APPENDIX A
PERFORMANCE WORK STATEMENT

Performance Work Statement
for Remedial Investigation / Feasibility Study
at Pinecastle Jeep Range
Orange County, Florida
I04FL0405
12 February 2008
Revision: 0
Revision Date; N/A

1.0 OBJECTIVE: The objective of this task order is to obtain government acceptance of a Decision Document meeting the requirements of ER 200-3-1 and CX Interim Guidance 06-04. Work to be accomplished includes the conduct of a Remedial Investigation (RI), Feasibility Study (FS) and all necessary activities required to accomplish this objective.

2.0 BACKGROUND:

2.1 Location: The Pinecastle Jeep Range, Formerly Used Defense Site, is located in Orange County, Florida.

2.2 History: The 12,483 acre, former Pinecastle Jeep Range was leased by the Department of Defense during WWII for use as a gunnery and demonstration range. It is five miles from the Orlando International Airport. The Pinecastle Range was declared surplus in December 1946 and the lease was terminated in 1947. Records from 1948 indicate that half of the land was cleared of ordnance; however, there are no records to verify which half. At the time, part of the property was wetlands. Historical records research indicates that no ordnance or debris was reported when building the expressway or other roadway that ran through the middle of the former installation; magnetic anomalies have been identified on a portion of one property through a geophysical survey conducted by the owner. Two boys were seriously injured in 1948 when a fuze exploded when they dropped it. It is not known in which portion of the range the device was found by the injured individuals.

2.2.1 Several public investments have been constructed on lands that were part of the former installation without reported incident including Highway 417, Highway 528, numerous other surface streets, and the county landfill. But recognition of munitions problem may have been ignored because of large financial interests involved. Construction on the FUDS and within the known bombing area circles includes the Odyssey Middle School in the North-West quadrant and the Tivoli Gardens housing sub-division East of the school, Avon sub-division to North of school, Crowntree Lakes Apartments to Northeast of school, portions of the Newport sub-division to the West of school, and the county waste management facilities to the East of Highway 417. Within the FUDS, but not within a known bombing area circle, at the North end of the FUDS are Vista Lakes Square, Hidden Oaks Elementary School, Tivoli Woods Village, Young Pines Apartments, Victoria Pines, Victoria Landings, and Watertree Estates. Construction outside FUDS but within the known bombing area circles includes portions of the Warwick sub-division and Newport sub-divisions.

2.2.2 The developers who own the largest tracts of land have plans to build 3,000 homes starting in 2009. There are also plans to develop high tech corridors known as Innovation Way east and south of the FUDS, and the local government has approved the construction of a road that will cut through portions of the site. Investigations also revealed that a landowner has plans to build the Beltway Commerce Center just east of Highway 417 on at end of Lee Vista Blvd.

2.2.3 In addition, on 1 June 2007, the Corps received a letter from a farmer who holds an agricultural lease on the Mockingbird Orlando LLC property testifying to an incident in 2002 in which farm employees encountered an incendiary device while using a disc harrow on the property.

2.2.4 As part of the MMRP SI, the Corps setup and conducted a Public Availability Session on 24 July 2007, to share information about the history of the property and educate the landowners about the potential hazards that exist and what to do if ordnance was discovered. EOD's emergency response action was reported to the public at this meeting. This session resulted in significant media coverage and additional Congressional interest.

2.2.5 Other Pertinent Information to Date:
• Odyssey Middle School construction was completed in 2001.
• Tractor catches on fire from incendiary device in 2002 but not reported to sheriff.
• Mockingbird LLC has contractor prepare munitions study in 2004 for property next to school.

• Mockingbird LLC provides 2004 report to Corps on 28 June 2007.
• Patrick AFB EOD blows-up 1 live incendiary device and 3 fused practice bombs on 13 July 2007 after Jacksonville District with help of Huntsville Center recognizes live munitions in photograph contained in private report and notifies owner to contact sheriff.
• Warwick housing sub-division two practice bombs found by contractor and disposed of by Patrick AFB EOD November 2007.

2.3 Previous Investigations: Inventory Project Report (INPR) was completed in July 1994 and documented the site as a FUDS eligible property. An Archives Search Report (ASR) was completed in May 1998 which provided the historical records search and the identification of ranges. An ASR Supplement was completed in 2004.

2.3.1 In 2005 USACE began a Site Inspection (SI) of the potential ranges on the property. Four potential munitions response sites (MRS) were identified on the former Pinecastle Jeep Range:

MRS-01: This is chemical demonstration range. The MMRP SI documents that this MRS has No Further Department of Defense Action Indicated (NDAI). No known chemical munitions were used during this testing. However, the chemical warfare demonstration activities documented possible use of DDT; the State of Florida requested testing for DDT on this MRS and was tested for during the Time Critical Removal Action (TCRA) discussed in paragraph 2.4. It should be noted that the Odyssey Middle School is located directly over this area.

MRS-02: This was an air-to-ground Rocket Range. This is the second major area of concern on Pinecastle. MRS-04 overlaps much of the Rocket Range MRS- 02. The Munitions Response Site Prioritization Protocol (MRSPP) score is 2 for this range (the highest possible MRSPP score is 1 which is reserved for a Chemical Warfare site).

MRS-03: This is a Small Arms Range. The MRSPP score is 8.

MRS-04: This is a collection of 10 Bombing Ranges and is the main area of concern. As part of the MMRP SI, high levels of Nitroglycerin were found in multiple soil samples in this area. The MRSPP score is 2.

Due to lack of information this site has now been broken down into Areas of Interest. Once the Remedial Investigation is complete the site will then be broken in to new MRS's with a Munitions Response Site Prioritization Protocol (MRSPP) prepared for each MRS.

2.3.2 On 28 June 2007, near the completion of the SI, the Corps received a letter from the manager of Mockingbird property which transmitted a "Preliminary UXO Survey" which was performed on their property for the Mockingbird Orlando LLC. This private report identified 1,285 magnetic anomalies on a portion of the Mockingbird property including photographs of items located on the surface. Upon review of this privately prepared report, it was determined by the Corps that there was documented surface UXO on this property. Subsequently, the Corps notified the landowner and encouraged him to notify the authorities of the existence of the ordnance on his property. On Friday, 13 July 2007, the landowner of the Mockingbird Property contacted the Orange County Sheriff's Department who then in accordance with their procedures, notified the Patrick Air Force Base EOD Team about ordnance. Four ordnance items including one live 6 lb. incendiary bomb were detonated in place within 1,500 ft. of the Odyssey Middle School.

2.3.3 In addition, on 1 June 2007, the Corps received a letter from a farmer who holds an agricultural lease on the Mockingbird Orlando LLC property testifying to an incident in 2002 in which farm employees encountered an incendiary device while using a disc harrow on the property.

2.3.4 As part of the MMRP SI, the Corps setup and conducted a Public Availability Session on 24 July 2007, to share information about the history of the property and educate the landowners about the potential hazards that exist and what to do if ordnance was discovered. EOD's emergency response action was reported to the public at this meeting. This session resulted in significant media coverage and additional Congressional interest.

2.4 Recent Activities: A TCRA was recommended as a result of findings in the SI, additional information provided by the private landowner, the danger to school students, and the EOD response. The TCRA contract awarded 03 August 07 to address the known threat near the Odyssey Middle School (OMS). The TCRA was established to educate the public, install fencing between the school and the Mockingbird property, and to investigate and mitigate any Munitions or Explosives of Concern in the Odyssey Middle School grounds or on the Mockingbird property adjacent to the Odyssey School Grounds. The TCRA was extended to investigate and mitigate any MEC found on the Tivoli housing sub-division located on the FUDS and due east of the Odyssey Middle School. After two practice bombs were found in the Warwick sub-division by a builder, the uninvestigated east side of the Warwick sub-division was also added to the TCRA.

2.4.1 The investigation and excavation on Odyssey School and Mockingbird property turned up several devices that were not anticipated by a review of the range documents. Document reviews led to anticipation of finding practice bombs, air-to-ground rockets, expended small arms ammunition and varying sizes of incendiary bombs. However, in addition to these items there have been found and disposed of practice and live rifle-propelled grenades; 2.36 inch rockets for bazookas; 23lb fragmentation bombs; 60mm, 81mm and 4.2 inch mortar rounds; and 37mm, 57mm, 75mm, 76mm, 90mm and 105mm artillery rounds. Munitions debris (fragmentation) from HE bombs has been found on the Mockingbird property.

2.4.2 Concerns about explosive devices and to allay the fears of homeowners located off, but adjacent to, the Pinecastle Jeep Range, the builder for the western portion of the Warwick sub-division contracted for a MEC investigation. Two 20 lb practice bombs were located about West of the FUDS property boundary. Even though the bombs were found out side of the FUDS property, they were still found within the suspect bombing target circles established for the property. These devices were inert practice bombs.

3.0 SPECIFIC TASKS: Methods to be used to achieve task order objectives at the specified level of performance shall be determined by the Contractor. The Contractor will be evaluated periodically during each of the following tasks to ensure compliance with the PWS and to document that quality objectives, delivery schedule, and the overall completion date are being met. This evaluation will be performed according to a Quality Assurance Surveillance Plan (QASP). An example of a QASP is contained in EM 1110-1-4009 and will be modified for the specific task order requirements and the contractor's Quality Control Plan (QCP). Failure to adequately complete any service or submittal to at least a satisfactory level of quality or timeliness may result in a repeat of the work, or a poor performance evaluation. Performance metrics are provided in Section 6.0.

3.1 Task 1, Technical Project Planning (TPP): This is a Firm Fixed Price/Unit Cost task. The objective of this task is to develop determine the property closeout statement, determine the data requirements necessary to make decisions at this site, analysis existing data for the site, determine data gaps, develop a data collection plan to fill those gaps and develop DQO for the level of data acceptable for the quality of data to make those decisions.. Disputes between the Project Delivery Team (PDT) and the regulators regarding the adequacy of DQOs will be resolved by the USACE Project Manager. In coordination with the Government, the Contractor shall implement the TPP process IAW EM 200-1-2, *Technical Project Planning (TPP) Process* and Interim Guidance Document 01-02, *Implementation of Technical Project Planning (TPP) Ordnance and Explosives (OE) Formerly Used Defense Sites (FUDS) Projects*. The contractor shall organize and coordinate the TPP meetings. The Contractor shall anticipate 3 meetings for 1 day plus travel to be conducted in the Pinecastle Jeep Range. The contractor shall also propose a unit cost per TPP meeting in the event more meetings are necessary. The contractor shall work with the USACE to identify and involve all stakeholders to be included in the TPP process. The contractor shall be responsible for the logistics of the TPP meetings to include but not limited to, obtain meeting location, send invitation letters (after government review), and preparing briefing materials. The USACE will provide the facilitator for the TPP meetings. The Contractor shall prepare a TPP memorandum containing the DQOs and other results of the TPP meetings. If a site visit is planned, the Contractor shall prepare and submit for acceptance an Abbreviated Accident Prevention Plan (AAPP). At a minimum for the TPP, the conceptual site model shall be developed using a GIS. The first TPP meeting is planned for March 2008 with the exact date to be determined. ***The contractor shall attend a planning meeting in the Pinecastle area to take on the 11th and 12th of March 2008. The contractor shall provide a facility (i.e. hotel conference room) for the meeting. This meeting is between the contractor and Corps of Engineers only and is a planning meeting for the first TPP meeting and is in addition to the 4 TPP meetings. The first TPP meeting is scheduled for the 27th of March 2008 with a public meeting to be held the night of the 27th. Since the first TPP and public meeting are held at the same time the government expects to see the costs saving reflected in the proposal.***

3.2 Task 2, RI/FS Work Plan (WP): This is a Firm Fixed Price task. The objective of this task is that the contractor prepare, submit for acceptance a WP that is a detailed and comprehensive plan covering **all** aspects of the site characterization in accordance with data item description (DID) MR-001 and EM 1110-1-4009. The WP shall incorporate the decisions from the TPP meetings. An Explosives Siting Plan (ESP) shall be submitted for acceptance in accordance with DID MR-005-04 as a stand alone document and inserted in the WP after ESP acceptance. The government expects the contractor to be in the field performing geophysical mapping beginning in May 2008. The contractor shall attend an on-board review in Huntsville after receipt of comments on the draft WP.

3.3 Task 3, GeoSpatial Data: This is a Firm Fixed Price task. The objective of this task is for the Contractor to utilize GIS in the development of the Conceptual Site Model (CSM). The Government will provide any existing GIS data

available. The GIS will be used to build upon and manage IAW DID MR-005-07.01. A pre and post-project response action geospatial data analysis shall be performed using a GIS. All available existing data that is applicable to the project shall be consolidated into the GeoDatabase and analyzed to relay pertinent information to the PDT. The analysis of data from the GIS shall support all conclusions of the CSM. The information attained through the pre-RI analysis shall be documented in the work plan. The information attained in the post-RI and FS analysis shall be documented in the RI and FS reports. The pre-RI analysis shall encompass social, environmental and/or economic entities that will be or may be impacted by response-action activities. The post-RI and FS analysis shall detail entities impacted by RI/FS activities and impacts of future response action activities (if applicable). The pre and post-RI and FS analysis may detail the fieldwork strategies, areas of concern, survey requirements, environmental concerns, milestones and/or other factors that affect product delivery and future action planning. Entities that may be affected by response actions include but are not limited to: landowners, homeowners, rental tenants, schools, utilities, roads, businesses, recreational areas, air traffic, water bodies and/or industries. The GeoDatabase shall be a living repository that is refined throughout the life of the project. The contractor shall incorporate layers that overlay on maps of the site that identify physical features, and MPPEH/MD and Range-Related Debris found during the investigation. Examples include: streets; anomalies; MEC positively identified; identifiable MD; sampling location; cultural resources; and environmental, biological, and socio-economic variables. Archeological site location(s) will not be released to the public without written permission from USACE. The Contractor shall perform civil surveys IAW EM 1110-1-4009 and DID MR-005-07.01.

3.3.1 Task 3a, Historical Data Analysis: This task is Firm Fixed Price/Unit Cost Task (Optional)
The contractor shall perform a historical data analysis which may include photographs, records and documents to identify MRAs or other munitions related areas. The contractor shall propose 320 man hours (2 people for 4 weeks) with a unit price 80 hrs (2 people for 1 week).

3.4 Task 4, RI/FS Field Activities: This task is a Time and Materials task, with Unit Cost provided. This task may be converted to firm fixed price after completion of the TPP process.

3.4.1 Former Pinecastle Jeep Range has been divided into 8 areas of interest. They are listed below along with the acreage and the planned investigation methodology. A time critical removal action (TCRA) is being performed on Odyssey Middle School, Tivoli Gardens, portions of Warwick sub-division and the northern portion of the Mockingbird property. This TCRA does not include MC sampling except for Odyssey Middle School. This RI will not have MEC investigations on the areas where the TCRA was performed but will have MC sampling performed. The data from the TCRA will be provided to contractor and shall be incorporated into the RI report. The USACE has held a scoping meeting with selected stakeholders for the former Pinecastle Jeep Range and determined that the site will be characterized by performing 100% geophysical mapping in the housing areas, transects over remaining areas and 50’ x 50’ grids placed in areas where MPPEH or elevated anomaly counts are found during the transects. Digital geophysical mapping (DGM) shall be used in all areas possible. Handheld analog instruments may be necessary in the housing areas in conjunction with DGM. All DGM shall be IAW DID MR-005-05.01. For this task order 1 acre of transects equals 14,520 lf (2.75 miles) of transects 3 feet wide. One acres worth of grids equals seventeen (17) 50’ x 50’ grids. A pricing schedule is provided in Appendix A for unit cost required for this task order for cost increase or decrease. Jacksonville District will be responsible for the cost of evacuations. The contractor shall identify the persons needing evacuated and ensure they are in fact evacuated. Employees shall have plainly visible company identification on them while in the field. Acreages and quantities provide below are for proposal purposes. Actual acreages and quantities may change based upon results of technical project planning, field conditions, investigation results, etc. ***For costing purposes the transect and grid areas have been divided into areas of light vegetation, heavy vegetation and conservation areas. Conservation areas are considered wetlands and depending upon rainfall amounts may have standing water.***

3.4.2 Task 4a Area of Interest A
Area of Interest A is approximately 403 acres. A TCRA was performed at Odyssey Middle School and Tivoli Gardens. The contractor shall propose on 40 acres of geophysical mapping of residential housing and ***2*** acres of transects. Assume the investigation of 500 anomalies and ***5*** demolition shots. ***Assume transects to be in conservation areas. The geophysical prove out shall be performed under this task.***

3.4.3 Task 4b Area of Interest B
Area of Interest B is approximately 81 acres. A TCRA is being performed on the eastern portion of the Warwick sub-division. The contractor shall propose on 10 acres of geophysical mapping of residential housing and 0.3 acres of transects. Assume the investigation of 100 anomalies and 3 demolition shots. ***Assume transects to be in conservation areas.***

3.4.4 Task 4c Area of Interest C
Area of Interest C is approximately 761 acres. The contractor shall propose on 70 acres of geophysical mapping of residential housing and 3 acres of transects. Assume the investigation of 600 anomalies and 2 demolition shots. ***Assume transects to be in conservation areas.***

3.4.5 Task 4d Area of Interest D
Area of Interest D is approximately 607 acres. The contractor shall propose on 60 acres of geophysical mapping of residential housing and 2 acres of transects. Assume the investigation of 500 anomalies and 1 demolition shot***. Assume transects to be in conservation areas.***

3.4.6 Task 4e Area of Interest E
Area of Interest E is approximately 1561 acres. A TCRA was performed on the northern approximate 100 acres of the Mockingbird property. The contractor shall propose on 20 acres of transects and 4 acres of grids. Assume the investigation of 100 anomalies per acre and 20 demolition shots. ***Assume 5 acres of transects in light vegetation, 10 acres of transects in heavy vegetation and 5 acres of transects in conservation areas. Assume 4 acres of grids in heavy vegetation.***

3.4.7 Task 4f Area of Interest F
Area of Interest F is approximately 6781 acres. The contractor shall propose on 5 acres of geophysical mapping waste management facility areas. Additionally, the contractor shall propose on 50 acres of transects and 1 acre of grids. Assume the investigation of 40 anomalies per acre and 6 demolition shots***. Assume 12 acres of transects in light vegetation, 13 acres of transects in heavy vegetation and 25 acres of transects in conservation areas. Assume 2 acres of grids in heavy vegetation.***

3.4.8 Task 4g Area of Interest G
Area of Interest G is approximately 3300 acres. The contractor shall propose on 20 acres of transects and 1 acre of grids. Assume the investigation of 40 anomalies per acre and 4 demolition shots. ***Assume 12 acres of transects in light vegetation, 4 acres of transects in heavy vegetation and 4 acres of transects in conservation areas. Assume 1 acre of grids in heavy vegetation.***

3.4.9 Task 4h Area of Interest H
Area of Interest H is approximately 925 acres. The contractor shall propose on 6 acres of transects and 1 acre of grids. Assume 50 anomalies per acre and 6 demolition shots***. Assume 1 acres of transects in light vegetation, 3 acres of transects in heavy vegetation and 2 acres of transects in conservation areas. Assume 1 acres of grids in heavy vegetation.***

3.4.10 The objective of this task is for the contractor to perform all necessary field activities to meet the overall objective of this task order and the DQOs established for this project. The contractor shall adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives. The contractor shall incorporate all available data and previous reports into this RI/FS. This task shall include all field activities necessary to execute this task except MC sampling. MC sampling requirements are covered under the Environmental Sampling & Analysis task.

3.4.11 MEC Disposal: The Contractor shall be responsible for the destruction of all MEC encountered during project activities.

3.4.12 Backfilling Excavations: All access/excavation/detonation holes shall be backfilled by the Contractor. The Contractor shall restore such areas to their prior condition. Grass and flower areas in residential sub-divisions, park areas, and at schools shall be repaired if damaged by the contactor.

3.4.13 MEC Accountability: The Contractor shall maintain a detailed accounting of all MEC items/components encountered. This accounting shall include the amounts of MEC, nomenclature and condition, location and depth of MEC, and disposition. The accounting system shall also account for all demolition materials utilized to detonate MEC on site. The contractor shall take digital photographs of identifiable MEC found during the investigation.

3.4.14 Disposal/Disposition of Munitions Debris: All munitions debris shall be handled in accordance with Chapter 14, EM 1110-1-4009 and Errata Sheet No. 2.

3.5 Task 5, Remedial Investigation (RI) Report: This task is a Firm Fixed Price task. The objective of this task is for the Contractor to prepare and submit for acceptance a RI report in accordance with EM CX Interim Guidance 06-04. The contractor shall attend an onboard review in Huntsville after receiving comments on the draft RI Report The Contractor shall prepare as an appendix to this report a separate MRSPP for each area designated as a new MRS in this task order.

3.6 Task 6, Feasibility Study (FS) Report: This task is a Firm Fixed Price task. The objective of this task is for the Contractor to prepare and submit for acceptance a FS report in accordance with EM CX Interim Guidance 06-04. The contractor shall attend, by teleconference, an onboard review after receiving comments on the draft FS Report**.**

3.7 Task 7, Proposed Plan: This task is a Firm Fixed Price task. The objective of this task is for the Contractor to prepare and submit for acceptance a Proposed Plan IAW ER 200-3-1 FUDS Program Policy and MM CX Interim Guidance 06-04. The draft version of the Proposed Plan will be subject to a minimum 30-day public review.

3.8 Task 8, Decision Document: This task is a Firm Fixed Price task. The objective of this task is for the Contractor to prepare and submit for acceptance a Decision Document in accordance with ER 200-3-1 FUDS Program Policy and EM CX Interim Guidance 06-04.

3.9 Task 9, Community Relations Support: This task is a Firm Fixed Price/Unit Cost task. The objective of this task is for the Contractor to successfully complete public meetings and support the District with community relations. The Contractor shall attend and participate in 8 public meeting**s.** These meetings are different and in addition to TPP meetings. These meetings will be held in the Pinecastle Jeep Range area. The Contractor shall propose a unit cost per meeting for possible additional public meetings. The support shall include, but is not limited to: preparation and delivery of briefings, graphics, maps, posters, and support of question and answer sessions. The contractor shall also obtain the meeting site, perform public notification and prepare any correspondence necessary to meet the objectives of this task. The USACE shall approve all correspondence, public notices and other materiel before presenting to the public. These actions are independent of the field activities that involve interaction with the community. ***The contractor shall provide a court reporter and transcript for 4 public meetings and provide a unit cost for a court reporter and transcript per meeting for possible additional meetings.*** The contractors Project Manager shall attend monthly RAB meetings in order to answer questions if necessary about the project. The contractor shall propose on attending 18 RAB meetings and provide a unit cost for attending additional RAB meetings.

3.10 Task 10, Public Involvement Plan (PIP): This task is not used for this task order.

3.11 Task 11, Administrative Record: This task is a Firm Fixed Price task. The objective of this task is for the Contractor to establish and maintain the Administrative Record for the on-going project in accordance with the guidance given in EP 1110-3-8, Chapter 4 (Establishing and Maintaining Administrative Records). The Contractor will secure a place to establish and house the Administrative Record in the local city or community of the project. The Contractor shall provide all final documents in the Administrative Record on CD/DVD, in accordance with paragraphs 4.1 and 4.2, to USAESCH and Jacksonville District. These files shall be suitable for placement on the PIRS web site. The contractor shall submit 2 copies each to USAESCH and Jacksonville District

3.12 Task 12, Environmental Sampling & Analysis: This task is a Time and Materials, Unit Cost task. {The task may be converted to firm fixed price after the completion of the TPP process.

3.12.1 The objective of this task is to determine the presence of and the nature and extent of, the munitions constituents (MC) that are detected above the applicable regulatory criteria and to perform an ecological and human health risk assessment in accordance with the EPA Risk Assessment Guidance (RAGS) and USACE EM 200-1-4, Volumes I and II. Existing site data shall be reviewed and evaluated. The contractor shall propose on a two-phased sampling plan. The first phase shall encompass sampling of the residential areas within the FUDS and MRS boundary. The second phase will encompass sampling of areas that have a high number of anomalies determined by geophysical mapping and intrusive investigations. The contractor shall propose the analytical methodology, media and analytical parameters and shall propose on ***345*** discrete samples for phase 1 and ***115*** discrete samples for phase two, including QC***/QA and matrix spike*** requirements. The contractor shall propose a unit price for units of ***11*** samples ***including QC/QA requirements***. **The contractor shall expect to take soil, sediment, surface water and groundwater samples.** Sampling shall be conducted to support the MC baseline risk assessment. The contractor shall prepare and submit for acceptance a single sampling and

analysis plan (SAP) that shall include a field sampling plan and a quality assurance project plan in accordance with DID MR-005-10.01 and EM 200-1-3 that describes their phased approach and addresses contaminants of interest and sample media. The cost of the SAP shall be firm fixed price and shall be covered under the Work Plan Task. ***The contractor shall also provide a unit cost for installing a monitoring well.***

3.12.2 The SAP and the data deliverables shall be performed and submitted in accordance with DID MR-005-10.01. The contractor shall also provide a discussion on data evaluation and fate and transport analysis. The potential for fate and transport shall address all transport pathways, and it should also address future degradation products resulting from biodegradation, photolysis, and chemical reactions.

3.12.3 Any deviations from the accepted SAP shall be documented in the DQCRs. Any deviations that may affect Data Quality Objectives (DQO's) shall be conveyed to USAESCH personnel [project manager (PM), project engineer (PE), project chemist, etc.] immediately.

4.0 SUBMITTALS AND CORRESPONDENCE:

4.1 Computer Files: All final text files generated by the Contractor under this task order shall be furnished to the Contract Officer in MS Office Suite 2003 compatible format. These documents shall be submitted on CD or DVD.

4.2 PDF Deliverables: In addition to the paper and digital copies of submittals, all versions of any and all reports and/or plans shall be submitted, uncompressed, on CD or DVD in PDF format along with a linked table of contents, linked tables, linked photographs, linked graphs and linked figures, all of which shall be suitable for viewing on the Internet. PDF files shall be produced from source documents wherever possible. PDF files shall be provided without security restrictions.

4. 3 Identification Of Responsible Personnel: Each submittal shall identify the specific members and title of the Contractor's and subcontractor staff that had significant input into the report's preparation or review. All submittals shall be signed by a registered Professional-In-Charge.

4.4 Public Affairs: The Contractor shall not publicly disclose any data generated or reviewed under this contract. The Contractor shall refer all requests for information concerning site conditions to the **Jacksonville District Public Affairs Office** with a copy furnished to the USAESCH Project Manager. Reports and data generated under this contract are the property of the DoD and distribution to any other source by the Contractor, unless authorized by the Contracting Officer, is prohibited.

4.5 Submittals: The Contractor shall furnish copies of the plans, maps, and reports as identified in the Addressee list, or as specified in this PWS, to each addressee listed below in the quantities indicated in the Submittal Guidance table. The Contractor shall submit 1 copy on CD with each hard copy of all submittals (WPs, Reports, Plans, etc) in accordance with paragraphs computer files and PDF Deliverables.

4.6 Addressees:

US Army Engineering & Support Center, Huntsville
Attn: CEHNC-OE-DC (Doug Garretson)
PO Box 1600
Huntsville, AL 35807-4301
4820 University Square
Huntsville, AL 35816-1822

Commander
US Army Corps of Engineers, Jacksonville District
ATTN: CESAJ-DP-S (Wandell Carlton)
701 San Marco Blvd
Jacksonville, FL 32207

Note: Addresses may have to be verified by the Contractor.

4.7 Submittals and Due Dates:

Table 1. List of Deliverables

Submittals	**Due Dates (Calendar days)**
AAPP	14 days prior to site visit
Explosives Siting Plan	Separate MACOM approval before intentional physical contact with MEC on site
Proposed schedule	7 days after kick-off conference call
GIS on CD/DVD	3 weeks after NTP
CSM	14 days before 1st TPP
Draft TPP Memorandum	TBD
Final TPP Memorandum	14 days after comments
Draft Public Involvement Plan	Not required
Final Public Involvement Plan	Not required
Draft Work Plan	21 days after DQOs are determined (TPP)
Final Work Plan	14 days after on board review
Updated GIS on CD/DVD	Quarterly when not in the field Monthly when performing field work.
Draft RI Report w/ GIS on CD/DVD	60 days after completion of fieldwork
Draft Final RI Report	14 days after on board Review
Final RI Report	14 days after receipt of comments
Draft FS Report	TBD
Draft Final FS Report	14 days after on board Review
Final FS Report	14 days after receipt of comments
Draft Proposed Plan	TBD
Draft Final Proposed Plan	14 days after receipt of comments
Final Proposed Plan	7 days after receipt of comments
Responsive Summary	with final Proposed Plan
Draft Decision Document	14 days after acceptance of FS
Draft Final Decision Document	7 days after receipt of comments
Final Decision Document	7 days after receipt of comments
Administrative Record (On CD/DVD)	Upon completion of the Record
Daily QC Report for Environmental Sampling	Daily during Environmental Sampling Activities
Analytical Data Submittal for QA Evaluation	30 days after completion of fieldwork
Electronic Laboratory Data Submittal	Delivered with the RI Report
Final GIS Files on CD	End of Project

4.8 Submittal Quantities: Provide the number of submittals shown in Table 2 to the addressees given in Section 4.6.

Table 2. Submittal Submission Guidance

	Draft TPP/Plans /Reports/Documents	Draft Final/Final TPP /Plans /Reports/Documents	Others
USAESCH	4	4	TBD
Jacksonville District	6	6	TBD
Others	#	#	TBD

4.9 Review Comments: Various reviewers will have the opportunity to review submittals made by the Contractor under this contract. The Contractor shall review all comments received through the Project Delivery Team/Contracting Officer and evaluate their appropriateness based upon their merit and the requirements of the PWS. The Contractor shall issue to the Project Manager a formal, annotated response to each. The Contractor shall not non-concur with a comment without discussing with the PM and/or comment maker.

4.10 Schedule: A final schedule shall be submitted a minimum of 30 days before commencing field work in a format compatible with Microsoft Project. A PDF version shall also be submitted. This is an electronic submittal only. The Contractor shall update the schedule in accordance with DID MR-085 Project Status Report.

4.11 Telephone Conversations/Correspondence Records/Meeting Minutes: The Contractor shall keep a record of each phone conversation, written correspondence concerning this Task Order and meeting minutes in accordance with DID MR-055 and DID MR-045. A copy of these records shall be attached to the Project Status Report.

4.12 Project Status Reports: The Contractor shall prepare and submit Project Status Reports in accordance with DID MR-085 and include any other items required in the PWS. ***The project status report shall be sent COE project delivery team (PDT) members, at a minimum. PDT member email addresses will be provide and other recipients may be added or deleted during the duration of the task order.***

4.13 Period of Performance: The Completion Date for this Task Order is February 28, 2010.

4.14 Milestone Payments for firm fixed price tasks: Milestones will be considered met or completed when the appropriate QC documentation has been submitted, QA completed and the submittal and/or product is accepted. Any payment vouchers submitted that do not coincide with the final accepted milestones or do not have the appropriate QC documentation will be rejected. All payments will be made utilizing an agreed upon Payment Milestone Schedule.

4.15 Project-Essential Personnel: In accordance with EP 385-1-95a and DA Pam 385-64, USACE personnel in the roles listed below are designated as project-essential personnel who shall be permitted to enter and operate within the exclusion zone during MEC clearance operations without requirement that clearance activities cease while they are present:

- Project Manager;
- Program Manager;
- Project Engineer or their designated substitute;
- Lead Geophysicist or their designated substitute; and
- Other person(s) approved by the Contracting Officer.

These persons shall comply with all general and site-specific safety requirements for MEC clearance operations and shall be escorted by either the USACE OE Safety Specialist, the contractor's Safety Supervisor or a person designated by the contractor's safety supervisor.

5.0 REFERENCES:

5.1 Refer to "Basic Contract."

5.2 Data Item Descriptions: are part of this contract and are available at the following: http://www.hnd.usace.army.mil/oew/didsindex.aspx.

5.3 ASR and SI Report

6.0 PERFORMANCE METRICS:

6.1 Performance Metrics for Performance Assessment Record (PAR)

	Exceptional	**Very Good**	**Satisfactory**	**Marginal**	**Unsatisfactory**
PAR Category: Quality of Product or Service					
Performance indicator: Document reviews					
Draft Plans, Reports, and documents [Plans, documents and reports are considered draft until accepted as final by the	All contract-milestone documents accepted as submitted	One or more documents or subplans were accepted as submitted, but exceptions were noted. Resubmissions were not required.	One or more documents or subplans required revisions to be resubmitted for acceptance prior to proceeding. Resubmission of an entire	One or more documents or subplans required revisions to be resubmitted for acceptance prior to proceeding. Resubmission	One or more documents or subplans did not comply with contract requirements, or one or more documents or subplans required more than one resubmission of the entire document or subplan prior to its acceptance.

