against the elements, falling or flying objects, swinging loads, and similar hazards?			
8. Are all glasses in operator's compartment safety glass and in good repair?			
9. Is suitable access provided to lubrication points?			
10. Do all modifications, extensions, replacement parts, and/or repairs to equipment maintain the same factor of safety as original designed equipment?			
11. Are drums for load lines equipped with at least one positive holding device, applied directly to the motor shaft or some part of the train gear?			
12. Is there sufficient cable to allow two full wraps of cable on drums at all working positions?			
13. Are adequate headlights, taillights and turn signals provided and are they in proper operating condition?			
14. Are all approved brakes on wheeled equipment and in good operating condition?			
15. Do windshields have wipers in proper operating condition?			
16. Are rear view mirrors provided?			
17. Are operating levers equipped with latch or other devices to prevent accidental starting?			
18. Is engine equipped with power-operated starting device in operative condition?			
19. Do all pressure vessels have valid inspection certificates?			
20. Are reverse signal alarms on equipment?			

Bay West

CHECKLIST	Yes	No	N/A
21. Are belts, gears, shafts, electrical contacts, etc., adequately guarded?			
22. Are all hot pipes and surfaces suitably guarded?			
23. Are fuel tanks located so that spills or overflows will not come in contact with engine or exhaust?			
24. Are exhausts and discharges so directed as not to endanger workmen or obstruct view of operator?			
25. Are guards in place on equipment with drop type skip pans?			
26. Are adequate seats provided for all riders?			
27. Are tires in serviceable condition? Are testing/inspections documented?			
28. Is steering linkage and tie rod in good operating condition? Are testing/inspections documented?			
29. Are dump bodies provided with holding device or other suitable device for locking body in raised position?			
30. Are tailgate dumping devices so arranged that operator will be in the clear while dumping loads?			
31. Are trip-handles provided on tailgates to facilitate handling?			
32. Is air hose free from leaks or defects?			
33. Are safety lashings for quick make-up type connections provided?			
34. Is acceptable spark arrestor installed and working?			
35. Do heating devices comply with references?			
36. Does welding equipment comply with code requirements?			
37. Is equipment adequately grounded?			
38. Do electrical components comply with code?			
39. Are required pressure, temperature, or relief gages and valves installed and operable?			
40. Are approved seat belts and rollover protection provided?			
41. Is recommended preventive maintenance being followed?			
42. Do helicopter cranes meet construction requirements?			
43. Do hydraulic jacks meet special safety conditions?			
44. Is concrete equipment fitted with adequate safety devices?			
45. Are elevating and rotating work platforms in conformance with ANSI A92.2?			
46. Do conveyors, cableways, and related equipment conform to ANSI B20.0?			

Bay West

CHECKLIST	Yes	No	N/A
47. Are pile drivers equipped with all appropriate safety devices?			
48. Do material hoists conform to ANSI A10.5?			
49. Do passenger elevators conform to ANSI A10.4? Do temporary hoists in accordance to ANSI A20.22?			
50. Do hand and power tools comply with applicable ANSI standards?			
The following six questions apply to Cranes and Hoisting Equipment only and need not be answered for other construction equipment.			
51. Is high voltage sign posted?			
52. Is equipment fitted with positive stops for rotation when near power lines?			
53. Is there any visible evidence to damage to boom?			
54. Is the boom position indicator operating and visible to operator?			
55. Have all operators had a current physical examination?			
56. Is equipment capable of effectively braking, lowering and safety holding a load of at least the full rated load as required?			

REMARKS:

CERTIFICATION: *I hereby certify that this item of equipment is in good operating condition and that it meets all above requirements except as noted under remarks.*

Signature of Competent Mechanic _____ Date _____

Signature of Superintendent/Quality Control Engineer _____ Date _____

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Bay West, Inc. Daily Equipment Checklist
Contract No: W9128F-04-D-0004-0043
Project:MMRP MEC Burial Pit Removal, Holloman AFB, New Mexico

Week Ending: _____

Type of Equipment: _____

Area	Comments	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
Glass								
Hydraulic Cylinders								
Hoses								
Hydraulic Fluid Level								
Fuel								
Engine Oil								
Coolant								
Leaks								
Fire Extinguishers								
Reverse Signals								
Tires								
Grease								
Grease Fittings								
Box Condition								
Lights								
Belts								
Saftey Guards								

INSPECTED BY _____

Docs# 93023

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BAY WEST
EXCAVATION INSPECTION FORM

Complete this form at the beginning of each shift or after an event which may have impacted the safety of an excavation.

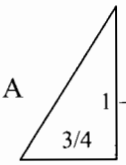
Job No.:	Competent Person:
Date of Inspection:	Time of Inspection: a.m./p.m.
Description of Excavation:	
Excavation activities performed/planned:	

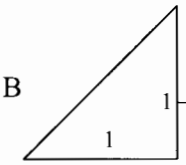
Soil type and protective system:

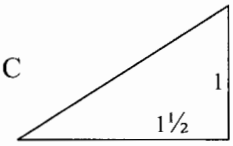
____ Sloping or Benching

____ Stable Rock (Vertical)

____ Shoring/shielding Utilized?

_____ Type A 

_____ Type B 

____ Type C 

INSPECTION CHECKLIST	N/A	YES	NO
All Excavations:			
Is a barrier provided to identify and guard the excavation boundary?			
Have underground utilities been identified and marked?			
Is clearance (10 feet minimum) or guarding provided to overhead power lines?			
Is excavated material and equipment placed at least 2' from the excavation?			
Do ground workers wear safety vests when working near heavy equipment?			
Are adjacent structures properly stabilized if impacted by the excavation?			
Is there evidence of water that may impact the safety of the excavation?			
Excavations >4 feet deep			
Is a means of egress provided no more than 25' from the work?			
Is there a potential for a hazardous atmosphere in the excavation?			
If yes, is the atmosphere monitored and emergency equipment provided?			
Excavations >5 feet deep			
Is a cave-in protective system employed?			
Is sloping at the proper angle?			
Is shoring or shielding properly designed, constructed, installed and maintained?			
Excavation >20 feet deep			
Has a Registered Professional Engineer designed the protective system?			
Are the designs followed?			

Competent Person Signature:_____

File this completed checklist with the project file.

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Prime Contractor: Bay West, Inc.
Subcontractor: USA Environmental

Safety Inspection Form
For MEC Operations

DATE:	**TIME:**	**LOG NO.:**
CONTRACT NO.: W9128F-04-D-0004	**TASK ORDER NO.:** 0043	

SITE NAME AND LOCATION: MMRP MEC Burial Pit Removal, Holloman AFB, NM

TEAM OR NAME OF INSPECTED:

INSPECTED ITEMS OR OPERATIONS: (List by task, item or other specific identifier)

II. INSPECTION RESULTS

Item Description	Pass	Item Description	Pass
1. PPE (A, B,C,D)	Y / N	9. MEC/UXO Disposal Operations:	Y / N
2. Compliance with Approved SOP's	Y / N	10. Motor Vehicles / MHE Inspections	Y / N
3. Compliance with Approved Safety Plans	Y / N	11. First Aid / Trauma Kit:	Y / N
4. Safety / Support Equipment	Y / N	12. Other (list):	Y / N
5. On- and Off-Site Communications	Y / N	13. Other (list):	Y / N
6. Explosives / Ordnance Reference Material	Y / N	14. Other (list):	Y / N
7. MSDSs and Container Labeling per APP or SOP	Y / N	15. Other (list):	Y / N
8 MEC/UXO Precautions Observed	Y / N	16. Other (list):	Y / N

SUMMARY OF DEFICIENCIES NOTED: (If Required)

CORRECTIVE ACTIONS RECOMMENDED: (If required)

REINSPECTION RESULTS: (If required)

VI. SIGNATURES:

I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (if necessary).

UXOSO / UXOQC

Sr. UXO Supervisor / Project Manager

Note: Safety Inspections are to be conducted each day and documented on this form. This form will also be used to document the present status of the site/site operations, personnel, and will also be used to note the current status of deficiencies noted during daily inspections. Any daily inspection forms where deficiencies have been noted will be forwarded to the Project Manager, Project SUXOS and the Corporate Safety and Health Manager.

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Prime Contractor: Bay West, Inc.
Subcontractor: USA Environmental

Quality Control Inspection Form
For MEC Operations

DATE:	**TIME:**	**LOG NO.:**
CONTRACT NO.: W9128F-04-D-0004	**TASK ORDER NO.:** 0043	
SITE NAME AND LOCATION: MMRP MEC Burial Pit Removal, Holloman AFB, New Mexico		
WEATHER CONDITIONS:		
AREAS INSPECTED: (List by grid number, team, task, or other identifier)		

II. INSPECTION RESULTS

	Pass	Item Description	Pass
1. PPE	Y / N	9. UXO/MEC Specific Equipment	Y / N
2. Compliance with Work Plan	Y / N	10. MOTOR VEHICLES / MHE	Y / N
3. Compliance with Safety and QC Plans	Y / N	11. Other (list):	Y / N
4. Support Equipment	Y / N	12. Other (list):	Y / N
5. On- and Off-Site Communications	Y / N	13. Other (list):	Y / N
6. Explosives / Ordnance Storage Areas	Y / N	14. Other (list):	Y / N
7. MSDSs and Container Labeling per SSHP	Y / N	15. Other (list):	Y / N
8 UXO/MEC Disposal Equipment	Y / N	16. Other (list):	Y / N

SUMMARY OF DEFICIENCIES NOTED: (If Required)

CORRECTIVE ACTIONS RECOMMENDED: (If required)

REINSPECTION RESULTS: (If required)

VI. SIGNATURES:

I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (if necessary).

UXOQCS

Sr. UXO Supervisor / Project Manager

Note: QC Inspections are to be conducted and documented on this form. This form will also be used to document the present status of the site/site operations, and will also be used to note the current status of deficiencies noted during daily inspections. Any daily inspection forms where deficiencies have been noted will be forwarded to the Site Manager and the Corporate QA/QC Manager.

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	Bay West, Inc. **HAZARD REPORT AND SUGGESTION FORM**	**Hazard Type:** **Condition** ☐ **Practice** ☐

The form is intended to provide a means for any employee to report hazards in the work place, or to make suggestions that will improve safety, environmental protection, quality or productivity. It may also be used to report Near Miss incidents with a low loss potential. If desired, the Report may be submitted anonymously. Please provide enough information to allow an effective evaluation of the hazard or suggestion. Your input is appreciated and all suggestions will be evaluated. If your name is included, we may request further information, and will inform you of the disposition. Thank You!

DESCRIBE CONDITION OR PRACTICE:

SUBMITTED BY (OPTIONAL):	**DATE:**	
IMMEDIATE CORRECTIVE ACTION COMPLETED:	**COMPLETED BY**	**COMPLETION DATE**

RECOMMENDATIONS FOR FURTHER CORRECTIVE ACTION	**RESPONSIBLE PERSON**	**TARGET DATE**	**COMPLETION DATE**

FOR OFFICE USE ONLY

POTENTIAL INCIDENT TYPE:

Slip/Trip/Fall		**Strain/Overexertion**		**Fire**	
Struck By Or Against		**Chemical Exposure**		**Environmental Release**	
Caught In, Between Or		**Property Damage**		**Other (Explain)**	

Project/Office/Location:

Report Given To: _____ Date: _____

Tracking Number:

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Prime Contractor: Bay West, Inc.
Subcontractor: USA Environmental

Non-Conformance Log

Project Location: MMRP MEC Burial Pit Removal, Holloman AFB, New Mexico

Contract No.: W9128F-04-D-0004
Task Order 0043

Date:	NRC #:	Description of NCR	Issued By:	Correction Date:

Docs# 93028

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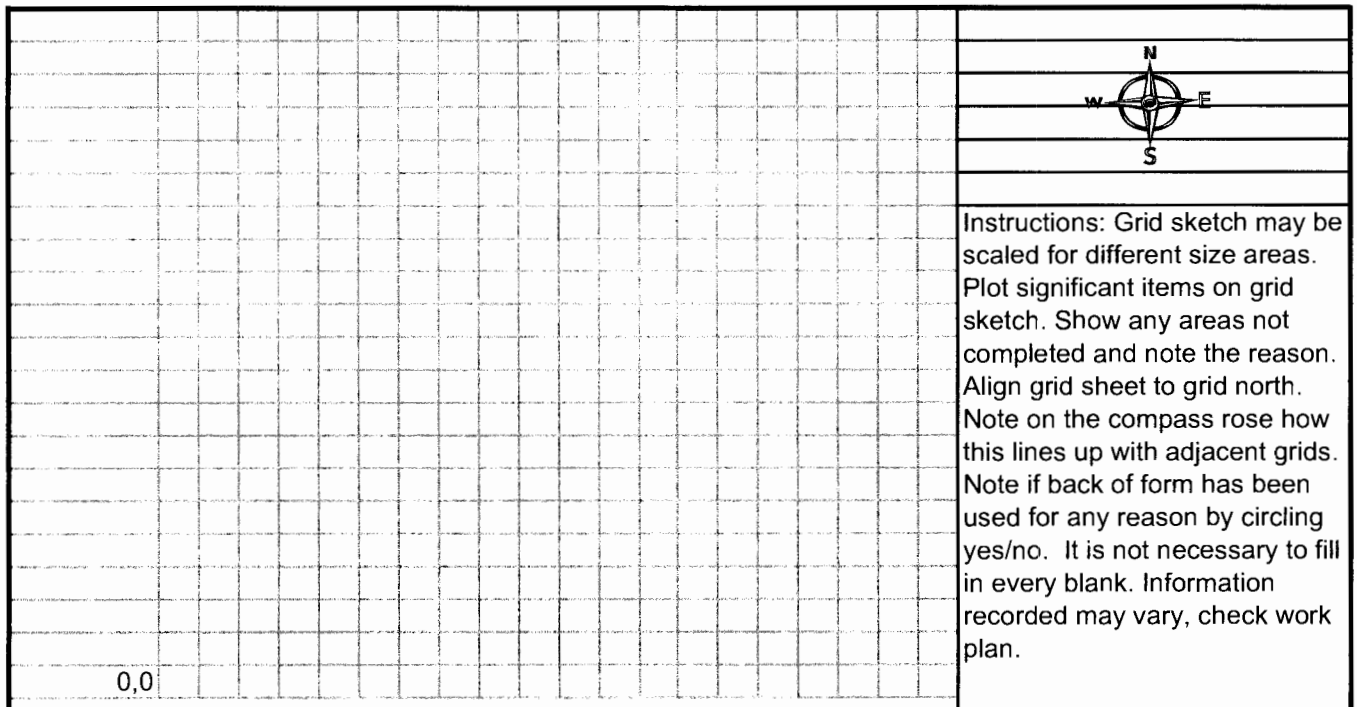
Bay West Inc. GRID SHEET Back Used: YES NO

Project:_____Grid_____ Date: _____

Grid Sketch



Instructions: Grid sketch may be scaled for different size areas. Plot significant items on grid sketch. Show any areas not completed and note the reason. Align grid sheet to grid north. Note on the compass rose how this lines up with adjacent grids. Note if back of form has been used for any reason by circling yes/no. It is not necessary to fill in every blank. Information recorded may vary, check work plan.

Each Line = _____ feet (Fill in to scale drawing as necessary)

Team _____ Team Leader _____

Date	Digs	MEC Items	MD	Other Debris	SQ Ft. Today	% of Grid Complete	Comments
Grid Total							

UXO/MEC or Other Significant Items (Use back for additional.)

1

2

3

4

5

Notes:

QC Check: Sat ☐ Unsat ☐ Date: _____ Rework complete _____

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U.S. Department of Justice
Bureau of Alcohol, Tobacco, Firearms and Explosives

OMB No. 1140-0072

Employee Possessor Questionnaire

o needs to complete this form? This questionnaire MUST be completed by EACH employee sessor of a Federal explosives licensee or permittee or applicant, unless otherwise provided. (*See reverse for definition of employee possessor.*)

For ATF Use Only

RDS KEY:

Employee Possessor Information and Certification

Print the Requested Information in Block Letters.

1. Last Name

2. First Name

3. Middle Name

4. Name Suffix, if any (*e.g., sr., Jr., II*)

5. Other Names Used - Including Maiden Name

6. Social Security Number (***Voluntary**, will help prevent misidentification*)

7. Place of Birth (*City and State - or - City and Foreign Country*)

8. Date of Birth (*Month/Day/Year*)

9. Race/Ethnicity (*Check one or more boxes*)

- ☐ ierican Indian or Alaskan Native
- ☐ Hispanic
- ☐ Asian
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ Black or African American
- ☐ White

10. Sex *(Check one box)*

Male ☐ Female ☐

11. Home Telephone Number (*Include area code*)

12. Work Telephone Number (*Include area code and extension*)

Home Address

13a. Street Address

13b. Street Address *(Continuation)*

13c. Apt. Number

13d. City

13e. State or Province, Country (*if outside the United States*)

13d. Zip Code / Postal Code

Explosives Applicant Business or Operations Name

14. Name and address of explosives business or operations at which you are an employee possessor.

15. Your position in the explosives business or operations.

16. Federal explosives license/permit number for explosives business/operations.

17a. What is your Country of Citizenship?

17b. If you have citizenship in additional countries, please list.

If you indicated above you are a United States citizen, skip to question 18.

17c. What is your U.S. Immigration and Naturalization Service (INS) - issued alien number or admission number?

The following questions must be answered with a "YES" or "NO" in the box.

	Yes	No
18. Are you a fugitive from justice?	☐	☐
19. Are you an unlawful user of, or addicted to, marijuana or a depressant, stimulant, or narcotic drug, or any other controlled substance?	☐	☐
20. Have you ever been convicted in any court of a **felony**, or any other crime, for which the judge could have imprisoned you for more than one year, even if you received a shorter sentence, including probation? (See Definition 1, Exception 1.)	☐	☐
21. Are you under indictment or information in any court for a **felony**, or any crime, for which the judge could imprison you for more than one year? (An information is a formal accusation of a crime by a prosecutor. See Definition 1.)	☐	☐
22. Have you ever been adjudicated mentally defective (which includes having been adjudicated incompetent to manage your own affairs) or have you ever been committed to a mental institution?	☐	☐
23. Have you ever been discharged from the Armed Forces under **dishonorable** conditions?	☐	☐
24. Have you ever **renounced** your United States citizenship?	☐	☐
25. Are you an alien in the United States? If "YES," attach an explanatory statement showing that you are a lawful permanent resident. (See Definition 3, Exception 2.) (Generally, if you are an alien [except for a lawful permanent resident alien], you cannot possess explosive materials.) **Statement Attached** ☐	☐	☐

Under the penalties imposed by 18 U.S.C. 844, I, _____, certify under penalties of perjury that
Print Your Full Name
the answers on this questionnaire are true, correct, and complete.