Government]			document or subplan was not required.	of an entire document or subplan was required.	
Performance indicator: Project Execution					
Process Compliance	Zero Corrective Action Requests (CAR)	1-5 CARs for non-critical WP violations (no impact to overall cost and schedule resulting from the non-compliance)	6 or more CARS for non-critical violations (no impact to overall cost and schedule resulting from the non-compliance)	>1 CAR where non-compliance adversely impacted overall cost or schedule	Repeated non-compliance with WP requirements resulted in cost overruns or repeated schedule extensions
Quality Control	Zero QA failures, 90% or more QC measures accepted, zero repetitive QC failures	Zero QA failures, 90% or more QC measures accepted, one or more repetitive QC failure occurred	Zero QA failures, less than 90% of QC measures accepted, or, One or more non-repetitive QA failures occurred	1-5 repetitive QA failures occurred	>5 repetitive QA failures occurred

PAR Category: Schedule					
Performance indicator: Timely completion of tasks					
Final Plans and Reports, project milestones, T.O. invoices	All document submittals and task order milestones and invoices complete and accepted by T.O date, project closed out/final invoice approved ahead of schedule	Project closed out/final invoice accepted ahead of schedule	project closed out/final invoice accepted on T.O. date	Project closed out/final invoice accepted within 30 calendar days after T.O. date.	Project closed out/final invoice accepted more than 30 calendar days after T.O. date.
Project status reports accurate			Yes		No
Performance indicator: Impacts to schedule					
Impacts caused by contractor or other causes identified, in writing to HNC CO/ PM, in a timely manner to apply acceptable corrective actions.			Yes		No
PAR Category: Cost Control					
Performance indicator: No unauthorized cost overruns					
Unauthorized cost overruns			No		Yes
Total Project Costs	Total contract invoices less	Total contract invoices greater	Total contract invoices	Total contract invoices	Total contract invoices greater than or equal

	than 98% of T.O. authorized amount	than 98% but less than 99.99%of T.O. authorized amount	between 99.99% and 100% of T.O. authorized amount	greater than 100% but less than 105% of T.O. authorized amount	to 105% of T.O. authorized amount
Performance indicator: Monthly cost report					
Monthly cost reports accurate			Yes		No
Performance indicator: Impacts to cost					
Impacts caused by contractor or other causes identified, in writing to HNC CO/PM, in a timely manner to apply acceptable corrective actions.			Yes		No
PAR Category: Business Relations					
Performance indicator: Met contractual obligations					
Corrective Actions taken were timely and effective (Refer to CARs issued to contractor)			Yes		No
Performance indicator: Professional and Ethical Conduct					
Meetings and correspondences with Public, project delivery team and other stakeholders	Zero letters of reprimand, grievances, or formal complaints AND one or more unsolicited letters of commendation		Zero letters of reprimand, grievances, or formal complaints	One letter of reprimand, grievance or formal complaint that was resolved through negotiation	More than one letter of reprimand, grievance or formal complaint that were resolved through negotiation OR removal of one or more project personnel as a results of a letter of reprimand, grievance or formal complaint.
Performance indicator: Customer has overall satisfaction with work performed					
Customer survey results for rating period	4.0-5.0	3.0-3.9	2.0-2.9	1.0-1.9	<1.0
Performance indicator: Personnel responsive and cooperative					
Key personnel responsive, and cooperative	Always		Most Times		Almost Never
PAR Category: Management of Key Personnel and Resources					
Performance indicator: Personnel knowledgeable and effective in their areas of responsibility					
Personnel assigned to tasks	All personnel proposed by contractor were assigned to project, some personnel were substituted by higher qualified individuals.		All personnel proposed by contractor were assigned to project, some personnel were substituted by equally qualified individuals.	All personnel proposed by contractor were assigned to project, some personnel were substituted by equally	All personnel proposed by contractor were assigned to project, some personnel were substituted by lesser qualified individuals or HNC requested, in writing, removal of

				qualified individuals, Letter of reprimand received for personnel conduct from HNC.	assigned personnel for poor performance.
Performance indicator: Personnel able to manage resources efficiently					
Instances when resource management had negative impact on project execution	0	1-2	3-4	5-6	>6

PAR Category: Safety					
Performance indicator: Accidents and Violations					
*No Class A Accidents, contractor at fault	0 No class A accidents IAW AR 385-40	No class A accidents IAW AR 385-40	<1 non-explosive related Class D, accidents, or <2 non-explosive Class C accidents IAW AR 385-40.	<2 non-explosive related Class C accidents, or 1 non-explosive Class B accident, IAW AR 385-40	1 Any Class A accident IAW AR-385-40, or Any explosive related accident.
*Major safety violations	0 accidents/injuries No safety violations	0 accidents/injuries No safety violations	0 accidents/injuries 1 non-explosive related safety violation.	2 non-explosive safety violations.	>1 any violation of procedures for handling, storage, transportation, or use of explosives IAW the WP, and all Federal, State and local laws/ordinances.
*Minor safety violations	No safety violations	1 safety violation	2 safety violations.	3 safety violations	>3 safety violations

Classes of Accidents:

- **Class A:** Fatality or permanent total disability (Government Civilian, Military Personnel, and/or Contractor), or >$1,000,000 property damage.

- **Class B:** Permanent partial disability or impatient hospitalization of 3 or more persons (Government Civilian, Military Personnel, and/or Contractor), $200,000< $1,000,000 property damage.

- **Class C:** Lost Workday (Contractor) or Lost Time (Government Civilians), $20,000< $200,000 property damage.

- **Class D:** $2000, $20.000 property damage.

* From Section C of Solicitation Number W912DY-04-R-0003, Amendment 0001 (may be included but are not limited to these).

The following guidelines are provided for issuing ratings that are subjective in nature, these ratings will be supported by the weight of evidence documented during the government's surveillance efforts:

Exceptional: Performance *meets* contractual requirements and *exceeds many* to the Government's benefit. The contractual performance of the element or sub-element being assessed was accomplished with *few minor problems* for which corrective actions taken by the contractor were *highly effective*.

Very Good: Performance *meets* contractual requirements and *exceeds some* to the Government's benefit. The contractual performance of the element or sub-element being assessed was accomplished with *some minor problems* for which corrective actions taken by the contractor were *effective*.

Satisfactory: Performance *meets* contractual requirements. The contractual performance of the element or sub-element contains *some minor problems* for which corrective actions taken by the contractor *appear or were satisfactory*.

Marginal: Performance *does not meet all* contractual requirements. The contractual performance of the element or sub-element being assessed reflects a *serious problem* for which the contractor has *not yet identified corrective actions*. The contractor's proposed actions appear only *marginally effective or were not fully implemented.*

Unsatisfactory: Performance *does not meet most* contractual requirements and *recovery is not likely* in a timely manner. The contractual performance of the element or sub-element contains *serious problems* for which the contractor's corrective actions *appear or were ineffective*

APPENDIX B
SITE MAPS

APPENDIX B
MAPS

All maps for the Pinecastle Jeep Range RI/FS Work Plan are contained within the main text.

APPENDIX C
CONTACTS

Key Contacts
Pinecastle Jeep Range RI/FS
Orange County, Florida

Organization	Name	Telephone/FAX
U.S. Army Engineering and Support Center Huntsville 4820 University Square Huntsville, AL 35816-1822	Mr. Douglas M. Garretson Project Manager Ordnance and Explosives Design Center ***Email***: douglas.m.garretson@usace.army.mil	(256) 895-1066 (256) 895-1378 (FAX)
U.S. Army Engineering and Support Center Huntsville 4820 University Square Huntsville, AL 35816-1822	Ms. Betina Johnson Project Manager Ordnance and Explosives Design Center ***Email***: betina.v.johnson@usace.army.mil	(256) 895-1238 (256) 895-1378 (FAX) (256) 426-5838 (cell)
U.S. Army Engineering and Support Center Huntsville 4820 University Square Huntsville, AL 35816-1822	Mr. Michael R. Gooding, PE, PLS Technical Manager ***Email:*** Michael.r.gooding@usace.army.mil	(256) 895-1635 (256) 503-3508 (cell)
U.S. Army Corps of Engineers, Jacksonville District (CESAJ) 701 San Marco Boulevard Jacksonville, FL 32207-8175	Mr. Wandell Carlton Project Manager ***Email:*** wandell.e.carlton@usace.army.mil	(904) 232-1804 (904) 697-6980 (cell)
U.S. Army Corps of Engineers, Jacksonville District (CESAJ) 701 San Marco Boulevard Jacksonville, FL 32207-8175	Ms. Nancy Sticht Public Affairs Team Leader ***Email:*** Nancy.j.sticht@saj02.usace.army.mil	(904) 232-1667 (904) 232-2237 (FAX) (904) 334-1054 (cell)
U.S. Army Corps of Engineers St. Louis District (CEMVS) 1222 Spruce Street St. Louis, MO 63103-2833	Mr. Randal S. Curtis, P.E. Project Manager/ Geological Engineer ***Email:*** randal.s.curtis@usace.army.mil	(314) 331-8786 (314) 331-8828 (FAX) (314) 435-7187 (cell)
Florida Department of Environmental Protection (FDEP) 3319 Maguire Blvd. Orlando, FL 32803-3767	Ms. Mary Ann Kraus Environmental Specialist Waste Cleanup ***Email:*** mary.kraus@dep.state.fl.us	(407) 893-3331 (407) 893-3599 (FAX)
Florida Department of Environmental Protection (FDEP) 3319 Maguire Blvd. Orlando, FL 32803-3767	Mr. Bret LeRoux Program Manager, Storage Tanks/Waste Cleanup ***Email:*** Bret.LeRoux@dep.state.fl.us	(407) 893-3321 (407) 893-3599 (FAX)
City of Orlando	Bruce Hossfield ***Email:*** bruce.hossfield@cityoforlando.net	(407) 246-3355
Orange County	Chris Testerman ***Email:*** chris.testerman@ocfl.net	(407) 836-5883
Parsons 5390 Triangle Pkwy, Suite 100 Norcross, GA 30092	Mr. John Chulick Project Manager ***Email:*** John.Chulick@Parsons.com	(678) 969-2409 (770) 446-4910 (FAX) (770) 294-4393 (cell)
Parsons 5390 Triangle Pkwy, Suite 100 Norcross, GA 30092	Mr. Michael E. Short Technical Director ***Email:*** Michael.Short@Parsons.com	(678) 969-2451 (770) 446-4910 (FAX) (404) 387-0798 (cell)
Parsons 5390 Triangle Pkwy, Suite 100 Norcross, GA 30092	Ms. Debra James Pubic Affairs Specialist ***Email:*** Debra.James@Parsons.com	(678) 969-2309 (770) 446-4910 (FAX) (678)644-0875 (cell)
USA Environmental, Inc. 720 Brooker Creek Blvd Suite 204 Oldsmar, FL 34677	Mr. Doug Ralston Pinecastle Project Manager ***Email:*** Dralston@usatampa.com	(813) 343-6368

APPENDIX D
ACCIDENT PREVENTION PLAN

FINAL

APPENDIX D
ACCIDENT PREVENTION PLAN

RI/FS AT PINECASTLE JEEP RANGE
ORANGE COUNTY, FLORIDA

prepared for:

U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE
and
U.S. ARMY CORPS OF ENGINEERS MOBILE DISTRICT

Contract W912DY-04-D-0005
Delivery Order 0019

prepared by:

PARSONS
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

Revision 0
May 2008

Ed Grunwald, C.I.H. **Corporate Safety Officer** **678-969-2394**	(Signature)	**5/30/2008** (Date)
John Chulick **Project Manager** **678-969-2409**	(Signature)	**5/30/2008** (Date)
Joseph Cudney **Vice President** **678-969-2344**	(Signature)	**5/30/2008** (Date)

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SECTION 1
BACKGROUND INFORMATION

1.1 INTRODUCTION

Accident prevention is a key program element to achieve compliance and strive towards our ultimate goal of zero safety incidents. Personnel active in site operations will be thoroughly familiar with the programs and procedures outlined in this Accident Prevention Plan (APP) prior to conducting work at the site.

1.2 PROJECT AUTHORIZATION

1.2.1 Under Contract W912DY-04-D-0005 and Delivery Order 0019, Parsons is serving as the prime contractor to the USAESCH for the Remedial Investigation/Feasibility Study (RI/FS) of MEC and MC at the former Pinecastle Jeep Range. The Project Team will consist of Parsons, USAESCH, and CESAJ as well as other government and non-government agencies with specific expertise for implementation of specialized components of the field operations.

1.2.2 This APP covers the Pinecastle Jeep Range RI/FS. The project will focus on the investigation of MEC and MC while adhering to the highest levels of safety for the public and project staff. Primary project activities will include geophysical surveys, brush clearing, land surveys, environmental sampling, intrusive investigation of anomalies, and handling/inspection of material potentially presenting an explosive hazard (MPPEH). The location of the RI/FS is presented in Figure 1.1 of the Work Plan.

1.3 HAZARDOUS ACTIVITIES ASSOCIATED WITH PINECASTLE JEEP RANGE RI/FS

1.3.4 The RI/FS work at the former Pinecastle Jeep Range will involve potentially hazardous activities during the course of operations. Chapter 2 of the Site Safety and Health Plan (Attachment 1 to this APP) identifies the hazards associated with the project activities. The Activity Hazard Analysis (AHA) for each activity is presented as Attachment 2 to the APP and details each activity and preventative measures for avoiding accidents. Personnel involved with hazardous tasks will be qualified to participate by previous or site specific training, as applicable.

1.3.5 The following is a list of activities associated with the work being performed:

- Digital Geophysical Mapping.
- Anomaly Reacquisition and Surveying.
- Brush Clearing and Debris Removal.
- Intrusive Investigation.

- Excavation Backfill.
- Environmental Sampling.
- Demolition Operations.
- Project Mobilization / Demobilization.

1.4 PARSONS ACCIDENT EXPERIENCE

Parsons has a policy of compliance with all governing safety standards and regulations, and a safety performance goal of zero accidents, operational mishaps, and injuries/illnesses. The preliminary 2008 Parsons' Experience Modification Rate (EMR) is 0.64. Additional safety documentation specific to Parsons is included as Attachment 3 to this APP.

SECTION 2
STATEMENT OF SAFETY AND HEALTH POLICY

2.1 PARSONS CORPORATE SAFETY AND HEALTH POLICY

2.1.1 As an industry-leading engineering, construction, and technical services firm, Parsons is firmly committed to maintaining a safe and healthy working environment at all its offices and project facilities. We share the National Safety Council Safety and Health Code of Ethics as the principles guiding our commitment to safety.

1. We will hold safety and health as our highest core value.
2. Executive management will lead the safety improvement process.
3. Safety will be a responsibility shared by everyone in our organization.
4. Safety performance will be a key indicator of our organizational excellence and will be incorporated into our business processes.
5. We will communicate safety performance openly with employees.
6. All employees will be given the knowledge and skills necessary to safely perform their jobs.
7. We will extend our safety efforts beyond the workplace to include transportation, homes, and communities.
8. We will continually strive to improve our safety and health processes.

2.1.2 To meet its health and safety objectives, all Parsons employees are expected to act proactively with regard to health and safety issues. This requires the combined efforts of a concerned management, responsible and knowledgeable supervision, and conscientious, well-trained employees.

2.1.3 Parsons will take all reasonable action to meet or exceed the applicable occupational health and safety requirements, domestically and internationally, and will continuously monitor and improve operations, procedures, technologies, and programs that are conducive to maintaining a safe and healthy working environment.

2.2 PARSONS SAFETY, HEALTH, AND RISK PROGRAM

Parsons has developed a Safety, Health, and Risk Program (SHARP) for implementation of key safety initiatives on all Parsons' projects. All Parsons PMs maintain a copy of this document in their office to ensure application and conformance on all projects.

SECTION 3
RESPONSIBILITIES AND LINES OF AUTHORITY

3.1 LEVELS OF SAFETY RESPONSIBILITY AT PARSONS

3.1.1 Parsons Corporate Safety Personnel

Parsons corporate safety personnel are required to develop, communicate, and oversee Parsons health and safety programs at all Parsons business units. These employees will assist Parsons business unit managers regarding health and safety regulations, reporting requirements, safety training, and other related issues. Corporate safety personnel are responsible for monitoring the effectiveness of Parsons health and safety programs, conduct audits, ensure that all injuries and near misses are fully investigated, and develop OSHA reporting and worker's compensation claim procedures. As part of corporate policy, safety information and statistics will be collected and maintained for all Parsons business units. Parsons corporate safety personnel also keep senior management informed of significant internal and external developments regarding health and safety.

3.1.2 Parsons Management and Supervisory Personnel

Supervisors and members of management, at all levels within Parsons, will comply with the Company's Health and Safety Policy and ensure that the applicable health and safety requirements at each domestic and international office and project facility are effectively implemented and monitored at all times. The supervisors and members of management will insure that the policies are effectively integrated with the preparation of proposals, project planning, and project execution. The safety performance of subcontractors will also be monitored in accordance with contract specifications as required by the contract with the client. Safety information and statistics will be reported to Parsons Corporate Safety Manager by personnel serving as supervisors or managers on a consistent and regular basis.

3.1.3 Parsons Employee Responsibility

Health and safety is the responsibility of everyone at Parsons. The Parsons employee, to include subcontractors of Parsons, is required to exercise maximum appropriate care and good judgment at all times regarding health and safety, and adhere to safety procedures to prevent accidents and injuries. Any accidents or injuries either suffered by or witnessed by employees will be promptly reported to supervisory personnel. In order to better plan and avoid possible future accidents or injuries, the Parsons employee is required to promptly report any near misses or close calls. The employees are also required to promptly report any unsafe conditions, equipment, or practices to supervisory personnel in order to ensure a safe working environment.

3.2 LINES OF AUTHORITY REGARDING SAFETY

It is important for each employee involved with the project to know and understand the lines of authority. The organizational structure of supervisory personnel for this project is outlined in Chapter 2 of the Work Plan. All personnel will be informed of the organization structure during the training phase of the project. The résumés of key safety personnel in the organizational structure are provided in Appendix H of this Work Plan.

SECTION 4
SUBCONTRACTORS AND SUPPLIERS

4.1 Table D-4.1 details the current vendors and subcontractors anticipated to supply equipment or render services to the personnel working at site. The actual subcontractors and suppliers used may vary from the list in Table D-4.1. All services and vendors will be selected based on government-approved procurement procedures.

4.2 Each subcontractor is required to abide by all site safety and health regulations. Parsons will work closely with each subcontractor to ensure they are aware of the health and safety regulations that apply to the work site. Personnel arriving on-site to conduct business or provide a service will first attend an initial site-specific safety briefing. If returning to the site, the individual will be required to register and sign in at the office before beginning work. The site-specific safety briefing will inform the individual of the policies and regulations that apply to the subcontractor while on-site. The briefing will also include hazards associated with the individual's area of work, as well as hazards specific to the site. Documentation of the subcontractor's attendance will be generated and the personnel involved will agree to abide by all site regulations.

Table D-4.1
Subcontractors and Suppliers

Subcontractor or Supplier	Service Provided
Pine Environmental Services, Inc. 4037 Darling Court, Suite D Lilburn, GA 30047 (800) 842-1088 (770) 925-2811 (fax)	**Environmental Instrument Rentals**
Ashtead Technology Rentals 1057 East Henrietta Road Rochester, NY 14623 (800) 242-3910 (585) 424-2166	**Environmental Instrument Rentals**
Exploration Instruments (EXI) 2600 Longhorn Boulevard Suite 108 Austin, TX 78758 (512) 346-4042 (512) 832-5233 (fax)	**Geophysical Equipment Rentals**

Table D-4.1
Subcontractors and Suppliers

Subcontractor or Supplier	Service Provided
Rapid 2-Way 6440 Norwalk Road Suite L Medina, OH 44256 (330) 725-4367 (330) 722-3721 (fax)	**Radio Rentals**
Clean Harbors Environmental Services 42 Longwater Drive P.O. Box 9149 Norwell, MA 02061-9149 781.792.5000 800.282.0058	**Hazardous Waste Destruction and Disposal**
USA Environmental, Inc. 720 Brooker Creek Blvd Suite 204 Oldsmar, FL 34677 Office: (813) 343-6382 Rick Hanoski	**UXO Subcontractor**
APPL, Inc. 4203 West Swift Fresno, CA 93722 559-275-2175 Diane Anderson	**Sample Analysis Laboratory**

SECTION 5
TRAINING

Training is discussed in Chapter 4 of the SSHP (Attachment D1).

SECTION 6
SAFETY AND HEALTH INSPECTIONS

6.1 RESPONSIBILITY

6.1.1 As part of the Parsons SHARP Management, roles and responsibilities for safety audits, inspections and recordkeeping have been established. For each project, the Parsons PM is responsible for ensuring that routine internal safety inspections are performed, for tracking corrective actions to completion, and performing inspections. The Parsons PSHO is responsible for developing and implementing the project safety and health inspection program contained in this plan as well as conducting inspections.

6.1.2 The SSHO is responsible for conducting safety and health inspections or walkarounds, identifying and reporting deficiencies, and working with the project team to develop corrections. The SSHO will follow-up on any deficiency in a timely manner and halt operations if necessary in order to ensure that individuals are not exposed to an unsafe environment.

6.1.3 Credentials of Parsons PM and PSHO are included in Appendix H of the Work Plan. Inspections or certifications by external organizations are not anticipated while conducting operations.

6.2 INSPECTIONS

6.2.1 Safety and health inspections will be conducted by either the SSHO, the PSHO, the Parsons PM, the UXOQCS, or a qualified appointee. Personnel responsible for safety and health inspections will meet the criteria of an OSHA competent person. Safety and health inspections will be conducted at least weekly during field operations or when the following events occur:

- The introduction of new substances, procedures, or equipment that presents potential new hazards into the workplace.
- New, previously unidentified hazards are recognized.
- Receipt of complaints of unsafe conditions.
- In the event of an occupational injury or illness.

6.2.2 Safety inspections are conducted by physically walking around the work areas and observing conditions for routine and emergency access, evacuation technique, PPE, work practices, site access control, first aid equipment, fire fighting equipment, sanitation. The inspections may include conversations with workers and supervisors and review of certifications and training documentation.

6.2.3 All deficiencies or nonconformances will be documented. If safety hazards exist, it may be necessary to stop work until corrections are in place. Many deficiencies

can be corrected immediately by placing barriers, installing signs, changing procedures, etc. The status of each deficiency will be tracked by the SSHO to ensure that a correction is made. If necessary, the SSHO will stop work until the deficiency is corrected. Follow-up reporting on deficiencies will be included on succeeding safety and health inspection documentation until the deficiency is resolved.

6.3 RECORDKEEPING

A record of each inspection will be maintained in the project files. The record must include the name of the inspector, unsafe conditions and work practices identified, and actions taken to correct unsafe conditions and work practices. A standard safety inspection form has been developed to assist the inspections and provide documentation of safety and health nonconformances. The safety inspection form is located in Appendix F of the Work Plan.

SECTION 7
SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE

7.1 SAFETY GOALS AND OBJECTIVES

As stated in the company's corporate safety and health policy statement (Section 2 of this APP), Parsons holds safety and health as our highest core value. It is Parsons' objective to maintain a safe working environment and complete every job with zero accidents.

7.2 PARSONS SAFETY AWARD PROGRAM

7.2.1 Project management meets on a regular basis to maintain and support an incentive program based on the safety performance of Parsons and subcontractor employees.

7.2.2 It has been established that a necessary tie-in to a meaningful safety program is a program that rewards exemplary conduct. To any true professional, the monetary value of an award is transcended by the recognition given. To present a plaque for demonstrating dedication to creating a safe and healthy environment; to dedicate a prime parking space for the use of the individual who has recognized a hazard and has eliminated it or devised a method of managing it; or to let an individual's or group's peers know, in some way, that individual or group has taken an extra step where safety is involved, is the type of award best appreciated by the professional.

7.3 SAFETY VIOLATIONS

7.3.1 If a safety violation occurs, the individual (supervisor, manager, employee) or company will be notified of the issue and the situation will be documented. After documentation is completed, the safety violator will be required to submit a written plan of action to correct the problem within two days of notification. Failure to comply will result in disciplinary action against the individual or the individual's company. If the violation is such that work on the site is deemed unsafe, work will be stopped until the problem is corrected and the SSHO inspects the site for safety. Once the corrections are in place and the site has been inspected for compliance, the SSHO will notify the SM when work may resume. Examples of Subcontractor Safety Violation and Noncompliance forms are provided in Appendix F of the Work Plan.

7.3.2 Each member of the project team will play a part in keeping operations safe. A brief description of each employee's safety responsibility is listed below:

- Senior management is responsible for leadership and support of the safety program, for its effectiveness and improvement, and for providing all the safe guards necessary to assure a safe working environment.

- Supervisors are responsible for developing proper attitudes towards safety in themselves, and in those they supervise. Supervisors must ensure that all operations are performed with the highest regard for the safety of all personnel involved.
- Employees are responsible for genuine cooperation with all aspects of the safety program, including compliance with all policies and procedures. Employees need to continually practice safety while performing their work duties.

7.3.3 Parsons holds the SSHO, SM, PSHO and PM accountable for maintaining project safety and health. All of these persons may be subject to safety inspections by Parsons senior management. These inspections are used to measure safety and health performance and to provide feedback.

SECTION 8
ACCIDENT REPORTING

8.1 ACCIDENT REPORTING

8.1.1 All accidents/incidents will be reported immediately to the on-site USAESCH safety representative. If an accident occurs at the site, the SSHO will investigate the accident after all emergency actions have been taken. ENG Form 3394 (Appendix F of the Work Plan) will be filled out by the SSHO with assistance from the USAESCH safety representative and submitted to the Parsons PSHO. A verbal notification should be given to the PSHO that the form is being filled out.

8.1.2 An accident will be reported immediately to the USAESCH if any of the following occur as a result of the accident:

1. Fatality
2. Injury to three or more persons who are admitted to the hospital
3. Property damage in the amount of $2,000 or more
4. Unfavorable criticism of the Army

8.1.3 For Items 1 and 2, OSHA must be notified within 8 hours of the accident. If possible, notification should go through the PSHO; however, it may be necessary to make the notification directly in order to meet the deadline.

8.1.4 Parsons has an online incident reporting tool for internal reporting. This system can be used to file the initial report and the incident detail report; however, it is necessary to have access to the Parsons PWeb in order to use this tool. The incident reporting tool can be accessed at the following link:

PWeb.parsons.com/PIT/safety/default.htm

8.1.5 Other lost-time or OSHA recordable accidents will be formally reported (i.e., a written report) to the USAESCH within five working days. The onsite USAESCH representative will be immediately verbally notified of any accident or injury that may require reporting. An OSHA 300 log of work-related injuries and illnesses will be maintained at the site. A copy of the OSHA 300 log is provided in Appendix F.

8.1.6 Exposure hours must be reported each month for exposure analysis. The exposure hours consist of the number of hours worked by Parsons personnel in the field plus the hours worked by subcontractors. The reporting of exposure hours is submitted internally by the Parsons PM.

8.2 ACCIDENT INVESTIGATIONS

8.2.1 Accident investigations are an important element of Parsons safety program because they provide useful information to prevent similar incidents. Incident

investigations identify root causes, system failures, unsafe acts and conditions, and noncompliance with or inadequacy of the APP. All significant near miss, injury, illness, or major equipment or property damage incidents (including work interruptions) require an investigation.

8.2.2 The PM and PSHO must conduct the onsite investigation immediately and prepare an incident investigation report. The PM is responsible for ensuring that all incidents are reported and investigated in a timely manner and that appropriate corrective actions are identified and implemented. The PSHO usually leads investigations with the assistance of the SM and SSHO.

8.2.3 The general information collected by the accident investigation includes:

- Location, time, and date.
- Description of the operation being performed at the time of the accident.
- Outline of the sequence of events that led up to the accident.
- All personnel associated with the work task and incident.
- All eyewitnesses.

8.2.4 The investigation team should proceed in the following manner.

1. Identify, secure, and document any evidence, tools, or other materials pertinent to the investigation.
2. Identify and interview all involved employees and eyewitnesses.
3. Provide a private place and time for each individual to prepare a written statement.
4. Prepare and issue a written report.

SECTION 9
EMERGENCY MEDICAL SUPPORT

Emergency medical support is discussed in Chapter 7 of the SSHP (Attachment D1).

SECTION 10
PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment (PPE) is addressed in Chapter 5 of the SSHP (Attachment 1 of the APP).

SECTION 11
SITE PLANS

11.1 PURPOSE

The work at Pinecastle Jeep Range will involve potentially hazardous activities during the course of operations. In order to prepare for the potential hazards, site plans have been developed and summarized to ensure the prevention of accidents.

11.2 LAYOUT PLAN

Discussion of the site layout is provided in Chapter 12 of the SSHP – Site Control Measures.

11.3 EMERGENCY RESPONSE PLAN

The emergency response plan is provided in the SSHP divided into the following chapters:

- Chapter 15 - Emergency Equipment and First Aid
- Chapter 16 - Emergency Response and Contingency Plan
- Chapter 17 - Emergency Response Team

11.4 SPILL PLAN

The spill plan is provided in Chapter 16.11 of the SSHP.

11.5 FIRE FIGHTING PLAN

The Fire Fighting Plan is provided in Chapter 16.10 of the SSHP.

11.6 POSTING OF EMERGENCY TELEPHONE NUMBERS

Emergency telephone numbers for the closest hospitals capable of providing emergency service, Poison Control Center, local Police and Fire Department, and key safety and management personnel from the USACE, Jacksonville District, USAESCH, and Parsons will be available to the SSHO and will be posted in the Site Office and other conspicuous locations. The SSHO will be responsible for keeping the list current and for taking necessary action and contacting the appropriate emergency contacts in the event of an emergency. Emergency contact numbers are provided in Appendix C of the Work Plan.

11.7 WILD LAND FIRE PREVENTION PLAN

The fire prevention methods outlined in the SOP document will apply and be used by personnel to avoid inadvertently creating fires. These methods will also be followed by site personnel in the notification and treatment of fires should they arise.

11.8 MAN OVERBOARD/ABANDON SHIP

There will be no watercraft or aquatic work required during the operations. Therefore, Man Overboard/Abandon Ship procedures do not apply.

11.9 HAZARD COMMUNICATION PROGRAM

Hazard communication training is presented in Chapter 4 of the SSHP. The hazard communication program is covered in the SOP document.

11.10 RESPIRATORY PROTECTION PROGRAM

The Respiratory Protection Program provides workers with sufficient information and guidance to adequately protect themselves from potential inhalation hazards during hazardous waste operations. The use of respirators to protect personnel from inhalation hazards is permitted by OSHA when other methods of protection (e.g., engineering controls or changes in work practices) are not feasible. The Respiratory Protection Program is provided in the SOP document.

11.11 HEALTH HAZARD CONTROL PROGRAM

The health hazard controls are covered in detail in Chapter 2 of the SSHP (Attachment 1).

11.12 LEAD ABATEMENT PLAN

Contact with lead is not anticipated as part of any of the operations conducted at the site. In the unlikely event that lead is encountered during operations, workers will be required to avoid the area of contamination and consult with the SSHO and SM for further instruction.

11.13 ASBESTOS ABATEMENT PLAN

Contact with asbestos is not anticipated as part of any of the operations conducted at the site. In the unlikely event that asbestos is encountered during operations, workers will be required to avoid the area of contamination and consult with the SSHO and SM for further instruction.

11.14 ABRASIVE BLASTING

Abrasive blasting is not required as part of the operations at the site.

11.15 CONFINED SPACE

Confined space entry is not anticipated as part of normal operations at the site.

11.16 HAZARDOUS ENERGY CONTROL PLAN

This procedure shall be used by Parsons and subcontractor personnel to ensure that the machine or equipment being worked on is isolated from all potential hazardous energy sources, and locked out or tagged out before an employee performs any servicing or maintenance activity where the unexpected start-up or release of energy could cause an

injury. The Hazardous Energy Control Plan is provided in Chapter 2.2.4 of Attachment 1.

11.17 CRITICAL LIFT PROCEDURES

Lifting using cranes is not anticipated during the RI/FS work. Should the need for crane use arise, a standardized Critical Lift Plan form is located in Appendix F of the Work Plan for use if the need for a critical lift arises.

11.18 CONTINGENCY PLAN FOR SEVERE WEATHER

In the event of severe weather: high winds, electrical storms, tornadoes, extremely hot weather (>100°F), or extremely cold weather (<0°F), it may be necessary to cease operations and evacuate the site. The SSHO will be responsible for monitoring the weather. Should severe weather threaten, the SSHO is responsible for deciding (i.e., in conjunction with the SM) if site operations should be stopped. The reader is referred to Chapter 2 of the SSHP (Attachment D1) for more detailed information.

11.19 ACCESS AND HAUL ROAD PLAN

All roads used will be maintained in a safe working condition to reduce any potential hazards involving vehicles or heavy equipment. Equipment and vehicle safety is provided in the SOP document.

11.20 DEMOLITION PLAN

No building demolition is planned for this project.

11.21 EMERGENCY RESCUE (TUNNELING)

Tunneling is not required as part of the operations at the site. General procedures for emergency rescue operations are presented in SOP document.

11.22 UNDERGROUND CONSTRUCTION FIRE PREVENTION AND PROTECTION PLAN

Underground construction will not be a part of the operations.

11.23 COMPRESSED AIR PLAN

Use of pressurized cylinders or compressed air is not planned for this project..

11.24 FORMWORK AND SHORING ERECTION AND REMOVAL PLAN

Formwork and shoring erection operations is not anticipated as part of site operations. In the event that shoring is required, it will be erected and handled in accordance with manufactures instructions.

11.25 JACKING PLAN (LIFT)

Lift-slab operations will not be conducted at the site.

11.26 SAFETY AND HEALTH PLAN

The SSHP is Attachment D1 to this APP.

11.27 BLASTING PLAN

Details specific to explosives operations conducted on site are presented in Chapters 5 and 6 of the Work plan.

11.28 DIVING PLAN

Diving will not be a part of operations at the site.

11.29 PREVENTION OF ALCOHOL AND DRUG ABUSE

Parsons will institute and maintain a program for achieving the objective of a drug free and alcohol free workspace. Parsons ensures consistent and uniform application of this policy and, when required interfaces with supervisor and employee to evaluate performance and behavior.

11.29.1 Parsons Corporate Statement of Policy

11.29.1.1 Parsons expects all employees to report to work in a fit condition in order to perform their duties at the utmost levels of safety and efficiency. To that end, Parsons expressly prohibits the unlawful manufacture, distribution, dispensing, possession, use, or sale of a controlled substance or alcohol on its premises at any time. Employees are prohibited from being at work under the influence of these substances. Parsons will reasonably accommodate the efforts of an employee to obtain medical treatment for substance abuse and to return to employment thereafter. However, no provisions of this policy will contravene the provision of the Employee Personal Conduct Policy or preclude the corporation from terminating an employee in accordance with this policy.

11.29.1.2 Parsons has an obligation to safeguard the privacy rights of all employees; however, it is also committed to provide a healthy and safe work environment for all employees and to take reasonable steps to safeguard the health and safety of others and protect the environment in conducting its business.

11.29.2 Safety and Environmental Provisions

11.29.2.1 In some instances employees may be required to undergo random toxicological tests to ensure their continuing fitness for duty to comply with contract mandated requirements or government regulations, or if performing work at locations where the nature of their duties is such that there is the potential for serious physical injury to themselves, to others, or the general public, or potential for significant damage to property or the environment.

11.29.2.2 Assignment of employees to such job sites will be done on a voluntary basis. Employees who refuse to participate in the random testing program and whose job duties would normally expose them to random testing will be considered for placement in other positions not requiring random testing. Every reasonable effort will be made to accommodate such transfers; however if suitable work for which the employee is qualified is not available, the employee will be subject to termination. A positive test result will lead to immediate removal from the site, in addition to either corrective action in accordance with this policy or the employee's termination in accordance with the Employee Personal Conduct Policy.