Your Signature	Date

Instructions

1. **Who must fill out and complete this form?** EACH employee possessor, as defined below, MUST personally complete this questionnaire form and certify that the answers are true, correct, and complete.
2. **To whom do I submit this form?** You must complete and submit this form to your employer (applicant for license/permit). The employer will submit this form, along with the application, to ATF. **If** this form is being submitted AFTER a license or permit has been issued in order to ADD you as an employee possessor, then the form must be accompanied by a signed letter from the licensee or permittee requesting that you be added as an employee possessor. In such instance, the form should be sent to: ATF, National Licensing Center, 2600 Century Parkway NE, Suite 400, Atlanta, GA 30345.
3. **Why is this form required?** 18 U.S.C., Chapter 40, was amended by the 'Safe Explosives Act of 2002' (the Act). The Act made it unlawful for certain persons to ship, transport, receive, or possess explosive materials. The Act also made it unlawful to distribute explosive materials to certain persons. Information you provide on this form will allow ATF to determine whether you, an employee possessor in the explosives business or operations, are prohibited from shipping, transporting, receiving, or possessing explosive materials. 18 U.S.C. 842(d), (i).
4. **Should documentation be attached to clarify a response to a question or item?** Providing additional documentation to clarify a response to a specific question or item on the front of this form could help prevent a delay in processing your Employer Possessor Questionnaire. Please ensure that your name is on any attached documents(s). In addition, if your employer is renewing a Federal explosives license or permit, ensure that the employer's current license or permit number is on any attached documents.
5. **How do I obtain additional forms?** The form can be downloaded from ATF's website in Adobe PDF format at **www.atf.gov/forms/index.htm**. The form can be ordered using ATF's Online Distribution Center Order Form at **www.atf.gov/dcof/index.htm**. The form can also be ordered by calling ATF's Distribution Center at **(703) 455-7801**.
6. **What do I do if I am prohibited from possessing explosives as indicated above?** If you are prohibited from possessing explosives, you may request relief from your Federal explosives disability by filing an ATF Form 5400.29, Application for Restoration of Explosives Privileges. This form can be downloaded from ATF's website at **www.atf.gov/forms/index.htm** or may be obtained by calling (202) 927-2260/2310. Please be advised that you cannot possess explosives until such time that relief may be granted. For example, if you are a nonimmigrant alien, you should answer "yes" to question 25, and you are prohibited from possessing explosives. You may file a relief application, but you cannot possess explosives until such time that ATF may grant you relief.
7. **Need assistance in completing the form?** Please review information online concerning this form at **www.atf.gov**, contact the National Licensing Center at **(404) 417-2750**, or contact your local **ATF office**.

Definitions

1. **Under Indictment or Information or Convicted in Any Court.** An indictment, information, or conviction in any Federal, State, local, or foreign court.
2. **Employee Possessor.** An employee possessor is an individual who has **actual or constructive possession** of explosive materials during the course of his employment. **Actual possession** exists when a person is in immediate possession or control of explosive materials (*e.g., an employee who physically handles explosive materials as part of the production process; an employee who handles explosive materials in order to ship, transport, or sell them; or an employee such as a blaster, who actually uses explosive materials*).
   Constructive possession exists when an employee lacks direct physical control over explosive materials, but knowingly has the power and intention to exercise dominion and control over the explosive materials, either directly or indirectly through others (*e.g., an employee at a construction site who keeps keys for magazines in which explosive materials are stored, or who directs the use of explosive materials by other employees; or an employee transporting explosive materials from a licensee to a purchaser*).
3. **Alien.** An alien in the United States means any person who is not a citizen or national of the United States.

Exceptions

1. A person who has been convicted of a felony, or any other crime, for which the judge could have imprisoned the person for more than one year, is not prohibited from shipping, transporting, possessing, or receiving explosives if: (1) the conviction was properly invalidated by a court on the basis that the conviction was unconstitutional; (2) in the case of a Federal conviction, the person received a Presidential pardon; or (3) ATF granted relief from Federal explosives disabilities under 18 U.S.C. 845(b), 27 CFR 555.142.
2. For purposes of this form, aliens can be employee possessors if they a lawful permanent residents. 18 U.S.C. 842(d)(7); (i)(5).

Privacy Act Information

The following information is provided pursuant to Section 3 of the Privacy Act of 1974, 5 U.S.C. 552a(e)(3):

1. **Authority.** Solicitation of this information is made pursuant to 18 U.S.C. 842, 843. Disclosure of this information by the employee possessor is mandatory if the employee possessor wishes to possess explosives.
2. **Purpose.** To determine the eligibility of the employee possessor to possess explosive materials.
3. **Routine Uses.** The information will be used by ATF to make determinations set forth in paragraph 2. In addition, information may be disclosed to other Federal, State, foreign, and local law enforcement and regulatory agency personnel to verify information on the employee possessor questionnaire and to aid in the performance of their duties with respect to the regulation of explosives unless such disclosure is prohibited by law. Finally, the information may be disclosed to members of the public in order to verify the information on the questionnaire when such disclosure is not prohibited by law.
4. **Effects of not supplying the requested information.** Failure to supply complete information will delay processing and may cause denial of the application.
5. **Disclosure of social security number.** Disclosure of the individual's social security number is voluntary. Under 18 U.S.C. 842(f), 843, an Executive Order 9397, November 22, 1943, ATF has the authority to solicit an individual's social security number. The number may be used to verify the individual's identity.

Paperwork Reduction Act Notice

This request is in accordance with the Paperwork Reduction Act of 1995. The purpose of this information collection is to determine the eligibility of the employee possessor to engage in certain operations. The information requested is required to obtain or retain a benefit and is mandatory by statute 18 U.S.C. 843.

The estimated average burden associated with this collection is 20 minutes per respondent, depending on individual circumstances. Comments concerning the accuracy of this burden estimate and suggestions for reducing this burden should be addressed to Reports Management Officer, Document Services Branch, Bureau of Alcohol, Tobacco, Firearms and Explosives, Washington, DC 20226.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

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Magazine Data Card

Nomenclature:

Lot Number: Unit Of Issue:

Date	Name	Received	Issued	Balance	Checkers Initials

Docs# 100060

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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.

Docs# 100060

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U.S. Department of Justice
Bureau of Alcohol, Tobacco, Firearms and Explosives

OMB No. 1140-0026 (01/31/2009)

Report of Theft or Loss - Explosive Materials

For ATF Use Only

.ic Received	Time Received	Unique Identifier

Upon discovery of any theft or loss of any of your explosive materials:
- First, contact ATF toll free at 1-800-461-8841 between 8:00 a.m. - 5:00 p.m. EST or after hours and weekends contact ATF at 1-800-800-3855 to report the theft or loss;
- Second, contact your local law enforcement office to report the theft or loss to obtain a police report; and
- Third, complete this form and attach any additional reports, sheets or invoices necessary to provide the required information, and fax the form with additional material(s) to the ATF U.S. Bomb Data Center (USBDC).

To Be Completed By Person Making Report

1. Date	2. Type of Report *(Check one)*: **Theft** ☐ **Loss** ☐
3. Full Name of Person Making the Report *(Last, First, Middle)*	4. Corporate or Business Name *(If applicable)*
5a. Office Address *(Street Address, City, State, and Zip Code)*	5b. Telephone Number

6. Actual Location of Theft or Loss *(if different from item 5a)*

7. Theft or Loss	Date	Time	8. Name of Local Law Enforcement Officer to Whom Reported	
)iscovered			9. Agency Name and Address of Local Authority to Whom Reported	
b. Occurred *(Show approximate if exact not known)*				
c. Reported to ATF by Telephone			10. Telephone Number	11. Police Report Number
d. Reported to Local Authorities				

12. Explosive Materials Lost or Stolen *(Attach invoices or additional sheets, if necessary)*

a. Manufacturer	**b. Brand Name**	**c. Date Shift Code**	**d. Size**	**e. Quantity** *(Pounds of Explosives, Number of Dets)*	**f. Type and Description** *(Dynamite, Blasting Agents, Detonators, etc. Include for each type, size, MS delay or length of legwire, as applicable)*

13. Theft or Loss Occurred From *(Check applicable box)*

Permanent Magazine ☐ Portable Magazine ☐ Truck ☐ Work Site ☐ Other *(Explain)* ☐ _____

14. Method of Entry *(Complete if applicable)*				15. Hood Defeated *(If yes, check the applicable box below)* Yes ☐ No ☐	
Locks Cut	☐	Inside Help	☐	Broken	☐
Locks Picked	☐	Wall Entry	☐	Cut	☐
Door Unlocked	☐	Key Stolen/ Used	☐	Removed	☐
Door Blown Open	☐			Inadequate for Lock Used	☐

16. Other Information Pertinent to the Theft or Loss

17. Signature and Title of Person Making Report	18. Federal Explosives License or Permit Number

Reporting Instructions

Fax this completed form to the ATF address listed below or call if no fax is available:

Bureau of Alcohol, Tobacco, Firearms and Explosives
U.S. Bomb Data Center
99 New York Ave. NE, 8.S.295
Washington, DC 20226
Toll Free Fax: 1-866-927-4570

Questions regarding the completion of this form should be referred to the U.S. Bomb Data Center toll free at 1-800-461-8841.

Privacy Act Information

The following information is provided pursuant to section 3 of the Privacy Act of 1974 (5 U.S.C. § 522a(e)(3))

1. **Authority.** Solicitation of this information is made pursuant to Title XI of the Organized Crime Control Act of 1970 (18 U.S.C. Chapter 40). Disclosure of a theft or loss of explosive materials is mandatory pursuant to 18 U.S.C. § 842(k) for any person who has knowledge of such theft or loss from his stock.

2. **Purpose.** The purpose for the collection of this information is to give ATF notice of the theft or loss of explosive materials, and to furnish ATF with the pertinent facts surrounding such theft or loss. In addition, the information is used to confirm and verify prior notification of this theft or loss of explosive materials.

3. **Routine Uses.** The information will be used by ATF to aid in the administration of laws within its jurisdiction concerning the regulation of explosive materials and other related areas. In addition, the information may be disclosed to other Federal, State, foreign, and local law enforcement of laws within their jurisdiction.

4. **Effects of not supplying information requested.** 18 U.S.C. § 842(k) makes it unlawful for any person, who has knowledge of the theft or loss of explosive materials from his stock, to fail to report such theft or loss within twenty-four hours of discovery thereof, to the Secretary and to appropriate local authorities. The penalty for violation of this section is a fine of not more than $1,000 or imprisonment for not more than one year, or both. 18 U.S.C. § 844(b)

Paperwork Reduction Act Notice

This request in accordance with the Paperwork Reduction Act of 1995. The purpose of this information collection is to report the theft or loss of explosive materials. The information is used for investigative purposes by ATF officials. This information is mandatory by statute. (18 U.S.C. § 842)

The estimated average burden associated with this collection of information is 1 hour and 48 minutes per respondent or recordkeeper, depending on individual circumstances. Comments concerning the accuracy of this burden estimate and suggestions for reducing this burden should be addressed to Reports Management Officer, Document Services Branch, Bureau of Alcohol, Tobacco, Firearms and Explosives, Washington, DC 20226.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

MOTOR VEHICLE INSPECTION (TRANSPORTING HAZARDOUS MATERIALS)

(Read Instructions before completing this form.)

This form applies to all vehicles which must be marked or placarded in accordance with Title 49 CFR.	1. BILL OF LADING/TRANSPORTATION CONTROL NUMBER

SECTION 1 - DOCUMENTATION	ORIGIN a.	DESTINATION b.
2. CARRIER/GOVERNMENT ORGANIZATION		
3. DATE/TIME OF INSPECTION		
4. LOCATION OF INSPECTION		
5. OPERATOR(S) NAME(S)		
6. OPERATOR(S) LICENSE NUMBER(S)		
7. MEDICAL EXAMINER'S CERTIFICATE*		

8. *(X if satisfactory at origin)*

a. MILITARY HAZMAT ENDORSEMENT		d. ERG OR EQUIVALENT COMMERCIAL:		YES		NO	
b. VALID LEASE*		e. DRIVER'S VEHICLE INSPECTION REPORT*					
c. ROUTE PLAN		f. COPY OF 49 CFR PART 397					

9. CVSA DECAL DISPLAYED ON COMMERCIAL EQUIPMENT*	YES	NO
a. TRUCK/TRACTOR		
b. TRAILER		

SECTION II - MECHANICAL INSPECTION

All items shall be checked on empty equipment prior to loading. Items with an asterisk shall be checked on all incoming loaded equipment.

10. TYPE OF VEHICLE(S)	11. VEHICLE NUMBER(S)

12. PART INSPECTED *(X as applicable)*	ORIGIN (1)		DESTINATION (2)			ORIGIN (1)		DESTINATION (2)		COMMENTS (3)
	SAT	UNSAT	SAT	UNSAT		SAT	UNSAT	SAT	UNSAT	
a. SPARE ELECTRICAL FUSES					k. EXHAUST SYSTEM					
b. HORN OPERATIVE					l. BRAKE SYSTEM*					
c. STEERING SYSTEM					m. SUSPENSION					
d. WINDSHIELD/WIPERS					n. COUPLING DEVICES					
e. MIRRORS					o. CARGO SPACE					
f. WARNING EQUIPMENT					p. LANDING GEAR*					
g. FIRE EXTINGUISHER*					q. TIRES, WHEELS, RIMS					
h. ELECTRICAL WIRING					r. TAILGATE/DOORS*					
i. LIGHTS AND REFLECTORS					s. TARPAULIN*					
j. FUEL SYSTEM*					t. OTHER *(Specify)*					

13. INSPECTION RESULTS *(X one)* ACCEPTED ☐ REJECTED ☐

(If rejected give reason under "Remarks". Equipment will be approved if deficiencies are corrected prior to loading.)

14. SATELLITE MOTOR SURVEILLANCE SYSTEM: *(X one)* ACCEPTED ☐ REJECTED ☐

15. REMARKS

16. INSPECTOR SIGNATURE *(Origin)*	17. INSPECTOR SIGNATURE *(Destination)*

SECTION III - POST LOADING INSPECTION

This section applies to Commercial and Government/Military vehicles. All items will be checked prior to release of loaded equipment and shall be checked on all incoming loaded equipment.

	ORIGIN (1)		DESTINATION (2)		COMMENTS (3)
	SAT	UNSAT	SAT	UNSAT	
18. LOADED IAW APPLICABLE SEGREGATION/COMPATIBILITY TABLE OF 49 CFR					
19. LOAD PROPERLY SECURED TO PREVENT MOVEMENT					
20. SEALS APPLIED TO CLOSED VEHICLE; TARPAULIN APPLIED ON OPEN EQUIPMENT					
21. PROPER PLACARDS APPLIED					
22. SHIPPING PAPERS/DD FORM 836 FOR GOVERNMENT VEHICLE SHIPMENTS					
23. COPY OF DD FORM 626 FOR DRIVER					
24. SHIPPED UNDER DOT SPECIAL PERMIT 868					

25. INSPECTOR SIGNATURE *(Origin)*	26. DRIVER(S) SIGNATURE *(Origin)*
27. INSPECTOR SIGNATURE *(Destination)*	28. DRIVER(S) SIGNATURE *(Destination)*

INSTRUCTIONS

SECTION I - DOCUMENTATION

General Instructions.

All items (2 through 9) will be checked at origin prior to loading. Items with an asterisk (*) apply to commercial operators or equipment only. Only Items 2 through 7 are required to be checked at destination.

Items 1 through 5. Self explanatory.

Item 6. Enter operator's Commercial Driver's License (CDL) number or Military OF-346 License Number. CDL and OF-346 must have the HAZMAT and other appropriate endorsements IAW 49 CFR 383.

Item 7. *Enter the expiration date listed on the Medical Examiner's Certificate.

Item 8.a. APPLIES TO MILITARY OPERATORS ONLY. Military Hazardous Materials Certification. In accordance with applicable service regulations, ensure operator has been certified to transport hazardous materials.

b. *Valid Lease. Shipper will ensure a copy of the appropriate contract or lease is carried in all leased vehicles and is available for inspection. (49 CFR 376.12 and 376.11(c)(2)).

c. Route Plan. Prior to loading any Hazard Class/Division 1.1, 1.2, or 1.3 (Explosives) for shipment, ensure that the operator possesses a written route plan in accordance with 49 CFR Part 397. Route Plan requirements for Hazard Class 7 (Radioactive) materials are found in 49 CFR 397.101.

d. Emergency Response Guidebook (ERG) or Equivalent. Commercial operators must be in possession of an ERG or equivalent document. Shipper will provide applicable ERG page(s) to military operators.

e. *Driver's Vehicle Inspection Report. Review the operator's Vehicle Inspection Report. Ensure that there are no defects listed on the report that would affect the safe operation of the vehicle.

f. Copy of 49 CFR Part 397. Operators are required by regulation to have in their possession a copy of 49 CFR Part 397 (Transportation of Hazardous Materials Driving and Parking Rules). If military operators do not possess this document, shipper will provide a copy to operator.

Item 9. *Commercial Vehicle Safety Alliance (CVSA) Decal. Check to see if equipment has a current CVSA decal and mark applicable box. Vehicles without CVSA, check documentation of the last vehicle periodic inspection and perform DD Form 626 inspection.

SECTION II - MECHANICAL INSPECTION

General Instructions.

All items (12.a. through 12.t.) will be checked on all incoming empty equipment prior to loading. All UNSATISFACTORY conditions must be corrected prior to loading. Items with an asterisk (*) shall be checked on all incoming loaded equipment. Unsatisfactory conditions that would affect the safe off-loading of the equipment must be corrected prior to unloading.