11.29.2.3 Searches are another means of protecting the safety of individuals and property at those locations where the nature of the work has the potential for serious injury or damage. Reasonable searches may be conducted of individuals, their personal vehicles, effects, and other areas under the individual's control while at such work sites, or engaged in Parsons business at such sites.

11.29.2.4 Employees will not be detained or searched without their consent. An employee's cooperation in a search at such work sites is a condition of employment. The employee will be required to sign an Acknowledgment and Consent for Random Toxicological Tests and Searches form. Such testing will be performed by the company using qualified contracted agents, or trained employees.

11.29.3 Substance Abuse Testing - Employment Offer

No candidate for employment will be subjected to substance abuse testing prior to the receipt of an offer of employment. Offers of employment, regardless of employment category, must contain a contingency regarding satisfactory completion of substance abuse testing. Failure to submit to or pass an examination will result in immediate disqualification from consideration for placement.

11.28.4 Employee Personal Conduct

11.29.4.1 Employees bear the primary responsibility for their own job performance and for taking any action or undergoing treatment necessary to maintain performance at a satisfactory level.

11.29.4.2 In addition, the corporation may require an employee to submit to a test for alcohol or illegal drugs, based upon reasonable suspicion that the employee's performance or behavior is being adversely affected by use of such substance(s). Reasonable suspicion will be based upon physical manifestations of impairment, or unsatisfactory behavior or job performance (including on-the-job accident or injury) which causes the supervisor and Human Resources Representative to reasonably believe that alcohol or drug abuse may be a contributing factor. Refusal by an employee to take such a test will be viewed as an admission of such use by the employee.

11.29.5 Confidentiality of Records

All information concerning an applicant's or employee's medical condition or test results will be kept strictly confidential, with information released only upon a legitimate need-to-know basis.

11.30 FALL PROTECTION PLAN

Activities to be performed at the site likely do not require fall protection. If workers become exposed to fall hazards, proper precautions will be implemented to ensure safety. Standard guardrail, catch platforms, temporary floors, and safety nets will be used based on evaluations by the SSHO. In addition, full body harnesses with a shock absorbing lanyard will be worn by any personnel working at risk of falling more than 6 feet. The lanyard will be adjusted to limit free-fall to no more than 6 feet. Lanyards must be secured to strong structural components (breaking strength of 5,000 lbs per attached employee) or lifelines.

11.31 STEEL ERECTION PLAN

Steel erection activities at the site are not anticipated. Should the need for steel erection arise, a steel erection plan will be provided.

11.32 NIGHT OPERATIONS LIGHTING PLAN

Nighttime operations are not anticipated during RI/FS activities.

11.33 SITE SANITATION PLAN

Site sanitation is discussed in Chapter 13 of the SSHP – Personal Hygiene and Decontamination.

11.34 FIRE PREVENTION PLAN

To ensure adequate fire prevention, the SSHO will inspect the site to ensure all flammable and combustible materials are being safely stored in appropriately configured storage areas and containers. The SSHO will also ensure that no flammable/combustible materials are stored near any sources of ignition, and that sources of ignition are removed a safe distance from storage areas. If needed, storage areas will be segregated from the remainder of the site using flagging. Portable fire extinguishers shall be located on site. The Fire Prevention Plan is included in the SOP document.

ATTACHMENT 1
SITE SAFETY AND HEALTH PLAN

FINAL

ATTACHMENT 1
SITE SAFETY AND HEALTH PLAN

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
PINECASTLE JEEP RANGE
ORANGE COUNTY, FLORIDA

prepared for:

U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE
and
U.S. ARMY CORPS OF ENGINEERS, JACKSONVILLE DISTRICT

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prepared by:

PARSONS
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

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CHAPTER 1
SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

The Accident Prevention Plan (APP) and this Site Safety and Health Plan (SSHP) describe the procedures to be implemented during the conduct of RI/FS operations at the Former Pinecastle Jeep Range.

1.1 SITE DESCRIPTION

A description of the Pinecastle Jeep Range including location, history, previous investigations, topography, and climate is contained in Chapter 1 of the WP.

1.2 MUNITIONS CHARACTERIZATION

Based on historical information and previous investigations at the Pinecastle Jeep Range, the munitions of concern are listed in Table 1.1 in Chapter 1 of the work plan.

CHAPTER 2
HAZARD AND RISK ANALYSIS

2.0 INTRODUCTION

Work activities, natural phenomena, and biological hazards may present a risk to the field team on this project. The level of risk is dependent upon the type of work being conducted. This chapter identifies munitions and explosives of concern (MEC), physical, chemical, and biological hazards associated with the tasks scheduled to be performed on this project and outlines the procedures that are to be employed to prevent accidents, injuries, and illness. The SSHP is designed to protect the site personnel, the public, and the environment.

Personnel working most directly with intrusive anomaly investigations will have the greatest chance of encountering possible MEC hazards. However, all project personnel and visitors to the site will be expected to be aware of the guidance provided by this document and comply with all applicable safety and health requirements during all activities.

2.1 ACTIVITY HAZARD ANALYSIS

2.1.1. Individual hazard analyses have been performed for the tasks associated with the Pinecastle Jeep Range RI/FS. The potential hazards have been identified; control measures have been outlined; training requirements and personal protective equipment (PPE) requirements and equipment inspection procedures have been established. The following activities are considered in the Activity Hazard Analyses (AHAs):

- Site mobilization and preparation
- Property survey
- Brush cutting and removal
- Digital geophysical mapping (DGM)
- Reacquisition
- Intrusive investigation and Mag and Dig
- Soil sampling
- Emergency rescue
- Demobilization

2.1.2. Attachment 2 to the APP contains AHAs for each of the major tasks identified for the Pinecastle Jeep Range RI/FS, including potential hazards, control measures, training and PPE requirements. These AHAs will be reviewed and updated for the 8 Area of Interest (AOI) sites at the Pinecastle Jeep Range.

2.1.3. If new operations/tasks are introduced, an AHA will be performed by the Project Safety and Health Manager (PSHM). If operations change significantly during the course of this project, the related AHA will be updated to accommodate these changes. Any changes in PPE or

operating procedures will be approved by the PSHM before they are implemented, and will be communicated to the field team during daily tailgate safety meetings. It will be the responsibility of the Site Safety and Health Officer (SSHO) to ensure that the required controls are being properly implemented.

2.2 COMMON SAFETY HAZARDS

2.2.1. The most common safety hazards potentially associated with this project are expected to include:

- Slips, trips, and falls;
- Motor vehicle and heavy equipment operation;
- Excavation safety; and
- Electrical energy, lockout/tagout

2.2.2. Personnel working on site will have the possibility of encountering these hazards at one time or another. These hazards at the job site and methods to prevent injury resulting from them are described in the following subsections. Additional physical hazards are addressed in Section 3.5.

2.2.1 Slip, Trip, and Fall Hazards

2.2.1.1 Hazard Identification

Work sites may contain slip, trip, and fall hazards for site workers, such as:

- Holes, craters, pits, or ditches.
- Slippery surfaces.
- Uneven grades.
- Sharp objects, such as nails, metal shards, and broken glass.
- Weather conditions, such as thunder storms and hurricanes, that make surfaces slippery and obscure visibility.

2.2.1.2 Hazard Mitigation/Prevention

Site personnel will be instructed to look for these potential safety hazards and immediately inform the SSHO, and the United States Army Engineering and Support Center, Huntsville (USAESCH) Safety Specialist about any encountered and or new slip, trip or fall hazards. If the hazard cannot be immediately removed or mitigated, action will be taken to notify site personnel about the hazard. Slips, trips, and fall hazards will be a daily tailgate safety briefing item. Operations will cease if weather conditions could cause activities to be hazardous.

2.2.2 Motor Vehicles and Heavy Equipment

2.2.2.1 Hazard Identification

Site tasks such as site preparation, brush clearing, excavation, and vehicle and/or heavy equipment operation may present a hazard. Injuries can result from being hit or run over by a moving vehicle, from vehicles overturning, or from being struck, burned, or otherwise injured by moving parts.

2.2.2.2 Hazard Mitigation/Prevention

The following precautions will be taken to help prevent injuries and accidents related to motor vehicles and heavy equipment:

- Operations will often occur in residential neighborhoods so special care will be exercised while operating vehicles and equipment because of narrow streets and residential traffic.
- Brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering mechanisms, tires, horn, and other safety devices will be inspected and maintained in good working order throughout the duration of the items use. A weekly Vehicle and Heavy Equipment Inspection Form will be filled out. The forms are included in Appendix F, Forms to this WP. Whenever a deficiency that affects the safe operation of a vehicle or heavy equipment is present, the item will be immediately taken out of service and its use prohibited until the unsafe condition(s) has been corrected.
- All heavy equipment will not be operated in reverse gear unless the vehicle has a reverse signal alarm audible above the surrounding noise level, backup warning lights and a backup guide is used whenever the piece of equipment is being backed up. A motor vehicle must have backup warning lights, and the vehicle is backed up only when a spotter signals it is safe to do so.
- Heavy equipment will be provided with necessary safety equipment including seat belts, rollover protection, emergency shut-off during rollover, fire extinguisher, first-aid kit, backup warning lights, and audible alarms.
- Blades and buckets will be lowered to the ground and parking brakes will be set before shutting off any heavy equipment.
- Field support vehicles will be equipped with a first-aid kit and appropriate fire extinguisher.
- All operators will provide proof of competency to the SSHO prior to operation of heavy equipment.

See Vehicle Operation SOP in Appendix J.

2.2.3 Excavation Safety

2.2.3.1 Hazard Identification

When excavations exceed a depth of 5 feet, potential hazards include:

- Cave-ins.
- Items falling into the excavation.
- Personnel falling into the excavation.

2.2.3.2 Hazard Mitigation/Prevention

If the excavation exceeds 5 feet in depth and will be entered by workers, a modular panel shoring system or sloping/benching will be used. Additional mitigation measures include:

- A safe means of egress will be provided if the excavation depth is greater than 4 feet.
- Exit locations will be spaced at lateral intervals of less than 25 feet.

- Water Accumulation. The Occupational Safety and Health Administration (OSHA) standard prohibits employees from working in excavations where water has accumulated or is accumulating unless adequate protection has been taken. If water removal equipment is used to control or prevent water from accumulating, a competent person will monitor the equipment to ensure proper use and operation of the equipment.
- A competent person, as defined by OSHA, will perform daily inspections of excavations for evidence of a potential cave-in. Inspections will also be conducted after every rainstorm.

2.2.3.3 Falls and Equipment

In addition to cave-in hazards and secondary hazards related to cave-ins, other hazards from which workers must be protected during excavation-related work include exposure to falls, falling loads, and mobile equipment. To protect employees from these hazards, OSHA requires the following precautions:

- Keep materials or equipment that might fall or roll into an excavation a minimum of 2 feet from the edge of excavations, or have retaining devices, or both.
- Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs, to alert operators of the edge of an excavation. If possible, keep the grade away from the excavation.
- Provide scaling to remove loose rock or soil or install protective barricades and other equivalent protection to protect employees against falling rock, soil or materials.
- Prohibit employees from working on faces of sloped or benched excavations at levels above other employees unless employees at lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

2.2.4 Electrical Energy, Lockout/Tagout

2.2.4.1 Hazard Identification

It is important to be aware of electrical safety to prevent electrical accidents. Accidents occur when electrical equipment is not properly used or installed. Accidents also occur when equipment is not properly isolated, shut down, and/or de-energized (i.e., lockout/tagout procedures are not used).

2.2.4.2 Hazard Mitigation/Prevention

2.2.4.2.1 Electrical Energy

- No electrical work will be performed on an energized circuit.
- Only approved, qualified electricians will be permitted to work on electrical equipment or electrical wiring.
- Proper clearance and grounding procedures will be used. All electrical circuits and equipment will be de-energized and lockout/tagout accomplished before maintenance or repair work is started.

- Single-phase electric hand tools and other single-phase portable electrical equipment will be approved by a recognized testing agency and all exposed non-current-carrying metal parts will be grounded or double-insulated.
- Before each use, portable electrical appliances will be examined for obvious defects in the appliance, cord, and plug. If any deficiency is noted, the appliance will not be used.
- Extension cords will be kept clean, dry, free of kinks, and protected from oil, hot or sharp surfaces, and chemicals. Extension cords used outdoors will be equipped with Ground Fault Circuit Interrupters (GFCI).
- Portable electrical tools not provided with special insulating or grounding protection will not be used.
- Portable electrical appliances and equipment with non-current-carrying metal parts exposed to contact by personnel will be grounded by a continuous conductor from the device to a grounded receptacle. The SSHO will resolve any question as to whether a particular appliance is or should be grounded.
- Grounding of receptacles will be accomplished in one of two ways:
    - A built-in ground wire of green color will be attached to the ground pole of the receptacle, or
    - The conduit system, if installed in an approved manner, will be relied upon for grounding of a receptacle serving single-phase appliances with ratings up to 230 volts.
- At outside locations all single-phase 15- and 20-ampere receptacle outlets (operating at 230 volts or less) that are not part of the permanent wiring of the building or structure will have GFCI for personnel protection. The GFCI will be located at the power source so that all extension cords and tools are protected.
- The outlet box for portable extension cords for outdoor use will be weatherproof and maintained in good condition.

2.2.4.2.2 Lockout/Tagout

Lockout/tagout procedures will be used for all maintenance procedures to ensure the equipment is isolated from all potential hazardous energy sources (electrical and mechanical). These procedures include the following:

- The team leader with jurisdiction over the equipment and all affected personnel will be notified that the energy sources are to be deactivated.
- All sources of power that must be locked out, blocked or released will be identified by the SSHO and the individual who will work on the equipment.
- In order to ensure that the equipment cannot be re-energized while maintenance activities are performed the SSHO will lockout/blank out all potential energy sources. The applicable personnel will be assigned padlocks with their names or identification numbers affixed to the locks. The locks will be individually keyed to prevent another individual from removing the lock inadvertently. If more than one person is assigned to work on the equipment, a multi-lockout hasp will be used so that all personnel working on the equipment can apply their locks and ensure their safety.
- A tagout device will be affixed to all components or systems de-energized to indicate that lockout has occurred.

- After the servicing and/or maintenance is complete and the equipment is ready for normal operations, the area around the machine or equipment will be checked. After all tools have been removed from the machine or equipment, guards have been reinstalled, all lockout or tagout devices will be removed. Finally, the energy-isolating devices will be operated to restore energy to the machine or equipment.

2.3 EXPLOSIVE ORDNANCE AND EXPLOSIVE HAZARDS

2.3.1 Hazard Identification

As a result of the former use of Pinecastle Jeep Range and based on the results of previous investigations at the site, it is highly possible that the field teams may encounter MEC items that have been fired, buried, or abandoned, and that still represent a hazard. The MEC hazards of concern at the site are listed in Table 1-1.

2.3.2 Hazard Mitigation/Prevention

2.3.2.1 All field personnel will be given ordnance recognition training prior to working on the site as discussed in Chapter 4 of this SSHP. The training will be verified by signature on the site training form.

2.3.2.2 The following general precautions concerning MEC will be observed at all times:

- MEC item(s) WILL NOT be touched or moved regardless of the markings or apparent condition.
- Radios or cellular phones WILL NOT be used in the vicinity of an MEC item.
- Areas where the ground cannot be seen WILL NOT be traveled across.
- Vehicles WILL NOT be driven into suspected MEC areas; clearly marked lanes will be used.
- Matches, cigarettes, lighters, or other flame-producing devices WILL NOT be carried on to an active excavation site).
- Color codes WILL NOT be relied upon for positive identification of MEC items or their contents.
- MEC items will be approached from the side whenever possible; approaching the front or rear areas will be avoided.
- Personnel will always assume that a MEC item contains a live charge until it can be determined otherwise.

2.3.2.3 The following actions will be taken if ordnance is found:

- Personnel who are not UXO-qualified will leave the immediate vicinity. They WILL NOT touch, move, or otherwise disturb the item.
- Personnel should not be misled by markings on the ordnance item stating or indicating that the item is either practice or inert. Even practice bombs may have explosive charges that are used to mark/spot the point of impact, or the item could be incorrectly marked.
- Immediately upon locating any suspect UXO/MEC, the SSHO and Site Manager (SM) will be notified. The SM will notify the Parsons Project Manager (PM), and the SSHO will notify the USAESCH Safety Specialist.

- Operations in the immediate area of the suspect UXO/MEC will be halted and the appropriate Contingency Plan (Chapter 16) will be implemented.

2.4 CHEMICAL HAZARDS

2.4.1 Hazard Identification

Table D-2.1 lists contaminants of concern for the RI/FS at the Pinecastle Jeep Range. Compounds listed include gasoline and diesel, which are components of some incendiary munitions. The table includes the Threshold Limit Value (TLVs), Permissible Exposure Limit (PELs), Immediately Dangerous to Life or Health (IDLH) value, and health effects for these compounds.

2.4.2 Hazard Mitigation/Prevention

The potential hazards from chemicals of concern will be minimized through the use of proper PPE (Chapter 5 of this SSHP). Details on hazard communication training are presented in Chapter 4 of this SSHP.

2.5 PHYSICAL HAZARDS

2.5.1 Primary Physical Hazards

The primary physical hazards potentially associated with this project are expected to include:

- Underground utilities;
- Severe weather;
- Lightning;
- Hazardous noise;
- Heat stress; and
- Cold stress.

These hazards and mitigation actions are discussed in the following subsections.

2.5.1.1. Underground Utilities

2.5.1.2. Hazard Identification

Underground utility lines may be present at Pinecastle Jeep Range that may pose hazards during the intrusive operations, including both manual and mechanized excavations. The specific hazards include, but are not limited to, utilities such as sewers, telephone, cable, fiber optic, water, fuel, gas, and electrical lines.

2.5.1.3. Hazard Mitigation and Prevention

The local utility locating hotline (i.e., Call Sunshine – 811, www.callsunshine.com) will be contacted to identify the locations of buried utilities before subsurface activities are allowed to commence. Prior to commencing any intrusive activities, the Parsons SM will obtain a digging clearance if appropriate, and document phone calls, correspondence, and confirmation numbers. Site personnel will not enter underground utilities. In the event the local utility service cannot

access all areas of the site where utilities may be located, geophysical instruments and utility locators will be used to scan for buried utilities.

Table D1-2.1
Health Hazard Qualities of Hazardous Substances of Concern

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Ionization Potential[d/] (eV)	Physical Description – Health Effects - Symptoms
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	NA [e/]	NA [e/]	NA [e/]	NA [e/]	An explosive white powder, used in combination with other ingredients in explosives. Its odor and taste are unknown. A synthetic product that does not occur naturally. It creates fumes when it is burned with other substances.
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	NA [e/]	NA [e/]	NA [e/]	NA [e/]	a colorless solid - The taste and smell of HMX are not known.
2,4,6-Trinitrotoluene	1.5 [f/]	0.1 [b/]	500 [c/]	10.59 [d/]	Pale yellow, needle-shaped crystals and can be distilled in a vacuum. Low melting point of 80.35 °C. TNT is poisonous and skin contact can cause allergic reactions, causing the skin to turn a bright yellow-orange color.
1,3,5-Trinitrobenzene	NA [e/]	NA [e/]	NA [e/]	NA [e/]	Yellow, crystal-like solids at room temperature. They may exist in the air in very small amounts as a dust or a vapor and can dissolve in certain liquids. If either compound is put under very high heat, it will explode. These compounds have no odor or taste.
1,3-Dinitrobenzene	1 [f/]	0.15 [b/]	50 [c/]	10.43 [d/]	Yellow, crystal-like solids at room temperature. They may exist in the air in very small amounts as a dust or a vapor and can dissolve in certain liquids. If either compound is put under very high heat, it will explode. These compounds have no odor or taste.
2,4-Dinitrotoluene	1.5 [f/]	0.2 [b/]	50 [c/]	na	Pale yellow solids with a slight odor
2,6-Dinitrotoluene	1.5 [f/]	0.2 [b/]	50 [c/]	na	Pale yellow solids with a slight odor
2-Amino-4,6-dinitrotoluene	NA [e/]	NA [e/]	NA [e/]	NA [e/]	

Table D1-2.1
Health Hazard Qualities of Hazardous Substances of Concern

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Ionization Potential[d/] (eV)	Physical Description – Health Effects - Symptoms
2-Nitrotoluene	5 [f/]	2 [b/]	200 [c/]	9.43 [d/]	Yellow liquid or solid, weak, aromatic odor
3-Nitrotoluene	5 [f/]	2 [b/]	200 [c/]	9.48 [d/]	Pale yellow solid; weak, aromatic odor
4-Amino-2,6-dinitrotoluene					
4-Nitrotoluene	5 [f/]	2 [b/]	200 [c/]	9.5 [d/]	Yellow liquid or solid, weak, aromatic odor
Nitrobenzene	1 [f/]	1 [b/]	200 [c/]	9.92 [d/]	It is an oily yellow liquid with an almond-like odor
Nitroglycerin	0.2 [f/]	0.05 [b/]	75 [c/]	NA [e/]	Pure nitroglycerin is a colourless, oily, somewhat toxic liquid having a sweet, burning taste
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	NA [e/]	NA [e/]	NA [e/]	NA [e/]	
Pentaerythritol Tetranitrate (PETN)	NA [e/]	NA [e/]	NA [e/]	NA [e/]	White crystals -Stable, but decomposes readily and possibly explosively if heated
Gasoline	300 (TWA); 500 (STEL)	300 (TWA); 500 (STEL)	NA [e/]	NA [e/]	Light yellow to light red liquid with aromatic odor. Overexposure may cause redness of the eyes, redness and/or swelling if skin is contacted, & headache, nausea, vomiting, dizziness, drowsiness, euphoria, loss of coordination, & disorientation if inhaled.

a/ PEL = Permissible Exposure Limit. OSHA-enforced average air concentration to which a worker may be exposed for an 8-hour workday without harm. Expressed as parts per million (ppm) unless noted otherwise. Some states (such as California) may have more restrictive PELs. Check state regulations.

b/ TLV = Threshold Limit Value - Time-Weighted Average. Average air concentration (same definition as PEL, above) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH), 2007*Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.*

c/ IDLH = Immediately Dangerous to Life or Health. Air concentration at which an unprotected worker can escape without debilitating injury or health effects. Expressed as ppm unless noted otherwise. IDLH values are published in the *NIOSH Pocket Guide to Chemical Hazards*, September 2005.

d/ Ionization Potential, measured in electron volts (eV), used to determine if field air monitoring equipment can detect substance. Values are published in the *NIOSH Pocket Guide to Chemical Hazards*, September 2005.

e/ NA = Not available.

f/ OSHA PELs used. Values are published in the *NIOSH Pocket Guide to Chemical Hazards*, September 2005.

2.5.2 Severe Weather

2.5.2.1. Hazard Identification

During the course of field operations, severe weather may be encountered, including thunderstorms, rainstorms, hurricanes and other unsafe weather conditions (i.e., high winds). Criteria indicating that severe weather conditions may exist include:

- High winds (greater than 40 miles per hour – depending on the tree cover and other site specific conditions),
- Hurricane watch or warning in place for the area,
- Visible lightning,
- Extreme temperatures (e.g., greater than 100°F or less than 32°F), or
- Heavy rainfall or fog that makes footing treacherous and visibility difficult.

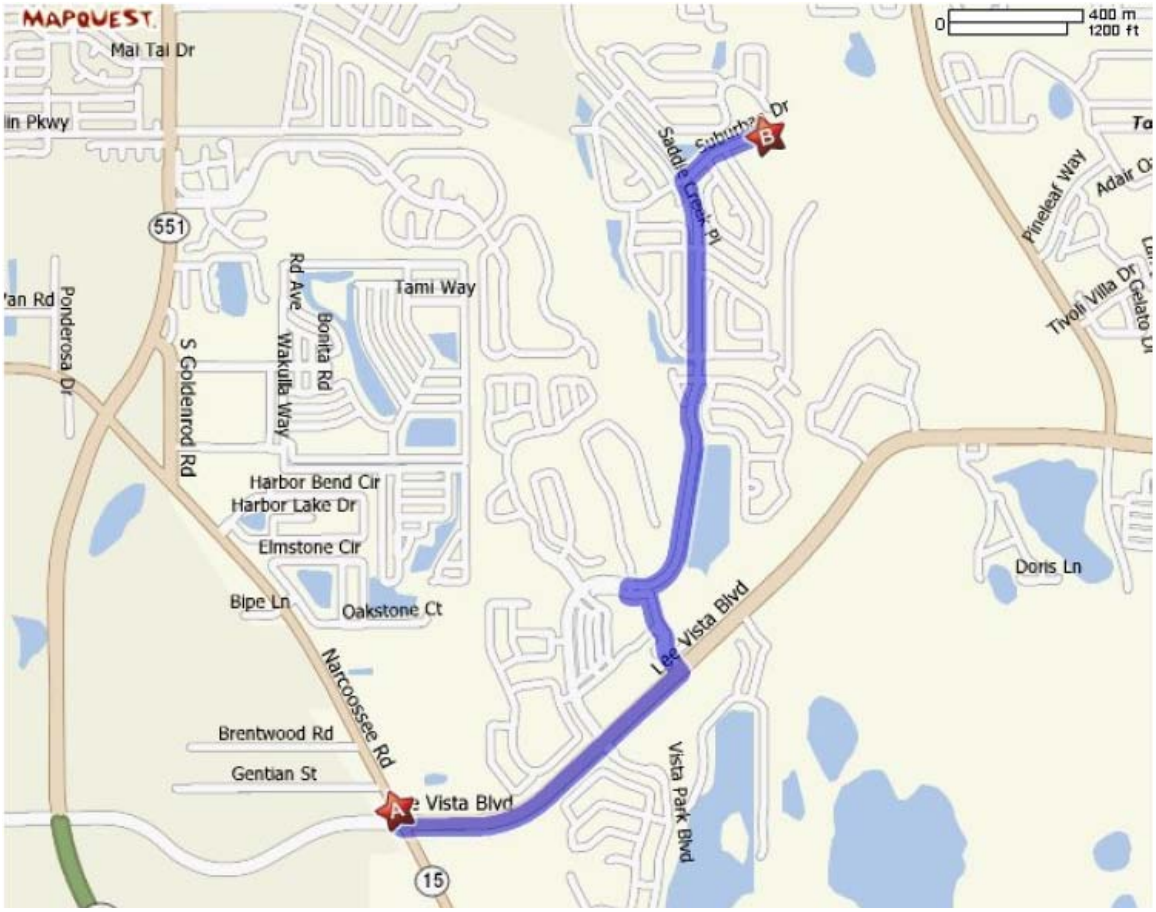
2.5.2.2. Hazard Mitigation and Prevention

2.5.2.2.1 In the event of severe weather, it may be necessary to cease operations and evacuate the site. The SSHO will be responsible for being aware of local weather forecasts and monitoring the weather. Weather forecasts will be monitored using a combination of local radio and television broadcasts, internet, and a weather radio. Should severe weather threaten, the SSHO will be responsible for deciding whether site operations should cease.

2.5.2.2.2 In the event that work is suspended, the SSHO will notify the teams and individuals via radio or cellular telephone. These individuals will be responsible for relaying the work suspension to other personnel in their areas. All personnel will cease operations, secure equipment, if time permits, and expeditiously move to designated assembly areas for further instruction. Once the severe weather hazard has passed, the SSHO will notify the SM that work may resume.

2.5.2.2.3 In the event that a hurricane is projected to impact the location of the jobsite, several measures will be taken. If the hurricane's projected path is forecasted to move through the area, the site and all equipment will be secured and personnel will be demobilized if time allows. If there is no time for demobilization, personnel will evacuate to a designated hurricane shelter. The closest hurricane shelter to the Pinecastle Jeep Range is the Hidden Oaks Elementary School. The school is located at 9051 Suburban Dr., Orlando; the directions (from the CP) and location from the CP is presented below:

- Start out going south on Narcoossee Road
- Turn Left on Lee Vista Blvd.
- Turn Left on Contessa Drive
- Turn Left on Buccilli Drive
- Turn Right on Lake Melrose Drive
- Turn Right on Chickasaw Trail
- Turn Right on Suburban Drive



Hurricane Shelter: Path from the CP (A) to Hidden Oaks Elementary School (B)

2.5.3 Lightning

2.5.3.1. Hazard Identification

Lightning's distance from a given person's position can be estimated by noting the time from its flash to the bang of the associated thunder. For each 5-second count from flash to bang (F-B), lightning is 1 mile away. Thus, a F-B of 10 means that lightning is 2 miles away and an F-B of 15 means that lightning is 3 miles away, and so on. Because the distance from Strike A to Strike B to Strike C can be 0.5 to 1.5 miles apart, the lightning safety evacuation plan will be implemented at a count of 50 (10 miles), or as soon as lightning is observed or thunder is heard.

2.5.3.2. Hazard Mitigation and Prevention

2.5.3.2.1 If a lightning storm is observed, all outdoor site activities will cease and personnel will seek safe shelter. A safe shelter may consist of:

- Fully enclosed metal vehicles with windows up and vehicle radio off,
- Enclosed buildings, or
- Low ground.

2.5.3.2.2 Unsafe shelter areas include all nearby outdoor metallic objects such as flag poles, fences, high mast light poles, gates, etc. Trees, water, and open fields will be avoided, and personnel will avoid using the telephone.

2.5.3.2.3 Feeling one's hair standing on end and/or hearing "crackling noises" are signs of being in lightning's electric field. Individuals experiencing these signs will immediately remove objects containing metal or metal parts (including baseball caps), place their feet together, duck their head, and crouch down with their hands on their knees. A waiting period of at least 15 minutes from the last nearby lightning strike will be observed before resuming activities.

2.5.3.2.4 People who have been struck by lightning do not carry an electrical charge in their bodies and are safe to handle. Cardiopulmonary resuscitation (CPR) will be performed immediately on victims of a lightning strike by someone qualified to do so. Additionally, emergency help will be immediately sought. See Severe Weather SOP in Appendix J.

2.5.4 Hazardous Noise

2.5.4.1. Hazard Identification

2.5.4.1.1 Planned activities may involve the use of heavy equipment, such as brush hog, weed trimmer, bobcats and backhoes and other noise-producing equipment. The unprotected exposure of site workers to this noise during operations could result in noise-induced hearing loss.

2.5.4.1.2 A hazardous noise condition exists when communication between individuals separated by three feet requires shouting.

2.5.4.2. Hazard Mitigation/Prevention

2.5.4.2.1 Hearing protection will be required at any time the noise level reaches 85 decibels (dbA) or greater, or when communication between individuals separated by 3 feet requires shouting. Double protection will be required at any time noise levels exceed 100 dbA. The SSHO will ensure that either earmuffs or disposable foam earplugs are available to, and used by, all personnel near sources of hazardous noise.

2.5.4.2.2 Where equipment generate high levels of continuous or impact noise, the SSHO will conduct a noise survey using a sound level meter to verify that appropriate PPE is being utilized

2.5.5 Heat Stress

A detailed discussion of heat stress symptoms, mitigation, and prevention is provided in Chapter 9 of this SSHP.

2.5.6 Cold Stress

A detailed discussion of cold stress symptoms, mitigation, and prevention is provided in Chapter 9 of this SSHP.

2.6 IONIZING RADIATION

The only known source of ionizing radiation is the field radiographic unit (x-ray equipment) that will be used to assess potential MEC items. Potential ionizing radiation hazard, mitigation

and prevention are included in the X-ray SOP for the x-ray equipment that will be in use and can be found in Attachment 3 to the APP. Misuse or carelessness during operation could result in injury or death. Only a trained, authorized operator will operate the equipment. The authorized operator(s) will be enrolled in a dosimeter /film badge program and will wear a dosimeter when operating the equipment. The x-ray equipment operator must establish a 200 ft exclusion zone (EZ) before use and maintain a minimum of 20 feet to the rear of the unit during operation. The unit will be calibrated and leak tested in accordance with the manufacturer's specification. Only an appropriate number of pulses will be used to radiate a given item. Never use the x-ray equipment with unauthorized personnel in the EZ. Report any suspected overexposure to the SSHO immediately.

2.7 BIOLOGICAL HAZARDS

Biological hazards may include encounters with mammals, insects, snakes, spiders, ticks, plants, parasites, and pathogens. Potential biological hazards present at the former Pinecastle Jeep Range include hazardous plants, insects, and spiders.

2.7.1 Hazardous Plants

2.7.1.1. Hazard Identification

2.7.1.1.1 Because most of the area is residential with associated landscaping, the potential for hazardous plants will mainly be in unimproved areas. Most skin reactions following contact with offending plants are allergic in nature and are characterized by:

- General symptoms of headache and fever;
- Itching;
- Redness; and
- Rash.

2.7.1.1.2 Some of the most common and severe allergic reactions resulting from contact with hazardous plants are caused by poison ivy, poison oak, and poison sumac. Contact with the poisonous sap of these plants produces a severe rash characterized by redness, blisters, swelling, and intense burning and itching. In some cases the victim may develop a high fever and may become very ill. Ordinarily, the rash begins within a few hours after exposure, but it may take as long as 24 to 48 hours to appear.

2.7.1.1.3 The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets. In certain seasons, both plants also have greenish-white flowers and berries that grow in clusters. Pictures of poison ivy, poison oak, and poison sumac are shown in Figure 2-1.

2.7.1.2. Hazard Mitigation/Prevention

Avoiding contact with the plants or their sap is the only effective means of preventing the poisoning. A person experiencing symptoms of hazardous plant poisoning should remove contaminated clothing and wash all exposed areas thoroughly with soap and water. Apply calamine or other poison ivy/oak lotion if the rash is mild. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity. Thorough washing of skin and clothing after site work or after potential exposure can also reduce severity of irritation.

Figure D1-2.1
Poison Ivy/Poison Oak/Poison Sumac

2.7.2 Ticks and Chiggers

2.7.2.1. Hazard Identification

2.7.2.1.1 Ticks are small, ranging from the size of a printed comma up to about one quarter inch. They are sometimes difficult to see. When embedded in the skin, they may look like a freckle. Chiggers, much like ticks however much smaller, and are distinguishable from ticks in both their physical characteristics (bright red body), size (approximately 1/20 of an inch), and feeding characteristics (unlike ticks, they do not feed on blood). Additionally, there has been no known diseases associated with chigger bites, unlike ticks (Lyme disease and Rocky Mountain Spotted Fever).

2.7.2.1.2 Both insects are active in the spring through the summer, however may be active year-round in warmer climates. Ticks and chiggers may be found in wooded areas and where you may encounter tall grass or brush. They can usually be found at the top of a stalk of vegetation, waiting to snag a passerby. While ticks are active all through their lives, it is only the larvae of the chigger that will attach itself to humans and other wildlife.

2.7.2.1.3 Ticks feed by inserting their harpoon-type structure – the hypostome – through the skin of a victim, feeding on the capillary blood flow, and after engorged with blood, dropping off the victim. Chiggers do not feed on blood. In fact, chiggers do not penetrate through the skin, but insert their mouthparts in a skin pore or hair follicle. Unlike common belief, they do not burrow into the skin. Chigger larvae, once attached to a host, inject a powerful salivary secretion containing digestive enzymes which breaking down the skin cells that are then sucked up. This digestive fluid also causes the skin cells around the bite area to harden, producing a “straw-like” feeding tube of hardened flesh (stylostome). This bit turns into a red welt with a hard white center on the skin which may be itch severely and may turn into dermatitis. Scratching may evolve into secondary infections.

2.7.2.1.2 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, tall grass, and brush. Lyme disease has occurred in 43 states, with the heaviest concentrations in the Northeast. It is transmitted by deer ticks and lone star ticks. 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. A female deer tick is shown in Figure 2-3.

2.7.2.1.3 The first signal of Lyme disease infection may appear in a few days or a few weeks after the tick bite. Typically, a rash starts as a small red rash that sometimes appears as a bulls-eye. Other symptoms include headache, weakness, joint and muscle pain and other flu-like symptoms.

2.7.2.1.4 RMSF has occurred in 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 RMSF are also flu-like chills, fever, headache, dizziness, fatigue, stiff neck, and bone pain.

2.7.2.1.5 In the case of Lyme disease or RMSF, if immediately treated by a physician, most individuals recover fully in a short period of time. If not treated, more serious symptoms can occur.

Figure D1-2.1 Chigger larvae (image magnified)

Figure D1-2.3 Female Deer Tick

2.7.2.2. Hazard Mitigation/Prevention

2.7.2.2.1 If you believe a tick has bitten you, or if any of the signs and symptoms noted above appears, contact the SSHO, who will authorize you to visit a physician for an examination and possible treatment.

2.7.2.2.2 You may not know if you have been infested with chigger larvae until you start scratching. If you think you may have been infected with chiggers, wash your field clothes in soapy, hot water for ½ hour and place in the sun to dry. Unlaundered clothes will allow reinfestation. As soon as possible, take a hot shower or bath and soap repeatedly. This action will remove the chiggers, but the stylostomes will remain and will cause the severe itching. For temporary relief from itching, apply hydrocortisone ointment or calamine.

2.7.2.2.3 Standard field gear (work boots, socks, and light-colored coveralls) provides good protection against tick and chigger bites, particularly if the joints are taped. However, even when wearing field gear, the following precautions will be taken when working in areas that might be infested:

- When in the field, check yourself often for ticks, particularly on your lower legs and areas covered with hair.

- Apply DEET (vapor-active repellent) to any exposed skin surface (except eyes and lips) and apply the permethrin repellent spray to field clothing (Note - allow the permethrin to dry before starting field activities).
- When walking in wooded areas, wear a hat or hard hat, and avoid contact with bushes, tall grass, or brush in as much as possible.
- If you find a tick, remove it by pulling on it gently with tweezers. Do not squeeze the tick's body. Grasp it where the mouthparts enter the skin and tug gently, but firmly, until it releases its hold on the skin.
- DO NOT use matches, a lit cigarette, nail polish, or any type of chemical to "coax" the tick out.
- Be sure to remove all parts of the tick's body, and disinfect the area with alcohol or a similar antiseptic after removal.
- Upon leaving the field spray your boots, pants and any other area you may suspect of having ticks with alcohol. Launder your clothes in hot water.
- For several days to several weeks after removal of the tick, look for the signs of the onset of Lyme disease, such as a rash that looks like a bulls-eye or an expanding red circle surrounding a light area, frequently seen with a small welt in the center.
- Also look for the signs of the onset of RMSF, such as inflammation that is visible in the form of a rash comprising many red spots under the skin, which appears 3 to 10 days after the tick bite.

2.7.3 Bees and Other Stinging Insects

2.7.3.1. Hazard Identification

Contact with stinging insects may result in site personnel experiencing adverse health affects that range from being mildly uncomfortable 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. Poisonous insects and insect-like creatures that may be encountered at the Pinecastle Jeep Range include the following:

- Bees (killer bees, honeybees, yellow jackets, bumble bees, wasps, and hornets);
- Scorpions

2.7.3.2. Hazard Mitigation/Prevention

2.7.3.2.1 Site personnel will comply with the following work practices:

- Personnel with a known hypersensitivity to bee, wasp, ant, or hornet stings will inform the SSHO of this condition during the site-specific training.
- Personnel with a known hypersensitivity condition will keep emergency medication in their possession.
- All personnel will be on the look-out for the presence of these stinging insects. Discovered nests will be flagged and their position reported to other site personnel.
- If stung, personnel will immediately inform the SSHO in order that they are able to receive appropriate treatment.

2.7.3.2.2 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 or grassy areas and hidden in cavities.
- The nest can be situated in trees, rocks, bushes, or in the ground, and are usually difficult to see.
- 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.
- 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 not experienced allergic reaction, there is no guarantee that they will not have an allergic reaction if they are stung again.

2.7.4 Fire Ants

2.7.4.1. Hazard Identification

2.7.4.1.1 Fire ants physically resemble ordinary ants, however they differ in the fact that they exhibit a vicious behavior. Fire ants average between 1/8 to 1/4 inches in length and are reddish-brown to black in color. Fire ants are mostly known for their lively and aggressive behavior, swarming over anything that disturbs their nest. Stings from fire ants produce small pustule within 24-48 hours – and can become sites of secondary infections if they are disturbed or broken. Bites from the fire ant can be very serious in people who may be hypersensitive to their toxins and may culminate in nausea, shock, chest pain, and in rare cases, coma.

2.7.4.1.2 Great care needs to be taken in areas which may flood occasionally. If the nest of fire ants suddenly becomes flooded, the ants are able to survive by forming a “raft” of floating ants. These “rafts” may persist in the flooded area until the ants have floated to dry ground. If one were to encounter a “raft” of floating ants, they may be seriously injured from the stings.

2.7.4.2. Hazard Mitigation/Prevention

2.7.3.2.1 Site personnel will comply with the following work practices:

- Personnel with a known hypersensitivity to ant stings will inform the SSHO of this condition during the site-specific training.
- Personnel with a known hypersensitivity condition will keep emergency medication in their possession.
- All personnel will be on the look-out for the presence of ants or ant mounds. Discovered nests of considerable size will be flagged and their position reported to other site personnel.
- Personnel working in an area where there is a large density of mounds will dress accordingly. Personnel should wear boots and/or tuck pants into the socks to reduce the risk of being stung. Use insect repellants, such as DEET or Picaridan (Picaridan should be applied to clothing only).

- If stung, personnel may consult with their pharmacist for treatments of minor bites or irritation. If personnel are experiencing a shortness of breath or considerable swelling, they should immediately inform the SSHO in order that they are able to receive appropriate and immediate medical treatment.

2.7.3.2.2 Some of the factors that are related to fire ants that increase the degree of risk associated with accidental contact are as follows:

- The nests for these insects are frequently found in both remote wooded or grassy areas.
- If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and blisters which can leave the worker incapacitated and in need of medical attention.
- 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 not experienced allergic reaction, there is no guarantee that they will not have an allergic reaction if they are stung again.

2.7.5 Snakes

2.7.5.1. Hazard Identification

2.7.5.1.1 Venomous snakes that may be encountered at the Pinecastle Jeep Range include the following members of the “pit-viper” family: Copperheads, Rattlesnake species, and Water Moccasins; and the Elapidae family: Coral Snakes. None of these snakes are considered likely to be encountered in residential areas.

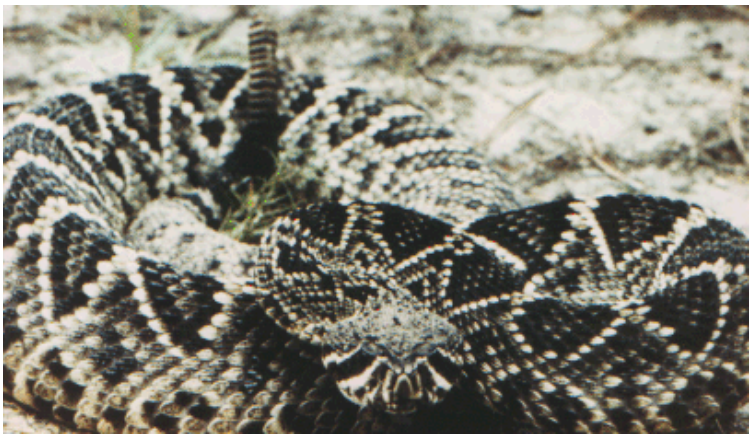
2.7.5.1.2 Illustrations of these snakes are shown in Figures D1-2.3a through D1-2.3e, and descriptions provided below:

Copperheads (Figure D1-2.3a) are commonly found near water sources in wooded areas. They are generally less than four feet in length and are not particularly aggressive. Coloration ranges from golden brown to tan. These snakes have a banded pattern.

Figure D1-2.3a
Copperhead

The Eastern Diamondback Rattlesnake (Figure D1-2.3b) is the largest snake native to North America, reaching 6 feet long. It has brown, black, and beige diamond marks on its back. This snake lives in forests near palmetto bushes and makes its home in old animal burrows (holes in the ground). It is a good swimmer and can live near fresh or salt water. The eastern diamondback does NOT always rattle before it strikes.

Figure D1-2.3b
Eastern Diamondback Rattlesnake



Eastern Coral Snakes (Figure D1-2.3c) are seldom seen and tend to be nocturnal. These snakes are typically small snakes averaging approximately 20 inches in length. Eastern Coral Snakes have rings of red, yellow, and black along the length of their bodies. Their noses are always black. They do not have long fangs and would have to actually chew on a person in order to inject their venom. Many snakes look like the coral snake. Venomous coral snakes always have red and yellow stripes touching.

Figure D1-2.3c
Eastern Coral Snake

Pigmy Rattlesnake (Figure D1-2.3d): These are very aggressive snakes usually about eighteen inches long. They are gray with brownish round markings. They are found in most habitats.

Figure D1-2.3d
Pygmy Rattlesnake

Water Moccasin (Figure D1-2.3e): Also known as Cottonmouths, these snakes usually are encountered near water. They are black to greenish-brown and are up to five feet long.

Figure D1-2.3e
Water Moccasins

2.7.5.1.3 A bite from a poisonous snake is usually characterized by extreme pain and swelling at the site of the bite; the presence of one or more puncture wounds created by the fangs; and a general skin discoloration. The manifestations of the bite include general weakness; rapid pulse; nausea and vomiting; shortness of breath; dimness of vision; tingling or numbness of the tongue, mouth or scalp; and shock. General snake identification features are shown in Table D1-2.2

2.7.5.1.4 Physical reactions are aggravated by acute fear, anxiety, the amount of venom injected, the speed of absorption of the venom into the victim's circulatory system, the size of the victim, protection provided by clothing (including shoes and gloves), quick anti-venom therapy, and the location of the bite.

Table D1-2.2
Generalized Snake Identification Features

Feature	Poisonous	Non-Poisonous
Eye pupils	Elliptical, or cat-like	Round
Sensing pits	Pit between the eyelids and nostrils	No pit between the eyelids and nostrils
Teeth	Two enlarged teeth (fangs) in front of the upper jaw	All teeth are approximately the same size
Scales	Form a single row on the underside and below the tail	Arranged in a double row on the underside of the tail
Head	Head much wider than the neck	Head slightly wider than the neck
Tail	Single anal plate	Divided anal plate

2.7.5.2. Hazard Mitigation/Prevention

2.7.5.2.1 The best snakebite mitigation measure is avoidance. The following measures will help in this process:

- Personnel will review the types of poisonous snakes most common to the Pinecastle Jeep Range. This will be reviewed during site-specific safety training. Regardless of type, all snakes will be avoided.
- Personnel will wear long pants and work boots as protection.
- Personnel will be careful where they sit and where they place their hands and feet.
- Personnel will avoid rock piles, stacks of old boards, and brush piles in wooded areas in as much as possible. If it is necessary to move these items, personnel will use a remote means to initially relocate the material. Prior to entering a heavily wooded or brushy area, personnel will look and listen carefully.
- Personnel will never handle "dead" snakes, as they may not be dead.
- Personnel will not attempt to capture or kill ANY snakes. According to the Centers for Disease Control and Prevention, most snakebites are the direct result of handling or harassing snakes, which bite as a defensive measure.

2.7.5.2.2 First aid rules that will be followed in the event that someone is bitten by a snake are:

- DO NOT make an incision through the fang marks; this procedure is too hazardous to underlying structures and, at best, removes only 20% of the venom, and will intensify the effect of the venom.
- DO NOT apply suction to the wound since this has a minimal effect in removing venom.
- DO NOT apply a tourniquet since this will concentrate the venom and increase the amount of tissue damage in the immediate area of the wound.
- DO NOT use cold compresses, ice, dry ice, chemical ice packs, spray refrigerants, or other methods of cold therapy.
- If possible, try to identify the snake for proper selection of anti-venom; but do not try to capture or kill it.
- DO NOT allow the victim to run for help, since running increases the heart rate and will increase the spread of the venom throughout the body.
- Keep the victim calm and immobile, and reassure them.
- Have the victim hold the affected extremity lower than the heart during transport or while waiting for medical assistance.
- Do not delay evacuation. Seek medical attention immediately.

2.7.5.2.3 In addition to the above guidelines, several other factors will be considered by the caregiver in selecting the appropriate actions:

- **Shock:** The victim will be kept in a comfortable, prone position and body temperature will be stabilized.
- **Breathing and heartbeat:** if breathing stops, mouth-to-mouth resuscitation will be administered. If breathing stops and there is no pulse, CPR should be performed by a trained individual.
- **Cleaning the bite area:** The bite area may be washed with soap and water and blotted dry with sterile gauze. Dressings and bandages may be applied, but only for a short period of time.

- **Medicine to relieve the pain:** The victim will not be given alcohol, sedatives, or any medicine containing aspirin. Some painkillers may be given after consulting with a doctor or medical personnel for specific medications that may be used.
- **Snakebite kits:** Kits will be kept accessible for all outings in primitive areas or areas known or suspected to be snake infested. All directions will be followed precisely.

2.7.5 Spiders

2.7.5.1. Hazard Identification

2.7.5.1.1 A large variety of spiders may be encountered during site activities. While most spider bites merely cause localized pain, swelling, reddening and in some cases, tissue damage, there are a few spiders that are dangerous due to the severity of the physiological affects caused by their venom. The SSHO will brief site personnel as to the identification and avoidance of these dangerous spiders. These species include the black widow and the brown recluse or violin spiders.

2.7.5.1.2 The black widow spider (Figure D1-2.4a) is a coal-black, bulbous spider ¾ to 1½ inches in length, with a bright red hourglass on the under side of the abdomen. The black widow is usually found in dark moist locations, especially under rocks, rotting logs and may even be found in outdoor toilets where they inhabit the underside of the seat. 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.
- 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.

Figure D1-2.4a
Black Widow Spider

2.7.5.1.3 The brown recluse or violin spider (Figure D1-2.4b) is brownish to tan in color, rather flat, 1/2 to 5/8 inches long. Of the recluse spider, there are eleven native and two non-native varieties found in the United States. Of these, the most venomous is the cinnamon variety of the brown recluse. These spiders may be found in a variety of locations including trees, rocks

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, postulating lesion with a bull's-eye appearance.
- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea and vomiting.
- Pain may become severe after 8 hours, with the onset of tissue necrosis.

Figure D1-2.4b
Brown Recluse Spider

2.7.5.2. Hazard Mitigation/Prevention

2.7.5.2.1 The field team will avoid spiders and webs whenever possible during the course of field activities. An individual who believes they have been bitten by a black widow or brown recluse spider will be immediately transported to a hospital. The spider will be collected (if possible) for confirmation of the species. Extreme caution will be used when lifting logs and debris, since spiders are typically found in these areas.

2.7.5.2.2 The best spider bite mitigation is avoidance. The following measures will help in this process:

- Personnel will review the types of harmful spiders most common to the Pinecastle Jeep Range. This will be reviewed during site-specific safety training. Regardless of type, all insects will be avoided.
- Personnel will wear pants either tucked into boots or taped to boots and long sleeved shirts as protection.
- Personnel will watch where they sit and where they place their hands and feet.
- Personnel will avoid rock piles, stacks of old boards, and brush piles in wooded areas. If it is necessary to move these items, personnel will use a remote means to relocate the material. Prior to entering a heavily wooded or brushy area, personnel will look carefully.

- Personnel will never handle “dead” spiders, as they may not be dead.

2.7.5.2.3 First aid treatment if bitten is to attempt to identify the spider that bit the individual and take the individual to the hospital immediately for treatment.

2.7.6 Blood-borne Pathogens

2.7.6.1 Hazard Identification

2.7.6.1.1 Blood-borne pathogens enter the human body through punctures, cuts, or abrasions of the skin or mucous membranes. They are not usually transmitted through ingestion (swallowing), through the lungs (breathing), or by contact with whole, healthy skin. However, under the principle of universal precautions, all blood will be considered infectious, and all skin and mucous membranes will be considered to have possible points of entry for pathogens.

2.7.6.1.2 Potential blood-borne pathogen exposures include:

- Contact with contaminated medical equipment or medical waste or sharps.
- Medical emergency response operations, such as administering first aid or CPR.
- Contact with human wastes such as domestic sewage.
- Accidental contact with blood from cuts and scratches incurred during field operations such as brush clearing, excavation, or clearance of munitions debris.

2.7.6.2 Hazard Mitigation/Prevention

Whenever there is a potential for exposure, personnel will wear the proper PPE (including gloves and masks when appropriate) to prevent exposure to blood-borne pathogens. If exposure to blood-borne pathogens is suspected, the SSHO will be informed and immediate medical attention will be sought.

CHAPTER 3
STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

3.0 INTRODUCTION

3.0.1 Chapter 2 of the WP provides detail on the project team, qualifications, and responsibilities of the different organizations and staff involved in this project. Figure 2-1 of the WP shows the project organizational structure.

3.0.2 The Parsons PM, Site Manager, SSHO, and the PSHM are collectively responsible for formulating and enforcing health and safety requirements and for implementing the APP/SSHP. This section outlines the specific safety responsibilities, accountability, and lines of authority for key Parsons personnel during the course of project activities.

3.0.3 All site personnel and subcontractors performing tasks or working in areas where there is a potential for exposure to hazardous material will meet the training requirements of OSHA 29 CFR §1910.120 prior to commencing any site activities.

3.1 PARSONS PROJECT MANAGER

The Parsons PM is responsible for all project personnel to include subcontractors and designates safety duties to the on-site personnel.

3.2 PROJECT SAFETY AND HEALTH MANAGER

The PSHM is responsible for oversight and direction to ensure full compliance with all health and safety issues at the project site. The PSHM will oversee all aspects of site safety, including the preparation of the APP/SSHP, conduct audits, and review of internal and external audits of site operations and records to verify OSHA, USACE, and APP/SSHP compliance. The PSHM responsibilities include the following.

- Oversee the development, maintenance, and implementation of the APP/SSHP.
- Visit the project site as needed to audit the effectiveness of the APP/SSHP.
- Remain available for project emergencies.
- Develop modifications to the APP/SSHP as needed.
- Evaluate occupational exposure monitoring data/air-sampling data and adjust the APP/SSHP requirements as necessary.
- Serve as a Quality Control staff member.
- Approve the APP/SSHP by signature.

3.3 SITE SAFETY AND HEALTH OFFICER

3.3.1 At a minimum, the SSHO will have completed the 10-hour OSHA Construction safety class within the last three years. The SSHO will also have at least one year of experience implementing safety and occupational health procedures at cleanup operations and have the training and experience to conduct exposure monitoring/air sampling, and select and adjust PPE.

A UXO Safety Officer (UXOSO) who meets these qualifications may also serve as the SSHO. The training and experience criteria of the SSHO will be documented in writing and filed on site.

3.3.2 The SSHO will be present during all operations at the Pinecastle Jeep Range, is responsible for implementing the APP/SSHP on site, and has the following additional responsibilities:

- Be present during operations covered by the APP/SSHP.
- Inspect site activities, identify any safety and occupational health deficiencies, and correct any deficiencies found.
- Coordinate changes and modifications to the APP/SSHP with the PSHM, PM, Site Manager, and USACE Project Manager.
- Conduct site-specific training and audits.

3.3.3 The SSHO has stop work authority is designated as the first responder for medical emergencies or minor injuries and is the on-scene commander in the event of an emergency.

3.3.4 The SSHO for the RI/FS at the Pinecastle Jeep Range will be Ken Cargel.

CHAPTER 4
TRAINING

4.0 GENERAL

4.1 INITIAL TRAINING

4.1.1 Prior to arriving on the site, all personnel will receive training from their employers complying with, but not necessarily limited to, those requirements specified by the USACE in EM 385-1-1 and 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response, or HAZWOPER), 29 CFR 1910.1200 (Hazard Communication), 29 CFR 1910.1030 (blood-borne pathogens). Copies of certificates of completion for HAZWOPER training (initial 40-hour and refresher course, supervisor training, etc.), medical status, first aid and CPR, and KO review of the Parsons certification of key personnel working on site will be maintained on site by the SSHO. These requirements are summarized in Table D1-4.1.

4.1.2 In addition to the initial training above, site-specific training including topics on safe work practices and equipment use (including heavy equipment), PPE, medical surveillance, decontamination, and emergency response will be conducted upon mobilization.

4.1.3 Personnel conducting brush clearing, surveying, or other similar non-intrusive activities are not subject to HAZWOPER training requirements under the following conditions:

- No intrusive operations occur while those personnel are on site;
- There is no potential for those personnel to be exposed to hazardous contaminants;
- The personnel receive the daily/visitor's site safety briefing prior to commencing work; and
- A UXO escort is provided for entrance into areas that have not been cleared of potential MEC.

Table D1-4.1
Training Requirements

Training Content	Duration (If specified)	Frequency (If specified)	Personnel Categories (see Section 5.1)		
			Supervisors (SSHO, SM)	Field Teams	Visitors
Health and Safety for Hazardous Waste Operations and Emergency Response – 29 CFR 1910.120	40 hours	Once	☑	☑	
Health and Safety for Hazardous Waste Operations and Emergency Response (Refresher) - 29 CFR 1910.120	8 hours	Annually	☑	☑	

Training Content	Duration (If specified)	Frequency (If specified)	Personnel Categories (see Section 5.1)		
			Supervisors (SSHO, SM)	Field Teams	Visitors
Supervised Field Experience	3 days	Once	☑	☑	
Supervisor's Health and Safety for Hazardous Waste Operations and Emergency Response – 29 CFR 1910.120	8 hours	Once	☑		
Construction Safety Training (to comply with EM 385-1-1 01.A.17.)	10 hours	Every 3 years	☑[1]		
Site-Specific Training (see Section 5.2 for training contents)	-	Once	☑	☑	
Hazard Communication, Hazards of Materials Used/Encountered Emphasis on Chemical Agents & Industrial Chemicals	-	Once	☑	☑	
First Aid and CPR (Minimum of 2 Trained Personnel On Site) - Equivalent to American Red Cross Training	-	Every 3 years for first aid; every year for CPR	☑[2]	☑[2]	
Bloodborne Pathogen – 29 CFR 1915.1030 Protective Equipment, Containment and Disposal of Waste	-	Annually	☑	☑	
Visitor Training - Operational Activities & Hazards, Boundaries of Work Area and Entry/Exit, Emergency Evacuation & Assembly Points, PPE	-	Per visit			☑
Tailgate Safety Meetings - Potential Hazards & Risks, Encounters with Hazardous Materials to Date, Daily Activities	-	Daily, prior to operations	☑	☑	☑

[1]SSHO is the only person required to have this training.

[2]A minimum of 2 trained personnel on site. Any of the personnel categories may have workers trained in First Aid/CPR.

4.2 SUPERVISORY TRAINING

4.2.1 The SSHO and individuals responsible for supervising personnel engaged in site work will also have at least eight additional hours of specialized training on managing such operations. This specialized training includes the employer's safety and health program and the associated employee training program, PPE program, and health hazard monitoring procedures and techniques. These supervisory personnel will also each have a minimum of three days of field experience under the supervision of a trained, experienced supervisor.

4.2.2 In addition, the SM, SSHO, UXOQCS and team leaders will have completed the 10-hour OSHA construction safety class or meet equivalent training requirements specified in EM 385-1-1 Paragraph 01.A.17, and parsons requirements. This requirement must be met at least once every three years.

4.3 REFRESHER TRAINING

All applicable site personnel will complete eight hours of refresher training annually on the items covered in the 40-hour initial training program.

4.4 SITE-SPECIFIC TRAINING

4.4.1 Site-specific training will be provided for all personnel, contractors, and subcontractors who plan to work on site and who have met the requirements of Section 4.1. Training will be conducted prior to the job start-up or, for new or replacement personnel, prior to starting work, and as needed thereafter. The SSHO will conduct initial site-specific training prior to job start-up to ensure that personnel have a thorough understanding of the SSHP, the overall project, standard operating procedures (SOPs), and all of the potential safety hazards at the site. The site-specific training will be conducted as necessary when new personnel enter the site. Topics covered in the site-specific health and safety training will include:

- Site history and background.
- Names of key personnel and their responsibilities.
- Project goals and objectives.
- Employee rights and responsibilities under OSHA.
- Review of the WP/APP/SSHP and AHAs.
- SOPs prepared specifically for various aspects of this project.
- Site control measures.
- Fire prevention measures.
- Emergency response procedures.
- Locations of medical facilities/hospitals.
- Engineering controls, such as blast fragmentation suppression techniques.
- Medical surveillance program.
- PPE.
- Discussion of action levels for changing site PPE or evacuating the site.
- Heat and/or cold stress prevention, treatment, and monitoring.
- Proper use of heavy equipment and machinery.
- Other physical hazards such as slips, trips, and falls, noise, electrocution, being struck by something, and being caught in or between something.
- Proper lifting techniques.
- Personal cleanliness and restrictions on eating, drinking, and smoking.
- Site-specific UXO training to include demolition training.

4.4.2 Personnel will also be instructed in the use of the "buddy system," which is a method of organizing work groups so that there is someone that is always available to:

- Provide their partner with assistance in an emergency,
- Observe their partner for signs of physical exposure,
- Periodically check the integrity of their partner's PPE, and
- Notify the emergency response personnel when an emergency occurs.

4.4.3 Any emergency response training during a project will be conducted by qualified instructors. The qualifications are relative to the specific emergency response operation being conducted and are outlined in EM-385-1-1.

4.4.4 All personnel will be made aware of the most probable route of evacuation from the site in the event of an emergency and other emergency procedures included in the project plans. All personnel will be briefed on the procedures and hazards specific to the site.

4.4.5 At the completion of site-specific training, all personnel will be required to sign forms that state they have received site-specific training, and read, understood, agreed with, and will abide by the health and safety procedures outlined in the APP. Appendix F, Forms, of the WP contains a Plan Acceptance Form and the Site-Specific Training Form.

4.5 TAILGATE SAFETY MEETINGS

All personnel who plan to enter the site during investigation activities will attend the daily tailgate safety meeting. This meeting, conducted by the SSHO, will cover specific health and safety issues, site activities for that day, changes in site conditions, topics covered in the initial health and safety meeting as they apply to daily activities, PPE, personnel and equipment, potential physical hazards, emergency warning signal, rally point, etc. Issues discussed in the daily tailgate meeting will be documented on a form, which will be signed by all the attendees and retained by the SSHO. A sample Tailgate Safety Meeting Form is provided in Appendix F.

4.6 BLOODBORNE PATHOGENS AND CPR/FIRST AID TRAINING

4.6.1 First Aid/CPR

Personnel assigned to conduct fieldwork for this project will not conduct first aid or CPR as a primary job function. Rather, selected employees have been trained in CPR and first aid for emergency use only. Acting in the capacity of a designated emergency first aid provider is not mandatory and anyone who is uncomfortable with the possibility of being so designated should notify the SSHO. In accordance with EM 385-1-1, at least two individuals currently certified in CPR and first aid will be present on site at all times during site operations.

4.6.2 Bloodborne Pathogens

4.6.2.1 An indoctrination to the bloodborne pathogens standard (29 CFR 1910.1030) will be provided to all employees either during their first aid training, and/or during the initial site health and safety meeting. Hepatitis B and Acquired Immune Deficiency Syndrome (AIDS), among other pathogenic microorganisms, can be contracted during emergency first aid and CPR through contact with blood. Therefore, it is important to recognize the concept of "universal precautions." Universal precautions require one to assume that all blood and bodily fluids contain pathogens and require the use of protective barriers to prevent exposure. Latex gloves and CPR barriers will be available in the first aid supplies stored at each site and should be used

prior to attending to a victim's needs. Additionally, washing any body part or surface that has been contaminated with blood is an important part of the universal precautions. The SSHO should be notified of any potential contact with blood or bodily fluids resulting from first aid or CPR administered on the job.

4.6.2.2 Hepatitis B Vaccine - Should personnel trained in first aid and CPR desire the vaccine, Parsons will arrange to have the individual receive the series of inoculations. The Hepatitis B vaccine can also be effective when administered after exposure to blood containing the Hepatitis B virus, though this method is less efficient than vaccination.

4.7 EMERGENCY RESPONSE TRAINING

All personnel will be made aware of the project emergency assistance network, the most probable route of evacuation from the site in the event of an emergency, and other emergency procedures included in Chapter 16 of this SSHP.

4.8 HAZARD COMMUNICATION TRAINING

4.8.1 In accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200 and CFR 1926.59), copies of all Material Safety Data Sheets (MSDSs) for hazardous chemical materials that are planned for use during site operations or that are present on-site will be available on site from the SSHO. Additionally, a written Hazard Communication Program has been prepared and will be maintained at the site by the SSHO.

4.8.2 Hazard communication training in accordance with 29 CFR 1910.1200 and 29 CFR 1926.59, DA Pam 40-173, DA Pam 385-61, and EM 385-1-1 will be presented during site-specific training to address site-specific hazards. Training will include, but not be limited to, all hazards or potential hazards associated with site activities, and any hazardous chemical materials brought to or found on site. MSDSs for chemicals potentially present will be maintained on site by the SSHO.

4.9 VISITOR TRAINING

4.9.1 All visitors to the site will check in with the SSHO and receive a visitor's safety briefing that will include the following:

- Location and description of potential hazards and risks;
- Emergency warning alarms, evacuation procedures, and location of the rally point;
- Chemical and physical hazards found on-site;
- Areas of the site that are closed to visitors;
- Other topics as deemed appropriate.

4.9.2 All visitors will be required to sign the Visitor's Log. Site visitors wishing to enter the work area during site operations will be subject to the same documentation and training as specified for site workers.

4.10 UXO TRAINING

4.10.1 Non-UXO Personnel

All non-UXO trained site personnel will be trained in ordnance recognition, hazards and actions to take in the event a suspected ordnance item is encountered. They will be taught the three Rs, Recognize, Retreat, Report.

4.10.2 UXO Personnel

All UXO trained personnel, regardless of position, will receive site-specific ordnance training and demolition training.

4.11 SITE-SPECIFIC TEAM TRAINING

4.11.1 Team Training Activities

Prior to initiating intrusive activities at the Pinecastle Jeep Range, site-specific team training will be conducted under the direction of the SSHO. The objective of this training will be to prepare field personnel for the operations to be carried out at that specific site. The training will address the following topics:

- Site layout.
- General site operations.
- Hazard communication.
- Emergency procedures.
- Health and safety measures.

4.11.2 Training Documentation

Documentation of training requirements is the responsibility of Parsons and the subcontractors. Written documentation verifying compliance with 29 CFR 1910.120 (e)(3), (e)(4) (as applicable) and (e)(8) will be submitted to the SSHO prior to commencing work at the site. Types of training documentation include 40-hour HAZWOPER, 8-hour refresher, 8-hour supervisor training, 10-hour OSHA construction safety, UXO, bloodborne pathogens, HAZCOM, first aid, CPR, current physician's certificate, and hearing conservation training. Documentation of all workers' current training credentials will be kept on site. Daily tailgate meetings will be documented using the form presented in Appendix F of the WP.

CHAPTER 5
PERSONAL PROTECTIVE EQUIPMENT

5.1 GENERAL REQUIREMENTS

Personnel performing site tasks will wear and use the appropriate level and type of PPE for each individual task and as otherwise specified in this plan. This SSHP makes provisions for use Level D PPE in accordance with the hazards and contamination level anticipated for each task or operation. The following sections describe the PPE requirements for activities at the Pinecastle Jeep Range.

5.1.1 Responsibilities

5.1.1.1 The SSHO

The SSHO must ensure that:

- Personnel are trained in the proper wearing, donning, and doffing procedures for the PPE used at the site.
- PPE used is properly fitted.
- PPE is in good serviceable condition.
- Replacement PPE is on hand and serviceable.
- PPE use complies with all applicable OSHA, USACE, and Parsons' regulations.

5.1.1.2 Site Personnel

All site personnel using PPE must ensure that:

PPE is serviceable.

PPE is clean.

Defective PPE will be turned in to the SSHO.

5.1.2 Hazard and Risk Assessment

Hazard and risk assessment is a continuing process and will be conducted throughout the duration of the project. As a general rule, levels of PPE will need to be reassessed if any of the following occur:

- Previously unidentified or unanticipated chemicals, conditions or hazards are encountered.
- Ambient weather conditions affect the use of assigned PPE.
- A new task is introduced, or a previously assigned and evaluated task is expanded in scope.

5.1.3 PPE Changes

If work tasks are added to the project after approval of this SSHP that change the type or level of PPE, the SSHO will identify and assess the task hazards and relay that information to the PSHM and USAESCH Safety Specialist. The PSHM will prepare an amendment to the SSHP and submit the amendment for approval from USACE, as appropriate. The amendment will be added to the SSHP upon approval.