SECTION II *(Continued)*

Item 12.a. Spare Electrical Fuses. Check to ensure that at least one spare fuse for each type of installed fuse is carried on the vehicle as a spare or vehicle is equipped with an overload protection device (circuit breaker). (49 CFR 393.95)

b. Horn Operative. Ensure that horn is securely mounted and of sufficient volume to serve purpose. (49 CFR 393.81)

c. Steering System. The steering wheel shall be secure and must not have any spokes cracked through or missing. The steering column must be securely fastened. Universal joints shall not be worn, faulty or repaired by welding. The steering gear box shall not have loose or missing mounting bolts or cracks in the gear box mounting brackets. The pitman arm on the steering gear output shaft shall not be loose. Steering wheel shall turn freely through the limit of travel in both directions. All components of a power steering system must be in operating condition. No parts shall be loose or broken. Belts shall not be frayed, cracked or slipping. The power steering system shall not be leaking. (49 CFR 396 Appendix G)

d. Windshield/Wipers. Inspect to ensure that windshield is free from breaks, cracks or defects that would make operation of the vehicle unsafe; that the view of the driver is not obscured and that the windshield wipers are operational and wiper blades are in serviceable condition. Defroster must be operative when conditions require. (49 CFR 393.60, 393.78 and 393.79)

e. Mirrors. Every vehicle must be equipped with two rear vision mirrors located so as to reflect to the driver a view of the highway to the rear along both sides of the vehicle. Mirrors shall not be cracked or dirty. (49 CFR 393.80)

f. Warning Equipment. Equipment must include three bidirectional emergency reflective triangles that conform to the requirements of FMVSS No. 125. FLAME PRODUCING DEVICES ARE PROHIBITED. (49 CFR 393.95)

g. Fire Extinguisher. Military vehicles must be equipped with two serviceable fire extinguishers with an Underwriters Laboratories rating of 10 BC or more. (Commercial motor vehicles must be equipped with one serviceable 10 BC Fire Extinguisher). Fire extinguisher(s) must be located so that it is readily accessible for use and securely mounted on the vehicle. The fire extinguisher must be designed, constructed and maintained to permit visual determination of whether it is fully charged. (49 CFR 393.95)

h. Electrical Wiring: Electrical wiring must be clean and properly secured. Insulation must not be frayed, cracked or otherwise in poor condition. There shall be no uninsulated wires, improper splices or connections. Wires and electrical fixtures inside the cargo area must be protected from the lading. (49 CFR 393.28, 393.32, 393.33)

INSTRUCTIONS

SECTION II *(Continued)*

i. Lights/Reflectors. (Head, tail, turn signal, brake, clearance, marker and identification lights, Emergency Flashers). Inspect to see that all lighting devices and reflectors required are operable, of proper color and properly mounted. Ensure that lights and reflectors are not obscured by dirt or grease or have broken lenses. High/Low beam switch must be operative. Emergency Flashers must be operative on both the front and rear of vehicle. (49 CFR 393.24, 25, and 26)

j. Fuel System. Inspect fuel tank and lines to ensure that they are in serviceable condition, free from leaks, or evidence of leakage and securely mounted. Ensure that fuel tank filler cap is not missing. Examine cap for defective gasket or plugged vent. Inspect filler necks to see that they are in completely serviceable condition and not leaking at joints. (49 CFR 393.83)

k. Exhaust System. Exhaust system shall discharge to the atmosphere at a location to the rear of the cab or if the exhaust projects above the cab, at a location near the rear of the cab. Exhaust system shall not be leaking at a point forward of or directly below the driver compartment. No part of the exhaust system shall be located where it will burn, char or damage electrical wiring, fuel system or any other part of the vehicle. No part of the exhaust system shall be temporarily repaired with wrap or patches. (49 CFR 393.83)

l. Brake System (to include hand brakes, parking brakes and Low Air Warning devices). Check to ensure that brakes are operational and properly adjusted. Check for audible air leaks around air brake components and air lines. Check for fluid leaks, cracked or damaged lines in hydraulic brake systems. Ensure that parking brake is operational and properly adjusted. Low Air Warning devices must be operative. (49 CFR 393.40, 41, 42, 43, 44, 45, 47, 48, 49, 50, 51, 52, 53, and 55)

m. Suspension. Inspect for indications of misaligned, shifted or cracked springs, loosened shackles, missing bolts, spring hangers unsecured at frame and cracked or loose U-bolts. Inspect for any unsecured axle positioning parts, and sign of axle misalignment, broken torsion bar springs (if so equipped). (49 CFR 393.207)

n. Coupling Devices (Inspect without uncoupling). Fifth Wheels: Inspect for unsecured mounting to frame or any missing or damaged parts. Inspect for any visible space between upper and lower fifth wheel plates. Ensure that the locking jaws are around the shank and not the head of the kingpin. Ensure that the release lever is seated properly and safety latch is engaged. Pintle Hook, Drawbar, Towbar Eye and Tongue and Safety Devices: Inspect for unsecured mounting, cracks, missing or ineffective fasteners (welded repairs to pintle hook is prohibited). Ensure safety devices (chains, hooks, cables) are in serviceable condition and properly attached. (49 CFR 393.70 and 71)

o. Cargo Space. Inspect to ensure that cargo space is clean and free from exposed bolts, nuts, screws, nails or inwardly projecting parts that could damage the lading. Check floor to ensure it is tight and free from holes. Floor shall not be permeated with oil or other substances. (49 CFR 393.84)

p. Landing Gear. Inspect to ensure that landing gear and assembly are in serviceable condition, correctly assembled, adequately lubricated and properly mounted.

SECTION II *(Continued)*

q. Tires, Wheels and Rims: Inspect to ensure that tires are properly inflated. Flat or leaking tires are unacceptable. Inspect tires for cuts, bruises, breaks and blisters. Tires with cuts that extend into the cord body are unacceptable. Thread depth shall not be less than: 4/32 inches for tires on a steering axle of a power unit, and 2/32 inches for all other tires. Mixing bias and radial on the steering axle is prohibited. Inspect wheels and rims for cracks, unseated locking rings, broken, loose, damaged or missing lug nuts or elongated stud holes. (49 CFR 393.75)

r. Tailgate/Doors. Inspect to see that all hinges are tight in body. Check for broken latches and safety chains. Doors must close securely. (49 CFR 177.835(h))

s. Tarpaulin. If shipment is made on open equipment, ensure that lading is properly covered with fire and water resistant tarpaulin. (49 CFR 177.835(h))

t. Other Unsatisfactory Condition. Note any other condition which would prohibit the vehicle from being loaded with hazardous materials.

Item 14. For AA&E and other shipments requiring satellite surveillance, ensure that the Satellite Motor Surveillance System is operable. The DTTS Message Display Unit, when operative, will display the signal "DTTS ON". The munitions carrier driver, when practical, will position the DTTS message display unit in a manner that allows the shipping inspector or other designated shipping personnel to observe the "DTTS ON" message without climbing aboard the cab of the motor vehicle.

SECTION III - POST LOADING INSPECTION

General Instructions.

All items will be checked prior to the release of loaded equipment. Shipment will not be released until deficiencies are corrected. All items will be checked on incoming loaded equipment. Deficiencies will be reported in accordance with applicable service regulations.

Item 18. Check to ensure shipment is loaded in accordance with 49 CFR Part 177.848 and the applicable Segregation or Compatibility Table of 49 CFR 177.848.

Item 19. Check to ensure the load is secured from movement in accordance with applicable service outload drawings.

Item 20. Check to ensure seal(s) have been applied to closed equipment; fire and water resistant tarpaulin applied on open equipment.

Item 21. Check to ensure each transport vehicle has been properly placarded in accordance with 49 CFR 172.504.

Item 22. Check to ensure operator has been provided shipping papers that comply with 49 CFR 172.201 and 202. For shipments transported by Government vehicle, shipping paper will be DD Form 836.

Item 23. Ensure operator(s) sign DD Form 626, are given a copy and understand the hazards associated with the shipment.

Item 24. Applies to Commercial Shipments Only. If shipment is made under DOT Special Permit 868, ensure that shipping papers are properly annotated and copy of Special Permit 868 is with shipping papers.

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Bay West Inc. Property Damage and Injury Report Form

Routing - Office Use Only

- ☐ Heath & Safety
- ☐ Human Resources
- ☐ Controller
- ☐ Shop Manager
- ☐ PM_____ (if applicable)

Site Supervisor is to notify the Project Manager, and injured employee's supervisor as soon as practical after the incident. Supervisor to complete the appropriate section and fax or return the form to PM within **two days** of incident occurrence.

equipment damage complete.....**Section 1**
For vehicle accident reporting complete.....**Section 2** and Vehicle Accident Report Form
For near-miss or safety incident reporting complete.....**Section 3**
For First Report of Injury complete.....**Section 4** (back side)

Section 1

Description of damaged Bay West equipment _____
How did damage or loss occur? _____

What immediate conditions or actions led to the incident? _____

List underlying cause that allowed the incident to occur _____

Toolwatch # _____
BW Job # _____
Project Manager _____
Cost to replace/repair? $_____
Were pictures taken? Yes___ No___
Bay West owned ☐ or rented ☐?

Notes:

Section 2 **Complete Accordia Accident Report Packet (Located In BW Vehicles)**

Name of driver _____ Drivers License # _____ State____
Bay West vehicle number or ID _____ Is the vehicle rented? ☐ Yes ☐ No
Description of vehicle damage _____

Estimated cost of repair $_____

Passengers? ☐ Yes - List _____ ☐ No _____

Injuries? ☐ Yes - List names & go to **Section 4** ☐ No _____

List underlying cause for accident _____

Sketch the accident:

Section 3

Bay West Office Location: ☐ St. Paul Other_____ ☐ _____
Supervisor: _____ Project Manager: _____
Date of occurrence: ___/___/___ Time: ___:___ AM/PM Witness name _____
What happened? – Describe the near-miss or incident: _____

Why Did This Happen? (In your opinion): _____

What Corrective Actions Can Be Made? (What should be done to prevent another occurrence)

Root Cause Evaluation Procedure – What immediate conditions or actions led to the incident?
1. _____
2. _____
3. _____

Sketch the incident/near-miss

Name of employee completing report (Print Name): _____ **Date:** _____

Signature of Site Supervisor: _____

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Minnesota Department of Labor and Industry
Workers' Compensation Division
443 Lafayette Road North
St. Paul, MN 55155-4305
(651) 284-5030

First Report of Injury

See Instructions on Reverse Side
PRINT or TYPE your responses.
Enter dates in MM/DD/YYYY format.

FR01

DO NOT USE THIS SPACE

1. **EMPLOYEE SOCIAL SECURITY #**	2. OSHA Case #

3. **DATE OF CLAIMED INJURY**	4. Time of injury ☐ am ☐ pm	5. Time employee began work on date of injury ☐ am ☐ pm

6. **EMPLOYEE** Name (last, first, middle)	7. Gender ☐ M ☐ F	8. Marital Status ☐ Married ☐ Unmarried

9. Home Address	10. Home phone #	11. Date of birth
City State Zip Code	12. Occupation	13. Regular department	14. Date hired

15. Average weekly wage	16. Rate per hour	17. Hours per day	18. Days per week	19. Employment Status ☐ Full time ☐ Part time ☐ Seasonal ☐ Volunteer

20. Weekly value of:	Meals	Lodging	2nd Income	21. Apprentice ☐ Yes ☐ No

22. **Tell us how the injury occurred and what the employee was doing before the incident (give details).** *Examples: "Worker was driving lift truck with a pallet of boxes when the truck tipped, pinning worker's left leg under drive shaft." "Worker developed soreness in left wrist over time from daily computer key entry."*

23. **What was the injury or illness (include the part(s) of body)?** *Examples: chemical burn left hand, broken left leg, carpal tunnel syndrome in left wrist.*	24. **What tools, equipment, machines, objects, or substances were involved?** *Examples: chlorine, hand sprayer, pallet lift truck, computer keyboard.*

25. Did injury occur on employer's premises? ☐ Yes ☐ No If No, indicate name and address of place of occurrence	26. Date of first day of any lost time	27. Employer paid for lost time on day of injury (DOI) ☐ Yes ☐ No ☐ No lost time on DOI
	28. Date employer notified of injury	29. Date employer notified of lost time
	30. Return to work date	31. Date of death

32. TREATING PHYSICIAN (name, address, and phone)	33. HOSPITAL/CLINIC (name and address) (if any)	34. Emergency Room Visit ☐ Yes ☐ No 35. Overnight in-patient ☐ Yes ☐ No

36. **EMPLOYER** Legal name	37. EMPLOYER DBA name (if different)	
38. **Mailing** address	39. Employer FEIN	40. Unemployment ID#
City State Zip Code	41. Employer's contact name and phone #	
42. **Physical** address (if different)	43. Witness (name and phone)	
City State Zip Code	44. NAICS code	45. Date form completed

46. **INSURER** name	51. **CLAIMS ADMIN COMPANY** (CA) name (check one) ☐ Insurer ☐ TPA
47. Insured legal name	52. CA address
48. Policy # or self-insured certificate #	City State Zip Code
49. Insurer FEIN / 50. Date insurer received notice	53. CA FEIN / 54. Claim #

Copies to: Insurer, Employer, Employee, and Workers' Compensation Division (if no insurer)

GENERAL INSTRUCTIONS TO THE EMPLOYER

Filing this form is not an admission of liability. You must report a claim to your insurer whenever anyone believes that a work-related injury or illness that requires medical care or lost time from work has occurred. If the claimed injury wholly or partially incapacitates the employee for more than **three** calendar days, the claim must be made on this form and reported to your insurer within **ten** days. Your insurer may require you to file it sooner. Failure to file within the **ten** days may result in penalties. Self-insured employers have 14 days to file this form with the Department of Labor and Industry (Department). It is important to file this form qui to allow your insurer time to investigate the claim. **Your insurer will forward a copy of this form** to the Department, if necessary.

If the claim involves death or serious injury (including injuries that later result in death), you must notify the Department and your insurer within 48 hours of the occurrence. The claim can be reported initially to the Department by telephone (651-284-5041), fax (651-284-5731), or personal notice. The initial notice must be followed by the filing of this form within **seven** days of the occurrence.

Employers are required to complete this form. Each piece of information is needed to determine liability and entitlement to benefits. Failure to complete the form may result in delayed processing and possible penalties. You must file this form with your insurer, and give a copy to the employee and the employee's local union office. You are required to provide the employee with a copy of the Employee Information Sheet, which is available on the Department's web site at www.doli.state.mn.us. Employees are not responsible for completing this form.

SEND REPORT TO INSURER IMMEDIATELY – DO NOT WAIT FOR DOCTOR'S REPORT

SPECIFIC INSTRUCTIONS FOR COMPLETING THIS FORM

- Item 2: OSHA Case #. Fill in the case number from the OSHA 300 log. This form contains all items required by the OSHA form 301.
- Items 15-20: Fill in all the wage information. If the employee does not work a regularly scheduled work week, attach a 26 week wage statement so your insurer can calculate the appropriate average weekly wage.
- Items 22-24: Be as specific as possible in describing: the events causing the injury; the nature of the injury (cut, sprain, burn, etc.), and the part(s) of body injured (back, arm, etc.); and the tools, equipment, machines, objects or substances involved.
- Item 26: Fill in the first day the employee lost any time from work (including time lost for medical treatment), even if you paid the employee for the lost time.
- Item 27: Check the appropriate box to indicate if there was lost time on the date of injury and whether you paid for that lost time.
- Item 28: Fill in the date you first became aware of the injury or illness.
- Item 29: Fill in the date you became aware that the lost time indicated in Item 26 was related to the claimed injury.
- Item 30: Leave the box blank if the employee has not returned to work by the time you file this form. If the employee has returne work, fill in the date and notify your insurer if the employee misses time due to this injury after that date.
- Item 39: Fill in your Federal Employment ID number (FEIN). For information on this number, see www.firstgov.gov and click on Employer ID Number under Business.
- Items 40 and 44: Fill in your Unemployment ID number and North American Industry Classification System (NAICS) code which are both assigned by the Minnesota Unemployment Insurance Program (651-296-6141).
- Items 46-54: Your insurer or claims administrator will complete this information.

INSTRUCTIONS TO THE INSURER/CLAIMS ADMINISTRATOR/SELF-INSURED EMPLOYER

The following data elements must be completed on this form prior to filing with the Department of Labor and Industry: employee's name and social security number; date of injury; and the names of the employer and insurer. If any of this information is missing, the First Report will be rejected and returned to you (per Minn. Stat. § 176.275). Providing the name of the third party administrator does not meet the statutory requirement to provide the name of the insurer. NOTE: If the claim does not involve lost time beyond the waiting period or potential PPD, the form does **NOT** need to be filed with the Department.

- Item 46: Fill in the name of the insurance company. If the employer is self-insured, indicate the name of the licensed or public self-insured company or group.
- Items 47-48: Fill in the legal name of the employer who purchased the policy from the insurer (named in Item 46) and the policy number. If the employer is licensed to self-insure, fill in the certificate number.
- Item 49: Fill in the insurer's Federal Employment ID number (FEIN) number.
- Item 51: Fill in the name and address of the company administering the claim (either the insurer or third party administrator). Be sure to mark either the "Insurer" or "TPA" box.
- Item 53-54: Fill in the claims administrator's FEIN and claim number.

This material can be made available in different forms, such as large print, Braille or on a tape. To request, call (651) 284-5030 or 1-800-342-5354 (DIAL-DLI)/Voice or TDD (651) 297-4198.

ANY PERSON WHO, WITH INTENT TO DEFRAUD, RECEIVES WORKERS' COMPENSATION BENEFITS TO WHICH THE PERSON IS NOT ENTITLED BY KNOWINGLY MISREPRESENTING, MISSTATING, OR FAILING TO DISCLOSE ANY MATER FACT IS GUILTY OF THEFT AND SHALL BE SENTENCED PURSUANT TO SECTION 609.52, SUBDIVISION 3.