5.2 TASK-SPECIFIC LEVELS OF PPE

5.2.1 Special PPE Considerations

The following special considerations will be observed in the selection of PPE:

- Hard hats will be required when working around heavy equipment or when an overhead hazard exists.
- Steel toe/shank boots are not required during surface/subsurface location of UXO unless a serious toe hazard exists, whereupon footwear with a fiber safety toe will be required.
- Safety glasses will be selected that provide site personnel with the best protection from not only physical hazards, such as flying objects, but that also provide adequate splash protection where required. Safety glasses will be worn when a eye hazard exists i.e., in wooded areas, when using a chain saw or weed eater.
- The SSHO will continually evaluate site tasks to identify hazards and will provide necessary and appropriate PPE to ensure the safety and health of site personnel, regardless of the activity they perform.

5.2.2 Level D PPE

Level D PPE will be worn during the site activities which, includes the following:

- Work clothes (i.e., long pants and shirt) or cotton coveralls. Tyvek coveralls may also be worn if handling heavy metal-contaminated soil.
- Leather work boots (disposable over boots may also be worn if deemed necessary). Safety toe may be required when working in conjunction with heavy equipment.
- Safety glasses with side shields or goggles when eye hazards exist.
- Hard hat when working around heavy equipment or when overhead hazard exists.
- Hearing protection when high noise levels are present.
- Leather or canvas work gloves when a scrape or cut hazard exists and when operating hand tools.
- High visibility vest when working on or adjacent to public roads.
- Kevlar Chaps and face shield when using chainsaws or other brush-clearing equipment.
- Unless otherwise specified in the SSHP, Level D PPE is sufficient for all mobilization, site preparation, and demobilization activities at the Pinecastle Jeep Range.

5.3 PPE INSPECTION, MAINTENANCE, CLEANING, AND STORAGE

5.3.1 All PPE will be inspected prior to use to ensure that it is functional and that its structural integrity has not been compromised. Re-usable PPE (such as safety glasses and hard hats) will also be inspected after each use, prior to storage, and prior to maintenance. If site personnel find that a piece of PPE is defective, it will be reported to the SSHO and the defective article will be repaired or replaced.

5.3.1 Any PPE stored and designated as emergency rescue equipment will be inspected at least monthly to ensure that it has not been adversely affected by prolonged storage. Any equipment found to be defective will be replaced immediately. This inspection will be recorded in the appropriate log.

CHAPTER 6
MEDICAL SURVEILLANCE

Personnel engaged in hazardous waste operations will be enrolled in a medical monitoring program as required by 29 CFR 1910.120(f), A letter (signed by a physician) attesting to each individual's fitness for duty will be provided to the SSHO prior to beginning work and will be filed on site.

CHAPTER 7
MEDICAL SUPPORT

7.1 The medical support requirements necessary during activities at the Pinecastle Jeep Range are described in the following sections.

7.2 The primary hospital for activities at the Pinecastle Jeep Range is Florida Hospital – East Orlando. The address is:

7722 Lake Underhill Road
Orlando, FL 32806
Phone: (407) 303-8665 (**Call 911 in an emergency**)

7.3 A map showing the transportation route to the hospital is shown in Figures D1-7.1 and D1-7.2.

Figure D1-7.1
Transportation Route to Florida Hospital – East Orlando

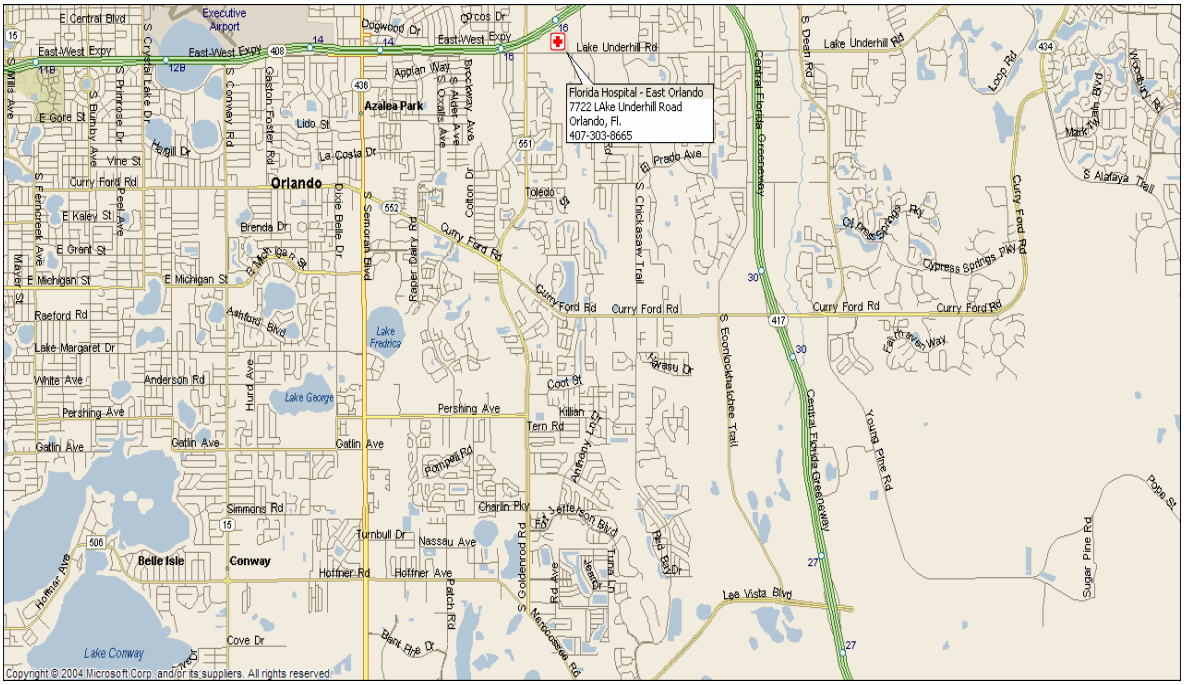
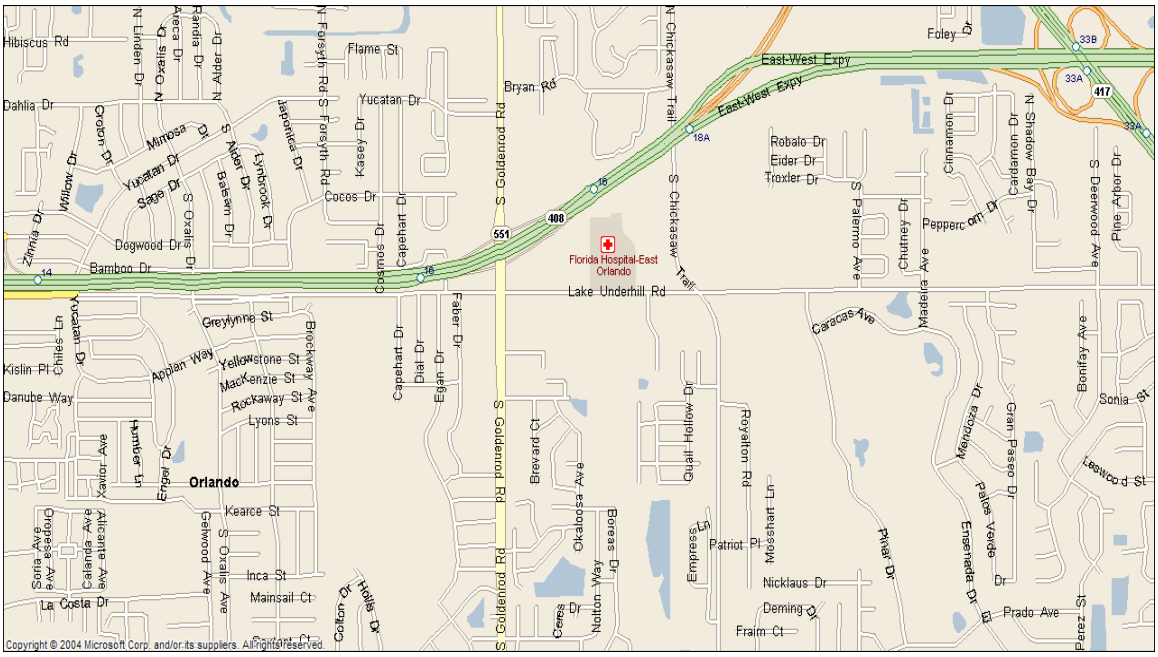


Figure D1-7.2
Close-up Map showing Florida Hospital – East Orlando



7.4 Physical Route Description from site to Hospital:

Instruction	**Distance**
Head west on Lee Vista Boulevard	
Turn right onto Narcoossee Road	2.2 miles
Turn right onto Goldenrod Road	4.4 miles
Turn right onto Lake Underhill Road	0.3 miles
Arrive at Florida Hospital – East Orlando on left	

7.5 During investigations at the Pinecastle Jeep Range, at least two personnel trained in First Aid and CPR will be on site at all times. In the event of a medical emergency, team members will render first aid, while additional medical assistance will be requested by calling 911. (see Table 1-16, list of emergency numbers)

CHAPTER 8
EXPOSURE AIR MONITORING AND AIR SAMPLING PROGRAM

No air monitoring is planned during the RI/FS at Pinecastle Jeep Range.

CHAPTER 9
HEAT AND COLD STRESS

9.1 HEAT STRESS

The potential for heat stress is high for this project because the work will be conducted mostly during the summer months in Florida, therefore, extra care must be taken to observe and respond to symptoms. Sweating does not cool the body unless the sweat is evaporated from the body. The use of some PPE can reduce 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. If semi-permeable and impermeable PPE is used at the site, heat stress is a MAJOR HAZARD.

9.1.1 Types of Heat Stress

Heat stress related problems include heat rash, fainting, heat cramps, heat exhaustion, and heat stroke. Heat rash occurs because sweat is not evaporating, making the skin wet most of the time. Standing erect and immobile allows blood to pool in the lower extremities. As a result, blood does not return to the heart to be pumped back to the brain and fainting may occur. Heat cramps are painful spasms of the muscles as a result of excessive salt loss from profuse sweating. Heat exhaustion occurs because of the large fluid and salt loss from profuse sweating. Heat stroke occurs when the body's temperature regulatory system has failed.

9.1.2 Early Symptoms of Heat Stress Related Problems

Personnel should recognize the early symptoms of heat stress. These symptoms include:

- Reduced performance,
- Lack of coordination,
- Lack of alertness,
- Unsteady walk,
- Excessive fatigue,
- Muscle cramps, or
- Dizziness.

9.1.3 Engineering Controls

WBGT monitoring will be performed by the SSHO when temperatures on site exceed 80°F.

9.1.4 Work/Rest Regimens

9.1.4.1 The management of risk for heat stress exposures centers around the principal of job-specific controls. Controls that will be implemented to reduce the potential for heat stress includes: use of acclimated personnel, providing adequate replacement fluids, educating individuals to recognize the early symptoms of heat stress, use of cooling vests, physiological monitoring, and development of a work/rest regimen that will prevent the onset of heat stress.

9.1.4.2 Work-rest regimens will be implemented in accordance with the limits specified in Table D1-9.1, for Level D and Modified Level D PPE.

9.1.4.3 Work schedules may be adjusted in accordance with physiological monitoring results.

9.1.4.4 If at the end of a work period the core body temperature for any team member exceeds 38°C (100.4°F), then the next lower work-rest regimen will be instituted.

9.1.4.5 If no team member's core body temperature exceeds 37.5°C (99.5°F), then the next higher work-rest regimen may be instituted.

9.1.4.6 A wet bulb globe temperature (WBGT) monitor may be used to monitor for conditions that pose a threat of heat stress. WBGT monitoring should be conducted by the SSHO/SUXOS when workers are dressed in Level D ensembles and the ambient temperature exceeds 75 °F. Once the WBGT has been determined, the SSHO/SUXOS can estimate workers' metabolic heat load using Table 1-9 to determine the appropriate work-rest regimen. As indicated above, modification to the work-rest schedule can be instituted by the SSHO/SUXOS based on physiological monitoring data.

9.1.4.7 Whenever a new team member begins work on site, that member's entire team will use the appropriate table for establishing the work-rest regimen until the new team member is acclimated.

9.1.4.8 Use of cooling vests by team members may also modify the work-rest regimen or the time of stay for continuous work. In this event, work-rest regimens will be modified as described in Paragraphs 9.1.4.3 through 9.1.4.6.

Table D1-9.1
Permissible Heat Exposure Threshold Limit Values [°C and (°F) WBGT]
when Level D PPE is Worn

Work-Rest Regimen	Workload		
	Light	**Moderate**	**Heavy**
Continuous work	29.5 (85.1)	27.5 (82)	26 (77)
75% Work 25% Rest, each hour	30.5 (87)	28.5 (82)	27.5 (78)
50% Work 50% Rest, each hour	31.5 (89)	29.5 (85)	28.5 (82)
25% Work 75% Rest, each hour	32.5 (90)	31 (88)	30.0 (86)

Work-Rest Regimen	Workload		
	Light	**Moderate**	**Heavy**

NOTE: The workload category may be established by ranking each job into light, medium, or heavy categories on the basis of type of operation:

Light: (up to 200 kcal/hr or 800 Btu/hr): e.g., sitting or standing to control machines, performing light hand or arm work.

Moderate: (200-350 kcal/hr or 800-1400 Btu/hr): e.g., walking about with moderate lifting and pushing.

Heavy: (350-500 kcal/hr or 1400-2000 Btu/hr): e.g., pick and shovel work.

9.1.5 Prevention of Heat Stress

Proper training and preventive measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illnesses. To avoid heat stress, the following steps should be taken:

- Adjust work schedules.
    - Modify work/rest regimens as described above.
    - Mandate work slowdowns as needed.
- Perform work during cooler hours of the day, if possible.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Ensure workers are acclimated to weather conditions and have extensive experience in the selected level of PPE. Workers can be acclimatized by gradually increasing the workload over a period of days.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluids intake must approximately equal the amount of water lost in sweat, e.g. 8 fluid ounces (0.23 liters) of water must be ingested for approximately every 8 ounces (0.23 kg) of weight loss. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
    - Maintain water temperature at 50° to 60°F (10° to 16.6°C).
    - Provide small disposable cups that hold about 4 ounces (0.1 liter).
    - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or diluted drinks) before beginning work.
    - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- Train workers to recognize the symptoms of heat-related illnesses.

- Rotate personnel and alternate job functions.

9.2 COLD-RELATED ILLNESS

9.2.1 General

9.2.1.1 Exposure to low temperatures presents a risk to employee safety and health both through the direct effect of the low temperature on the body and collateral effects such as slipping on ice, decreased dexterity, and reduced dependability of equipment. Work conducted in the winter months can become a hazard for field personnel as a result of cold exposure. All personnel must exercise increased care when working in cold environments to prevent accidents that may result from the cold. The effects of cold exposure include frostbite and hypothermia. Wind increases the impact of cold on a person's body. Systemic cold exposure is referred to as hypothermia. Local 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.

9.2.1.2 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 (Table D1.9.2). This accounts for the progressive signs and symptoms ranging from sluggishness and slurred speech to disorientation and eventually unconsciousness.

Table D1-9.2
Progressive Clinical Symptoms of Hypothermia

Core Temperature	Clinical Signs
95°F	Maximum shivering
87°F - 89°F	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated
84°F - 86°F	Progressive loss of consciousness; muscular rigidity; respiratory rate decreases
79°F	Victim rarely conscious
70°F - 72°F	Maximum risk of ventricular fibrillation

9.2.1.3 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 that 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.
- **Deep frostbite** - Tissue damage deeper than the skin, at times, down to the bone. The skin is cold, numb and hard.

9.2.2 Preventing Cold Exposure

In preventing cold stress, the SSHO must consider factors relating to both the worker and the environment. Training, medical screening, establishment of administrative controls, selecting proper work clothing, and wind-chill monitoring all contribute to the prevention of hypothermia and frostbite.

- **Training** - Recognizing the early signs and symptoms of cold stress can help prevent serious injury. Therefore, workers will be trained to recognize the symptoms of hypothermia and frostbite and have appropriate first-aid instruction. When the air temperature is below 50°F, the SSHO will inform workers of the proper clothing requirements and any work practices that are in effect to reduce cold exposure.
- **Administrative Controls** - The SSHO will establish a work/rest schedule based upon worker monitoring. At the first sign of uncontrollable shivering the worker will be rested in a heated shelter. Work will stop when the air temperature reaches 0°F.
- **Clothing** - Workers will be encouraged to layer clothing when air temperature is below 50°F. Clothing that has a high insulation value will be worn under protective garments. Insulated gloves will be worn when the wind chill index is below 32°F.

CHAPTER 10
STANDARD OPERATING PROCEDURES AND WORK PRACTICES

10.1 GENERAL SAFETY

Field personnel must be able to recognize and understand potential hazards associated with the operations they will be performing. Personnel active in site operations must be thoroughly familiar with the programs, practices, and procedures outlined in this SSHP. The following are considered standard safe work practices:

- Eating, drinking, chewing tobacco, smoking, and carrying matches or lighters are prohibited in a contaminated or potentially contaminated area, or where the possibility for contamination transfer exists.
- Wearing cosmetics and/or contact lenses is not authorized within the EZ.
- Contact with potentially contaminated substances or materials will be avoided. Walking through puddles, pools, mud, or handling soils without protective gloves, etc., will be prohibited. Whenever possible, kneeling on the ground, leaning or sitting on equipment or the ground will be avoided. Monitoring equipment will not be placed on potentially contaminated surfaces (e.g., ground, etc.).
- All field crew members will be alert to all potentially dangerous situations (e.g., the presence of strong, irritating, unusual, or nauseating odors).
- Field crew members will be familiar with the physical characteristics of the site during intrusive investigations, including:
    - Wind direction in relation to nearby buildings.
    - Accessibility to associates, equipment, vehicles, and communication.
    - The EZ location and boundaries.
    - Site access.
    - Nearest water sources.
- Site workers will use PPE as specified in this SSHP during the initial site reconnaissance and follow-on geophysical activities.
- Use of heavy equipment on site (e.g., trucks and bobcats) may be hazardous to site workers. All field crew members will stay clear while heavy equipment is being operated.
- Wearing PPE may result in the impaired ability to operate site equipment. All field crew members will pay specific attention to decreased performance capabilities resulting from wearing PPE, such as poor tactile skills when wearing certain types of gloves. Prior knowledge of limitations imposed by the use of such equipment will allow the worker to assess the decrease in his or her capability to perform field operations safely.

- Wearing jewelry, such as rings and loose bracelets and necklaces, will be prohibited in order to avoid their entanglement in site machinery.
- Overhead power lines, downed electrical wires, and buried cables may pose a danger of shock or electrocution in the event workers contact or sever them during site operations.
- Buddy system procedures will be enforced during site operations.
- Site personnel will perform only those tasks that they are qualified to perform.
- Site visitors will be escorted by qualified personnel at all times.
- Running and horseplay will be prohibited in all areas of the site.
- The number of personnel in the EZ will be the minimum number necessary to perform work tasks in a safe and efficient manner.

10.2 ORDNANCE SAFETY

The following measures will be observed by personnel working in areas suspected to contain suspect MEC/UXO:

- UXO will be avoided, and will not be touched, handled, or moved under any circumstances except by UXO Technicians when applicable.
- UXO that have been exposed to fire and detonation will be considered as extremely hazardous.
- Outer or undergarments made of wool, silk, or synthetic textiles such as rayon and nylon will not be worn while working in a UXO-contaminated environment. These materials can generate a sufficient static charge to ignite fuels or initiate explosives. Any UXO technician needing to touch a UXO item will ground themselves prior to touching it.
- Any practice munitions will be assumed to contain a live charge until it can be determined otherwise.
- Unnecessary personnel will not be present in the vicinity of UXO. Personnel exposure time will be limited. Operations will always be based upon minimum exposure consistent with efficient operations.
- Inhalation of and skin contact with smoke, fumes, and vapors associated with any explosives, smoke, or other associated materials will be avoided.
- Color-coding of MEC will not be relied on for positive identification of contents. Munitions having no, incomplete, or improper color-coding have been encountered.

10.3 ENGINEERING CONTROLS

10.3.1 Intrusive investigations will be performed by evacuating residents and/or by performing work using engineering controls. Engineering controls consist of a structure that is designed to reduce the fragmentation distance of the MEC items being investigated.

10.3.2 While the engineering controls are functioning as designed, the boundary of the exclusion zone, (EZ) for the investigation will be entered only by UXO personnel..

CHAPTER 11
PUBLIC SAFETY AND SITE CONTROL

11.1 INTRODUCTION

The measures used to ensure safety of the public during activities at the Former Pinecastle Jeep Range depend upon whether intrusive operations or other activities are being conducted. The following sections describe the details of these requirements and procedures.

11.2 PUBLIC SAFETY

11.2.1 General

This activities conducted at Former Pinecastle Jeep Range consist of general construction-type activities. The public (in particular, residents) will be kept out of the immediate work area by evacuating them to an off-site location consistent with the EP. In the event that unauthorized personnel (e.g., homeowners, utility workers, vagrants) inadvertently enter the construction site, work will be stopped immediately. Work will not begin again until the unauthorized persons is outside the EZ.

11.2.2 Dust Control

Dust mitigation measures (e.g., wetting down) will be implemented any time that site activities result in a visible dust cloud.

11.2.3 Establishment of Exclusion Zones (EZ)

11.2.3.1 Approach

11.2.3.1.1 The Exclusion Zone (EZ) is an area used to protect the public and non-essential personnel from inadvertent detonations. The EZs used at the Former Pinecastle Jeep Range will be based on the Munition with the Greatest Fragmentation Distance (MGFD) for each area of the site. The primary protective distance is the the Minimum Separation Distance (MSD), which is based on the MGFD. The principle of operation is that the EZ is determined by the largest applicable protective distance. The largest applicable distance in each direction will be computed based on the use of or non-use of engineering controls (MOFB, open-air).

11.2.3.1.2 For situations where the MSD must be reduced an MOFB can be used. In this case, the MSD on three sides is reduced and for the open side the distance is equal to the full fragmentation distance. On the open side, the distance covers a 90-degree arc. Details on the MGFD and MSD for each area of the site are provided in the Explosives Siting Plan (ESP), which is prepared as a separate document from the work plan.

11.2.3.2 Evacuation

If any non-essential personnel are located within the EZ and additional engineering controls cannot mitigate the potential blast effects, evacuations will be conducted. The evacuation will be

implemented in accordance with the procedures outlined in the Evacuation Plan (Appendix K of the Work Plan).

11.2.3.3 Site Access

If disposal of suspected UXO cannot be completed within a single day, the area will be secured and guarded 24 hours per day to prevent unauthorized access until the excavation is completed.

CHAPTER 12
SITE CONTROL MEASURES

12.1 WORK ZONES

12.1.1 The purpose of establishing work zones and maintaining site control is to minimize potential contamination of workers, protect the public, and prevent unauthorized entry to work areas. Site control involves the physical arrangement of, and controlling access into, established work zones. Additionally, PPE requirements are specified for each work zone. At the Former Pinecastle Jeep Range, work zones will be established for all activities involving intrusive operations.

12.1.2 Zones will be delineated to aid in controlling the flow of personnel and equipment. The establishment of these work zones will help to ensure that personnel are properly protected against the potential hazards present where they are working, that work activities and contamination are confined to the immediate area, and that personnel can be located and evacuated in an emergency.

12.1.3 The general work zones designated for the Former Pinecastle Jeep Range are the EZ, and the SZ and are described in greater detail below. The actual boundaries of the work zones for each STEP will be specified in each the WP.

12.2 EXCLUSION ZONE

12.2.1 The EZ is the work area where intrusive activities take place and where contamination does or could occur. The EZ boundary will be physically marked by tape or temporary barriers, when engineering controls are used, or otherwise well defined by physical and geographic boundaries. All site personnel will be properly trained in controlling and minimizing access to the EZ.

12.2.2 Should an unauthorized person enter the EZ, work will be stopped and the unauthorized person will be escorted out of the EZ. Following any unauthorized entry of the EZ, the event will be recorded in the field logbook and site control measures will be reevaluated immediately with regard to preventing future unauthorized intrusions.

12.3 CONTAMINATION REDUCTION ZONE

The CRZ is the transition area between the EZ and the SZ. Since no contamination is expected at the site, the CRZ is not applicable. This zone typically provides an area to prevent or reduce the transfer of hazardous materials that may have contaminated personnel or equipment leaving the EZ.

12.4 SUPPORT ZONE

12.4.1 The SZ is considered to be a clean area and will be located at sufficient distance from intrusive activities to ensure the safety of SZ personnel.

12.4.2 The SZ contains the command post (field office trailer) and other support supplies. Level D PPE is the appropriate apparel within this zone. In the event that site activities are being conducted during cold weather, safety equipment susceptible to freezing (such as eye wash and decontamination solutions) will be stored in a heated space.

CHAPTER 13
PERSONAL HYGIENE AND DECONTAMINATION

13.1 INTRODUCTION

General sanitation requirements are applicable to work at Former Pinecastle Jeep Range. The following sections describe the details of these requirements and procedures.

13.2 GENERAL SANITATION

13.2.1 The sanitation provisions specified in Section 2 of EM 385-1-1 will be established and maintained on site as outlined in the following paragraphs.

13.2.2 Eating, drinking, smoking, chewing, and application of cosmetics will be restricted to the SZ.

13.2.1 Drinking Water

Cool, potable drinking water will be provided in sanitary, portable containers at all sites. Where necessary, disposable cups will also be provided and used to drink from the drinking water containers.

13.2.2 Toilets

At a minimum, two Portable toilets will be available.

13.2.3 Hand-Washing Facilities

Hand-washing facilities or cleaning wipes will be provided in the portable toilet facilities and cleaning wipes will be provided in the crew break area. Field team personnel will wash their hands prior to eating or drinking, and prior to leaving a site.

13.2.4 Designated Smoking Areas

13.2.4.1 Smoking will only be permitted in specific areas designated by the SSHO.

13.2.4.2 No personnel decontamination is expected at the Former Pinecastle Jeep Range.

CHAPTER 14
EQUIPMENT DECONTAMINATION

Dedicated sampling equipment will be the only equipment/tools used during the RI/FS. Therefore equipment decontamination is not anticipated. Gloves used in sampling will be disposed of in a garbage bag for site trash pickup. If contamination is detected (*i.e.*, visual evidence or known contact with potentially contaminated liquids, soil, or sediment) PPE will be bagged separately from regular garbage.

CHAPTER 15
EMERGENCY EQUIPMENT AND FIRST AID

15.1 FIREFIGHTING EQUIPMENT

Fire extinguishers will be maintained onsite by the SSHO/SUXOS in accordance with EM 385-1-1. Fire extinguishers will also be placed in each work vehicle.

15.2 FIRST AID EQUIPMENT

A minimum of one first aid kit will be maintained on site by the SSHO. First aid kits used at the site will meet the requirements for Type III, 16-unit kits as described in EM 385-1-1, Paragraph 03.B. First aid kits will be easily accessible to all site workers, protected from the weather, and stored in a manner that keeps the contained items sterile. The location(s) of first aid kits will be clearly marked.

15.3 OTHER EMERGENCY EQUIPMENT

A minimum of one portable emergency eyewash system will be maintained on site by the SSHO. Emergency eyewash systems used at the site will meet ANSI requirements. Emergency eyewash systems kept on site will be easily accessible to all site workers.

CHAPTER 16
EMERGENCY RESPONSE AND CONTINGENCY PLAN

16.1 INTRODUCTION

The purpose of this Emergency Response and Contingency Plan (ERCP) is to define procedures to protect human health and the environment both on and off site in the event of an accident or emergency during the intrusive activities at the Former Pinecastle Jeep Range.

16.2 EMERGENCY RESPONSE PROCEDURES

16.2.1 Emergency response procedures are provided in Section 6 of the SOP document and an Emergency Contact List is provided below as Table D1-16.1. The Florida Hospital will be the designated hospital for possible injuries during this project. A map of the hospital route with corresponding text directions is provided on in Chapter 7 – Medical Support.

16.2.2 This ERCP complies with 29 CFR 1910.120(1) and includes the following elements:

- Pre-emergency planning.
- Personnel roles, lines of authority, training, and communications.
- Posted instructions and emergency contact list.
- Emergency recognition and prevention.
- Description of the site topography, layout, and prevailing weather conditions.
- Criteria and procedures for site evacuation.
- Procedures for decontamination and medical treatment.
- Evacuation routes and procedures.
- Emergency alerting and response procedure.
- Critique of emergency responses and follow-up.
- PPE and emergency equipment.

16.2.3 This ERCP meets the guidelines given in "Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties," Appendix B, Contingency Plan (EPA, 1990).

Table D1-16.1
Emergency Contacts

These contacts and maps should be available to all personnel at the site. Should any situation or unplanned occurrence require outside assistance or support services, the appropriate contact from the following list should be made:

Agency/Contact	Activity	Telephone Number
Police		**911**
Fire Dept		**911**
Ambulance		**911**
Hospital for Trauma/Chemical	Florida Hospital, Orlando	407-303-8665
National Response Center		800-424-8802
Poison Control Center		800-288-9999

Responsible Person	Telephone Numbers	
	Work	**Other**
SSHO/UXOQC – Ken Cargel	407-282-3577 (site office)	321-258-7554 (cell)
Parsons Project Safety and Health Manager - Ed Grunwald, C.I.H.	678-969-2394	678-429-6887 (cell)
CESAJ Project Manager – Wandell Carlton	904-232-1804	
CESAJ Contractor – Robert Bridgers	904-232-1107	
USAESCH Project Manager – Betina Johnson	256-895-1238	256-426-5838 (cell)
Parsons Project Manager – John Chulick	678-969-2409	770-294-4393 (cell)
Parsons Site Manager – Al Ebner	407-282-3577 (site office)	940-372-0158 (cell)

16.1.1 Emergency Identification

It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms, such as exposure to chemical agents of various types, illnesses or injuries, chemical exposure, fires, compressed gas leaks, or sudden changes in the weather. The remaining sections of the ERCP outline general emergency and contingency planning procedures to be followed at the Former Pinecastle Jeep Range. Emergency information and instructions will be posted as appropriate.

16.2.1 Emergency Information Documentation

16.2.1.1 The following forms, provided in Appendix F of the WP, will be completed by all team members to ensure that they have been instructed in the execution of emergency procedures:

- Plan Acceptance Form (acknowledging receipt and review of this APP/SSHP).
- Daily Tailgate Meeting Sign-off (tailgate meetings are conducted by the SSHO for all site personnel).

16.2.1.2 The SSHO will maintain the completed forms on site.

16.3 PRE-EMERGENCY PLANNING

16.3.1 Situations requiring emergency response can be minimized by planning and approaching the circumstances in a calm, deliberate manner. The EP, provided in Appendix I outlines whom and what means will be used to alert the local community if they are in jeopardy.

16.3.2 As conditions dictate, the USAESCH Safety Specialist or the SSHO will be the on-site emergency coordinator in case of an accident or incident requiring emergency response. All personnel will be briefed at the morning tailgate safety meetings of the location of the cellular telephones and who has on-site radio communications. This information will also be included in all visitor briefings and in briefings to residents, if the work is occurring at a residential property.

16.3.3 A warning system using a series of three (3) long blasts on portable air horns and/or vehicle horns will notify site personnel that an accident or incident has occurred and evacuation is required. Another type of warning signal may be used for emergency notification if deemed appropriate. Upon hearing the site evacuation warning, all personnel will immediately clear the site and respond to the rally point. A rally point will be identified for each site-specific investigation. The rally point will be revised based upon prevailing weather conditions and will be identified by the SSHO at the morning tailgate safety briefing. At the rally point, all personnel will be accounted for and interviewed to ensure no one has sustained injuries as a result of the accident or incident.

16.3.4 If an emergency response rescue operation is required, no personnel will re-enter the area until the situation has been assessed and it has been determined that resources are on hand to handle the rescue without jeopardizing additional personnel.

16.4 PERSONNEL ROLES, LINES OF AUTHORITY, AND TRAINING

16.4.1 This section describes the various roles, responsibilities, and communication procedures that will be followed by personnel working on this project in the event of an emergency.

16.4.2 In the event of an emergency on site, the primary on-site Emergency Coordinator will be the Parsons SSHO or his designee. The on-site Emergency Coordinator will determine the nature of the emergency and take appropriate action.

16.4.3 Prior to all field activities, the Parsons SSHO will plan emergency egress routes and discuss them with all personnel who will be conducting fieldwork. Initial planning includes activities such as establishing and testing emergency warning signals and evacuation routes to prevent delays in the event of an emergency.

16.4.4 Training requirements for site personnel, including site-specific training are discussed in Chapter 4 of this SSHP.

16.5 EMERGENCY CONTACT LIST

Emergency telephone numbers for the closest hospitals capable of providing emergency service, the Poison Control Center, local police and fire departments, and key safety and management personnel from USAESCH and Parsons are included in Table D1.16.1 and listed in Appendix C of the WP, for the site, and will also be posted in conspicuous locations on site. The SSHO will be responsible for contacting the listed emergency contacts.

16.6 SITE TOPOGRAPHY, LAYOUT, AND PREVAILING WEATHER CONDITIONS

A description of the Pinecastle Jeep Range including topography, geology, and climate is contained in Chapter 1 of the WP.

16.7 EMERGENCY RESPONSE PREPAREDNESS

The following emergency response preparedness steps will be taken prior to any intrusive investigation activities:

- Personnel will have the proper PPE and will be trained in its correct use.
- The “buddy system” will be enforced. No one will be permitted to enter the EZ alone. Personnel within the EZ will remain in contact with each other at all times.

16.8 MEDICAL EMERGENCIES

16.8.1 Treatment of Minor Injuries

16.8.1.1 For minor injuries at lower probability sites, the on site first aid/CPR trained personnel will provide the initial first aid response. If additional/advanced attention is required, an ambulance will be called using 911 or the injured person will be transported by any available site personnel to the Florida Hospital in Orlando.

16.8.1.2 For serious injuries, the first aid/CPR-trained personnel will initiate appropriate emergency first-aid and emergency medical assistance will be summoned using 911.

16.8.2 Off Site Accidents

Accidents or incidents occurring off site will be reported to the local authorities. In the event of a transportation accident or incident, personnel will take immediate action to secure the area. Immediate notification of the local authorities will be initiated.

16.8.3 Accident Reporting Requirements

Accident reporting requirements are described in Chapter 8 of the APP to which this SSHP is attached.

16.9 EMERGENCY EVACUATION PLAN

16.9.1 General Evacuation Plan

16.9.1.1 In the case of an operational shutdown as a result of severe weather conditions, or if other hazards exist on-site, the Emergency Coordinator or Site Manager will sound the alarm (three blasts each of five second duration on an air horn or other signal as specified in the SSWP). All personnel in the work area will secure their equipment and proceed to the off-site assembly point, located a safe distance (designated at morning safety meeting) at an upwind location from the site. The Emergency Coordinator or designated alternate will obtain the site entry/exit logs to ensure that all personnel have been safely evacuated. The Site Manager will coordinate with the Emergency Coordinator to determine when it is safe to re-enter the site and resume work.

16.9.1.2 In the general case of a large fire or explosion, a site evacuation will be ordered and the following steps implemented:

- The alarm will be sounded (three blasts each of a five-second duration on an air horn, appropriate emergency response agencies will be notified, and USAESCH and Parsons project management personnel will be advised of the situation.
- All personnel will assemble in an upwind area when the situation permits, and a head count will be taken.
- The extent of the problem will be determined before additional actions are taken.

16.9.2 Evacuation Signals and Routes

16.9.2.1 Two-way radio communication, direct voice communication, or an air-horn (three blasts - each of five seconds duration) will be used to notify employees of the necessity to evacuate an area involved in a release/spill of a hazardous material. Each work location will have a two-way radio. A two-way radio will be kept in the Emergency Coordinator's work location to monitor for emergencies. Total site evacuation will be initiated only by the Emergency Coordinator. However, in their absence, the decision to preserve the health and safety of employees and the public will take precedence.

16.9.2.2 Evacuation routes will be discussed and described during the daily tailgate safety meeting. Periodic drills (before each new phase of work) will be conducted to familiarize each employee with the proper routes and procedures.

16.9.3 Evacuation Procedures

In the event that evacuation is necessary, the following actions will be taken:

- The alarm will be activated.
- No further entry of visitors, contractors, or trucks will be permitted to the site. Vehicle and equipment traffic within the site will cease in order to allow the safe exit of personnel and movement of emergency equipment.
- All machinery and equipment will be shut off as long as it is safe to do so.
- All on-site personnel, visitors, and contractors in the Support Zone will assemble at the office trailer, or other designated area, for a head count and wait for further instructions from the Emergency Coordinator.
- Upon completion of the head count, the senior person will provide the information to the Emergency Coordinator.
- Visitors will also be accounted for.
- A final tally of persons will be made by the Emergency Coordinator or his designee. No attempt will be made to find persons not accounted for if the rescue attempt involves endangering the lives of employees.
- Personnel will be assigned by the Emergency Coordinator to be available at a specific coordination point to direct and brief emergency responders.
- Re-entry into the site will be made only after clearance has been given by the Emergency Coordinator. At his direction, a signal or other notification will be given for re-entry into the site.
- Drills will be held at the beginning of intrusive fieldwork and at intervals as deemed necessary during the intrusive work. Drills will be treated with the same seriousness as an actual emergency. However, the drills will be held in a manner that does not disturb or alarm the residents or the public.

16.10 FIRE FIGHTING PLAN

16.10.1 Immediate Action

16.10.1.1 Upon detecting a fire/explosion, employees will determine whether the fire is small enough to readily extinguish with immediately available portable extinguishers or water, or if other fire-fighting methods are necessary. Non-essential personnel will be directed away from the area of the fire. If it is judged that a fire is small enough to fight with available extinguishing media, employees will attempt to extinguish the fire provided that:

- They are able to approach the fire from the upwind side, or opposite to the direction of the fire's progress.
- The correct extinguisher is readily available. (Type ABC fire extinguishers will be provided in work areas and on vehicles.)
- No known complicating factors are present, such as the likelihood of rapid spread, imminent risk of explosion, or gross contamination.

16.10.1.2 Personnel leaving a fire/explosion area will account for all employees in that work area as soon as possible. The SSHO or designee will perform a head count for that work area.

16.10.2 Notification

The SSHO will be notified as soon as possible of the location, size, and nature of the fire/explosion. As conditions dictate, the SSHO will declare an emergency, initiate the remedial

procedures, request assistance from the local Fire Department by dialing 911, and make the necessary telephone notifications to the USAESCH Safety Specialist, and Parsons PM. Outside personnel responding to the fire/explosion may seek assistance from the SSHO with regard to the routing of equipment within the incident site to the most favorable and safe position while minimizing and/or avoiding exposure to any site contaminants.

16.10.3 Rescue

If employee(s) are unable to evacuate themselves from a fire/explosion area for any reason, their rescue will be the first priority of responders. The SSHO will determine whether on-site resources are sufficient to proceed or if rescue must be delayed until the Fire Department responders arrive.

16.11 SPILL PLAN

The only hazardous materials that would be present at Former Pinecastle Jeep Range during the field work that might present a spill threat are fuels. In the event of a spill of one of these materials, the following actions will be taken:

- The SSHO and Site Manager will be notified immediately.
- The leak/spill will be stopped using spill kit located at command post, if this can be accomplished without endangering personnel.
- The spill will be contained, if this can be accomplished without endangering personnel
- The SSHO will sound the alarm to the rally point.
- All nearby drains will be covered/protected.

16.12 EC CONTINGENCY PLAN

16.12.1 Introduction

This contingency plan defines the procedures that will be followed in the event that potential MEC items are encountered during intrusive activities in order to ensure the safety and the protection of the public and workers, and to ensure the proper disposal of discovered MEC items.

16.12.2 Initial Reconnaissance

If a suspect MEC item is encountered, the excavation team will perform an initial reconnaissance. If an item is suspected to be MEC, the UXO team will assess the suspect MEC using their SOPs.

16.12.3 MEC Assessment

16.12.3.1 If the item is a potential MEC item, qualified UXO technicians will perform the assessment. An X-Ray equipment will be used to confirm if the item is MEC.

NOTE: IN THE EVENT THAT A MEC ITEM RECOVERED DURING AN INVESTIGATION IS DETERMINED TO BE INCONSISTENT WITH THE MGFD STATED IN THE WP, WORK WILL CEASE AND THE SITE-SPECIFIC MGFD WILL BE REEVALUATED. IF THE MGFD IS REVISED TO A GREATER HAZARD, THE RELATED MSD WILL BE RECALCULATED AND THE NEW MSD WILL BE IN EFFECT FOR THE

REMAINDER OF THE INVESTIGATION. THE REVISED MGFD AND MSD WILL BE APPROVED BY USAESCH PRIOR TO IMPLEMENTATION. AN AMENDMENT TO THE ESS WILL BE PREPARED AND SUBMITTED FOR APPROVAL.

16.12.3.2 If the item is confirmed to pose an explosive hazard, the following steps will be taken:

- The SSHO, USAESCH Safety Specialist, and Site Manager will be notified immediately. .
- If the item is fuzed and fired/armed, necessary arrangement will be made for its disposal.
- Work will stop and appropriate safety precautions, in conjunction with engineering controls, will be selected. These measures will be applied only after review and approval by the on-site USAESCH Safety Specialist.
- The area will be secured until disposal of the item is performed.

CHAPTER 17
EMERGENCY RESPONSE TEAM

17.1 SITE SAFETY AND HEALTH OFFICER

The SSHO has overall responsibility during emergencies. In case of emergency, the SSHO will implement the site emergency response procedures and is specifically responsible for the following:

- Designating the members of the Emergency Response Team.
- Implementing the site ERCP, including ordering site evacuations, coordinating fire fighting efforts, and directing spill control and cleanup.
- Supervising site evacuation and decontamination procedures.
- Contacting emergency services such as the fire department, ambulance and security services, as may be required as requested by the Emergency Response Team.

    1. Assisting in providing first aid services and medical support or evacuation for injured personnel.

    2. Determining the cause of the incident and ways to prevent future occurrences.

    3. Preparing a written incident report for submission to the CESAJ and USAESCH Project Managers.

17.2 ALL ONSITE PERSONNEL

Onsite personnel are responsible for reporting emergencies immediately to their supervisors, alerting other employees, helping injured personnel, and assisting as directed to mitigate the incident.

17.3 EMERGENCY TRAINING

Prior to initiating intrusive operations, Team Training will occur under the direction of the SSHO/SUXOS and PSHO. This will include the following:

- Hazard communication;
- Emergency procedures.

CHAPTER 18
CONFINED SPACE ENTRY

18.1 BACKGROUND

Hundreds of fatal accidents occur each year in "confined spaces." The causes of these fatalities include lack of knowledge, improper procedures, and inappropriate equipment for entry and work in confined spaces. The greatest dangers posed by confined spaces are atmospheric hazards and the leading cause of confined space fatalities is asphyxiation.

18.2 CLASSIFICATION OF CONFINED SPACES

Confined spaces are classified based upon existing or potential hazards. The two classifications of confined spaces are "non-permit confined space" and "permit-required confined space." Neither of these confined spaces conditions are expected at the Former Pinecastle Jeep Range.

CHAPTER 19
LOGS, REPORTS, AND RECORDKEEPING

19.1 LOGBOOK

The SSHO will keep a log recording all of the following aspects related to safety at the site. This information will be maintained in a logbook or personal digital assistant. The log will include at a minimum, but not be limited to:

- Date and recorder of log;
- Training (kickoff training, site-specific training, and other gatherings);
- Issues or problems encountered;
- Tailgate safety briefings (time conducted and by whom);
- Significant site events relating to safety;
- Accidents, incidents, and near misses;
- Stop work events resulting from reasons of safety; and
- Safety audits.

19.2 WEEKLY REPORTS

The SSHO will prepare a report each week that is forwarded to the PSHM and USAESCH. This report will describe and summarize the following for the completed week:

- Activities performed and personnel on-site.
- Level of PPE used for site activities.
- Air monitoring results for industrial chemicals.
- Training provided (including topics and number of personnel attending).
- On-site visitors.
- Incidents involving safety or health concerns or questions.
- Problems needing resolution.
- Activities planned for the following week.

19.3 RECORDKEEPING

The SSHO will establish and maintain a filing system onsite for health and safety records, reports, and other related information such as individual training, medical surveillance, etc. Folders in the health and safety filing system will include:

- Personnel Records: certificates for training (or copies) required by 29 CFR 1910.120, medical examination summary letters or certifications, signed APP/SSHP acceptance forms, monitoring results, etc.

- Air Monitoring Records: calibration details, equipment maintenance, monitoring results, etc.
- Training Records: sign-in sheets for onsite training with topics and dates.
- Visitor Logs: sign-in sheets for site visitors.
- Inspection Reports: reports of daily inspections by the SSHO and others concerning health and safety issues. Copies of reports of periodic safety-related inspections and/or audits by the PSHM, Quality Control Officer, and others.
- Accident Prevention: copies of all hazard analyses performed on new tasks or activities, copies of any accident/incident reports and follow-up reports, and any other pertinent correspondence.
- PPE Records: records of periodic inspection, testing, and maintenance performed on PPE.
- Weekly Reports: Copies of weekly safety reports (Section 19.2) forwarded to USAESCH.

ATTACHMENT 2
ACTIVITY HAZARD ANALYSES

ACTIVITY HAZARD ANALYSIS

Activity: PROJECT MOBILIZATION / DEMOBILIZATION

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
Install / Dismantle trailers / tents / Equipment	Slips, trips, and falls	Worker awareness of potential slippery surfaces and tripping hazards plus inspection and policing of debris.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the SSHP. Be alert when working around heavy equipment. Use ground guide when backing vehicles and heavy equipment.
	Excessive Noise	Hearing protection will be used in hazardous noise areas, such as when any member of the team cannot hear another in normal conversation voice levels, within a distance of 3 feet.
	Injury incurred while using hand tools	The tool users will inspect the tools that they will use. No damaged equipment will be used until repaired or replaced.
	Back injury	Proper lifting techniques will be reviewed by SSHO at morning toolbox meetings
Install/Remove electrical lines and connections.	Slips, trips, and falls	Worker awareness of potential slippery surfaces and tripping hazards plus inspection and policing of debris.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the SSHP. Be alert when working around heavy equipment. Use ground guide when backing vehicles and heavy equipment.
	Excessive Noise	Hearing protection will be used in hazardous noise areas, such as when any member of the team cannot hear another in normal conversation voice levels, within a distance of 3 feet.
	Injury incurred while using hand tools	Workers will inspect tools prior to use. No damaged equipment will be used until repaired or replaced.
	Electrical hazards	No frayed electrical cords will be permitted on site. GFCI devices will be used on all outdoor circuits. Only certified electricians will be allowed to work on shore powered electrical connections and will follow the guidelines set in Chapter 13, Cp Pendleton Base Requirements. Proper lock-out/tag-out procedures will be used when repairing or installing electrical equipment.
Restore site.	Slips, trips, and falls	Worker awareness of potential slippery surfaces and tripping hazards plus inspection and policing of debris.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program.

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
	Biological hazards	Site personnel have received blood-borne pathogen training during site-specific training. Workers will avoid hazardous plants, snakes, and insects.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the SSHP. Be alert when working around heavy equipment. Use ground guide when backing vehicles and heavy equipment.
	Excessive Noise	Hearing protection will be used in hazardous noise areas, such as when any member of the team cannot hear another in normal conversation voice levels, within a distance of 3 feet.
	Injury incurred while using hand tools	Workers will inspect tools prior to use. No damaged equipment will be used until repaired or replaced.
	Back injury	Proper lifting techniques.

Equipment to be used: Common hand tools, vehicles, and forklift.

Inspection Requirements: All equipment will be inspected by workers prior to use. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired or replaced. Cranes will be inspected as per 385-1-1 Appendix H

Training Requirements: When applicable, personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). CAIS, CWM, HTW, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating. The forklift operator must be certified as having been trained and evaluated in accordance with 29 CFR 1910.178. Crane operator will be qualified as required by 385-1-1, Section 16. SSHO will provide a review of proper lifting techniques.

Approver Signature: _____ Date:5/30/2008
Ed Grunwald, Project Safety and Health Officer

ACTIVITY HAZARD ANALYSIS

Activity: DIGITAL GEOPHYSICAL MAPPING

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
Pre-set Up of equipment/ Collect data at GAO Prove Out Grid.	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the SSHP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide.
	Back injury	Proper lifting techniques.
Gather geophysical data on subsurface anomalies by carrying instruments across the site.	Contact with potential hazardous, toxic chemicals	All personnel will don the proper PPE commensurate with the potential hazard. HTW and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing.
	MEC/UXO (Unintentional Detonation)	All Geophysical personnel will be provided an UXO Escort, who will perform UXO Avoidance for the crew. UXO awareness training provided by SSHO. Personnel within the EZ will observe EP-3851-95a, Basic Safety Concepts and Consideration for OE, dtd June 01. Only UXO technicians will handle OE/UXO/Demolition material. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. UXO Escort or SSHO will stop all operation when **non-essential** personnel are in the EZ.
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the SSHP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide.
	Back injury	Proper lifting techniques.

Equipment to be used: Geophysical instruments.

Inspection Requirements: Workers will perform a daily inspection of PPE prior to use. In addition, tools and mechanized equipment will be inspected daily by workers in accordance with the manufacturer's instructions. If during inspection or during use the equipment fails to function properly it is to be immediately turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect loading locations at least daily.

Training Requirements: Operators will be trained in the safe use of required equipment and in the required personal protective equipment. All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). UXO Personnel must be certified as EOD-trained and must be approved for the project by the USAESCH Safety Officer and Contracting Officer. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment.

Approver Signature: _____ Date:5/30/2008
Ed Grunwald, Project Safety and Health Officer

ACTIVITY HAZARD ANALYSIS

Activity: ANOMALY REACQUISITION AND SURVEYING

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
Locate anomalies and sample points selected for intrusive investigation.	Contact with potential hazardous, toxic chemicals	All personnel will don the proper PPE commensurate with the potential hazard. HTW and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing.
	MEC/UXO (Unintentional Detonation)	All Reacquisition and Survey personnel will be provided an UXO Escort, who will perform UXO Avoidance for the crew. UXO awareness training provided by SSHO. Personnel within the EZ will observe EP-3851-95a, Basic Safety Concepts and Consideration for OE, dtd June 01. Only UXO technicians will handle OE/UXO/Demolition material. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. UXO Escort or SSHO will stop all operation when **non-essential** personnel are in the EZ.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
Uses stakes or flags to mark the locations and extent of areas to be investigated.	Contact with potential hazardous, toxic chemicals	All personnel will don the proper PPE commensurate with the potential hazard. HTW and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing.
	MEC/UXO (Unintentional Detonation)	All Reacquisition and Survey personnel will be provided an UXO Escort, who will perform UXO Avoidance for the crew. UXO awareness training provided by SSHO. UXO Escorts will clear areas, using Schonstedts, prior to stakes or flag being placed in the ground. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. UXO Escort or SSHO will stop all operation when **non-essential** personnel are in the EZ.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
Clear lines of sight using hand tools where needed	Contact with potential hazardous, toxic chemicals	All personnel will don the proper PPE commensurate with the potential hazard. HTW and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing.
	MEC/UXO (Unintentional Detonation)	All Reacquisition and Survey personnel will be provided an UXO Escort, who will perform UXO Avoidance for the crew. UXO awareness training provided by SSHO. UXO Escorts will clear areas, using Schonstedts, prior to the use of hand tools being used. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. UXO Escort or SSHO will stop all operation when **non-essential** personnel are in the EZ.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.
	Back injury	Proper lifting techniques.

Equipment to be used: GPS, Scnostedts and shovels.

Inspection Requirements: Workers will perform a daily inspection of PPE prior to use. In addition, tools and mechanized equipment will be inspected each day by workers in accordance with the manufacturer's instructions. If during inspection or during use the equipment fails to function properly it is to be immediately turned in for repair/ replacement. All safety guards designed on equipment will remain in place. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect loading locations at least daily.

Training Requirements: Operators will be trained in the safe use of required equipment and in the required personal protective equipment. All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). UXO Personnel must be certified as EOD-trained and must be approved for the project by the USAESCH Safety Officer and Contracting Officer. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment.

Approver Signature: Edward J Grunwald Date:5/30/2008
Ed Grunwald, Project Safety and Health Officer

ACTIVITY HAZARD ANALYSIS

Activity: BRUSH CLEARING AND DEBRIS REMOVAL

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
Cut vegetation and removal of vegetation and debris to allow access for the intrusive operations.	Contact with potential hazardous, toxic chemicals	All personnel will don the proper PPE commensurate with the potential hazard. HTW and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing.
	MEC/UXO (Unintentional Detonation)	All Brush Clearing personnel will be provided an UXO Escort, who will perform UXO Avoidance for the crew, unless the work is completed by UXO personnel. UXO awareness training provided by SSHO. UXO Escorts will clear areas and mark, using Schonstedts, prior to the use of b rush clearing equipment being used. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. UXO Escort or SSHO will stop all operation when **non-essential** personnel are in the EZ.
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Biological hazards	Site personnel have received blood-borne pathogen training during site-specific training.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the SSHP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide.
	Noise	Hearing protection will be worn in hazardous noise areas.
	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.
	Back injury	Proper lifting techniques.

Equipment to be used: Shovels, rakes and hand tools; brush hog; chain saw; weed trimmers and power tools.

Inspection Requirements: A daily inspection of PPE by workers will be conducted. Equipment will be inspected daily by workers prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect loading locations at least daily.

Training Requirements: Operators will be trained in the safe use of required equipment and in the required personal protective equipment. All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). UXO Personnel must be certified as EOD-trained and must be approved for the project by the USAESCH Safety Officer and Contracting Officer. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment.

Approver Signature: Edward Grunwald Date:5/30/2008

Ed Grunwald, Project Safety and Health Officer

ACTIVITY HAZARD ANALYSIS

Activity: DEMOLITION OPERATIONS

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
Preparation for Demolition of MEC/UXO	MEC/UXO Hazards	UXO Tech III, serving as Demolition Team Leader (UXODTL) will conduct a specific Safety Brief on – MEC/UXO identification and safety precautions of all items being destroyed; Demolition Procedures; Wait times; Safe areas; Road Guard responsibilities; Evacuation; Notifications procedures. Demolition-shots must be fired during daylight hours (i.e., between 30 minutes after sunrise and 30 minutes before sunset).
	Severe Weather	SSHO will verify through local and national weather forecast agencies that an optimum time frame to complete all Demolition operations is in effect for the area.
	Slips, trips, and falls	Worker awareness of potential slippery surfaces and tripping hazards plus inspection and policing of debris.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the SSHP and applicable SOPs. Be alert when working around heavy equipment. Ground guide for the backing of vehicles and heavy equipment.
	Noise	Hearing protection will be worn in hazardous noise areas (85dBA or greater).
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
Site Set and Demolition Preparation	Contact with other hazardous chemicals	All personnel will don the proper PPE commensurate with the chemical hazard. HTW and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the SSHP and applicable SOPs. Be alert when working around heavy equipment. Ground guide for the backing of vehicles and heavy equipment. There will be two separate vehicles used in the transporting of MEC/UXO items requiring disposal and the required demolition materials, IAW Chapter 7, DA Pam 385-64, and Parsons ESAT SOP.

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
	Fire Hazards	A minimum area of 200 feet in diameter shall be cleared of dry grass, leaves and other extraneous combustible materials around the demolition shot/pit area. One 20 BC rated portable fire extinguisher shall be, if possible, mounted on the vehicle outside of the driver's cab or two 10BC fire extinguishers, with one inside the cab and the other near the front portion of the vehicle bed, nearest the driver. The UXODTL will designate a smoking area, if deemed necessary. No smoking is permitted outside of this area
	Unplanned Detonation	UXO awareness training provided by SSHO. Personnel within the EZ will observe EP-3851-95a, Basic Safety Concepts and Consideration for OE, dtd June 01. Only UXO technicians will handle DMM/UXO/Demolition material. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. Demo team or SSHO will stop all operations when **non-essential** personnel are in the EZ.
	Severe Weather	No Demolition Operations will be conducted at any time that lightning is or could possibly be in the area. No demolition activities will be conducted if there is less than a 2,000-foot ceiling or if wind velocity is in excess of 20 mph.
	Excavation and trenching hazards	Install shoring or implement benching/sloping when excavation exceeds 4 feet if worker entrance is required. The SSHO will implement the confined space entry program (as required) and make periodic trench inspections.
	Buried utilities	The Site Manager will contact a local utility location service and have the utility locations marked prior to excavation.
	Hand tools	The tool users will inspect the tools that they will use. No damaged equipment will be used until repaired or replaced.
	Slips, trips, and falls	Worker awareness of potential slippery surfaces and tripping hazards plus inspection and policing of debris.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program.
	Back Injury	The workers will be instructed in proper shoveling and lifting techniques.
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
Demolition Operations	Unplanned Detonation	The identified Demolition Team members are the only UXO technicians will handle DMM/UXO/Demolition material. Prior to initial "set-up" of demolition materials, all unnecessary personnel will pull back to the established Safe Area. The UXODTL, one member and one vehicle will remain at the demo site to complete the firing train. Road Guards or SSHO will stop all operations when **non-essential** personnel are in the EZ.

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
	Intentional Detonation	The quantity of MEC to be destroyed will be determined by the range limit, with the Net explosive weight (NEW) of the demolition explosives factored into the total NEW. Unless otherwise directed, all demolition shots will be tamped with a minimum of two feet of clean earth/dirt.
	Contact with chemical agent or other hazardous chemicals	When using two-component (binary) demolition materials, follow the manufacturer's instructions, while being sure to wear rubber gloves and goggles. Mix components in an area away from other demolition materials, the MEC, and if possible, sheltered from the wind.
	Misfires	A minimum of a 60-minute Wait period will be observed, prior to anyone re-approaching the Demo Site. All Misfire procedures are contained in the Parsons Demolition SOP and will be adhered to.
	Excavation and trenching hazards	Install shoring or implement benching/sloping when excavation exceeds 4 feet if worker entrance is required. Implement confined space entry program (as required). Periodic trench inspections by the SSHO.
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program.
	Noise	Hearing protection will be worn in hazardous noise areas (85dBA or greater).
Site Close-out and Post Demolition Operations	MEC/UXO Hazards	After each-detonation, surface exposed munitions debris shall be recovered from the demolition range and disposed of in accordance with contracted procedures, as well as all applicable environmental regulations. All collected munitions debris metal will be 100% inspected for absence of explosive materials by demolition range personnel and certified by the SUXOS and the UXOQCS. Items identified as still containing explosives may need additional demolition procedures.
	Contact with chemical agent or other hazardous chemicals	Demo personnel will never handle raw bulk explosives, without the proper PPE. Demo personnel will wash hands at break regardless of activity. SSHO will provide necessary equipment to complete task.
	Pinch, Crush and Burn	Demo personnel will wear appropriate gloves when handling MEC/UXO items that have been involved in a disposal operation.
	Hand tools	The tool users will inspect the tools that they will use. No damaged equipment will be used until repaired or replaced.
	Heavy Equipment	Excavation with heavy equipment shall be conducted in one-foot lifts, with a magnetometer check, conducted between lifts. Hand excavation shall be required once the heavy equipment has excavated to within 12 inches of the demo pit.

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program.
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
	Noise	Hearing protection will be worn in hazardous noise areas (85dBA or greater).

Equipment to be used: Excavator, vehicles, shoring, and hand tools.

Inspection Requirements: An inspection of PPE by workers will be conducted before each use. In addition, tools and mechanized equipment will be inspected daily by workers in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect or survey large excavations at least daily or right after changes in conditions (i.e., heavy rain, large amounts of soil removed). The SSHO will look for fissures and cracks in the walls and will ensure that engineering controls are still appropriate. During site set-up, equipment-generating noise will be monitored by the SSHO to determine whether or not hearing protection is required.

Training Requirements: Personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Operators will be trained in the safe use of required equipment and in the required personal protective equipment. UXO Personnel must be certified as EOD-trained and must be approved for the project by the USAESCH Safety Officer. Before entering a confined space, personnel will show proof of confined space training to the SSHO. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment.

Approver Signature: Edward Grunwald Date:5/30/2008
Ed Grunwald, Project Safety and Health Officer

ACTIVITY HAZARD ANALYSIS

Activity: EXCAVATION BACKFILL

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
Backfill excavation.	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement cold/heat stress control program.
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the SSHP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide.
	Noise	Hearing protection will be worn in hazardous noise areas.
Compacting soil.	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement cold/heat stress control program.
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the SSHP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide.
	Noise	Hearing protection will be worn in hazardous noise areas.
Seeding.	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement cold/heat stress control program.
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.

Equipment to be used: Loader, hand tools, compactor, and excavator.

Inspection Requirements: All excavator, compactor equipment will be inspected prior to use. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired or replaced.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). All personnel operating heavy equipment will provide proof of competency to the SSHO prior to operating.

Approver Signature: Ed Grunwald Date:5/30/2008
Ed Grunwald, Project Safety and Health Officer

ACTIVITY HAZARD ANALYSIS

Activity: INTRUSIVE INVESTIGATION

Principal Steps	Potential Hazards	Recommended Controls
General Anomaly Intrusive Investigation Hazards	Slips, trips and falls	UXOSO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or UXOSO of any observed potential slip, trip, or fall hazards.
	Biological hazards	UXOSO will walk site and identify potentially hazardous areas and these will be identified in the daily tailgate briefing. Site personnel will wear protective clothing to prevent exposure to biological hazards such as poison ivy. Personnel will exercise caution when moving obstacles, items, etc., that could be homes to snakes, spiders, or other animals or insects.
	Cold and Heat Stress Injuries	UXOSO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80°F or less than 40°F). Beverages will be available on site. UXOSO will monitor weather conditions and stress symptoms in workers.
	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances.
	Noise	UXOSO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
Magnetometer clearance	*See general hazards above*	*See general hazards above.*

Principal Steps	Potential Hazards	Recommended Controls
Anomaly investigation	Potential of encountering MEC	Magnetometer screening for anomalies by spotter. UXO training and safety awareness during site-specific training. Written MEC contingency plan (Chapter 16 of the SSHP).
	Manual lifting	UXOSO will make workers aware of proper lifting techniques and the potential for injuries due to lifting during morning safety briefings. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.
	Buried utilities	The Site Manager will contact a local utility location service and have the utility locations marked prior to excavation.
	Excavation and trenching	Shoring will be installed or benching/sloping implemented when excavation depth exceeds 4 feet, if workers are required to enter. All water will be pumped from the excavation prior to worker entrance. Excavation will be inspected by the UXOSO prior to entrance by workers. Proper ingress and egress will be provided.
	Injury from hand tool usage	UXOSO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools will be monitored periodically by UXOSO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the UXOSO.
	X-Ray Equipment	X-Ray equipment operator(s) will be trained to operate the equipment in accordance with the manufacturer's instructions. The X-Ray equipment SOP will be followed and all safety measures described in the manufacturer's equipment Operating Manuals will be briefed by the UXOSO and observed by the field team.

Principal Steps	Potential Hazards	Recommended Controls
Anomaly investigation (contd.)	Contact with contaminated soil, air, liquid	Contaminated soil, air, and liquid is not expected in the NTCRA area. Level D PPE will be donned. Should there be a situation where contamination in the media is suspected, operation will cease in the area until appropriate contingency measure is determined. All personnel will don the proper PPE commensurate with the chemical hazard. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication per 29 CFR 1910.1200. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring for VOCs using PID would be necessary if contamination is suspected
Anomaly removal	Potential of encountering MEC	Magnetometer screening for anomalies by spotter. UXO training and safety awareness during site-specific training. Written MEC contingency plan (Chapter 16 of the SSHP).
	Manual lifting	UXOSO will make workers aware of proper lifting techniques and the potential for injuries due to lifting during morning safety briefings. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.
	Buried utilities	The Site Manager will contact a local utility location service and have the utility locations marked prior to excavation.
	Excavation and trenching	Shoring will be installed or benching/sloping implemented when excavation depth exceeds 4 feet if workers are required to enter. All water will be pumped from the excavation prior to worker entrance. Excavation will be inspected by the UXOSO prior to entrance by workers. Proper ingress and egress will be provided.
	Injury from hand tool usage	UXOSO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools will be monitored periodically by UXOSO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the UXOSO.

Principal Steps	Potential Hazards	Recommended Controls
	Contact with contaminated soil, air, liquid	All personnel will don the proper PPE commensurate with the chemical hazard. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication per 29 CFR 1910.1200. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring for VOCs using PID if contamination is suspected.
Air monitoring	*See general hazards above*	*See general hazards above.*

Equipment to be used: Excavator, shoring, geophysics instruments, and hand tools.

Inspection Requirements: Workers will inspect PPE, equipment, hand and power tools daily prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The UXOSO will inspect the entire site daily or if site conditions change (e.g., high winds, extended dry periods) to ensure that engineering controls are adequate, and ensure that proper PPE is being worn. The UXOSO will inspect or survey excavation at least daily or right after changes in conditions (i.e., heavy rain, large amounts of soil removed). The UXOSO will ensure that there is no water in the excavation and that there are no fissures and cracks in the walls, and will also ensure that engineering controls are still appropriate.

Training Requirements: All on site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). All personnel on site will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP. A minimum of two people trained in First Aid and CPR will be on site during operations. Personnel will receive RCWM and UXO safety awareness training during site-specific training. All persons performing UXO operations will be graduates of USAESCH-approved courses and be approved by USAESCH Contracting. All personnel operating heavy equipment will provide proof of competency with the equipment to the UXOSO prior to operating the equipment.

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: 5/30/2008

ACTIVITY HAZARD ANALYSIS

Activity: SAMPLE COLLECTION

Principal Steps	Potential Safety/Health Hazards:	Recommended Controls
Setup / Preparation for sampling	Injury from hand tools	The operator will inspect tools prior to use. No damaged equipment will be used until repaired or replaced.
	Slips, trips, and falls	Worker awareness of potential slippery surfaces and tripping hazards plus inspection and policing of debris.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the SSHP and applicable SOPs. Be alert when working around heavy equipment. Ground guide for the backing of vehicles and heavy equipment.
	Noise	Hearing protection will be worn in hazardous noise areas (85dBA or greater).
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
	Contact with hazardous chemicals	The potential chemical hazards will be reviewed during morning tailgate briefings. All personnel will be familiar with the sampling PPE requirements.
Sample Collection (Soil/Sediment/ Water)	Contact with chemical agent or other hazardous chemicals	Personnel will don the appropriate PPE for the sampling activity conducted. Personnel will be familiar with the potential chemical hazards that may be encountered for each media sampled.
	Slips, trips, and falls	Worker awareness of potential slippery surfaces and tripping hazards plus inspection and policing of debris.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program.
	Injury from hand tools	The tool users will inspect the tools that they will use. No damaged equipment will be used until repaired or replaced.
	Biological hazards	Site personnel that encounter biological hazards will adhere to procedures described in this plan, and take precautions to prevent injuries from biological hazards.
	Buried utilities	The Field team Leader will contact a local utility location service and have the utility locations marked prior to excavation.
	Back Injury	The workers will be instructed in proper shoveling and lifting techniques.

Equipment to be used: Vehicles, and hand tools.

Inspection Requirements: An inspection of PPE by workers will be conducted before each use. Equipment and tools will be inspected by workers daily prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced.

Training Requirements: Site personnel will receive site orientation training from the SSHO. Additionally, personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Operators will be trained in the safe use of required equipment and in the required personal protective equipment.

Approver Signature:_____ Date:__5/30/2008_

Edward Grunwald, C.I.H, Project Health and Safety Officer

ATTACHMENT 3
PARSONS SAFETY DATA

OSHA Form 300A

Summary of Work-Related Injuries and Illnesses

All establishments covered by Part 1904 must complete this Summary page, even if no 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 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	2	6	7
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
166	369
(K)	(L)

Injury and Illness Types

Total number of ...