WORK SHEET FOR PRELIMINARY ACCIDENT NOTIFICATION

This work sheet is a field tool to assist the collection of information about an accident and facilitate the completion of a Preliminary Accident Notification. For Member of the Public Recreation Visitor accidents use the Initial Notification of Public Recreation Accident Work Sheet

Project Name: _____ Project Office Symbol: _____ Date Worksheet Completed: _____
Date of Accident: _____ Time of Accident: _____ Person Completing Worksheet: _____ Phone #: _____

Location and Incident Information
Exact Location of Accident: _____
Number of Persons Involved: ____ Number of Properties Involved: ____
Personnel Classification
Government: Civilian [ ] Military [ ] Government Direct Contractor [ ] Foreign National [ ] Volunteer [ ]
Contractor [ ] Member of the Public [ ]
Type of Accident (Mark all that are applicable)
Injury/Illness [ ] Fatality [ ] Motor Vehicle [ ] Property Damage [ ] Fire [ ] Diving [ ]
Personal Data (If more than 2 persons involved provide their personal data on a separate sheet)
Person 1 - Name: Last _____ First _____ Middle Initial ___ Age: ___Gender: Male [ ] Female [ ]
Date of Birth: _____ Address: _____
Job Series/Title: _____ Grade: ___ Duty Status: On Duty [ ] Off Duty [ ] TDY [ ] Time Began Work _____
Unit and Station Assignment: _____ Office Symbol: _____ Date Hired: _____
Nature of Injury: _____ Body Part(s) Affected Primary _____ Secondary _____
Type of Injury _____ Source of Injury _____
Severity of Injury: (See definitions on reverse side) Fatality: **Yes/No** Permanent Total Disability: **Yes/No**
Permanent Partial Disability: **Yes/No** Other Serious Injury: **Yes/No**
Estimated Days away from Work: _____ Estimated Days Restricted Duty/Job Transfer: _____
Primary Language Spoken: _____ English Literate: **Yes/No**
Does this person wish to remain anonymous **Yes/No**
What was employee worker doing before the accident occurred? _____
Name of Physician/Health Care Professional: _____
Medical Treatment Facility: _____
Address: _____ Phone # _____
Person 2 - Name: Last _____ First _____ Middle Initial ___ Age: ___Gender: Male [ ] Female [ ]
Date of Birth: _____ Address: _____
Job Series/Title: _____ Grade: ___ Duty Status: On Duty [ ] Off Duty [ ] TDY [ ] Time Began Work _____
Unit and Station Assignment: _____ Office Symbol: _____ Date Hired: _____
Nature of Injury: _____ Body Part(s) Affected Primary _____ Secondary _____
Type of Injury _____ Source of Injury _____
Severity of Injury: (See definitions on reverse side) Fatality: **Yes/No** Permanent Total Disability: **Yes/No**
Permanent Partial Disability: **Yes/No** Other Serious Injury: **Yes/No**
Estimated Days away from Work: _____ Estimated Days Restricted Duty/Job Transfer: _____
Primary Language Spoken: _____ English Literate: **Yes/No**
Does this person wish to remain anonymous **Yes/No**
What was employee worker doing before the accident occurred? _____

Name of Physician/Health Care Professional: _____
Medical Treatment Facility: _____
Address: _____ Phone # _____

Summary of Accident:(Use additional sheet if needed)

Remarks:

Describe Any Information Released to the Public:

Nature of Injury

Amputation	Drowning	Stroke	Tuberculosis
Abrasion	Fracture	Traumatic Food Poisoning	Traumatic Virological/Infective
Back Strain	Hearing Loss	Traumatic Heart Condition	Parasitic Disease
Burn	Hernia	Traumatic Mental Disorder	Traumatic Injury Other(list)
Contusion/Bruise	Laceration/Cut	Traumatic Respiratory	
Concussion	Puncture	(Carbon Monoxide)	
Dislocation of joint	Strain	Traumatic Skin Disease	

Type of Injury

Struck by/against	Punctured/lacerated	Exerted	Ingested
Fell/slipped/tripped	Stung/bit by	Exposed	Absorbed
Caught on/in/between	Contact with/by	Inhaled	Traveling In

Severity of Injury

Injury	Illness	Fatality	Permanent Disability

Source of Injury

Environmental Condition	Mechanical Equipment	Noise	
Building or other Area	Guard/Shield	Radiation	Inanimate Object
Walking surface	Video Display Terminal	Light	Animal Insect
Electricity	Heating	Ventilation	Human (Violence)
Temperature Extreme	Motor Vehicle/Cycle	Smoke	Diving Equipment
Weather	Boat	Stress	Parachute
Fire	Bicycle/Other non-	Confined Space	
Water	motorized vehicle	Carbon Monoxide	

Body Parts

Arm or Wrist	Brain	Face	Vertebrae
Breast	Cranial Bones	Scalp	Trunk Bones other
Testicle	Teeth	Knee	Shoulder
Abdomen	Jaw	Leg	Lung
Chest	Throat/Larynx	Hip	Kidney
Lower Back	Mouth	Ankle	Heart
Penis	Nose	Buttock	Liver
Side	Tongue	Hand	Reproductive Organs
Upper Back	Head Other External	Feet	Stomach
Waist	Elbow	Collar Bone	Intestines
Trunk Other	Finger	Shoulder Blade	Trunk/internal
Ear	Thumb	Rib	
Eye	Toe	Sternum	

(For Safety Staff only)	REPORT NO.	EROC CODE G6	**UNITED STATES ARMY CORPS OF ENGINEERS ACCIDENT INVESTIGATION REPORT** *(For Use of this Form See Attached Instructions and USACE Suppl to AR 385-40)*	**REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)**

1. ACCIDENT CLASSIFICATION

PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT ☐ CIVILIAN ☐ MILITARY	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ CONTRACTOR	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ PUBLIC	☐ FATAL ☐ OTHER		☐	

2. PERSONAL DATA

a. Name *(Last, First, MI)*	b. AGE	c. SEX ☐ MALE ☐ FEMALE	d. SOCIAL SECURITY NUMBER	e. GRADE

f. JOB SERIES/TITLE

g. DUTY STATUS AT TIME OF ACCIDENT: ☐ ON DUTY ☐ TDY ☐ OFF DUTY

h. EMPLOYMENT STATUS AT TIME OF ACCIDENT: ☐ ARMY ACTIVE ☐ ARMY RESERVE ☐ VOLUNTEER ☐ PERMANENT ☐ FOREIGN NATIONAL ☐ SEASONAL ☐ TEMPORARY ☐ STUDENT ☐ OTHER *(Specify)* _____

3. GENERAL INFORMATION

a. DATE OF ACCIDENT *(month/day/year)*

b. TIME OF ACCIDENT *(Military time)* hrs

c. EXACT LOCATION OF ACCIDENT

d. CONTRACTOR'S NAME (1) PRIME: (2) SUBCONTRACTOR:

e. CONTRACT NUMBER _____ ☐ CIVIL WORKS ☐ MILITARY ☐ OTHER *(SPECIFY)* _____

f. TYPE OF CONTRACT: ☐ CONSTRUCTION ☐ SERVICE ☐ A/E ☐ DREDGE ☐ OTHER *(SPECIFY)* _____

g. HAZARDOUS/TOXIC WASTE ACTIVITY: ☐ SUPERFUND ☐ DERP ☐ IRP ☐ OTHER *(Specify)* _____

4. CONSTRUCTION ACTIVITIES ONLY *(Fill in line and corresponding code number in box from list - see instructions)*

a. CONSTRUCTION ACTIVITY _____ (CODE) #

b. TYPE OF CONSTRUCTION EQUIPMENT _____ (CODE) #

5. INJURY/ILLNESS INFORMATION *(Include name on line and corresponding code number in box for items e, f & g - see instructions)*

A. SEVERITY OF ILLNESS/INJURY _____ (CODE) #

B. ESTIMATED DAYS LOST

C. ESTIMATED DAYS HOSPITALIZED

D. ESTIMATED DAYS RESTRICTED DUTY

e. BODY PART AFFECTED
PRIMARY _____ (CODE) #
SECONDARY _____ (CODE) #

f. NATURE OF ILLNESS / INJURY _____ (CODE) #

g. TYPE AND SOURCE OF INJURY/ILLNESS
TYPE _____ (CODE) #
SOURCE _____ (CODE) #

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see instructions)*

a. ACTIVITY AT TIME OF ACCIDENT _____ (CODE) #

b. PERSONAL FLOATATION DEVICE USED? ☐ YES ☐ NO ☐ N/A

7. MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE: ☐ PICKUP/VAN ☐ AUTOMOBILE ☐ TRUCK ☐ OTHER *(Specify)* _____

b. TYPE OF COLLISION: ☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END ☐ BROADSIDE ☐ ROLL OVER ☐ BACKING ☐ OTHER *(Specify)* _____

c. SEAT BELTS	USED	NOT USED	NOT AVAILABLE
(1) FRONT SEAT			
(2) REAR SEAT			

8. PROPERTY/MATERIAL INVOLVED

a. NAME OF ITEM	B. OWNERSHIP	C. $ AMOUNT OF DAMAGE
(1)		
(2)		
(3)		

9. VESSEL/FLOATING PLANT ACCIDENT *(Fill in line and correspondence code number in box from list - see instructions)*

a. TYPE OF VESSEL/FLOATING PLANT _____ (CODE) #

b. TYPE OF COLLISION/MISHAP _____ (CODE) #

ACCIDENT DESCRIPTION *(Use additional paper, if necessary)*

See attached page.

11. CAUSAL FACTOR(S) *(Read Instruction Before Completing)*

a. (Explain YES answers in item 13)	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	☐	☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐
OPERATING PROCEDURES: Were operating procedures a factor?	☐	☐
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	☐	☐
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?	☐	☐
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	☐	☐

a. *(CONTINUED)*	YES	NO
CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents, such as, noise, radiation, etc., contribute to accident?	☐	☐
OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?	☐	☐
SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐	☐
PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?	☐	☐
DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident	☐	☐

b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?

☐ YES *(If yes, attach a copy.)* ☐ NO

12. TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?	b. TYPE OF TRAINING.	c. DATE OF MOST RECENT FORMAL TRAINING.
☐ YES ☐ NO	☐ CLASSROOM ☐ ON JOB	(Month) (Day) (Year)

13. FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT; INCLUDE DIRECT AND INDIRECT CAUSES *(See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)*

a. DIRECT CAUSE

See attached page.

b. INDIRECT CAUSE(S)

See attached page.

14. ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S).

DESCRIBE FULLY:

See attached page.

15. DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.

a. BEGINNING (Month/Day/Year)	b. ANTICIPATED COMPLETION (Month/Day/Year)

c. SIGNATURE AND TITLE OF SUPERVISOR COMPLETING REPORT	d. DATE *(Mo/Da/Yr)*	e. ORGANIZATION IDENTIFIER *(Div, Br, Sect)*	f. OFFICE SYMBOL
CORPS _____ CONTRACTOR _____		CENWO-	

16. MANAGEMENT REVIEW *(1st)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

17. MANAGEMENT REVIEW *(2nd - Chief Operations, Construction, Engineering, etc.)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE
	Chief,	

18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. ☐ CONCUR b. ☐ NON CONCUR c. ADDITIONAL ACTIONS/COMMENTS

SIGNATURE	TITLE	DATE
	Chief, Division Safety & Occupational Health Office	

19. COMMAND APPROVAL

COMMENTS

COMMANDER SIGNATURE	DATE
JEFFREY A. BEDEY Colonel, EN Commanding	

*U.S. GOVERNMENT PRINTING OFFICE: 1993-0-791-757

10. ACCIDENT DESCRIPTION *(Continuation)*

DIRECT CAUSE *(Continuation)*

13b.	INDIRECT CAUSES *(Continuation)*

14.	ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S) *(Continuation)*

GENERAL. Complete a separate report for each person who was *injured, caused,* or *contributed* to the accident (excluding uninjured personnel and witnesses). Use of this form for reporting USACE employee first-aid type injuries not submitted to the Office of Workers' Compensation Programs (OWCP) shall be at the descretion of the FOA commander. Please type or print legibly. Appropriate items shall be marked with an "X" in box(es). If additional space is needed, provide the information on a separate sheet and attach to the completed form. Ensure that these instructions are forwarded with the completed report to the designated management reviewers indicated in sections 16. and 17.

INSTRUCTIONS FOR SECTION 1 — ACCIDENT CLASSIFICATION. *(Mark All Boxes That Are Applicable.)*

a. GOVERNMENT. Mark "CIVILIAN" box if accident involved government civilian employee; mark "MILITARY" box if accident involved U.S. military personnel.

(1) INJURY/ILLNESS/FATALITY — Mark if accident resulted in any government civilian employee injury, illness, or fatality that requires the submission of OWCP Forms CA-1 (injury), CA-2 (illness), or CA-6 (fatality) to OWCP; mark if accident resulted in military personnel lost-time or fatal injury or illness.

(2) PROPERTY DAMAGE — Mark the appropriate box if accident resulted in any damage of $1000 or more to government property (including motor vehicles).

(3) VEHICLE INVOLVED — Mark if accident involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.

(4) DIVING ACTIVITY — Mark if the accident involved an in-house USACE diving activity.

b. CONTRACTOR.

(1) INJURY/ILLNESS/FATALITY — Mark if accident resulted in any contractor lost-time injury/illness or fatality.

(2) PROPERTY DAMAGE — Mark the appropriate box if accident resulted in any damage of $1000 or more to contractor property (including motor vehicles).

(3) VEHICLE INVOLVED — Mark if accident involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.

(4) DIVING ACTIVITY — Mark if the accident involved a USACE Contractor diving activity.

c. PUBLIC.

(1) INJURY/ILLNESS/FATALITY — Mark if accident resulted in public fatality or permanent total disability. (The "OTHER" box will be marked when requested by the FOA to report an unusual non-fatal public accident that could result in claims against the government or as otherwise directed by the FOA Commander).

(2) VOID SPACE — Make no entry.

(3) VEHICLE INVOLVED — Mark if accident resulted in a fatality to a member of the public and involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" is marked.

(4) VOID SPACE — Make no entry.

INSTRUCTIONS FOR SECTION 2 — PERSONAL DATA

a. NAME — (MANDATORY FOR GOVERNMENT ACCIDENTS. OPTIONAL AT THE DISCRETION OF THE FOA COMMANDER FOR CONTRACTOR AND PUBLIC ACCIDENTS). Enter last name, first name, middle initial of person involved.

b. AGE — Enter age.

c. SEX — Mark appropriate box.

d. SOCIAL SECURITY NUMBER — (FOR GOVERNMENT PERSONNEL ONLY) Enter the social security number (or other personal identification number if no social security number issued).

e. GRADE — (FOR GOVERNMENT PERSONNEL ONLY) Enter pay grade. Example: O-6; E-7; WG-8; WS-12; GS-11; etc.

f. JOB SERIES/TITLE — For *government civilian employees* enter the pay plan, full series number, and job title, e.g. GS-0810/Civil Engineer. For *military personnel* enter the primary military occupational specialty (PMOS), e.g., 15A30 or 11G50. For *contractor employees* enter the job title assigned to the injured person, e.g. carpenter, laborer, surveyor, etc.,

g. DUTY STATUS — Mark the appropriate box.

(1) ON DUTY — Person was at duty station during duty hours or person was away from duty station during duty hours but on official business at time of the accident.

(2) TDY - Person was on official business, away from the duty station and with travel orders at time of accident. Line-of-duty investigation required.

(3) OFF DUTY - Person was not on official business at time of accident

h. EMPLOYMENT STATUS — (FOR GOVERNMENT PERSONNEL ONLY) Mark the most appropriate box. If "OTHER" is marked, specify the employment status of the person.

INSTRUCTION FOR SECTION 3 — GENERAL INFORMATION

a. DATE OF ACCIDENT — Enter the month, day, and year of accident.

b. TIME OF ACCIDENT — Enter the local time of accident in military time. Example: 1430 hrs (not 2:30 p.m.).

c. EXACT LOCATION OF ACCIDENT — Enter facts needed to locate the accident scene. (installation/project name, building number, street, direction and distance from closest landmark, etc.,).

d. CONTRACTOR NAME

(1) PRIME — Enter the exact name (title of firm) of the prime contractor.

(2) SUBCONTRACTOR — Enter the name of any subcontractor involved in the accident.

e. CONTRACT NUMBER — Mark the appropriate box to identify if contract is civil works, military, or other: if "OTHER" is marked, specify contract appropriation on line provided. Enter complete contract number of prime contract, e.g., DACW 09-85-C-0100.

f. TYPE OF CONTRACT — Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.

g. HAZARDOUS/TOXIC WASTE ACTIVITY (HTW) — Mark the box to identify the HTW activity being performed at the time of the accident. For Superfund, DERP, and Installation Restoration Program (IRP) HTW activities include accidents that occurred during inventory, predesign, design, and construction. For the purpose of accident reporting, DERP Formerly Used DoD Site (FUDS) activities and IRP activities will be treated separately. For Civil Works O&M HTW activities mark the "OTHER" box.

INSTRUCTIONS FOR SECTION 4 — CONSTRUCTION ACTIVITIES

a. CONSTRUCTION ACTIVITY — Select the *most appropriate* construction activity being performed at time of accident from the list below. Enter the activity name and place the corresponding code number identified in the box.

CONSTRUCTION ACTIVITY LIST

1. MOBILIZATION
2. SITE PREPARATION
3. EXCAVATION/TRENCHING
4. GRADING (EARTHWORK)
5. PIPING/UTILITIES
6. FOUNDATION
7. FORMING
8. CONCRETE PLACEMENT
9. STEEL ERECTION
10. ROOFING
11. FRAMING
12. MASONRY
13. CARPENTRY
14. ELECTRICAL
15. SCAFFOLDING/ACCESS
16. MECHANICAL
17. PAINTING
18. EQUIPMENT/MAINTENANCE
19. TUNNELING
20. WAREHOUSING/STORAGE
21. PAVING
22. FENCING
23. SIGNING
24. LANDSCAPING/IRRIGATION
25. INSULATION
26. DEMOLITION

INSTRUCTIONS FOR SECTION 13—CAUSES

a. DIRECT CAUSES—The direct cause is that single factor which most directly lead to the accident. See examples below.

b. INDIRECT CAUSES—Indirect causes are those factors which contributed to but did not directly initiate the occurrence of the accident.

Examples for section 13:

a. Employee was dismantling scaffold and fell 12 feet from unguarded opening.
Direct cause: failure to provide fall protection at elevation.
Indirect causes: failure to enforce USACE safety requirements; improper training/motivation of employee (possibility that employee was not knowledgeable of USACE fall protection requirements or was lax in his attitude towards safety); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

b. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by USACE vehicle. (note USACE vehicle was in proper/safe working condition).
Direct cause: failure of USACE driver to maintain control of and stop USACE vehicle within safe distance.
Indirect cause: Failure of employee to pay attention to driving (defensive driving).

INSTRUCTIONS FOR SECTION 14—ACTION TO ELIMINATE CAUSE(S)

DESCRIPTION—Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent reoccurrence of similar accidents/illnesses. Continue on blank sheets of paper if necessary to fully explain and attach to the completed report form.

INSTRUCTIONS FOR SECTION 15—DATES FOR ACTION

a. BEGIN DATE—Enter the date when the corrective action(s) identified in Section 14 will begin.

b. COMPLETE DATE—Enter the date when the corrective action(s) identified in Section 14 will be completed.

c. TITLE AND SIGNATURE—Enter the title and signature of supervisor completing the accident report. For a GOVERNMENT employee accident/illness the immediate supervisor will complete and sign the report. For PUBLIC accidents the USACE Project Manager/Area Engineer responsible for the USACE property where the accident happened shall complete and sign the report. For CONTRACTOR accidents the Contractor's project manager shall complete and sign the report and provide to the USACE supervisor responsible for oversight of that contractor activity. This USACE Supervisor shall also sign the report. Upon entering the information required in 15.d, 15.e and 15.f below, the responsible USACE supervisor shall forward the report for management review as indicated in Section 16.

d. DATE SIGNED—Enter the month, day, and year that the report was signed by the responsible supervisor.

e. ORGANIZATION NAME—For GOVERNMENT employee accidents enter the USACE organization name (Division, Branch, Section, etc.) of the injured employee. For PUBLIC accidents enter the USACE organization name for the person identified in block 15.c. For CONTRACTOR accidents enter the USACE organization name for the USACE office responsible for providing contract administration oversight.

f. OFFICE SYMBOL—Enter the latest complete USACE Office Symbol for the USACE organization identified in block 15.e.

INSTRUCTIONS FOR SECTION 16—MANAGEMENT REVIEW (1st)

1ST REVIEW—Each USACE FOA shall determine who will provid 1st management review. The responsible USACE supervisor in section 15.c shall forward the completed report to the USACE office designated as the 1st Reviewer by the FOA. Upon receipt, the Chief of the Office shall review the completed report, mark the appropriate box, provide substantive comments, sign, date, and forward to the FOA Staff Chief (2nd review) for review and comment.

INSTRUCTIONS FOR SECTION 17—MANAGEMENT REVIEW (2nd)

2ND REVIEW—The FOA Staff Chief (i.e., FOA Chief of Construction, Operations, Engineering, Planning, etc.) shall mark the appropriate box, review the completed report, provide substantive comments, sign, date, and return to the FOA Safety and Occupational Health Office.

INSTRUCTIONS FOR SECTION 18—SAFETY AND OCCUPATIONAL HEALTH REVIEW

3RD REVIEW—The FOA Safety and Occupational Health Office shall review the completed report, mark the appropriate box, ensure that any inadequacies, discrepancies, etc, are rectified by the responsible supervisor and management reviewers, provide substantive comments, sign, date and forward to the FOA Commander for review, comment, and signature.

INSTRUCTION FOR SECTION 19—COMMAND APPROVAL

4TH REVIEW—The FOA Commander shall (to include the person designated Acting Commander in his absence) review the completed report, comment if required, sign, date, and forward the report to th FOA Safety and Occupational Health Office. Signature authority sh not be delegated.

b. TYPE OF CONSTRUCTION EQUIPMENT—Select the equipment involved in the accident from the list below. Enter the name and place the corresponding code number identified in the box. If equipment is not included below, use code 24, "OTHER", and write in specific type of equipment.

CONSTRUCTION EQUIPMENT

1. GRADER
2. DRAGLINE
3. CRANE (ON VESSEL/BARGE)
4. CRANE (TRACKED)
5. CRANE (RUBBER TIRE)
6. CRANE (VEHICLE MOUNTED)
7. CRANE (TOWER)
8. SHOVEL
9. SCRAPER
10. PUMP TRUCK (CONCRETE)
11. TRUCK (CONCRETE/TRANSIT MIXER)
12. DUMP TRUCK (HIGHWAY)
13. DUMP TRUCK (OFF HIGHWAY)
14. TRUCK (OTHER)
15. FORKLIFT
16. BACKHOE
17. FRONT-END LOADER
18. PILE DRIVER
19. TRACTOR (UTILITY)
20. MANLIFT
21. DOZER
22. DRILL RIG
23. COMPACTOR/VIBRATORY ROLLER
24. OTHER

INSTRUCTIONS FOR SECTION 5—INJURY/ILLNESS INFORMATION

a. SEVERITY OF INJURY / ILLNESS - Reference para 2-10 of USACE Suppl 1 to AR 385-40 and enter code and description from list below.

NOI NO INJURY
FAT FATALITY
PTL PERMANENT TOTAL DISABILITY
PPR PERMANENT PARTIAL DISABILITY
LWD LOST WORKDAY CASE INVOLVING DAYS AWAY FROM WORK
NLW RECORDABLE CASE WITHOUT LOST WORKDAYS
RFA RECORDABLE FIRST AID CASE
NRI NON-RECORDABLE INJURY

b. ESTIMATED DAYS LOST—Enter the estimated number of workdays the person will lose from work.

c. ESTIMATED DAYS HOSPITALIZED—Enter the estimated number of workdays the person will be hospitalized.

d. ESTIMATED DAYS RESTRICTED DUTY—Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties.

e. BODY PART AFFECTED—Select the most appropriate primary and when applicable, secondary body part affected from the list below. Enter body part name on line and place the corresponding code letters identifying that body part in the box.

GENERAL BODY AREA	CODE	BODY PART NAME
ARM/WRIST	AB	ARM AND WRIST
	AS	ARM OR WRIST
TRUNK, EXTERNAL MUSCULATURE	B1	SINGLE BREAST
	B2	BOTH BREASTS
	B3	SINGLE TESTICLE
	B4	BOTH TESTICLES
	BA	ABDOMEN
	BC	CHEST
	BL	LOWER BACK
	BP	PENIS
	BS	SIDE
	BU	UPPER BACK
	BW	WAIST
	BZ	TRUNK OTHER
HEAD, INTERNAL	C1	SINGLE EAR INTERNAL
	C2	BOTH EARS INTERNAL
	C3	SINGLE EYE INTERNAL
	C4	BOTH EYES INTERNAL
	CB	BRAIN
	CC	CRANIAL BONES
	CD	TEETH
	CJ	JAW
	CL	THROAT, LARYNX
	CM	MOUTH
	CN	NOSE
	CR	THROAT, OTHER
	CT	TONGUE
	CZ	HEAD OTHER INTERNAL
ELBOW	EB	BOTH ELBOWS
	ES	SINGLE ELBOW
FINGER	F1	FIRST FINGER
	F2	BOTH FIRST FINGERS
	F3	SECOND FINGER
	F4	BOTH SECOND FINGERS
	F5	THIRD FINGER
	F6	BOTH THIRD FINGERS
	F7	FOURTH FINGER
	F8	BOTH FOURTH FINGERS
TOE	G1	GREAT TOE
	G2	BOTH GREAT TOES
	G3	TOE OTHER
	G4	TOES OTHER
HEAD, EXTERNAL	H1	EYE EXTERNAL
	H2	BOTH EYES EXTERNAL
	H3	EAR EXTERNAL
	H4	BOTH EARS EXTERNAL
	HC	CHIN
	HF	FACE
	HK	NECK/THROAT
	HM	MOUTH/LIPS
	HN	NOSE
	HS	SCALP
KNEE	KB	BOTH KNEES
	KS	KNEE
LEG, HIP, ANKLE, BUTTOCK	LB	BOTH LEGS/HIPS/ ANKLES/BUTTOCKS
	LS	SINGLE LEG/HIP ANKLE/BUTTOCK
HAND	MB	BOTH HANDS
	MS	SINGLE HAND
FOOT	PB	BOTH FEET
	PS	SINGLE FOOT
TRUNK, BONES	R1	SINGLE COLLAR BONE
	R2	BOTH COLLAR BONES
	R3	SHOULDER BLADE
	R4	BOTH SHOULDER BLADES
	RB	RIB
	RS	STERNUM (BREAST BONE)
	RV	VERTEBRAE (SPINE; DISC)
	RZ	TRUNK BONES OTHER
SHOULDER	SB	BOTH SHOULDERS
	SS	SINGLE SHOULDER
THUMB	TB	BOTH THUMBS
	TS	SINGLE THUMB
TRUNK, INTERNAL ORGANS	V1	LUNG, SINGLE
	V2	LUNGS, BOTH
	V3	KIDNEY, SINGLE
	V4	KIDNEYS, BOTH
	VH	HEART
	VL	LIVER
	VR	REPRODUCTIVE ORGANS
	VS	STOMACH
	VV	INTESTINES
	VZ	TRUNK, INTERNAL; OTHER

f. NATURE OF INJURY/ILLNESS - Select the most appropriate nature of injury / illness from the list below. This nature of injury / illness shall correspond to the primary body part selected in 5e, above. Enter the nature of injury / illness name on the line and place the corresponding CODE letters in the box provided.

INSTRUCTIONS FOR SECTION 9—VESSEL/ FLOATING PLANT ACCIDENT

a. TYPE OF VESSEL/FLOATING PLANT—Select the most appropriate vessel/floating plant from list below. Enter name and place corresponding number in box. If item is not listed below, enter item number for "OTHER" and write in specific type of vessel/ floating plant.

VESSEL/FLOATING PLANTS

1. ROW BOAT
2. SAIL BOAT
3. MOTOR BOAT
4. BARGE
5. DREDGE/HOPPER
6. DREDGE/SIDE CASTING
7. DREDGE/DIPPER
8. DREDGE/CLAMSHELL, BUCKET
9. DREDGE/PIPE LINE
10. DREDGE/DUST PAN
11. TUG BOAT
12. OTHER

b. COLLISION/MISHAP—Select from the list below the object(s) that contributed to the accident or were damaged in the accident.

COLLISION/MISHAP

1. COLLISION W/OTHER VESSEL
2. UPPER GUIDE WALL
3. UPPER LOCK GATES
4. LOCK WALL
5. LOWER LOCK GATES
6. LOWER GUIDE WALL
7. HAULAGE UNIT
8. BREAKING TOW
9. TOW BREAKING UP
10. SWEPT DOWN ON DAM
11. BUOY/DOLPHIN/CELL
12. WHARF OR DOCK
13. OTHER

INSTRUCTIONS FOR SECTION 10—ACCIDENT DESCRIPTION

DESCRIBE ACCIDENT—Fully describe the accident. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and equipment are clearly specified. Continue on blank sheets if necessary and attach to this report.

INSTRUCTIONS FOR SECTION 11—CAUSAL FACTORS

a. Review thoroughly. Answer each question by marking the appropriate block. If any answer is yes, explain in item 13 below. Consider, as a minimum, the following:

(1) DESIGN—Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?

(2) INSPECTION/MAINTENANCE—Did inadequately or improperly maintained equipment, tools, workplace, etc. create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?

(3) PERSON'S PHYSICAL CONDITION—Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was over exertion a factor?

(4) OPERATING PROCEDURES—Did a lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?

(5) JOB PRACTICES—Were any of the provisions of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?

(6) HUMAN FACTORS—Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person; i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach, strength, endurance, agility, etc., at beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?

(7) ENVIRONMENTAL FACTORS—Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun, temperature changes, wind, tides, floods, currents, dust, mud, glare, pressure changes, lightning, etc., play a part in the accident?

(8) CHEMICAL AND PHYSICAL AGENT FACTORS—Did exposure to chemical agents (either single shift exposure or long-term exposure) such as dusts, fibers (asbestos, etc.), silica, gases (carbon monoxide, chlorine, etc.,), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, by-products of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (UV radiation created during welding, etc.) contribute to the accident/incident?

(9) OFFICE FACTORS—Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?

(10) SUPPORT FACTORS—Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (in terms of employee skills, number of workers, and adequate supervision) available to get the job done properly? Was funding available, utilized, and adequate to provide proper tools, equipment, personnel, site preparation, etc?

(11) PERSONAL PROTECTIVE EQUIPMENT—Did the person to use appropriate personal protective equipment (gloves, eye protection, hard-toed shoes, respirator, etc.) for the task or environment? Did protective equipment provided or worn fail to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?

(12) DRUGS/ALCOHOL—Is there any reason to believe the person's mental or physical capabilities, judgement, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".

b. WRITTEN JOB/ACTIVITY HAZARD ANALYSIS—Was a written Job/Activity Hazard Analysis completed for the task being performed at the time of the accident? Mark the appropriate box. *If one was performed, attach a copy of the analysis to the report.*

INSTRUCTIONS FOR SECTION 12—TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?—For the purpose of this section "trained" means the person has been provided the necessary information (either formal and/or on-the-job (OJT) training) to competently perform the activity/task in a safe and healthful manner.

b. TYPE OF TRAINING—Mark the appropriate box that best indicates the type of training; (classroom or on-the-job) that the injured person received before the accident happened.

c. DATE OF MOST RECENT TRAINING—Enter the month, day, a year of the last *formal* training completed that covered the activ task being performed at the time of the accident.

* The injury or condition selected below must be caused by a specific incident or event which occurred during a single work day or shift.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
TRAUMATIC INJURY OR DISABILITY	TA	AMPUTATION
	TB	BACK STRAIN
	TC	CONTUSION; BRUISE; ABRASION
	TD	DISLOCATION
	TF	FRACTURE
	TH	HERNIA
	TK	CONCUSSION
	TL	LACERATION, CUT
	TP	PUNCTURE
	TS	STRAIN, MULTIPLE
	TU	BURN, SCALD, SUNBURN
	TI	TRAUMATIC SKIN DISEASES/ CONDITIONS INCLUDING DERMATITIS
	TR	TRAUMATIC RESPIRATORY DISEASE
	TQ	TRAUMATIC FOOD POISONING
	TW	TRAUMATIC TUBERCULOSIS
	TX	TRAUMATIC VIROLOGICAL/ INFECTIVE/PARASITIC DISEASE
	T1	TRAUMATIC CEREBRAL VASCULAR CONDITION/STROKE
	T2	TRAUMATIC HEARING LOSS
	T3	TRAUMATIC HEART CONDITION
	T4	TRAUMATIC MENTAL DISORDER; STRESS; NERVOUS CONDITION
	T8	TRAUMATIC INJURY – OTHER (EXCEPT DISEASE, ILLNESS)

**A nontraumatic physiological harm or loss of capacity produced by systemic infection; continued or repeated stress or strain; exposure to toxins, poisons, fumes, etc.; or other continued and repeated exposures to conditions of the work environment over a long period of time. For practical purposes, an occupational illness/disease or disability is any reported condition which doses not meet the definition of traumatic injury or disability as described above.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
**NON-TRAUMATIC ILLNESS/DISEASE OR DISABILITY		
RESPIRATORY DISEASE	RA	ASBESTOSIS
	RB	BRONCHITIS
	RE	EMPHYSEMA
	RP	PNEUMOCONIOSIS
	RS	SILICOSIS
	R9	RESPIRATORY DISEASE, OTHER
VIROLOGICAL, INFECTIVE & PARASITIC DISEASES	VB	BRUCELLOSIS
	VC	COCCIDIOMYCOSIS
	VF	FOOD POISONING
	VH	HEPATITIS
	VM	MALARIA
	VS	STAPHYLOCOCCUS
	VT	TUBERCULOSIS
	V9	VIROLOGICAL/INFECTIVE/ PARASITIC – OTHER
DISABILITY, OCCUPATIONAL	DA	ARTHRITIS, BURSITIS
	DB	BACK STRAIN, BACK SPRAIN
	DC	CEREBRAL VASCULAR CONDITION; STROKE
	DD	ENDEMIC DISEASE (OTHER THAN CODE TYPES R&S)
	DE	EFFECT OF ENVIRONMENTAL CONDITION
	DH	HEARING LOSS
	DK	HEART CONDITION
	DM	MENTAL DISORDER, EMOTIONAL STRESS NERVOUS CONDITION
	DR	RADIATION
	DS	STRAIN, MULTIPLE
	DU	ULCER
	DV	OTHER VASCULAR CONDITIONS
	D9	DISABILITY, OTHER
SKIN DISEASE OR CONDITION	SB	BIOLOGICAL
	SC	CHEMICAL
	S9	DERMATITIS, UNCLASSIFIED

g. TYPE AND SOURCE OF INJURY/ILLNESS (CAUSE) - Type and Source Codes are used to describe what caused the incident. The Type Code stands for an ACTION and the Source Code for an OBJECT or SUBSTANCE. Together, they form a brief description of how the incident occurred. Where there are two different sources, code the initiating source of the incident (see example 1, below). Examples:

(1) An employee tripped on carpet and struck his head on a desk.
TYPE: 210 (fell on same level) SOURCE: 0110 (walking/working surface)

NOTE: This example would NOT be coded 120 (struck against) and 0140 (furniture).

(2) A Park Ranger contracted dermatitis from contact with poison ivy/ oak.
TYPE: 510 (contact) SOURCE: 0920 (plant)

(3) A lock and dam mechanic punctured his finger with a metal sliver while grinding a turbine blade.
TYPE: 410 (punctured by) SOURCE: 0830 (metal)

(4) An employee was driving a government vehicle when it was struck by another vehicle..
TYPE: 800 (traveling in) SOURCE: 0421 (government-owned vehicle, as driver)

NOTE: The Type Code 800, "Traveling In" is different from the other type codes in that its function is not to identify factors contributing to the injury or fatality, but rather to collect data on the type of vehicle the employee was operating or traveling in at the time of the incident.

Select the most appropriate TYPE and SOURCE identifier from the list below and enter the name on the line and the corresponding code in the appropriate box.