	(M)		
(1) Injury	10	(4) Poisoning	0
(2) Skin Disorder	0	(5) HearingLoss	0
(3) Respiratory Condition	0	(6) All other illnesses	0

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 50 minutes per response, including time to review the instruction, 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 aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Year 2007

U.S. Department of Labor

Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

Establishment information

Your establishment name _____

Sreet _____

City _____ State _____ Zip _____

Industry description (e.g., Manufacture of motor truck trailers)

_____

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

____ ____ ____ ____

OR

North American Industrial Classification (NAICS), if known (e.g., 715)

____ ____ ____ ____

Employment information

Annual average number of employees _____

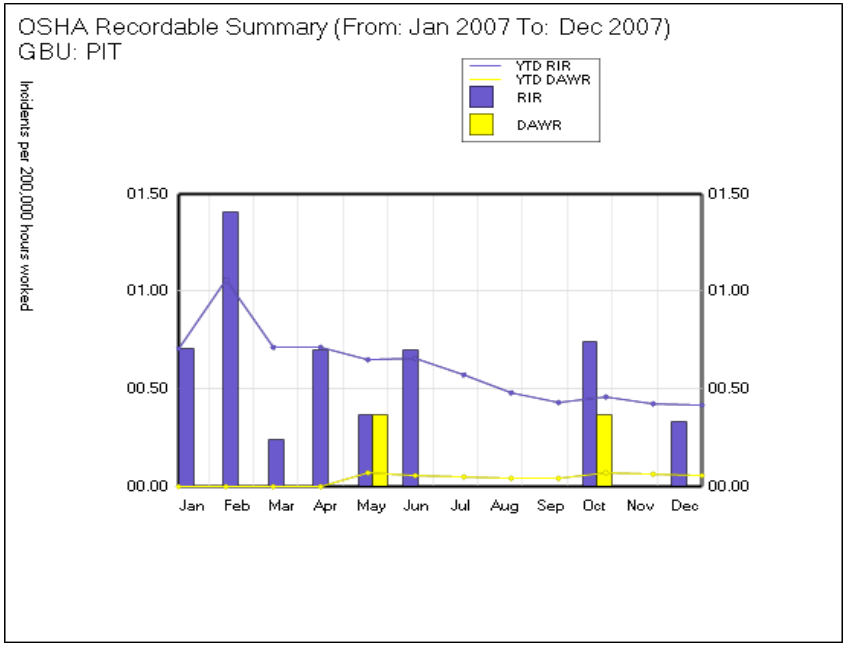
Total hours worked by all employees last year 7,270,734

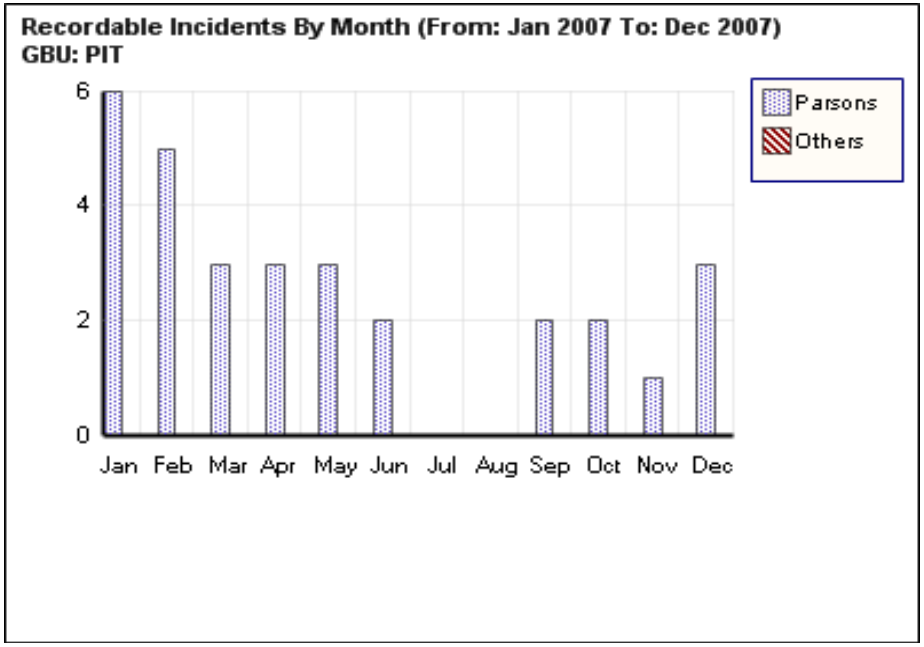
Sign here

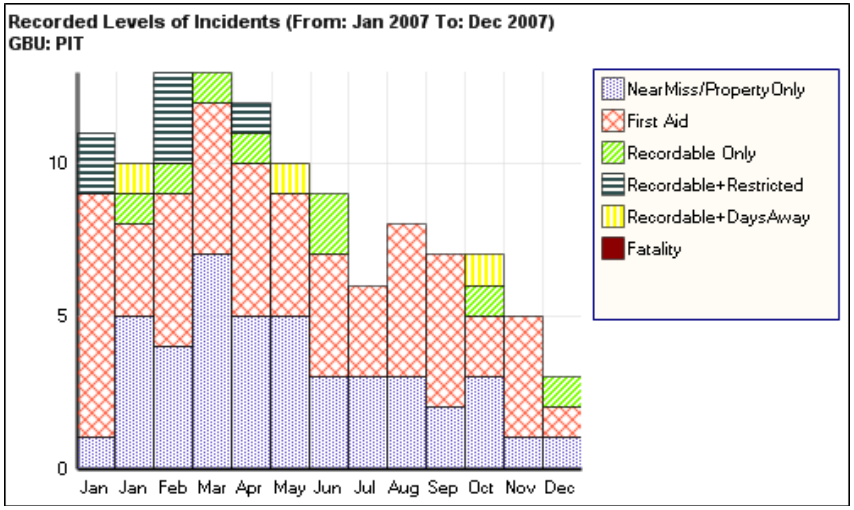
Knowingly falsifying this document may result in a fine.

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	Title
Phone	Date


OSHA Recordable Summary (From: Jan 2007 To: Dec 2007)
GBU: PIT
YTD RIR
YTD DAWR
RIR
DAWR
Incidents per 200,000 hours worked
01.50
01.00
00.50
00.00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Recordable Incidents By Month (From: Jan 2007 To: Dec 2007)
GBU: PIT
Parsons
Others
6
4
2
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


Recorded Levels of Incidents (From: Jan 2007 To: Dec 2007)
GBU: PIT
NearMiss/PropertyOnly
First Aid
Recordable Only
Recordable+Restricted
Recordable+DaysAway
Fatality
10
5
0
Jan Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Parsons

Parsons- Infrastructure & Technology

Safety Statistic Summary 2000-2007

Year	Man Hours	# Rec. Injuries	Recordable Incident Rate	# Lost work day cases	Lost Work Day Rate	DART	EMR	HOME STATE EMR	
2000	10,375,814	54	1.04	27	.52	.53	.66	.48	
2001	8,712,298	45	1.03	21	.48	1.07	.55	.46	
2002	9,577,166	60	1.25	20	.41	.64	.67	.50	
2003	6,796,078	66	1.94	25	.73	1.03	.87	.55	
2004	6,242,447	39	1.25	10	.32	.42	.98	.51	
2005	7,291,127	14	.38	3	.08	.16	1.11	.51	
2006	8,516,532	23	.54	4	.09	.16	.99	.51	
2007	7,270,734	15	.41	2	.06	0.22	.78	.51	

Workers Comp. Incurred Totals as of Dec. 31 each year

2003 claims reported to AIG, PIT only, valued 12/31/03:	984,116.03
2004 claims reported to AIG, PIT only, valued 12/31/04:	353,678.11
2005 claims reported to AIG, PIT only, valued 12/31/05:	300,886.98
2006 claims reported to AIG, PIT only, valued 11/1/06:	126,839.44

Risk Name: **PARSONS CORP, THE**	Risk ID: **910485296**
Address: **PARSONS MAIN INC PASADENA, CA 91124-0001**	
Governing State/Class Code: **RI/8601**	

Mod Factor

PARSONS CORP

Mod Factor

.64	Rating Effective Date: **1/1/2008**
	Production Date: **1/23/2008**
	Status: **FINAL - Interstate Rated Risk**
	Remarks: **REVISED**

ARAP	FLARAP	SARAP
1.00	1.00	.95

Rating Comments

RATING REVISED TO REFLECT APPROVED RATING VALUES

Contingent Comments

NONE

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APPENDIX E
SAMPLING AND ANALYSIS PLAN

ENVIRONMENTAL SAMPLING AND ANALYSIS PLAN

FORMER PINECASTLE JEEP RANGE
REMEDIAL INVESTIGATION / FEASIBILITY STUDY

Prepared for:

U.S. Army Engineering and Support Center, Huntsville
U.S. Army Corps of Engineers Jacksonville District

Prepared by:

PARSONS
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

May 2008

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APPENDIX E
REMEDIAL INVESTIGATION / FEASIBILITY STUDY SAMPLING AND ANALYSIS PLAN

PART I - ENVIRONMENTAL SAMPLING ANALYSIS PLAN

E.1 INTRODUCTION

This section details the Environmental Sampling and Analysis Plan (ESAP) for the Former Pinecastle Jeep Range RI/FS project in Orange County, Florida. The ESAP has been developed in accordance with DID MR-005-10.01, ER 1110-1-263, EM 200-1-3, and the SOW. All requirements given in the guidance documents are implied in this document. This document outlines all anticipated sampling and analysis procedures that may be used. The ESAP is presented in two parts, the Field Sampling Analysis Plan (FSP) and the Quality Assurance Project Plan (QAPP). The FSP is presented in Subsections E.2 through E.15. The QAPP is presented in Subsections E.16 through E.28. The basis for the sampling strategy is provided in Section 2 of the Work Plan.

E.2 TASK ORGANIZATION AND RESPONSIBILITIES

E.2.1 Project Team

Several organizations will be involved in the sampling activities for this project. The technical team consists of USAESCH, Parsons, and Parsons' subcontract laboratory – tentatively Agriculture & Priority Pollutants Laboratories, Inc. (APPL) of Fresno, California – which will be officially procured upon USAESCH's review of the Work Plan, The roles of these team members as they apply to sampling activities are described below.

E.2.2 U.S. Army Engineering and Support Center, Huntsville

The U.S. Army Engineering and Support Center, Huntsville (USAESCH) is the PM for this project and also the implementing agency for execution of this project. USAESCH provides technical expertise for MMRP activities and serves as the PM for conducting work at the Former Pinecastle Jeep Range. USAESCH will review all data quality reports prepared by Parsons.

E.2.3 U.S Army Engineering District, Jacksonville Florida (CESAJ)

The U.S. Army Corps of Engineers, Jacksonville District (CESAJ), is the owner of this project and has the overall responsibility for the project.

E.2.4 Parsons

E2.4.1 As the prime contractor to USAESCH, Parsons will provide overall engineering support and services for implementation of the work at the Former Pinecastle Jeep Range. Parsons' responsibilities during the sampling activities include coordination of equipment and personnel mobilization, collection and shipment of samples to the laboratories, validation, and

reporting of sample results. The sampling effort will be performed by members of the field team trained to adequately collect, package, document, and ship samples to the laboratory for required chemical analyses. Parsons will also use the services of the site manager, a project QC Manager, and a Site Safety and Health Officer (SSHO) as necessary to effectively complete the sampling work. The SSHO is the designated competent person. Sampling work may be performed by members of the intrusive teams or by other designated samplers. When non-UXO qualified personnel collect soil or sediment samples, a UXO escort will assist.

E.2.4.2 Table 2.2 in Chapter 2 of the Work Plan summarizes the roles and responsibilities of key players for this project.

E.2.5 Laboratory – APPL

APPL is the analytical laboratory responsible for performing the specified offsite analyses for background, soil, sediment, water, and Investigation Derived Waste (IDW) characterization samples collected during field activities. In the event that discolored, stained, or strong odor samples are discovered at the site, additional analyses may be added to this SAP with the approval of the Project Team.

E.2.6 QA Laboratory -TBD

A QA laboratory has not yet been identified for this project.

E.3 TASK OBJECTIVE

E.3.1 The primary objectives of this task are to collect, analyze, and evaluate soil samples from locations where Munitions and Explosives of Concern (MEC) items are encountered at the Former Pinecastle Jeep Range in an effort to characterize the presence and concentration of munitions constituents (MC) at the site.

E.3.2 This ESAP details the specific procedures related to the sampling for MC. The goal of the sampling work is to determine if MCs are present at locations where MEC are encountered at Former Pinecastle Jeep Range, determine their concentrations, evaluate the data collected, and determine extent of contaminant spread. This goal will be achieved by collecting, preserving, and analyzing samples and evaluating the laboratory results.

E.3.3 If evaluation of the sample data indicates that a release has likely occurred, a risk assessment will be conducted in a stepwise approach moving from a relatively simple screening level risk assessment to a more complex deterministic baseline risk assessment, as needed. After a release has been determined, Parsons will develop the conceptual site model to evaluate the potential exposure pathways at the site. If complete exposure pathways are identified matching those used to calculate the Florida Department of Environmental Protection (FDEP) soil or water Cleanup Target Levels (FAC 62-77) or USEPA Region 9 Preliminary Remediation Goals then representative concentrations of each chemical contaminant found above background levels will be compared to the listed criteria to determine the potential for a human health risk.

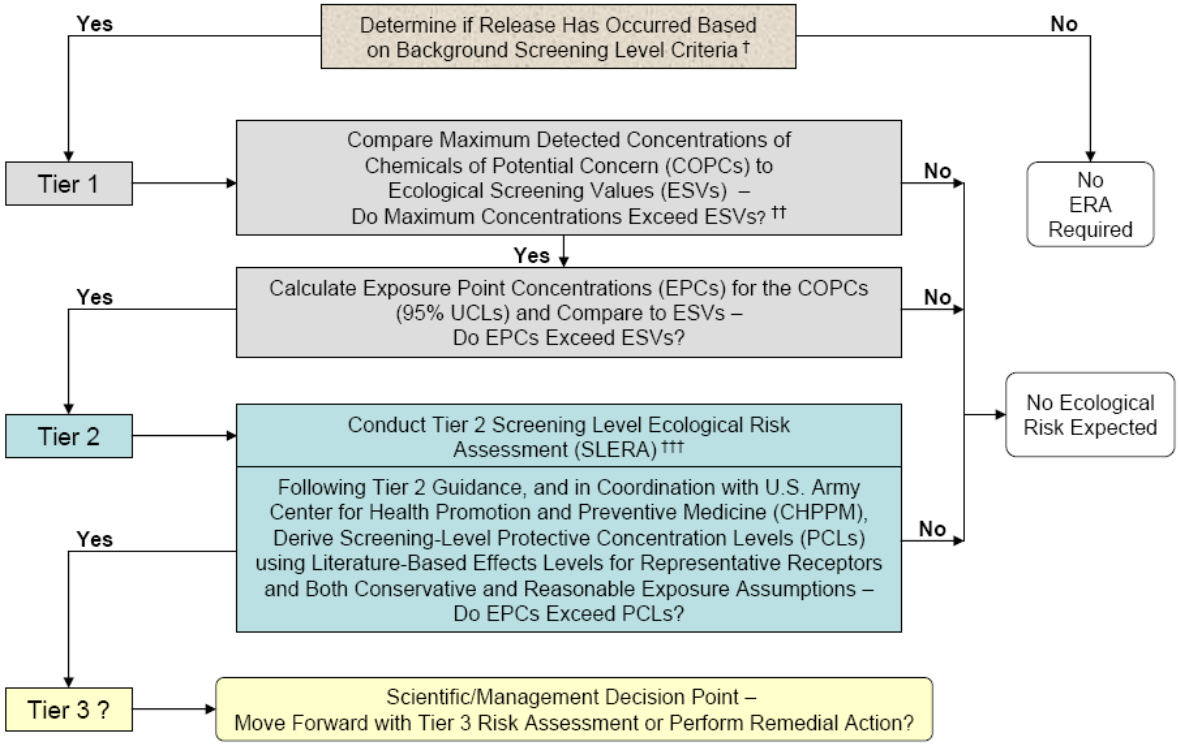
E.3.4 Ecological risk will be evaluated by comparing site conditions to background then

to USEPA Region 4 Ecological Screening Values, and U.S. Army Engineering Support Center, Final Sampling and Analysis Plan, Military Munitions Response Program Site Inspections (September, 2005) or the Munitions Response Site Prioritization Protocol Appendices (ecological screening values) when Region 4 values are not available. Background levels for chemicals not naturally occurring are considered above detection levels. Representative concentrations may be either the maximum detected concentration, or a statistically-derived 95% Upper Confidence Limit, depending on the numbers of samples and the sample locations. If representative concentrations are not exceeded, the risk assessment process will then be considered complete. The ecological risk assessment process is presented in Figure E-1. The human health risk assessment process is provided in Figure E-2.

E.3.5 In addition, waste characterization sampling will be conducted to allow proper disposal of all Investigation Derived Waste (IDW) according to the applicable federal, state and local regulations. This goal will be achieved by collecting, preserving, and analyzing waste samples properly.

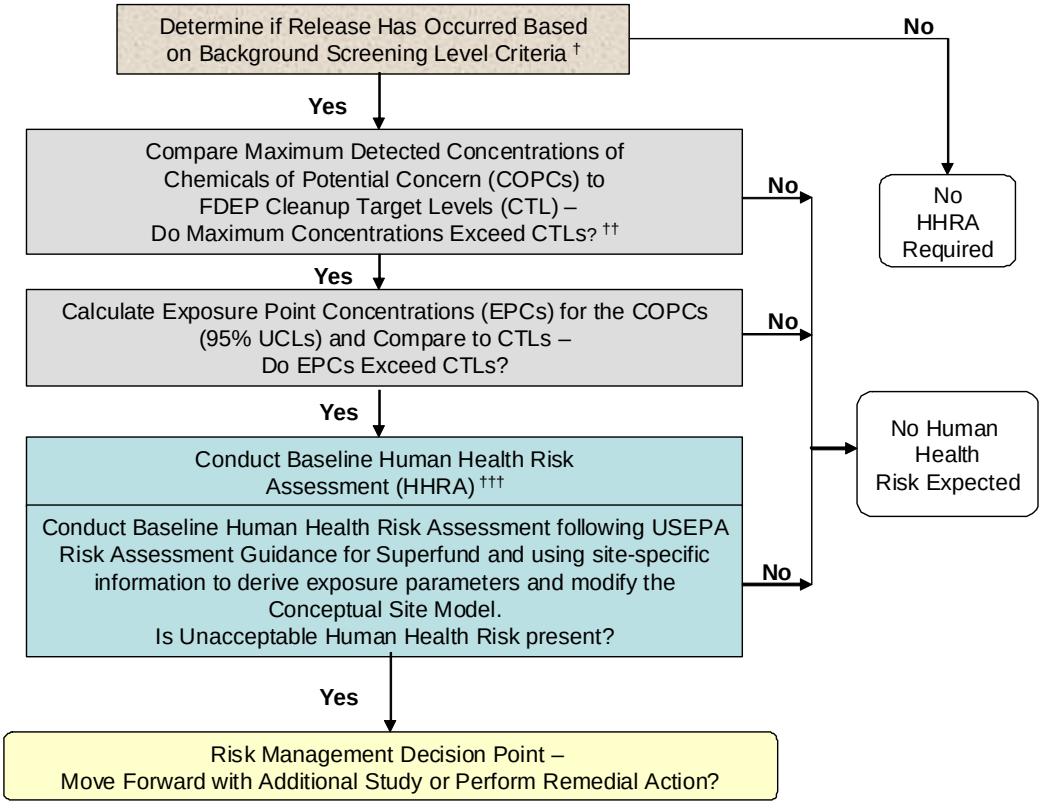
E.3.6 All methods used and data collected during the RI field task will be well documented and incorporated into the final RI Report.

Figure E-1
Proposed Ecological Risk Assessment (ERA) for the Former Pinecastle Jeep Range



† Following Methodology described in this Work Plan.
†† USEPA Region IV Screening Levels. If not available, U.S. Army Engineering Support Center, Final Sampling and Analysis Plan, Military Munitions Response Program Site Inspections. September 2005.
††† TCEQ Guidance (TCEQ, 2007).

Figure E-2
Proposed Human Health Risk Assessment (HHRA) Process for the Former Pinecastle Jeep Range



† Following Methodology described in this Work Plan.
†† Florida Department of Environmental Protection Cleanup Target Levels (FAC 62-77). If not available, USEPA Region 9 Preliminary Remediation Goals (revised 28 December 2004) will be used.
††† USEPA Risk Assessment Guidance for Superfund.

E.4 APPLICABLE STANDARDS

As the data are collected and evaluated during this RI, Applicable or Relevant and Appropriate Requirements (ARARs) and to be considered (TBC) criteria will be identified. Table E-1 provides a summary of the anticipated applicable standards.

E.5 NONMEASUREMENT DATA ACQUISITION

The nonmeasurement data acquisition information is included in the Work Plan. The information to be presented will include:

- Geological (Chapter 1),
- Climate (Chapter 1),
- Hydrogeological (Chapter 1),
- Local relevant habitats (Chapter 7), and

- Threatened and endangered species (Chapter 7).

Table E.1 Applicable Standards

Standard, Requirement, Criteria, or Limitation	Citation	Description of Requirement
Environmental Protection and Enhancement	AR 200-1, DA PAM 200-1	Requires Army compliance with all environmental statutes and regulations and requires Army consultation with federal, state, and local regulatory agencies.
Human Health Screening Values Residential Soil and Leachability Based on Groundwater Criteria	Region 9 PRGs, dtd 28 December 2004; Florida Administrative Code 62-77, dtd February 2005	Provides human health screening values for soil as applicable to the state of Florida.

E.6 FIELD ACTIVITIES

E.6.1 Sampling Approach

E.6.1.1 This section describes the sampling approach for this project. To identify the nature and extent of MEC, geophysical instruments will be used to identify anomalies suspected of being MEC. Geophysical surveys will be conducted over portions of the Former Pinecastle Jeep Range. Anomalies selected from the geophysical surveys will be excavated to characterize the extent of the MEC. Soil samples will be collected and analyzed for munitions constituents (MCs) at areas where MEC and selected munitions debris (MD) is found and where demolition of MEC takes place. The type of MD considered "selected", which are to be sampled includes: low order detonations, expended ejection rounds, and any piece of MD visibly containing explosives.

E.6.1.2 MC sampling will be conducted to determine if releases of MC from munitions at the Former Pinecastle Jeep Range have occurred that pose a hazard to human health and the environment. As an initial approach, environmental soil samples will be collected and analyzed at the following locations:

1. Where MEC and selected MD are found during the RI;
2. Where detonations are used to destroy munitions during the RI;
3. Where MEC and selected MD were found during the TCRA and by private contractors;
4. Where detonations were conduced to destroy munitions by the TCRA and by the private contractors; or
5. Locations identified based on the results of the SI and historical data as described in Chapter 3.

E.6.1.3 If no MEC or selected MD are found in an area, sampling is not required for that area. One soil sample will be collected for clusters and for each isolated instance of MEC and selected MD, not for every item found. When collected, soil samples will be collected from the

surface (0-12 inches below ground surface (bgs)) and at the depth of the MEC or MD item(s).

E.6.1.4 Laboratory analyses will include: explosives (method SW8330A), metals (methods SW6010B, SW6020, and SW7471A), and perchlorate (water only – method SW6850/6860). Analytical results will be compared to screening levels established by Florida Soil Cleanup Target Levels (Residential and Leaching) and USEPA Region 9 Preliminary Remediation Goals (PRGs). Aluminum, calcium, iron, magnesium, potassium, and sodium will not be evaluated since these metals are considered essential nutrients (Cirone, 1991). Arsenic, thallium, titanium, and vanadium will not be evaluated in samples collected for contaminant characterization purposes as these constituents were not present in munitions used at the former Pinecastle Jeep Range. IDW samples collected for waste characterization purposes will include those parameters listed in Table E.5.

E.6.1.5 Based on the results of this initial phase of sampling, additional environmental samples may be added to determine the nature and extent of MC. These additional samples may include soil, surface water, sediment, and ground water samples. If a release of MC is identified that exceeds the screening levels, additional sampling will be required to determine the nature and extent of the contamination. In addition to explosives and metals, any groundwater samples collected will be analyzed for perchlorate.

E.6.1.6 The following subsections present sampling procedures. Field sampling activities will be performed in accordance with the procedures outlined in the ESAP. The ESAP provides standard procedures to ensure collection of quality data to meet project objectives.

Table E-2
List of Parameters, Analytical Methods, and Primary Lab

Parameters	Methods	Primary Lab
Explosives*	SW 8330A	APPL
Metals *	SW 6010B/7471A	APPL
Perchlorate*	SW6850	APPL
Waste Characterization	TCLP-6010B/7470A metals, TCLP-8260B VOCs, explosives SW8330	APPL

Notes: * See Table E-5 for all analytes

E.6.2 Background Samples

Twenty background samples will be collected and will be analyzed for metals. These samples will be collected from areas of throughout the Former Pinecastle Jeep Range which are interpreted not to be affected by military activities or industrial influence (e.g. landfills). The background samples will be collected as grab samples from both the surface (0-12 inches bgs) and subsurface. These samples will be evaluated in combination with background samples which are publicly available and those collected as part of the MMRP SI project.

E.6.3 Determination of Sample Collection Locations with MEC

The following general procedures will be followed when collecting a representative sample

from each location for the required analysis:

1. Upon discovery of MEC, the approximate locations of the MEC and individual sampling point at the specific location where the MEC was found, will be acquired and marked using GPS equipment.
2. For safety, ordnance avoidance will be performed at each location.
3. Munition debris, if present, will be removed from the area where the sample will be collected.
4. One discrete soil sample will be collected adjacent to the munition prior to demolition for each type of conventional ordnance (blown in place (BIP)) to establish the baseline prior to demolition activities. The pre-demolition sample will be collected and shipped to APPL for explosives and metals analyses using the appropriate EPA Methods listed in Table E.2.
5. A discrete representative post-demolition soil sample will be collected to determine whether any explosives-related residues are present at locations where each type of UXO is found (and subsequently detonated) during the intrusive activities. This sampling will provide an initial assessment of the potential for explosives-contamination as the direct result of leaking UXO, BIP demolition, or consolidated demolition shots. The post-demolition sample will be collected and shipped to APPL for explosives and metals analyses using the appropriate USEPA Methods listed in Table E.2.

E.6.4 Soil and Sediment Sampling Procedures

E.6.4.1 Rational/Design

E.6.4.1.1 Soil and Sediment Sample Locations

Soil or sediment samples will be collected from various areas in accordance with Section 3.7 of the Work Plan. Soil samples may include samples collected from the ground surface to 2 feet bgs using either decontaminated or single-use plastic spoons or a hand auger.

E.6.4.1.2 Discrete/Composite Sampling Requirements

Samples will be collected as grab samples in accordance with FDEP Standard Operating Procedure (SOP) FS3000.

E.6.4.1.3 Sample Collection and Field and Laboratory Analysis

Soil and sediment samples collected will be analyzed for metals and explosives in accordance with the Work Plan.

E.6.4.1.4 QC, and Equipment Blank Samples and Frequency

QC will be collected in accordance with Section 6.8. Equipment blank samples will be collected in accordance with Section 6.8.3.

E.6.4.2 Field Procedures

E.6.4.2.1 Sampling Methods for Surface Soil / Dry Sediment – Grab Sampling

The process for collecting soil or dry sediment samples is as follows. These collection techniques apply to soil samples collected from the top 6 inches of soil.

1. A new pair of clean disposable latex or nitrile gloves will be donned at each sampling location.
2. Each sample location should be cleared of vegetation.
3. Sample collection will dependant on the required depth. If it is required that a sample be collected from the first six inches of topsoil, the sample may be collected by using a decontaminated stainless steel spoon or single-use plastic scoop.
4. If a hand auger is used to obtain soil samples from locations deeper than 6", the auger bucket will be advanced to the required depth, then a new decontaminated bucket will be used for sample collection. If more than one sample is needed from different depths of the same hole, the bucket used for the previous sample may be retained to acquire the next proper sample depth, then a new decontaminated auger bucket will be needed for the next sample. A powered auger may also be used to achieve sample depth; however, once sample depth is achieved, the sample will need to be collected using a decontaminated auger bucket.
5. After the sample containers are filled, the caps will be placed on the containers and they will be immediately placed on ice.
6. Once the samples have been collected, the hole will be backfilled with the remainder of soil not used in the sample and the site will be returned to its original condition to the best extent possible. If there is not enough soil left to fill the hole, top soil or planting soil will be added to bring the hole to grade.
7. QC samples will be collected as specified in Section 6.8.

E.6.4.2.2 Sampling Methods for Underwater Sediments

The process for collecting underwater (or wet) sediment samples is as follows:

1. A new pair of clean disposable latex or nitrile gloves will be donned at each sampling location.
2. In shallow streams and ponds that allow wading, sediment samples will be collected by using a decontaminated stainless steel spoon or single-use plastic scoop. In areas where wading is not possible, a scoop attached to a pole may be needed to collect sediment samples.
3. While facing upstream, collect the sample by scooping along the bottom of the surface water body. Remove excess water and place the sediment sample into the appropriate sample containers.
4. After the sample containers are filled, the caps will be placed on the containers and they will be packaged for shipment as specified in Sections E.11 and E.12.
5. QA/QC samples will be collected as specified in Section 6.8.

E.6.4.2.3 Field Measurement Procedures and Criteria

A description of the sample location and soil type should be noted in the Sampling Field

Log. A photograph of the sample location, as well as the sample, should be taken and downloaded to the field computer.

E.6.4.2.5 Sample Containers and Preservation Techniques

Sample containers and preservation is specified in Section E.6.7.

E.6.4.2.6 Field QC Sampling Procedures

QC samples will be collected as specified in Section E.6.8.

E.6.4.2.7 Decontaminating Procedures

Auger buckets, extension rods, stainless steel spoons, or any other equipment used for collecting soil samples should be thoroughly washed with soap (e.g., liquinox®, aquanox®) and warm water (tap water from a municipal supply is acceptable), and scrubbed with a brush or scrub pad to remove any particulate matter or surface film. Equipment should be rinsed thoroughly using warm water and then analyte-free water. The equipment should then be allowed to dry. Once equipment is dry, it will be wrapped in one layer of aluminum foil. Items that cannot be cleaned using these methods are not appropriate and should be discarded.

E.6.5 Surface Water Sampling Procedures

E.6.5.1 Rational/Design

E.6.5.1.1 Surface Water Sample Locations

Surface water samples will be collected from various areas in accordance with Section 3.7 of the Work Plan and FDEP SOP FS2000

E.6.5.1.2 Sample Collection and Field and Laboratory Analyses

Water samples will be analyzed for metals and explosives in accordance to the Work Plan.

E.6.5.1.3 QC and Blank Samples and Frequency

QC samples will be collected in accordance with Section E.6.8. Equipment blank samples will be collected in accordance with Section E.6.8.3.

E.6.5.2 Field Procedures

E.6.5.2.1 Sampling Methods for Surface Water

E.6.5.2.1.1 The surface water sample collection location should be deep enough so the sample bottles can be completely submerged (if possible), in an area with minimal flow or surface disturbance, and free of suspended material. Downstream samples (if applicable) will be collected first and disturbances during wading should be avoided. At locations where both surface water and sediments will be collected, the surface water samples should be collected before sediment samples. The objective is to ensure a representative surface water sample that is collected in such a manner as to minimize the introduction of sediments into the sample is collected at each designated sampling location to accurately determine presence or absence of MC. The process for collecting surface water samples is as follows:

1. A new pair of clean disposable latex or nitrile gloves will be donned at each sampling location.

2. Facing upstream (if applicable), submerge pre-labeled sample bottles in the upright position to prevent the loss of preservative into the water. Sediment should not be disturbed during the collection of surface water samples.
3. Allow sample bottle to fill and use bottle cap if necessary to fill the bottle completely. If samples cannot be collected directly into the sample bottle, a decontaminated or single use sample collection device made of glass, stainless steel, or Teflon® may be used.
4. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Sections E.11 and E.12.
5. QC samples will be collected as specified in Section E.6.8.

E.6.5.2.2 Field Measurement Procedures and Criteria

A description of the sample location should be noted in the Sampling Field Log. A picture of the sample location should be taken in a manner that identifies the location of the sample and downloaded to the field office computer.

E.6.5.2.3 Sample Containers and Preservation Techniques

Sample containers and preservation is specified in Section E.6.7.

E.6.5.2.4 Field QC Sampling Procedures

QC samples will be collected as specified in Section E.6.8.

E.6.5.2.5 Decontamination Procedures

E.6.5.2.5.1 Reusable sampling equipment, such as depth-to-water indicators, flow-through cells,, or any other equipment used for the collection of water samples should be thoroughly washed with soap (e.g., liquinox®, aquanox®) and warm water (tap water from a municipal supply is acceptable). Equipment should be rinsed thoroughly using warm water and then analyte-free water. The equipment should then be allowed to dry. If practical, once equipment is dry, it will be wrapped in one layer of aluminum foil.

E.6.5.2.5.2 Items that cannot be cleaned using these methods are not appropriate and should be discarded.

E.6.6 Groundwater Sampling Procedures

E.6.6.1 Rational/Design

E.6.6.1.1 Monitoring Well Location and Installations

To assess the possible migration of contaminants to groundwater, monitoring wells may be installed in areas of known contamination at the Former Pinecastle Jeep Range.

E.6.6.1.2 Sample Collection and Field and Laboratory Analysis

Once wells have been properly installed and developed, samples will be collected and analyzed for explosives, metals, and perchlorate.

E.6.6.1.3 QA/QC, and Blank Samples and Frequencies

QA/QC samples will be collected in accordance with section E.6.8. Equipment blank

samples will be collected in accordance with section 6.8.3.

E.6.6.2 Monitoring Well Installation

E.6.6.2.1 Drilling Methods and Equipment

E.6.6.2.1.1 Monitoring wells will be installed in accordance with FDEP SOP-PCS-006. These wells will be installed into an appropriate aquifer using hollow stem auger drilling techniques or equivalent. The wells will be screened across the aquifer which exhibits suitable yields and recharge rates.

E.6.6.2.1.2 All soil cuttings, drilling fluids, and decontamination fluids will be collected in 55-gallon drums. Drilling equipment will be decontaminated prior to drilling, between boreholes, and before leaving the site. Drilling equipment includes augers, auger bolts, drill rods, split spoons, drill head, and any other equipment located over the borehole or used in the well installation activities. Decontamination activities will be performed using a high-pressure steam cleaner. A decontamination pad will be constructed to contain all decontamination fluids.