CODE	TYPE OF INJURY NAME
	STRUCK
0110	STRUCK BY
0111	STRUCK BY FALLING OBJECT
0120	STRUCK AGAINST
	FELL, SLIPPED, TRIPPED
0210	FELL ON SAME LEVEL
0220	FELL ON DIFFERENT LEVEL
0230	SLIPPED, TRIPPED (NO FALL)
	CAUGHT
0310	CAUGHT ON
0320	CAUGHT IN
0330	CAUGHT BETWEEN
	PUNCTURED, LACERATED
0410	PUNCTURED BY
0420	CUT BY
0430	STUNG BY
0440	BITTEN BY
	CONTACTED
0510	CONTACTED WITH (INJURED PERSON MOVING)
0520	CONTACTED BY (OBJECT WAS MOVING)
	EXERTED
0610	LIFTED, STRAINED BY (SINGLE ACTION)
0620	STRESSED BY (REPEATED ACTION)
	EXPOSED
0710	INHALED
0720	INGESTED
0730	ABSORBED
0740	EXPOSED TO
0800	TRAVELING IN

CODE	SOURCE OF INJURY NAME
0100	BUILDING OR WORKING AREA
0110	WALKING/WORKING SURFACE (FLOOR, STREET, SIDEWALKS, ETC)
0120	STAIRS, STEPS
0130	LADDER
0140	FURNITURE, FURNISHINGS, OFFICE EQUIPMENT
0150	BOILER, PRESSURE VESSEL
0160	EQUIPMENT LAYOUT (ERGONOMIC)
0170	WINDOWS, DOORS
0180	ELECTRICITY

CODE	SOURCE OF INJURY NAME
0200	ENVIRONMENTAL CONDITION
0210	TEMPERATURE EXTREME (INDOOR)
0220	WEATHER (ICE, RAIN, HEAT, ETC.)
0230	FIRE, FLAME, SMOKE (NOT TOBACCO)
0240	NOISE
0250	RADIATION
0260	LIGHT
0270	VENTILATION
0271	TOBACCO SMOKE
0280	STRESS (EMOTIONAL)
0290	CONFINED SPACE
0300	MACHINE OR TOOL
0310	HAND TOOL (POWERED: SAW, GRINDER, ETC.)
0320	HAND TOOL (NONPOWERED)
0330	MECHANICAL POWER TRANSMISSION APPARATUS
0340	GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK)
0350	VIDEO DISPLAY TERMINAL
0360	PUMP, COMPRESSOR, AIR PRESSURE TOOL
0370	HEATING EQUIPMENT
0380	WELDING EQUIPMENT
0400	VEHICLE
0411	AS DRIVER OF PRIVATELY OWNED/RENTAL VEHICLE
0412	AS PASSENGER OF PRIVATELY OWNED/RENTAL VEHICLE
0421	DRIVER OF GOVERNMENT VEHICLE
0422	PASSENGER OF GOVERNMENT VEHICLE
0430	COMMON CARRIER (AIRLINE, BUS, ETC.)
0440	AIRCRAFT (NOT COMMERCIAL)
0450	BOAT, SHIP, BARGE
0500	MATERIAL HANDLING EQUIPMENT
0510	EARTHMOVER (TRACTOR, BACKHOE, ETC.)
0520	CONVEYOR (FOR MATERIAL AND EQUIPMENT)
0530	ELEVATOR, ESCALATOR, PERSONNEL HOIST
0540	HOIST, SLING CHAIN, JACK
0550	CRANE
0551	FORKLIFT
0560	HANDTRUCK, DOLLY
0600	DUST, VAPOR, ETC.
0610	DUST (SILICA, COAL, ETC.)
0620	FIBERS
0621	ASBESTOS
0630	GASES
0631	CARBON MONOXIDE
0640	MIST, STEAM, VAPOR, FUME
0641	WELDING FUMES
0650	PARTICLES (UNIDENTIFIED)
0700	CHEMICAL, PLASTIC, ETC.
0711	DRY CHEMICAL—CORROSIVE
0712	DRY CHEMICAL—TOXIC
0713	DRY CHEMICAL—EXPLOSIVE
0714	DRY CHEMICAL—FLAMMABLE
0721	LIQUID CHEMICAL—CORROSIVE
0722	LIQUID CHEMICAL—TOXIC
0723	LIQUID CHEMICAL—EXPLOSIVE
0724	LIQUID CHEMICAL—FLAMMABLE
0730	PLASTIC
0740	WATER
0750	MEDICINE
0800	INANIMATE OBJECT
0810	BOX, BARREL, ETC.
0820	PAPER
0830	METAL ITEM, MINERAL
0831	NEEDLE
0840	GLASS
0850	SCRAP, TRASH
0860	WOOD
0870	FOOD
0880	CLOTHING, APPAREL, SHOES
0900	ANIMATE OBJECT
0911	DOG
0912	OTHER ANIMAL
0920	PLANT
0930	INSECT
0940	HUMAN (VIOLENCE)
0950	HUMAN (COMMUNICABLE DISEASE)
0960	BACTERIA, VIRUS (NOT HUMAN CONTACT)

CODE	SOURCE OF INJURY NAME
1000	PERSONAL PROTECTIVE EQUIPMENT
1010	PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES
1020	RESPIRATOR, MASK
1021	DIVING EQUIPMENT
1030	SAFETY BELT, HARNESS
1040	PARACHUTE

INSTRUCTIONS FOR SECTION 6 — PUBLIC FATALITY

a. ACTIVITY AT TIME OF ACCIDENT—Select the activity being performed at the time of the accident from the list below. Enter the activity name on the line and the corresponding number in the box. If the activity performed is not identified on the list, select from the *most* appropriate primary activity area (water related, non-water related or other activity), the code number for "Other", and write in the activity being performed at the time of the accident.

WATER RELATED RECREATION

1. Sailing
2. Boating—powered
3. Boating—unpowered
4. Water skiing
5. Fishing from boat
6. Fishing from bank dock or pier
7. Fishing while wading
8. Swimming/supervised area
9. Swimming/designated area
10. Swimming/other area
11. Underwater activities (skin diving, scuba, etc.)
12. Wading
13. Attempted rescue
14. Hunting from boat
15. Other

NON-WATER RELATED RECREATION

16. Hiking and walking
17. Climbing (general)
18. Camping/picnicking authorized area
19. Camping/picnicking unauthorized area
20. Guided tours
21. Hunting
22. Playground equipment
23. Sports/summer (baseball, football, etc.)
24. Sports/winter (skiing, sledding, snowmobiling etc.)
25. Cycling (bicycle, motorcycle, scooter)
26. Gliding
27. Parachuting
28. Other non-water related

OTHER ACTIVITIES

29. Unlawful acts (fights, riots, vandalism, etc.)
30. Food preparation/serving
31. Food consumption
32. Housekeeping
33. Sleeping
34. Pedestrian struck by vehicle
35. Pedestrian other acts
36. Suicide
37. "Other" activities

b. PERSONAL FLOTATION DEVICE USED—If fatality was water-related was the victim wearing a person flotation device? Mark the appropriate box.

INSTRUCTIONS FOR SECTION 7—MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE—Mark appropriate box for each vehicle involved. If more than one vehicle of the same type is involved, mark both halves of the appropriate box. USACE vehicle(s) involved shall be marked in left half of appropriate box.

b. TYPE OF COLLISION—Mark appropriate box.

c. SEAT BELT—Mark appropriate box.

INSTRUCTIONS FOR SECTION 8—PROPERTY/ MATERIAL INVOLVED.

a. NAME OF ITEM—Describe all property involved in accident. Property/material involved means material which is damaged or whose use or misuse contributed to the accident. Include the name, type, model; also include the National Stock Number (NSN) whenever applicable.

b. OWNERSHIP—Enter ownership for each item listed. (Enter one of the following: *USACE; OTHER GOVERNMENT; CONTRACTOR: PRIVATE)*

c. $ AMOUNT OF DAMAGE—Enter the total estimated dollar amount of damage (parts and labor), if any.

Appendix G
Minimum Separation Distance (MSD) Calculation Sheets and Ordnance Data Sheets

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Fragmentation Data Review Form

Database Revision Date 12/31/07

Category:	Chemical	DODIC:	
Munition:	M125 Chemical Bomblet	Date Record Created:	3/15/2007
		Last Date Record Updated:	7/11/2007
Primary Database Category:	Submunition	Individual Last Updated Record:	M Crull
Secondary Database Category:	M125	Date Record Retired:	
Munition Case Classification:	N/A		

Munition Information and Fragmentation Characteristics

Explosive Type:	Tetryl
Explosive Weight (lb):	0.55000
Diameter (in):	3.6300
Max Fragment Weight (lb):	0.047482
Critical Fragment Velocity (fps):	3268

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	195
MFR-V [Vertical Range of Max Weight Fragment] (ft):	908
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	1187

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	36
Inhabited Building Distance (09 psi), K50 Distance:	45
Intentional MSD (0065 psi), K328 Distance:	292

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	1.85
Mild Steel:	0.34
Hard Steel:	0.28
Aluminum:	0.73
LEXAN:	3.10
Plexi-glass:	1.82
Bullet Resist Glass:	1.40

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.047482
Critical Fragment Velocity (fps)SB:	3268
Kinetic Energy 106 (lb-ft2/s2)SB:	0.2535
Required Wall Roof Sandbag Thickness (in)SB:	N/A
Expected Maximum Sandbag Throw Distance (ft)SB:	N/A
Minimum Separation Distance (ft)SB:	N/A

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.047482
Critical Fragment Velocity (fps)W:	3268
Kinetic Energy 106 (lb-ft2/s2)W:	0.2535
Water Containment System:	N/A
Minimum Separation Distance (ft)W:	N/A

Print This Form Close Form

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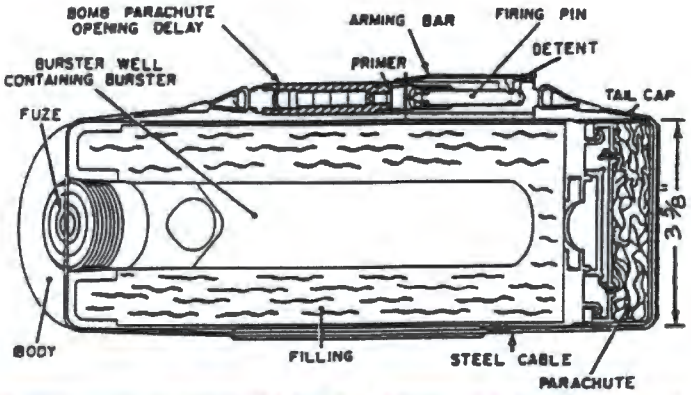
BOMB, GAS, 10-LBS, GB, M 125A1



Description. This is a bomblet type, air to surface munition, used with the M 34A1 cluster. The bomb consists of a body filling, parachute, and a parachute opening delay, a burster and fuze. The body is a sheet metal cylinder with a burst well and fuze at the front end and a parachute at the rear. The parachute opens to 14 inches diameter and is operated by a delay tube fastened to the outside of the body. The delay tube is ½-inch diameter x 6¼ inches long and contains a firing mechanism, delay charge, and explosive charge. When released from the cluster, the arming bar springs away from the parachute delay and the firing pin fires the primer. The primer ignites the delay charge, which burns in 3 to 7 seconds, then sets off the charge in the parachute delay. The explosion breaks the steel cable, freeing the tail cap and removes restraint from the fuze-arming ring. The parachute opens and slows the descent of the bomb. The deceleration causes the arming ring to fall from the fuze, arming the fuze. Upon impact the fuze ignites the burster, which explodes the body releasing the filling

Length	12 inches
Diameter	3⅝ inches
Weight	8.5 pounds
Filler/Weight	GB/ 2,6 pounds
Body Material	Sheet Steel
Fuze	Detonator - Safe impact nose fuze of the direct-arming inertia arming type
Burster	M31

Reference: TM 4-300, *Dept. of the Navy, Fourth Consolidated Report of BW/CW Study,* Mar '61

Appendix H
Standard Operating Procedures and Publications

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Standard Operating Procedure
Ops-04
DGM Anomaly investigations

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide USA Environmental, Inc. (USAE) employees and subcontractors with the minimum procedures and safety and health requirements applicable to the conduct of digital geophysical mapping (DGM) anomaly investigation 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 conduct of DGM 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 INTRUSIVE INVESTIGATION OPERATIONS

All intrusive 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) during intrusive operations. 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 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 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 Detection and Removal Procedures

GRID LAYOUT

A registered Land Surveyor will survey each of the clearance areas, accompanied by a UXO escort. Surveying activities will consist of locating clearance area boundaries, establishing permanent survey monuments, and establishing grids for geophysical investigation activities within the clearance areas. Grids will be laid out by the survey team in the approximate size of 100 feet (ft) x 100 ft or 200 ft x 200 ft, depending on the terrain. These grids will be geophysical surveyed and the data gathered and evaluated to determine which anomalies will be selected for intrusive investigation. Dig sheets will be developed that prioritize the anomalies. These prioritized anomalies will be re-acquired to an exact location using the highly accurate Real Time Kinematic-Differential Global Positioning System (RTK-DGPS) and a Schonstedt GA-52CX magnetometer.

ANOMALY REACQUISITION AND MARKING

The DGM personnel will reacquire all geophysical anomalies identified for excavation on the tracking sheets using the reacquisition method tested during the geophysical prove-out (GPO). Using a polyvinylchloride (PVC) flag with the unique identifier number recorded in indelible ink, the actual field location of each reacquired anomaly shown on the tracking sheet will be flagged. Such reacquisition will be carried out concurrently with other site activities, taking into account proper explosive safety quantity distance (ESQD) requirements related to adjoining work and off-site personnel.

INTRUSIVE INVESTIGATION OF ANOMALIES

Intrusive Teams

Intrusive investigation teams usually consist of a Team Leader (UXO Technician III) and at least one UXO Technician II or I. During Intrusive operations UXO Technicians I will operate under the supervision of UXO Technicians II or III. Only qualified UXO technicians will perform UXO operations, which are defined as:

- MEC identification
- Access procedures such as excavation, either by hand or using heavy equipment
- Handling of MEC, explosives or explosive items
- Disposal, including movement, transportation, and final disposal of MEC

The UXO Team will be assigned a set of anomalies. Using the Dig Sheets provided, the dig team(s) will excavate each of the selected target anomalies. Site-specific conditions (e.g., a larger ordnance item found than was anticipated) may warrant modification of the EZ/MSD and removal procedures described herein. As necessary, any changes will be prepared and submitted separately for approval prior to initiation of further activities on site.

Manual Excavations

Excavations for individual anomalies will be conducted using the DGM sensor used to acquire the site investigation data (e.g. EM61-MK2 for Camp Maxey) to refine each reacquired flag location within project location accuracy limits (e.g. 0.5m for Camp Maxey). The teams will record the peak value and any location offset distance and bearing on the dig list. The teams will use a Schonstedt GA-52CX (ferrous metal) and/or White's XLT or Minelab's Explorer II (all metals) detector to assist the team in determining the location, orientation, and proximity of the target item as each hole is dug. The personnel excavating an anomaly shall initially remove no more than a 6-inch layer of soil at the location of the anomaly. A visual and electronic search of the excavation shall then be made. This process shall be repeated until

the audible signal from the analog detector indicates the object is close to the surface. Once this determination has been made, soil will be removed by hand until the source of the anomaly is located. Excavations on individual anomalies greater than 4 ft below the ground surface (bgs) will not be made without prior approval of the U.S. Army Corps of Engineers (USACE) OE Safety Specialist. Each dig team will utilize both the analog detector and the DGM sensor (e.g. EM61-MK2 for Camp Maxey) to insure the anomaly source has been successfully removed and identified.

Hot Rocks, No Contact, Geology, Nothing Found

In the event that the dig teams identify the anomaly source as hot rock, no contact, geology, or nothing found, the team leader will verify that the same DGM sensor used to investigate the site has been used to refine its location and that the reported refined peak value equals or exceeds the dig list anomaly value, and that the reported refined offset does not exceed the project accuracy requirements. If necessary, the anomaly location will be reestablished and the anomaly refined again. If another anomaly source is found within project accuracy requirements, it will be investigated as detailed in section 3.1.3.2 above. If no other anomaly source is found, the team leader will update the dig list accordingly and flag that anomaly for additional evaluation by the UXOQCS, and the Project Geophysicist, or their designee. The UXOQCS will use the DGM sensor to evaluate the investigated hole to insure the anomaly source has been successfully removed or unambiguously identified. They will use the DGM sensor to evaluate any recovered object (e.g. hot rock or geology) to verify it as the source of the anomaly. They will also examine the area within a 1.5 meter around the anomaly location to assess if there are any terrain conditions or obstacles that may have contributed either noise or location errors into the DGM data. The Project Geophysicist will reexamine the DGM data for that anomaly and the parameters that were used to designate the anomaly as MEC-Like, along with all the information about the anomaly reported by the dig team and the UXOQCS (e.g. refined peak value and offset, object description, size, depth of recovery, and local site conditions for potential signal and location error sources). If necessary, the DGM data will be repositioned, processed, and analyzed and the anomaly reacquired and reinvestigated.

Mechanical Handling Equipment

Mechanical handling equipment (MHE) may be used to excavate large anomalies (e.g., pits) or those deeper than 4 ft bgs if required (e.g., to confirm the anomaly is not a MEC). Any decision to use mechanized equipment to excavate these anomalies will be made by the Senior UXO Supervisor (SUXOS) and the USACE OE Safety Specialist. Excavations will proceed slowly to ensure the MHE does not broach the item. If the excavated material is considered to be an MEC, it shall be uncovered sufficiently by hand to obtain a positive identification of the item. If the item is identified as UXO/MEC, a determination will subsequently be made as to whether it is fuzed or not.
While excavating with MHE, a UXO technician will be stationed in a position that is out of the reach of the excavation equipment but affords a view of the excavation site. This observer will ensure that the next lift is visually free of UXO. The excavated material will be placed onto the ground within a screening area that has been surface swept and the boundaries recorded. The soil spoils will be spread across the screening area using the excavator bucket. The excavated material will be screened for range related debris, material potentially presenting an explosive hazard (MPPEH), munitions debris (MD), and UXO/MEC items. UXO technicians will recover all pieces of munitions debris or range related debris and any ordnance items. After screening, the soil spoils will be stockpiled to the side of the screening area.

Disposal Pits

Excavations for disposal pits using MHE will be performed in a similar manner as specified in Section 3.1.3.2. However, because individual anomalies cannot be discerned within the disposal pits, material from the disposal pit will be excavated carefully in 2-foot lifts.

3.2 Anomaly Excavation Reporting

The MEC Subcontractor will excavate and identify the sources of the reacquired anomalies in the field. Data to be recorded for each item discovered during anomaly excavation will include the following (as applicable):

- Type (e.g., MD, MPPEH, MEC, and UXO)
- Description (e.g., "20mm projectile, MK105 practice bomb, 40mm hand grenade" and "base, coupling, firing device")
- Initial Condition (e.g., expended, inert, live, and to be determined [TBD])
- Approximate length
- Approximate width
- Depth
- Approximate weight
- Approximate inclination (per Figure 1-1)
- Approximate orientation (Azimuth per Figure 1-1)
- Approximate distance from flag
- Approximate orientation from flag
- Found in a pit?
- Piece of fragmentation?
    - Initial disposition (e.g., left in place or removed to scrap pile)
    - Requires demolition?

All data will be turned into the Site Geophysicist at the end of the day.

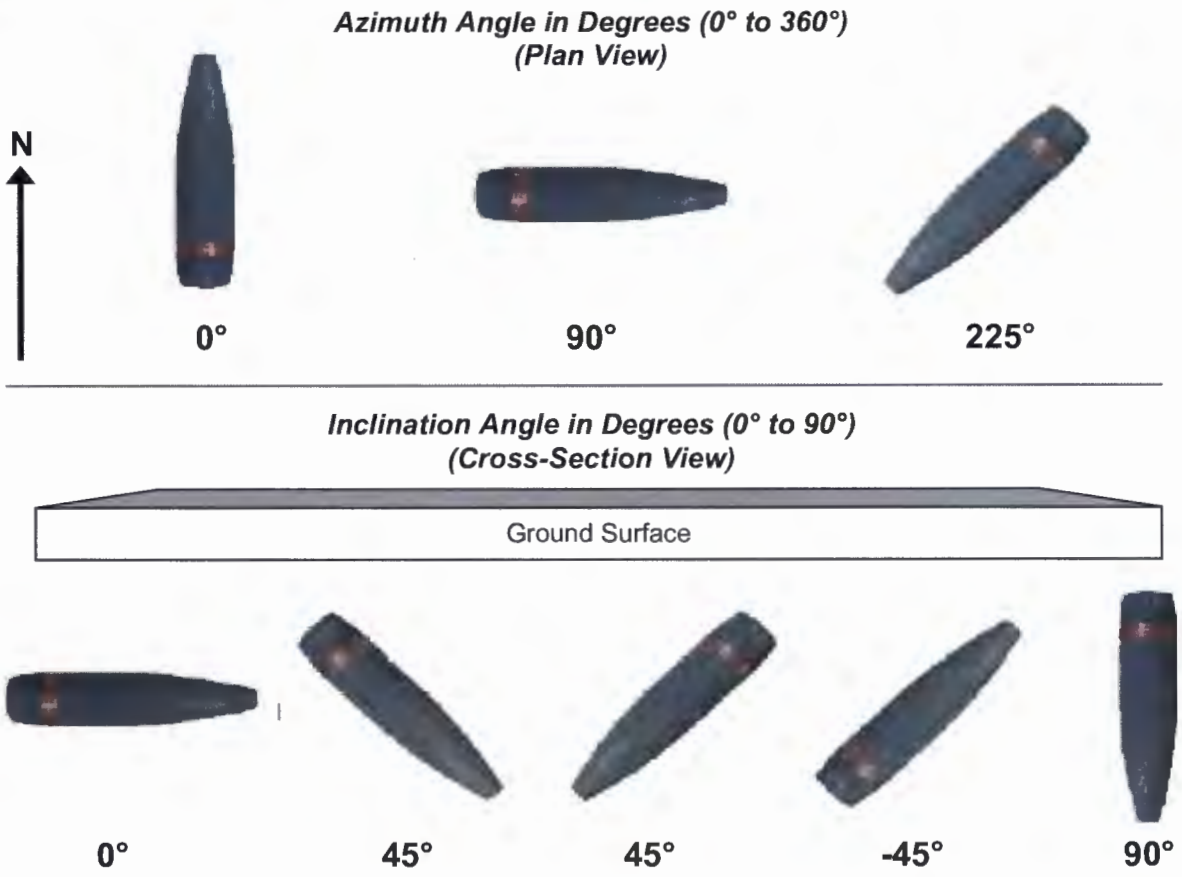

Figure 1-1: Azimuth and Inclination Examples

4.0 DISPOSAL OPERATIONS

Fuzed UXO/MEC items will be blown in place (BIP), and un-fuzed UXO/MEC items will be consolidated whenever possible in accordance with USACE Engineer Pamphlet (EP) 1110-1-17, *Establishing a Temporary Open Burn and Open Detonation Site for Conventional Ordnance and Explosives Projects*, dated 16 July 1999, Appendix D. In no case shall the SUXOS authorize or undertake destruction of UXO/MEC when there is sufficient reason to believe that the disposal action will result in personnel casualties or property damage. The USACE OE Safety Specialist will be consulted for guidance in the event that there is sufficient reason to believe that the disposal action will result in personnel casualties or property damage.

5.0 REFERENCES

- USACE Safety Considerations for UXO/MEC
- 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 6055.09-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 and Checklists – OPS-05
Digital Geophysical Mapping

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1.0 CHECKLIST FOR GEOPHYSICAL PROVE-OUT LOCATION AND DESIGN

Project Name: _____

Project Location: _____

USACE POC: _____

Reviewer's Name and Title: _____

Date of Review: _____

	Y	N	N/A
Objectives			
a. Have survey objectives been determined, clarified, and documented?	____	____	____
b. Has EM-1110-1-4009 been consulted to ensure that all objectives mentioned therein will be met?	____	____	____
c. Will the prove-out be available during the project for the evaluation of suspected instrument malfunctions?	____	____	____
d. Will the prove-out be available during the project for the evaluation of new equipment and operators?	____	____	____
e. Is the contractor prepared to demonstrate target reacquisition techniques in the prove-out area?	____	____	____
Site Selection			
1. Has the proposed prove-out site been evaluated for the following criteria:			
• Easy access for project personnel?	____	____	____
• Restricted access for non-project personnel?	____	____	____
2. Is the prove-out located in close proximity to the survey area?	____	____	____
3. Does the prove-out have geophysical noise conditions similar to those expected in the survey area?	____	____	____
4. Does the prove-out have terrain and vegetation conditions similar to those of the survey area?	____	____	____
5. Has a backup prove-out site been identified?	____	____	____
Site Preparation			
6. Has surface clearance been performed?	____	____	____
7. Have the following steps been executed in preparing three areas within the prove-out:			

Site Preparation (continued)	Y	N	N/A
• Geophysically map entire area prior to burial?	____	____	____
• Remove non geologic sources of anomalous response from two-thirds of the area? (optimal situation)	____	____	____
Seeding Prove-Out Grid			
8. Have all available sources been consulted to determine appropriate seeded items and orientations?	____	____	____
9. Have DQO's been established and documented?	____	____	____
10. Have appropriate burial depths been determined for the seeded items?	____	____	____
11. Have the DQO's been consulted to determine the number of seeded items?	____	____	____
12. Have the seeded items been spaced a minimum of 3 meters apart?	____	____	____
13. Has a list been made to document the range of burial depths for different OE items?	____	____	____
14. Have the following steps been taken to ensure accurate locations for the seeded items:	____	____	____
• Specify location requirements in x,y,z?	____	____	____
• Measure depth to top and center of mass of each object?	____	____	____
• Thorough notes taken on each item's burial?	____	____	____
• GPS or a land surveyor employed to record the position of each item?	____	____	____
Seeding Survey Areas			
15. Have items been seeded near the boundaries of the survey areas?	____	____	____
16. Has a list been made of number and type of items buried, the range burial depths for different OE items, and percentage of area seeded?	____	____	____
17. Will target threshold be reevaluated based on results of seeded items in the survey areas?	____	____	____
18. Have the positional accuracy standards used during the prove-out been applied to seeded items in the survey areas?	____	____	____

2.0 CHECKLIST FOR OUT OF BOX EQUIPMENT TESTS

Project Name: _____

Project Location: _____

USACE POC: _____

Equipment Source: _____

Equipment Serial Numbers: _____

_____

Reviewer's Name and Title: _____

Date of Review: _____

	Y	N	N/A
1. Has the equipment been inventoried and inspected for damage or wear?			
2. Has the cable shake test been performed? (Replace any faulty components if necessary)	____	____	____
3. Has the instrument (EM only) been nulled?	____	____	____
4. Has a nearby, noise-free site been selected for static background and static response tests?	____	____	____
5. Have the following instrument function tests been successfully performed:	____	____	____
• Static background test demonstrating <20% deviation in response for at least 3 minutes?	____	____	____

Background values: TG1_____, TG2_____, TG3_____, TG4_____

• Instrument response test demonstrating <20% deviation in response from test to test?	____	____	____

Response values: TG1_____, TG2_____, TG3_____, TG4_____

3.0 CHECKLIST FOR INITIAL INSTRUMENT TESTS

Project Name: _____
Project Location: _____
USACE POC: _____
Equipment Source: _____
Equipment Serial Numbers: _____
_____

Reviewer's Name and Title: _____
Date of Review: _____

	Y	N	N/A
6. Has the six-line test been utilized to evaluate the following factors:			
• Heading effects?	____	____	____
• Repeatability of the response amplitude?	____	____	____
• Positional accuracy?	____	____	____
• Latency?	____	____	____
7. If magnetics data are to be collected, have the following steps been taken in the performance of the azimuthal test:	____	____	____
• Selected an area free of geophysical noise?	____	____	____
• Fixed sensor head position?	____	____	____
• Marked four cardinal directions on ground?	____	____	____
• Collected data using a variety of sensor head orientations?	____	____	____
8. If magnetics data is to be collected, has the octant test been performed and documented?	____	____	____
9. Has the optimum sensor height for each instrument been determined?	____	____	____
10. Has the pull-away test been performed and successfully demonstrated no influence for navigational or towing equipment?	____	____	____

4.0 CHECKLIST FOR DAILY INSTRUMENT QC CHECKS

Project Name: _____

Project Location: _____

USACE POC: _____

Equipment Source: _____

Equipment Serial Numbers: _____

_____

Reviewer's Name and Title: _____

Date of Review: _____

	Y	N	N/A
1. Has the cable shake test been performed? (Replace faulty components if necessary)	____	____	____
2. Has instrument (EM only) been nulled?	____	____	____
3. Has a static background test been performed and demonstrated <20% deviation in response over at least 3 minutes:			
• Start of day?	____	____	____
Background values: TG1_____, TG2_____, TG3_____, TG4_____			
• End of day?	____	____	____
Background values: TG1_____, TG2_____, TG3_____, TG4_____			
4. Has instrument response test been performed and demonstrated <20% deviation in response from test to test:			
• Start of day?	____	____	____
Response values: TG1_____, TG2_____, TG3_____, TG4_____			
• End of day?	____	____	____
Response values: TG1_____, TG2_____, TG3_____, TG4_____			
5. Has the operator been thoroughly examined with the geophysical instrument for any sources of response that may not be readily apparent?	____	____	____
6. Has the repeat data or "clover-leaf" tests been utilized to evaluate the following factors:			
• Repeatability of response amplitude?	____	____	____
• Proper Lag Correction Applied?	____	____	____
• Positional accuracy?	____	____	____

5.0 SURVEY AREA REPORT FORM

☐ QC checked by _____ Date: _____ Date: _____

☐ QA checked by _____

Project Name: _____

Project Location:

Geophysical Contractor: _____

Design Center POC:

Project Geophysicist: _____

Site Geophysicist:

Prove-out Area ID: _____ **Date:** _____

Field Team:

Survey Type: ☐Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☐Local ☐Other _____ **Unit of Measure:** ☐ meters☐ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:** _____

Terrain:

☐Level ☐Moderate Slope ☐Steep ☐Rolling ☐Ruts ☐Gullies ☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ____☐None ☐Light ☐Medium ☐Thick

Brush: ☐None ☐Light ☐Medium ☐Thick

Weather: ☐Sunny ☐Cloudy ☐Drizzle ☐Rain ☐Thunderstorms ☐Hail ☐Fog ☐Humid ☐Snow

Grid Corner Coordinates: Start End File Name UTM/State Plane Local

Battery Voltage: _____ _____

SW _____, _____ _____, _____ **Static Background Value:** _____ _____ _____, _____

NW _____, _____ _____, _____

Static Response Value: _____ _____ _____, _____

NE _____, _____ _____, _____

SE _____, _____ _____, _____

Instrument Clock Drift: _____

Raw Data File Name: _____

Repeat Data File Name: _____

Geophysical Instrumentation: _____

Serial Number: _____

Sensor Separation (if applicable): _____

Source (rental agency, contractor, etc.): _____

Base Station: _____ **Source:** _____ **Serial Number:** _____

Navigation Method: _____ **Source:** _____ **Serial Number:** _____

Additional Comments:

_____

_____

_____

6.0 CHECKLIST FOR DATA STORAGE AND TRANSFER

Project Name: _____

Project Location: _____

USACE POC: _____

Reviewer's Name and Title: _____

Date of Review: _____

	Y	N	N/A
a. Has the transfer medium been approved by USACE?	____	____	____
b. Are all files in USACE approved formats?	____	____	____
c. Have all of the following been included in the transfer packet:			
• "Readme" file detailing contents?	____	____	____
• Raw data files?	____	____	____
• Edited data files?	____	____	____
• GPS positioning files (if separate)?	____	____	____
• Completed geophysical maps?	____	____	____
• Prioritized target lists?	____	____	____
• Data File Log / Spreadsheet of Delivered Data Files with Dates Sent?	____	____	____
d. Have the required number of copies, per USACE, been included in the transfer packet?	____	____	____

7.0 CHECKLIST FOR FIELD EDITING

Project Name: _____

Project Location: _____

USACE POC: _____

Reviewer's Name and Title: _____

Date of Review: _____

	Y	N	N/A
1. Have the following items been evaluated for correctness and edited if necessary:			
• Line numbers?	____	____	____
• Start and end points?	____	____	____
• Line direction?	____	____	____
• Fiducial locations?	____	____	____
2. Has the data been examined in profile and evaluated for geophysical noise? Enter background noise value and compare with GPO background:_____ vs. _____	____	____	____
3. Has the data been examined for the presence of drop-outs and spikes?	____	____	____
4. Has the presence of metal on the operator been eliminated as a possible source of geophysical noise?	____	____	____
5. Has the edited data been converted to the appropriate .xyz format?	____	____	____
6. If using magnetics, have the following steps been taken:			
• Examined base station data for any problems?	____	____	____
• Performed diurnal correction to field magnetometer data?	____	____	____
7. Has the positional data been evaluated for accuracy and completeness?	____	____	____

8.0 CHECKLIST FOR DATA PROCESSING

			FILENAMES:
Site:	_____	Raw:	_____
Location:	_____	Edited:	_____
Contractor:	_____	Processed:	_____
Sector:	_____	Contour Map:	_____
Grid:	_____	Target List:	_____
Processor(s):	_____	Target Map:	_____

	Y	N	N/A
Preprocessing			
1. Coordinate Conversion			
Projected Coordinate System _____	____	____	____
2. Removal of Drift and Leveling	____	____	____
Record Corrections:			
3. Removal of Heading	____	____	____
Record Corrections:			
4. Lag and Offset	____	____	____
Record Corrections:			
Processing			
5. Initial Gridding	____	____	____
Record Parameters:			
6. Calculation of 3D Analytic Signal	____	____	____
7. Digital Filtering and Enhancement			
❑ Low Pass			
❑ High Pass			
❑ Non Linear	____	____	____
❑ 3x3 Convolution			
❑ Difference			
❑ Other _____			
8. Threshold Selection			
Threshold value _____	____	____	____
9. Anomaly Selection			
Number of targets _____	____	____	____

RTK DGPS AND EM61-MK2 SOP

Base GPS Station Equipment

1. Base GPS receiver, model 4700/R7/5700/R6/5800 – yellow box
2. Base battery (Lunch Pail) – yellow box
3. L1/L2 GPS antenna with ground plane – yellow box
4. GPS antenna tripod with leveling bubble – tripod box
5. GPS power cable – in yellow box, attached to lunch pail or limo to alligator clips
6. GPS antenna cable – in yellow box
7. GPS/radio cable – in radio box
8. Base Radio (TrimMark3) – in radio box
9. Base radio power cable – in radio box
10. Base radio tripod
11. Base radio antenna – in yellow quiver
12. Base radio antenna cable – in radio box
13. Base radio battery
14. TSCE Controller cable – in yellow box

Rover GPS Equipment

1. Rover GPS receiver with integrated antenna and radio, model R8/5800 in yellow box
2. Rover Antenna range pole – in tripod box
3. TSCE with Stylus – in yellow box
4. Rover radio antenna whip – in yellow box
5. Rover batteries, 4 each – in yellow box
6. Rover/TSCE pigtail cable – in yellow box (Limo to DB9)
7. TSCE/serial cable – in yellow box (Limo to DB9)
8. TSCE Range Pole Bracket – in yellow box

Support Equipment

1. Battery chargers and data transfer link to PC – in yellow boxes
2. VAC power cable for chargers – in yellow box
3. Serial data transfer cable – in yellow box
4. Laptop PC with Trimble Geomatics Office software

RTK GPS Base Station Setup Procedures

1. Attach GPS L1/L2 antenna with ground plane to tripod
2. Set Base GPS antenna height (typically 2.0 meters for maximum height)
3. Set up Base GPS antenna tripod over base monument and point GPS antenna North
4. Secure Tripod legs (e.g. plant into ground and/or sandbag each leg). Level Base GPS antenna tripod
5. Connect Base GPS receiver to GPS antenna (wrap cable around tripod leg for strain relief, right angle at antenna)
6. Set up Base Radio antenna tripod and mount radio antenna (use large washer on top of tripod, if necessary, antenna base in radio box)
7. Connect Base radio to radio antenna
8. Connect Base GPS to Base radio – black Limo to Limo cable to GPS port 3
9. Connect Base Radio to radio battery (Radio should start. "Tran" light should not flash)
10. Connect Base GPS receiver to battery –GPS port 2.

NOTE1: Base radio needs power first. If the base receiver is powered first, the radio expects power from the base receiver, but there isn't sufficient power, so the radio will display the message "No External Battery Connected" even if there is one. Disconnect all power, and then reconnect the base radio power, and then the base receiver power.

11. Connect TSCE to base GPS receiver (GPS port 1) and turn on the TSCE and wait for it to boot
12. If the controller opens in Windows CE Desktop, double tap "Survey Controller"
13. Enter the "Files" menu (tap with stylus)
14. Tap "Open job"
15. Select Project (DRI, USA, etc.) and hit "Select" or wait for auto select
16. Enter Survey menu (Tap with stylus)
17. Select "R7R8TM3" – This stands for the R7 Base, R8 Rover, and TrimMark3 radio
18. Tap "Start Base Receiver" – TSCE will connect to base receiver

a. **Known Base Station location enter known coordinates**
   i. Enter Point Name by pull-down, List (e.g. BASE);

   NOTE2: If Base point has already been set, selecting the base point name from a List will automatically load the required settings, jump to x below.
   NOTE3: If you are keying in a new base station, type in the point name and hit enter. You will likely get the message "point name does not exist", just hit OK/accept.

   ii. Scroll down to Northing and key in known coordinate;
   iii. Record Northing _____ sft/m.;
   iv. Scroll down to Easting and key in known coordinate;
   v. Record Easting _____ sft./m;
   vi. Scroll down to Elevation and key in known elevation (make sure units match);
   vii. Record Elevation _____ sft/m.;
   viii. Scroll down to Antenna Height and enter measured value (make sure units match);
   ix. Hit "Enter";
   x. Press soft key "Start" to begin Base Survey file;
   xi. Follow prompt to disconnect TSCE.
   xii. Check base radio. The "Tran" message should be flashing. If the radio shows a "busy" message, see the Base Radio Trouble Shooting section at the end of this SOP

----- OR ----

b. **Local Base Station Location** –
   i. Key in the Base Point Name (e.g. BASE);
   ii. Instead of entering known coordinate, as in **a above**, Tap "here" to enter and store the current Base GPS measurement for its antenna location;

   NOTE4: This will be an autonomous GPS location. It will not be geodetically accurate to normal surveying standards. To be useful, you MUST use the same location AND the same coordinates for all project work with this setup option. If the geodetic location for this base station is subsequently determined by a Professional Land Surveyor, then all project coordinates can be shifted to geodetic accuracy.

iii. Record Easting _____ sft/m.;
iv. Record Northing _____ sft/m.;
v. Record Elevation _____ sft/m;
vi. Enter Antenna height _____ ft/m;
vii. Tap "Enter";
viii. Tap "Start" to begin Base Survey file;
ix. Follow prompt to disconnect the TSCE.
x. Check the base radio for the flashing "Tran" message. If the radio shows a "busy" message, see the Base Radio Trouble Shooting section at the end of this SOP

Rover set up for DGM Surveying:

1. Attach Rover L1/L2 antenna/receiver to sensor mount
2. Power ON and power TSCE with Bluetooth
3. Enter Survey Menu
4. Select R7R8TM3
5. Verify GGA output to integrated sensor data logger, if appropriate.
6. Verify position quality is RTK Fix

Rover set up for Reacquisition:

1. Put charged battery in R8 and attach whip antenna
2. Setup Range Pole and attach Rover antenna/receiver
3. Attach TSCE bracket to range pole and TSCE to bracket
4. Power ON the receiver and TSCE (Bluetooth connection should show rover status in upper right window). If, after several minutes, the Bluetooth connection fails, soft-reboot the TSCE by holding the power button through the five second countdown, then release and let the TSCE reboot. The rover status information should be displayed.
5. Enter Survey Menu
6. Select R7R8TM3
7. Start Survey
8. Select Stakeout for Reacquisition
9. Select points from list or from map
10. Add all points, if necessary
11. Select anomaly point [e.g. A1-12842]
12. Follow survey controller guidance to anomaly location
13. When delta values fall below 0.5 sft, mark location with flag labeled with the point name. Verify point reacquired with flag label
14. Measure location and accept to mark anomaly as reacquired
15. Select next point … etc.

Base Radio Trouble Shooting
If there is a "BUSY" message on the base radio or an audio indication of someone else using the selected frequency, follow these troubleshooting procedures.

1. Use the up or down buttons on the right side of the base radio to change the radio frequency. Look for a channel/frequency that is not busy and does not have any audio interference. Wait several minutes and if the channel is still clear, note the channel number AND the frequency.
2. You will then need to change the rover's internal radio to match the new base radio frequency. To do this, follow the instruction **Rover Setup for Reacquisition**, steps 1 thru 4 above.
3. After the TSCE connects to the rover GPS, the rover status (e.g. battery levels, number of satellites, etc) will be displayed in the upper-right portion of the TSCE display.
4. Tap the Configuration menu
5. Tap Survey Styles
6. Tap R7R8TM3
7. Tap Rover Radio – The display should show Type = Trimble Internal, and Method = Trimble 450/900
8. Tap "Connect" in the lower left corner
9. When the TSCE connects to the rover internal radio, the selected frequency will be displayed. To match the base radio's new frequency, scroll up or down until you find the new frequency (the frequency list is the same as the radio channel number).
10. Tap Accept (lower right corner)
11. Tap Store
12. Tap escape to return to the main menu. The rover radio LED should now be flashing and the TSCE display should show the rover radio icon.
13. Carry on.

Another thing you can do to troubleshoot the base radio:

1. Using the menu button on the left side of the radio, you can scroll to the transmit power setting and, using the up/down buttons on the right, adjust the transmit power to 25 watts (max). If you are experiencing low-level interference, this should dominate the local airwaves with your base station transmissions. However, we have experienced communities that broadcast at levels higher than 25 watts.
2. A less appropriate method could be to use the competing base transmission. The hazard with this approach is that you don't know how accurate the other user is. You could test it by relocating at least two known points and comparing their measured locations against their known locations. If the offset is within your project accuracy requirements (e.g. within 1-foot), you could reasonably use the competing base transmission. I would still leave your base station up and running in case the competitor shuts theirs down.

Rover RTK Position Reoccupation QC Test:

1. Position rover GPS antenna over a known location
2. Verify rover position is RTK Fix
3. Record Easting (X), and Northing (Y) location
4. Compare measured location to known location
5. If location offset exceeds 0.5 feet, combined,
    a. check base station for blown over antennas and correct base point values
    b. Verify radio connection
    c. Check satellite planning software

EM61-MK2 Setup:

1. Assemble coil assemblies
2. Attach wheels and handle (or stretcher)
3. Attach rover GPS antenna mount and mount rover GPS
4. connect upper coil to lower coil connector or attach shorting plug for bottom coil only
5. Attach battery to backpack
6. Connect coil cable to backpack
7. Connect data cable to backpack and Data Logger COM1
8. Connect GPS to EM Data Logger COM2
9. Move to an electromagnetically clean area
    a. Set the EM61-MK2 Mode Switch to:
        i. 4 – for logging four (4) bottom coil time gates
    b. Set the Master/Slave Switch to M for single sensor operation
    c. Push In the Circuit Breaker on the EM61-MK2 backpack and warm up for at least 5 minutes.
    d. Push the ON/OFF button to turn on the Data Logger
        i. Set Antenna Coil Size (e.g. Standard 1 x .5 m)
        ii. Set Up Logger
            1. Date
            2. Time
            3. Units (e.g. feet)
            4. COM port (e.g. COM1)
            5. Audio
            6. Pause Key: (e.g. Alt F1 or any key)
            7. Display (e.g. Text or Graphic)
        iii. Set GPS Port
            1. GPS Input: (Enabled)
            2. COM Port (COM2)
            3. Baud Rate: (9600)
            4. Parity: (No)
            5. Data Bits: 8
            6. Stop Bits: 1
            7. Can monitor GPS data in terminal mode (F3)
        iv. Set Output Port – Not used unless logging data to external PC
    e. Monitor/Null Coils – After 5 minute warm-up, null EM61-MK2 – all channels should be close to 0 +/- 1
    f. Acquire Data:
        i. Create File (F1 for default name, F3, Enter, F1 for other file name)
        ii. Survey Setup
            1. Mode: Auto
            2. Wheel Inc: N/A
            3. Reading/s: 10.00 or 15
            4. Surv Line: (e.g. 0)
            5. Line Incr: (e.g. 1 for instrument checks or 2.5 for survey)
            6. Sequence: (e.g. Alternate)
            7. Direction: (e.g. North
            8. Start Stn: (e.g. 0)
            9. Stn Incr: (e.g. Positive)
        iii. LOG DATA
            1. Wait for data display (0 to 100% internal calibration)
            2. Observe time gate values
            3. Observe DGPS input (observe toggle bar and correction status for letter D, letter A is unusable GPS)
            4. Enter to log data– System is ready to log data. Move to start of survey line.

g. When coil is centered over start point, press ENTER again. Display will show "logging" on the top display line. Observe coil readings. Observe Station Number (STN). Note any unusual recordings on Field Survey Sheet.
h. Walk along survey line slowly (about 2 to 3.5 miles per hour). Periodically observe Data Logger display. Note any unusual recordings, any deviations from the survey line, or any observed metal objects. Escort should log these observations and marks the outer coil edge with marking paint or plastic pin flags to insure sensor overlap on a return transect.

(If fiducial marks are available, press thumb button when coil is centered over mark for 1 second)

i. Press Pause Key (e.g. Any Key) when coil is centered over the line end to stop logging EM61-MK2 data.

(If in the Auto mode, simply continue to next line and keep moving until survey session is complete or manually set new lines with the F1 key)

j. When survey is complete, press F5 then the letter Y to exit logging. Enter a new file name to continue surveying, or return to main menu to transfer data.
k. Data Transfer using a cable:
    i. Turn OFF the Data Logger by holding the ON/OFF key
    ii. Disconnect Data Logger from EM61-MK2 backpack.
    iii. Change EM61-MK2 Backpack battery, if required
    iv. Connect Data Logger to Field Lap Top PC
    v. Power PC
    vi. Run DAT61MK2
    vii. Select "Data Transfer"
    viii. Verify serial port settings (COM1, Baud Rate: Auto)
    ix. Run the Data Logger program File Manager
        1. Upload Files.
    x. Select "List Files" and select the file names. (Check the Field Survey Form).
    xi. Select "Download" and observe PC and Data Logger to monitor data transfer status. Log any transfer problems on Field Survey Sheet.
    xii. Data Transfer using Memory Card:
        1. Exit DAT61 program to DOS c: prompt
        2. Use up arrow to find (or type) copy *.r61 d:
        3. Hit enter (files get copied from c: to Memory Card)
        4. Turn data logger OFF and eject Memory Card
        5. Insert Memory Card into PC and copy files to appropriate folder
        6. In DAT61 for Windows, convert all files from raw to ASCII (from *.r61 to *.m61)
l. Combine EM and GPS data in EM61MK2 using the "GPS Positioning" tool (or position with line and marker data).
    i. Select input file name
    ii. Enter output file name and location, enter file name on Survey Sheet.
    iii. Select the channels to position (e.g. STD D or STD 4 (all 4 bottom coil time gates))
    iv. Set the GPS Time Gap (e.g. 3 seconds)
    v. Select file format (e.g. Geosoft)
    vi. Set the GPS System (e.g. Geodetic or UTM)
    vii. Set Units to meters
    viii. Set GPS corrections to Raw GPS or Differential RTK
    ix. Click "Apply" to export GPS integrated ASCII data file
m. From the File tool, select "Open XYZ File" and select the one just created. Display should show the survey tracks.
n. Data is ready for Processing and Analysis.

10. Data Management in Data Logger
    a. Once data transfer is complete and data has been positioned, exported (*.xyz file), and processed successfully, clear the data logger memory

i. From the Main Menu, select "File Manager"
ii. Select "Delete File"
    1. Scroll to select a file to be deleted
    2. Hit F1 key to delete
    3. Hit the "Y" key to confirm delete

File should have been removed from list

Daily EM61 Static Check

1. Setup as above
2. In a quiet area, log static EM61 background data for 1 minute (observe meter readings near 0, +/- 2-3 mV)
3. Press Enter to Pause and increment line (F1)
4. Place a "know object (e.g. a Standard Static Test Bar with steel bolt)" on the coil and log data (Enter) for 1 minute (observe meter readings #> 0, +/- 2-3 mV)
5. Press Enter to Pause, remove target, and increment line (F1)
6. Log static background data (Enter) for 1 more minute (observe meter readings near 0 +/- 2-3 mV)
7. Press Enter to Pause, and increment line
8. Log static data for 30 seconds while all system cables are shaken (observe meter readings near 0 +/- 2-3 mV – no jumps or spikes),
9. Press Enter to Pause, and increment line
10. Log static data for 30 seconds while operator kicks towards coil, twists left/right, and bends up/down (observe meter readings near 0 +/- 2-3 mV).
11. QC checks:
    a. Look for near zero readings during lines 0, 2, 3, and 4 – re-null coil or replace battery as necessary
    b. Check for consistent target readings +/-20% on line 1 from previous readings. Replace battery as necessary

Daily Latency Check

1. Setup as above
2. Find a quiet area at least 50 feet long
3. Place a known object in the center of this line (e.g. 2" Tow Ball)
4. Acquire line 0 from start (0,0) to end (0,50) directly over the object (0,25)
5. Increment the line number and acquire line 1 from end (0,50) to start (0,0) directly over the object (0,25)
6. Use this data to help determine data processing latency parameter needed to get the peak to line up in both directions.

EM Reacquisition

1. Setup as above
2. Position coil (push and pull) over flagged location in several directions while monitoring the display (e.g. SUM Channel).
3. Try to match or exceed the reported mV value on the Dig Sheet within 3 ft radius of each flag
4. Move the flag to coil center over refined peak location
5. Log reacquired mV peak on Dig Sheet. If necessary, log refined location offset distance and direction on Dig List
6. Move to next flag

PC – Geomatics Office

1. New Project
2. Enter new project name (e.g. Pine Ridge 2006)
3. Make sure Template: in using USFeet … click OK
4. Set Coordinate System correctly (e.g. US State Plane 1983, Colorado Central 0502, NAD 1983, Geoid (none) … click Finish … click Apply … click OK
5. Import points, select Custom [format] … select Name,East,North,Elevation … OK
6. Find *.csv file to load (e.g. My Documents/DRI/DRI_Sector_D.csv). Points should load and be displayed. Verify!

GPS Data Transfer from PC to TSC1

1. Run Trimble Geomatics software
2. Open Project (e.g. Pine Ridge 2006)
3. Verify target points and BASE point are shown
4. Connect GPS Survey Controller to PC (USB or Serial) a power ON survey controller (machines should connect thru ActiveSync)
5. On PC, Select Export
6. Select Survey Devices
7. Select Survey Controller on ActiveSync and click open (file will transfer)
8. Verify on Survey Controller:
9. Select the job
10. Select Review current job and verify points and point order. You can also map the points for the job

7. Charge all GPS and EM61-MK2 batteries overnight..

9.0 WEEKLY DGM QC REPORT:

Project Name: _____
Report Week: _____

9.1 Instrument Latency Test

Metric is no zig-zag or chevron effects visible.

Describe latency correction performed _____
Document critical latency correction parameter(s) _____
Attach a representative data image map for each survey day documenting proper latency correction.

9.2 Instrument Noise

Metric based on approved GPO results (e.g. < +/- 1.3 mV on time gate 1).

Report the weekly summary of all static background noise levels from each static test.
Report the dynamic noise levels for each survey file.

9.3 Instrument response test results

Metric +/- 20 % from day to day.

Report the weekly summary of all static instrument response tests.

9.4 Magnetometer heading correction

If used, magnetometer data will be corrected for heading errors such that there is no visible heading affects in the data displayed at the amplitude range used for detection and analysis.

Describe magnetometer heading correction performed _____
Document specific heading correction values _____
Attach a representative data image map for each survey day documenting proper heading correction.

9.5 Data leveling and/or filtering

Metric is leveling and/or filtering utilities do not adversely alter the nature of the original measured response by more than 5%.

Describe data leveling and/or filtering used _____
Document critical leveling and/or filtering parameters used _____
Attach example of data profile before and after leveling and/or filtering

9.6 Anomaly reacquisition accuracy

Metric not to exceed +/- 1 foot.

Summarize the location offset(s) from each GPO repeat test

9.7 Reoccupation accuracy

Metric is not to exceed +/- 10 cm from a known location.

Describe the reoccupation point _____
Record the known location X = _____, Y = _____
Summarize the location offsets from each reoccupation test.

9.8 Data sampling density

Metric is along-track density will not exceed 0.5 feet.

Use Oasis QC tools to assess data sampling density.
Check if all data sets pass metric _____.
Attach QC maps to document any failures.

9.9 Across-track line spacing

Metric is line spacing will not exceed 3 feet.

Use Oasis QC tools to assess the across-track line spacing for each grid survey.
Check if all data sets pass metric _____.
Attach QC maps to document any failures.

9.10 Reacquisition accuracy

Metric is not to exceed 1 meter from to refined location.

Document all refined location offsets on dig list
Include updated dig list with this report

9.11 Refined location accuracy

Metric is not to exceed 30 cm from refined location.

Document all discovered location offsets from refined location on Dig List
Include updated dig list with this report.

9.12 DGM false negatives

Metric is no false negatives.

Document all false negative discoveries
Provide failure ID and photograph (attached to this report)
Provide failure location X = _____, Y = _____
Document corrective action taken _____

9.13 Intrusive anomaly resolution

Metric is for all intrusive results resolved with DGM data.

UXOQCS and Project Geophysicist will initial all dig results
Each discrepancy and final resolution will be documented
Final weekly dig list is attached to this report

Site Geophysicist Signature and Date _____

UXOSO/UXOQCS Signature and Date _____

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