E.6.6.2.1.3 A utility mark-out should be completed prior to any drilling activity. All boreholes need to be cleared for utilities and UXO to a minimum depth of four feet with a hand auger or post-hole digger. Drillers installing rigs should be cognizant of power lines in the vicinity of the drilling location. Rigs should be set up at a distance greater than 20 feet from powerlines; special precautions with the appropriate power company may be necessary that a well be installed closer than 20 feet from a powerline (e.g. voltage to the line should be shielded to prevent arching)

E.6.6.2.1.4 Monitoring well installations will be supervised by the Field Geologist and recorded in a field log book. Boring logs are required for all wells installed. Boring logs, such as those presented in Appendix A of the FDEP SOP-PCS-006 should be reviewed to make sure they contain all the information required according to the FDEP SOP-PCS-006.

E.6.6.2.2 Materials

E.6.6.2.2.1 Casing/Screen/Centralizers

E.6.6.2.2.1.1 Well casings and screens for monitoring wells completed in the overburden will be 2-inch inside diameter (ID), flush joint, threaded, schedule 40 polyvinyl chloride (PVC)(Type 1, Grade 1 in accordance with ASTM D1784) with a threaded PVC plug. The screen sections will be ten feet in length with 0.006 inch openings. The screen shall be free of any ink or printing. Teflon tape can be used to wrap the threads to insure a tight fit and minimize leakage.

E.6.6.2.2.2 Filter Pack, Bentonite Seal, Cement/Bentonite Grout

E.6.6.2.2.2.1 The primary and secondary filter pack surrounding the well screen will be a clean, inert, 30/65 graded silica sand.

E.6.6.2.2.2.2 The bentonite seal will consist of 3/8-inch diameter sodium bentonite pellets. In unsaturated conditions, the bentonite pellets will be hydrated with potable water. The bentonite pellets will be allowed to hydrate a minimum of 30 minutes after installation.

E.6.6.2.2.2.3 The grout mixture shall be a mixture of Type I Portland Cement (1-94 lb.

bag), minus No. 200 sieve bentonite powder (~3 lbs.), and potable water (~7 gallons) in appropriate quantity to fill the borehole.

E.6.6.2.2.2.4 A drum type batch machine mixer, or other capable means of mixing concrete must be used to create the concrete mix. The concrete will be protected from physical damage or reduced strength due to weather extremes during mixing, placement, and curing. All concrete will be solid, compact and smooth, free of laitance, cracks, and cold joints. A non-slip broom surface will be applied. The formed surface will be cured by use of moisture-retaining cover or a membrane-forming curing compound.

E.6.6.2.2.3 Surface Completion

The surface seal will contain Type I Portland Cement with processed aggregates containing no deleterious materials. The concrete will be mixed with clean potable water to obtain a mix strength of 3,000 psi at a minimum.

E.6.6.2.2.4 Water Source

Potable water from a municipal water source will be used for all drilling activities. Water may be containerized and brought to the site in a clean portable container if a municipal water source is not present onsite.

E.6.6.2.3 Installation

E.6.6.2.3.1 Borehole Advancement

E.6.6.2.3.1.1 Boreholes for the shallow monitoring wells will be advanced using 4.25-inch ID hollow stem augers or other appropriate drilling methods. Soil samples will be collected in each boring, using split spoon samplers for grain size distribution analysis, from the depth interval in which the well screen will be set. Split spoon samplers will be advanced 24-inches or until the number of blows exceeds 50 for 6-inches (or less) of penetration.

E.6.6.2.3.2 Screen and Well Casing Placement

The borehole for the well should be bored, drilled, or augered as close to vertical as possible and checked with a plumb bob or level. Well casings and screen will be placed into the borehole and plumbed by the use of centralizers and/or a plumb bob and level.

E.6.6.2.3.3 Filter Pack Placement

At least six inches of filter material should be placed at the bottom of the borehole to serve as a firm footing. Filter material should then be placed around the well screen, by tremie method, to a minimum of 2 feet above the top of the well screen.

E.6.6.2.3.4 Bentonite Seal

The bentonite seal will be tremied onto the filter pack to a minimum thickness of 2 feet. The bentonite seal should then be allowed to hydrate for a minimum of 8 hours, or the manufacturer's recommended hydration time, whichever is longer.

E.6.6.2.3.5 Cement/Bentonite Grout Placement

After the bentonite seal has hydrated, a grout mixture will be pumped by the tremie method into the annular space around the casing up to within 2-feet of the ground surface or below the frost line, whichever is greater. The grout should be allowed to set for a minimum of 24 hours

before the surface pad and protective casing are installed.

E.6.6.2.3.6 Concrete/Gravel Pad Placement

The concrete surface seal must be constructed with dimensions of one-foot thickness and four feet square. The concrete will be placed in a 2 x 2 foot form around the base of the protective casing at ground surface. The cement surface seal will be reinforced with reinforcing bars. The surface seal must also be constructed to prevent ponding of rainwater or irrigation water around the well and surface water from entering the well.

E.6.6.2.3.7 Protective Cover Placement

Monitoring wells will be finished to the ground surface and installed with watertight flush-mounted traffic and/or manhole covers. The flush-mounted covers should be installed as far above grade as practical to minimized standing water and promote runoff.

E.6.6.2.3.8 Well Identification

All monitoring wells should include a padlock or other specialized lock (keyed alike for all wells onsite) and should be permanently marked with the well number, date installed, site name, top-of-casing elevation and ground elevation.

E.6.6.2.3.9 Well Development

A newly completed well will not be developed for at least 24 hours after the surface pad and outer protective casing are installed. Wells will be developed until the column of water in the well is free of visible particulate matter; if particulate matter does not clear after a sufficient amount of time, development can be stopped at the discretion of the PM, but must be documented in the logbook or Well Construction and Development Log. The monitoring of pH, temperature, specific conductance, dissolved oxygen, and turbidity are not necessary while developing wells. However, recording the drawdown and pump-rate can provide useful information for later purging activities. Wells may be developed through use of the following acceptable methods:

- Backwashing – similar to above, only the pump is alternately started and stopped – allowing the column of water that is picked up by the pump to be alternately dropped and raised up in a surging action. This surge loosens the bridging of the fine particles so they may be moved out of the well. Wells created in formations with low hydraulic conductivity should not use this method.

- Surge Block – surge blocks will be used alternately with a bailer or pump so that material that has been agitated and loosened by the surging action is removed. The process of surging then pumping/bailing will be continued until the well has been properly developed.

E.6.6.2.3.10 Well Survey

Horizontal coordinates and elevation of newly installed wells shall be determined by a state licensed land surveyor. Each well shall be surveyed from a permanent measuring point scribed onto the well riser (north side of riser opening). Vertical measurements (elevations) shall be

measured to within ±0.01 feet. Measurements shall be tied into the horizontal and vertical control established for the site. The RI report will contain a table detailing the construction of all monitoring wells and piezometers. The table will include well name, date of installation, well diameter, construction material, length of casing, well screen slot size, well screened interval referenced to NAD83, total well depth, type and grain size of the filter pack, top of casing referenced to NGVD and NAD83, and ground surface elevation referenced to NGVD.

E.6.6.2.4 Documentation

E.6.6.2.4.1 Logs and Well Installation Diagrams

A field Geologist/Engineer will record all drilling activities in a well log. The well log will contain the following information:

- A record of the soil materials penetrated and the depth to which they were encountered in accordance with ASTM D2488-90
- A record showing lengths of each diameter of casing and screen used and the location of filter pack, bentonite seal, and concrete seal.
- Static groundwater level in the new well and the level at which water was encountered during well construction.

E.6.6.2.4.2 Development Records

All development activities will be documented in a field logbook or Well Construction and Development Log.

E.6.6.2.4.3 Decommission/Abandonment Records

No wells will be decommissioned or abandoned as part of this RI.

E.6.6.2.4.4 Photographs

Photographs will be taken during well installation, development, and sampling. Photographs should be downloaded to the Field Office computer.

E.6.6.2.5 Well Decommission/Abandonment

No wells will be decommissioned or abandoned as part of this RI.

E.6.6.2.6 Water Level Measurement

The total depth of the well casing and water levels will be measured to an accuracy of 0.1 ft. For each well installed, a mark will be made at the top of the casing, on the north side, which will be a reference point for all future water level measurements.

E.6.6.3 Determine Free Product Presence and Sampling

No free product is expected to be in the wells. However, after initial opening of each well, prior to purging, a photo-ionization detector will be used to measure for possible VOCs concentrations. These measurements will be recorded in the Sampling Field Book.

E.6.6.4 Field Measurement Procedures and Criteria

Groundwater parameters measured during sampling activities will be recorded in both the Sampling Field Log Book and on a Groundwater Sampling Data Form. Groundwater Sampling Data Forms will be collected and filed with all site records at the Field Office CP.

E.6.6.5 Sampling Methods for Ground Water – Using Low-Flow Techniques

Prior to the collection of groundwater samples, the monitoring wells will be purged to remove the stagnant water which is not representative of aquifer conditions. Samples may not be collected from newly-established groundwater wells until 24 hours from the completion of development. Purge water disposal will be addressed in the IDW section of the WP. A new pair of clean disposable latex or nitrile gloves will be donned at each sample location.

The procedures for monitoring well purging and sampling are in accordance with FDEP SOP FS 2200 and are as follows:

1. Place plastic around wellhead.
2. Unlock protective casing and remove well cap.
3. Immediately (after well cap removal) take an organic vapor reading down the well casing using a photo-ionization detector and record reading in the field logbook.
4. Measure the water level distance from the top of the casing and sound the total depth (using methods below). Record in logbook. Check tip of water level indicator for silt or product residue (if either are observed, note in logbook).
    a. Lower decontaminated water level indicator into monitoring well until indicator sounds and light is illuminated.
    b. Confirm that the water surface has been contacted by slowly raising and lowering the indicator at least three times to ensure a consistent sounding level has been reached.
    c. Measure and record the depth to the water surface from the top of the casing in the field logbook (to nearest 0.01 feet).
    d. If total depth of well is not known (from boring logs, etc.) lower the indicator slowly to the well bottom and record the total depth. Note that sampling may need to be delayed after sounding if the action has affected stabilization.
    e. Retrieve water level indicator and decontaminate.
5. Calculate the volume of the well. The volume of water in the well can be calculated using the following equation:

$$V = 0.0408\ HD^2$$

Where:
V = volume of the well (gallons)
H = height of water column (feet); [Total Depth of Well – Depth to Water]
D = inside well diameter (inches)

6. Lower decontaminated purging device or tubing into well so that the intake corresponds with the screen interval of the well.
7. Initiate purging. Purge until the water level in the well has stabilized (the well recovery rate equals the purge rate). When water has stabilized, purge a minimum of one volume of the pump, associated tubing, and flow container (if used) prior to collecting the initial measurements of the field parameters. Continue taking parameter measurements no sooner than two to three minutes apart.
8. Observe and record: odor, color, clarity, turbidity and general water condition in the logbook.
9. Temperature, pH, turbidity, dissolved oxygen (DO) and specific conductivity of the groundwater will be measured and recorded in the field book or on the Groundwater Sampling Data Form (Figure E.2). Temperature, pH, and conductivity will be attained using a multi-parameter water quality meter, such as the Horiba U-22 or similar. Turbidity data will be collected through the use of a stand-alone meter. Additionally, note the purging rate, drawdown of the well, pump or tubing intake placement, and length and location of the screened interval on the Groundwater Sampling Data Form.
10. The sample may be collected after the water has cleared sufficiently and the temperature, turbidity, pH, dissolved oxygen, and conductivity have stabilized. To attain stabilization, three consecutive measurements of the five parameters must be within the stated limits before purging is stopped. The range between the highest and the lowest values for the last three measurements of temperature, pH, and specific conductance cannot exceed the limits stated below:

-Temperature:	± 0.2º C
-pH:	± 0.2 Standard Units
-Specific Conductance:	± 5.0% of reading
-Dissolved Oxygen:	≤ 20% Saturation (ideal), or ± 0.2 mg/L or 10%, whichever is greater
-Turbidity:	≤ 20 NTU (ideal), or ± 5 NTUs or 10%, whichever is greater

11. The water level inside the well should be monitored and recorded in the field log book and Groundwater Sampling Data Form while purging the well. The rate of flow should be recorded and adjusted as every attempt should be made to keep the water level from differentiating significantly while purging.
12. Wells with little or no recharge will be purged to near dryness. If a well is purged to dryness, it is considered an adequate purge and samples will be collected after a sufficient recovery (i.e. enough volume to allow for filling of the sample containers).

Groundwater sample collection from a monitoring well will continue as follows:

1. Establish that the well has properly recharged (80% of static water level has recovered). Typically, no more than 6 hours should lapse between purge completion and sample collection. If sample collection does not occur within one hour from purge completion,

the five field parameters should be re-evaluated. The exception to these rules are wells that have gone dry.

2. The explosives and metals samples may be collected through continued use of the low-flow pump, however must be collected before reaching the flow-through cell on the multi-parameter instrument, if used. Perchlorate samples will be filtered through an in-line 0.02µm filter (if water is turbid, water may be placed through a .45µm filter before reaching the 0.02µm filter). The sample will be discharged from the filter line outlet directly into laboratory-supplied pre-preserved sample bottles.
3. After the sample bottles are filled, the cap will be placed on and they will be packaged for shipment as specified in Section E.11.
4. QA/QC samples will be collected as specified in Section E.6.8.

E.6.6.6 Sampling Methods for Ground Water – Water Supply Wells

Water supply wells that need to be sampled for constituents of concern, and are equipped with an operable pump, will also be purged of stagnant water. To do so, the total depth and diameter of the well should be known or accurately estimated, and it must be determined whether or not a storage tank exits. If a storage tank is present and is located before the sample port location, it must also be purged of stagnant water.

The procedures used for water supply well purging are as follows:

1. Locate a sample port or discharge location.
2. Determine volume to be removed based on total depth and diameter of the well (use the well volume equation from Section E.6.6.5) and the storage capacity of the storage tank (if applicable). If this information is not obtainable, the system should be purged for at least 15 minutes.
3. Activate the submersible pump in the well.
4. Begin to remove water from the well, and continue for a minimum of 15 minutes and until it has been determined that the stagnant water has been removed based on discharge rate and well construction.
5. Observe and record: odor, color, clarity, turbidity and general water condition in logbook and on the Groundwater Sampling Data Form. Also record observed construction of the water supply well.
6. After purging the system, measure the temperature, DO, pH, turbidity, and specific conductivity of the groundwater. To ensure that equilibrium has been established, three consecutive readings will be recorded at five-minute intervals. The sample may be collected after the water has cleared sufficiently and the temperature, turbidity, pH, and conductivity have stabilized. To attain stabilization, three consecutive measurements of the fiver parameters must be within the stated limits before purging is stopped. The range between the highest and the lowest values for the last three measurements of temperature, pH, and specific conductance cannot exceed the limits stated below:

-Temperature:	± 0.2º C
-pH:	± 0.2 Standard Units
-Specific Conductance:	± 5.0% of reading
-Dissolved Oxygen:	≤ 20% Saturation (ideal), or ± 0.2 mg/L or 10%, whichever is greater
-Turbidity:	≤ 20 NTU (ideal), or ± 5 NTUs or 10%, whichever is greater

Groundwater sample collection from a water supply well will be as follows:

1. Purge the well as described previously.
2. Disconnect any hoses, filters, or aerators before sampling.
3. Reduce the rate of flow prior to sample collection – ideal rate for sampling is 500 ml/minute or less (this rate may be calculated using an unneeded sample container – e.g. it would take a minute to fill one 500 mL bottle, or 12.5 40 mL voa vials).
4. At the sampling port carefully fill pre-cleaned, pre-preserved, and pre-labeled sample bottles in order of reverse volatility.
5. After the sample bottle is filled, the cap will be placed on the bottle and the bottle will be packaged for shipment as specified in Sections E.11 and E.12.
6. QA/QC samples will be collected as specified in Section E.6.8.

DEP-SOP-001/01
FS 2200 Groundwater Sampling
Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	SITE LOCATION:

WELL NO:	SAMPLE ID:	DATE:

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: feet to feet	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (feet – feet) X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µmhos/cm or µS/cm)	DISSOLVED OXYGEN (circle mg/L or % saturation)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0005; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	SAMPLE PUMP FLOW RATE (mL per minute):	TUBING MATERIAL CODE:	
FIELD DECONTAMINATION: Y N	FIELD-FILTERED: Y N FILTER SIZE: ____ µm Filtration Equipment Type: _____	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)
pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

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Figure E.3 – Groundwater Sampling Log

E.6.6.7 Sample Containers and Preservation Techniques

Sample containers and preservation is specified in Section E.6.7.

E.6.6.8 Field Quality Control Sampling Procedures

QA/QC samples will be collected as specified in Section E.6.8.

E.6.6.9 Decontamination Procedures

E.6.6.9.1 Preliminary inspection and cleaning of Drill Rigs used for well installation and sampling should include the following:

- Equipment should be inspected to insure that all oils, greases, hydraulic fluids, etc., have been removed and all seals and gaskets are intact with no fluid leaks;
- Hollow-stem Augers which are painted or have excessive rust, hard or caked matter, etc. which can not be removed by steam cleaning or wire brushing should be sandblasted;
- Any portion of the rig which is over the borehole should be steam cleaned (soap and high pressure hot water) and wire brushed (as needed) to remove all rust, soil, and other material which may have come from other hazardous waste sites before being brought on-site.

E.6.6.9.2 At the beginning of each monitoring well installation, any portion of the drill rig that is over the borehole (e.g. elly bar or mast, drilling platform, hoist or chin pull-downs, spindles, cathead) should be steam cleaned (soap and high pressure hot water) between boreholes. The following procedures should be used for field cleaning augers, drill stems, rods, tools and other associated drilling equipment:

- Clean equipment with tap water and soap (e.g., LiquiNox®, Alconox®) using a brush if necessary, to remove particulate matter and surface films. Steam cleaning may be necessary to remove matter that is difficult to remove with a brush.
- Drilling equipment that is steam cleaned should be placed on racks or saw horses at least two feet above the floor of the decontamination pad.
- Hollow stem augers, drill rods, etc. that are hollow or have holes that transmit water or drilling fluids should be cleaned on the inside with vigorous brushing.
- Decontaminated drilling equipment should be securely covered with plastic.

E.6.6.9.3 Reusable sampling equipment, such as depth-to-water indicators, flow-through cells,, or any other equipment used for the collection of water samples should be thoroughly washed with soap (e.g., LiquiNox®, Alconox®) and warm water (tap water from a municipal supply is acceptable). Equipment should be rinsed thoroughly using warm water and then analyte-free water. The equipment should then be allowed to dry.

E.6.6.9.5 Any equipment that cannot be cleaned utilizing these procedures should not be used for collecting samples.

E.6.7 Sample Containers and Preservation

Samples collected for the field activities at the Former Pinecastle Jeep Range will be collected following the containers, preservation, and holding time suggestions presented in Table E.3. APPL will provide pre-cleaned and preserved (if applicable) sample bottles for use in collecting HTRW samples. The sample container and preservation requirements are listed below in Table E.3.

E.6.8 Field QA/QC Samples

Field QA/QC samples are used to assess the representativeness of the sampling activities. They are designed to determine what effects activities such as sample container cleaning, sample collection, field decontamination, bottling, and shipping have on sample integrity and to ensure that samples sent to the laboratory are representative of site conditions. Field QC samples collected in support of this study may include field duplicates (FD) and matrix spike/matrix spike duplicate (MS/MSD). Enough sample volume will be collected when QA split, FD and MS/MSD samples are involved.

E.6.8.1 Field Duplicates

Field duplicates will be collected at the frequency of one per every ten field samples per matrix. Duplicate samples are samples collected simultaneously from the same media source under identical conditions, homogenized and split into separate containers. All FDs will be analyzed by the contract laboratory. All samples will be homogenized prior to division of split samples to ensure all sub-samples have the same properties. Field duplicates sent to the laboratories will be labeled so analysts performing laboratory analyses cannot distinguish duplicates from other samples in accordance with the sample numbering requirements in Subsection E.8.1.

E.6.8.2 Matrix Spikes / Matrix Spike Duplicates

For the laboratory analyses, MS/MSDs are used to assess interferences in analytical results caused by the sampled matrix. The analytical laboratory spikes the MS/MSDs with known concentrations of representative target compounds, and then analyzes the MS/MSDs. The percent recovery is calculated and used to evaluate interference effects. One set of MS/MSD will be collected per every twenty field samples per matrix. The samples for MS/MSD may be shared with the parent sample container or have its own container. The MS/MSD samples will be labeled the same as the parent sample with the addition of “MS/MSD” noted on the sample label and on the COC form.

Table E.3
Sample Containers, Preservation, and Holding Times

Parameter	Sample Container	Preservative	Holding Time [1]
Environmental Samples			
Soil and Sediment			
Total Explosives (SW8330)	1 8-oz wide-mouth glass w/ Teflon-lined cap	Cool to 4°C	14/40 days
Metals	1 8-oz wide-mouth glass w/ Teflon-lined cap	Cool to 4°C	28 days for Hg, 180 days for all other metals
Water			
Total Explosives (SW8330)	2 1-L amber bottles	Cool to 4°C	7/40 days[a]
Metals	1 250 mL plastic bottle w/ Teflon-lined cap	HNO_3 to pH<2, Cool to 4°C	28 days for Hg, 180 days for all other metals
Perchlorate	1 250 mL plastic or glass bottle w/ Teflon-lined cap	Cool to 4°C	28 days
Waste Characterization			
Soil \a			
Total Explosives (SW8330)	1 8-oz wide-mouth glass w/ Teflon-lined cap	Cool to 4°C	14/40 days
TCLP Metals	1 4-oz wide-mouth glass w/ Teflon-lined cap	Cool to 4°C	180/NA/180 days \2
TCLP Mercury	Same as TCLP Metals sample	Cool to 4°C	28/NA/28 days \2
TCLP-VOCs	1 4-oz wide-mouth glass w/ Teflon-lined cap	Cool to 4°C	14/NA/14 days \2
Aqueous \a			
TCLP Metals	1 500 mL plastic bottle	HNO_3 to pH<2, Cool to 4°C	28/NA/28 days \2 for mercury 180 days/NA/180 days for other metals
TCLP-VOCs	3 40 mL glass vial w/Teflon-lined cap	HCl to pH<2, Cool to 4°C	14/NA/14 days
pH and Ignitability	1 125-ml plastic and one 500 mL glass w/Teflon-lined cap	Cool to 4°C	Analyzed ASAP

1 - number of days between sample collection and extraction / number of days between extraction and analysis

E.6.8.3 Equipment Blank

Disposable (single use) sampling tools will be used to collect samples from the sampling locations; however, if non-disposable tools are required (e.g. auger buckets), equipment blanks will be collected per every decontamination event.

E.6.8.4 Temperature Blank

A temperature blank is a container (e.g. 40 mL) of water packaged along with field samples in the shipping cooler that will represent the temperature of the incoming cooler upon receipt at the laboratory. Use of these samples within a shipping container enables the receiving laboratory to assess the temperature of the shipment without disturbing any project field samples. All coolers will contain a minimum of one temperature blank.

E.6.8.5 QA Split

The QA split is defined as a triplicate collected from the same location as the parent sample and FD under identical conditions. QA splits, if desired by USAESCH, will be collected one per every ten field samples of similar matrix and will be sent to a government-procured laboratory for analyses. The QA split sample will provide a measure of the representativeness of the sampling procedure and precision between primary and secondary laboratories. The QA split sample containers will be filled immediately after the FD samples. The sample ID will be identical to the parent sample with the addition of "QA" to the name.

E.6.9 Basic Decontamination Procedures

E.6.9.1 Sample collection equipment will be decontaminated by the following process:

1. Wash equipment with tap/potable water and laboratory-grade detergent (Alconox or Liquinox). A scrub brush will be used to remove dirt and surface film.
2. If air monitoring, headspacing of samples, or low-level analysis detections of CA the equipment will be rinsed with bleach solution (5% sodium or calcium hypochlorite).
3. Rinse thoroughly with tap water.
4. Rinse thoroughly with ASTM Type II water.
5. Remove excess water and allow equipment to dry.
6. Wrap equipment in aluminum foil, shiny side out.

E.6.9.2 Equipment decontamination will be conducted in a clean area free of dust. All sampling equipment decontamination water will be containerized in a holding tank or drums and will be analyzed for chemical agent contamination. Disposal of decontamination water is described in Chapter 3 of the Work Plan.

E.7 FIELD OPERATIONS DOCUMENTATION

Field Operations Documentation will, when practical, be generated by field personnel using electronic forms on personal digital assistants (PDA) specifically programmed for this task.

E.7.1 Daily Quality Control Reports

When sampling activities occur, Daily Quality Control Reports (DQCRs) will be prepared, dated, and signed by the Site Manager or Sampling Coordinator. The DQCR will be included with the Site Manager's Daily Report. These individuals will initially send the DQCR, associated Chains-of-Custody, and the updated Sample Log (electronic) to the Project PM and Program Chemist for review. These will then be sent to the USAESCH PM and the USAESCH Project Chemist. The DQCR will include weather information at the time of sampling, field instrument measurements, calibrations, identification of all field and control samples taken, the status of each sample, departures from the SAP, any problems encountered, and onsite verbal or written instructions authorized from Government personnel. Any deviations that may affect data quality objectives will be conveyed to the USAESCH PM and USAESCH project chemist immediately.

E.7.2 Field Logbook

E.7.2.1 A logbook will be maintained during each sampling event. Its primary purpose is to provide documentation of activities which have occurred in the field on any given day, including, conditions or activities that affected the fieldwork. The logbook will be bound with numbered pages. All pertinent information regarding site activities will be documented as near to real-time as possible. Entries in the logbook will be signed and dated. The following is a partial list of the types of information that may be recorded in the logbook:

- Name and title of author; date and time of entry; and physical/environmental (weather included) conditions during the daily field activities.
- Sampling activity purpose and plan.
- Type of sampled media (surface soil).
- Number, type, and volume of samples taken.
- Sample ID number of each sampling points.
- Location of the sampling point.
- Date and time sample was collected.
- Description of sample collection activities and samples.

E.7.2.2 All entries will be made in permanent, waterproof ink. Any corrections made in the logbook will be marked through with a single line and then dated and initialed.

E.8 SAMPLE DOCUMENTATION

E.8.1 Sample Numbering

E.8.1.1 A sample numbering system will be used to identify each sample collected during the Removal Action and for all QC samples. The numbering system will provide a tracking procedure to allow retrieval of information about a particular location and to ensure that each sample is uniquely labeled. The samples will be identified by the following designation scheme.

E.8.1.2 Each sample collected will be preceded by a site name abbreviation to identify the sample's general location. The sample ID will be designated as follows:

Installation Name - Site Name – Type of Sample - Sample Number

An example soil sample label at the Pinecastle Jeep Range, Area A will contain the following information:

PJR – AREA A – SS – 002

Additionally, the sample may contain the anomaly number associated with the sample, and would appear as follows:

PJR – AREA A – A#4567 – SS – 002

E.8.1.3 Each sample name and sample location will be recorded in the sample logbook, the downrange logbook, chain-of-custody documentation, and reflected in daily sampling reports. Sample locations may be referenced by grid identification in order to track specific areas where soil samples were collected.

E.8.1.4 The environmental sample types collected will be soil (SS), sediment (SD), surface water (SW), and groundwater (GW). Depths of each soil sample occurring greater than 12 inches will be incorporated into the sample number, recorded in the sample logbook, and noted in daily sampling reports. The date and time of sample collection will also be recorded in the sample logbook, on chain-of-custody forms, and in daily sampling reports. Other sample abbreviations that may be used include:

- DeconH20 – decontamination water
- EB – equipment blank
- DR – drum sample (IDW)
- TB – trip blank

E.8.1.5 QA samples will be numbered using the same sequential system and notes will be made in the field notebook to record which samples are QA samples. However, duplicates will not be revealed to the laboratory.

E.8.2 Sample Labels

E.8.2.1 Each bottle shipped to the laboratory for analysis will have a sample label (Figure E-4) containing the following information:

- Site Name, e.g., Pinecastle Jeep Range RI/FS
- Site Location, e.g., Area A
- Parsons job number, e.g., 746164.12004
- Sample number designation, e.g., PJR-AREA A-SS-002
- Analysis required, e.g., Explosives
- Preservative added, e.g., None and
- Sampler, e.g., Parsons.

E.8.2.2 Prior to sample collection, sample label information will be completed and the label will be placed on the appropriate bottle and the sample label will be covered with clear tape. Markers with indelible ink will be used to complete the sample labels.

Figure E-4 Sample Label

	PARSONS		
	5390 Triangle Parkway, Suite 100		
	Norcross, GA 30092		
Project:	**Pinecastle Jeep Range RI/FS**	**Job #**	**746164.12004**
Sample ID:			
	PJR – AREA A – SS – 002		
Project -	Site	Location	
Site Name:	**Pinecastle Jeep Range, Area A**		
Analysis:	**Explosives**		
Sampler:	**Parsons**	**Preservative:**	**NONE**

E.8.3 Chain-of-Custody Records

E.8.3.1 COC procedures provide documentation of the handling of each sample from the time it is collected until it is delivered to the lab. COC procedures will be implemented so a record of sample collection, transfer of samples between personnel, sample shipping, and receipt by the laboratory analyzing the sample can be maintained. The COC record (Figure E-5) will serve as a legal record of possession of the sample. The COC record will be initiated with the acquisition of the sample. The COC record will remain with the sample at all times and will bear the name of the person assuming responsibility for the sample. A sample is considered to be under custody if one or more of the following criteria are met:

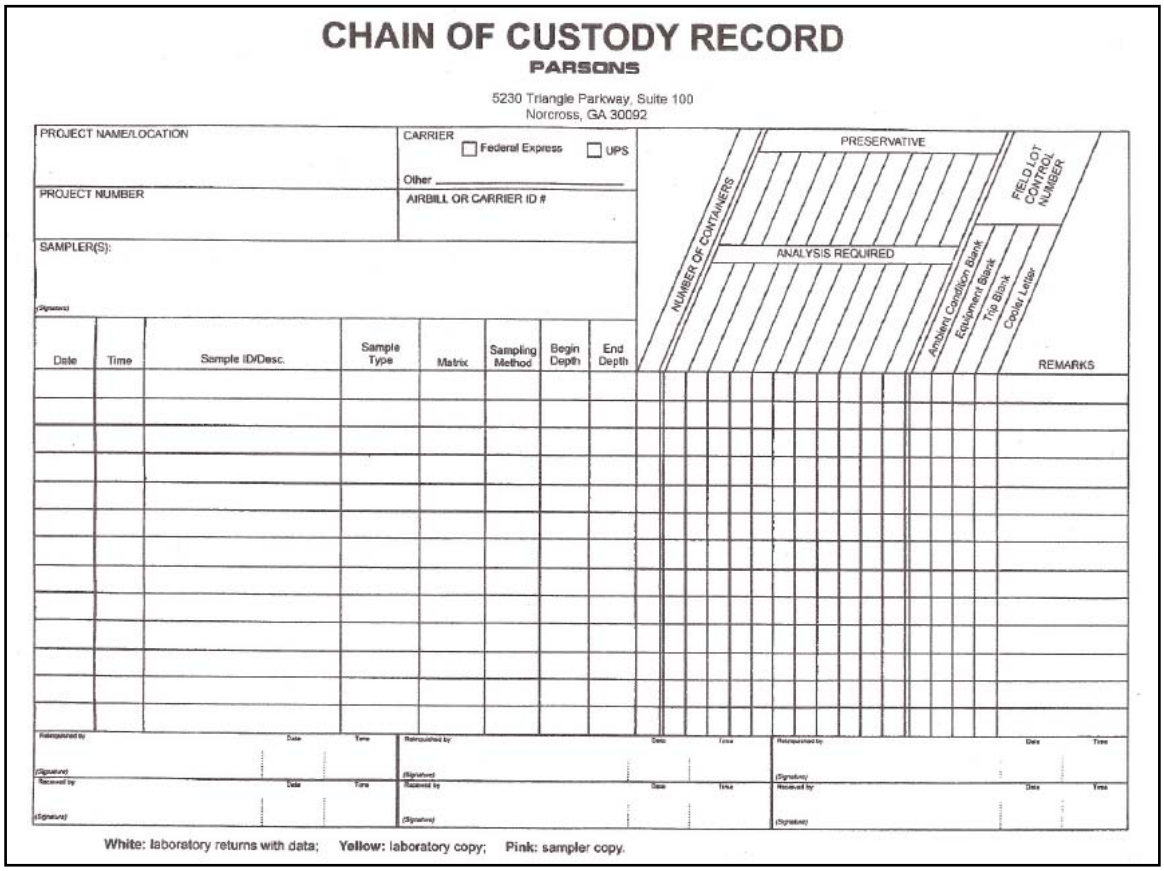
- The sample is in the sampler's possession.
- The sample is in the sampler's view after being in possession.
- The sample was in the sampler's possession and then was locked up to prevent tampering.

- The sample is in a designated secure area.

E.8.3.2 All samples collected will be documented on a COC record. This COC record will be used in the field to document the transfer of samples from Parsons to the contract laboratory or government-procured QA laboratory.

E.8.3.3 All sample shipments will be accompanied by a COC record. To document the transfer of possession of the samples, the person relinquishing the samples, as well as the person receiving the samples, will sign and date the respective COC record.

Figure E-5 Example Chain-of-Custody Form



CHAIN OF CUSTODY RECORD

PARSONS

5230 Triangle Parkway, Suite 100
Norcross, GA 30092

PROJECT NAME/LOCATION

CARRIER ☐ Federal Express ☐ UPS

Other _____

PROJECT NUMBER

AIRBILL OR CARRIER ID #

SAMPLER(S):

(Signature)

PRESERVATIVE

NUMBER OF CONTAINERS

FIELD LOT CONTROL NUMBER

ANALYSIS REQUIRED

Ambient Condition Blank

Equipment Blank

Trip Blank

Cooler Letter

Date	Time	Sample ID/Desc.	Sample Type	Matrix	Sampling Method	Begin Depth	End Depth	REMARKS

Relinquished by (Signature) Date Time

Received by (Signature) Date Time

Relinquished by (Signature) Date Time

Received by (Signature) Date Time

Relinquished by (Signature) Date Time

Received by (Signature) Date Time

White: laboratory returns with data; Yellow: laboratory copy; Pink: sampler copy.

E.9 LABORATORY ANALYTICAL RECORDS

All laboratory analytical records will be maintained by the contract laboratory and QA laboratory in accordance with each lab's standard operating procedures (SOP). See Section E.23 for data delivery requirements.

E.10 DOCUMENTATION PROCEDURES / DATA MANAGEMENT AND RETENTION

Following all site activities, all field documentation will be filed in the permanent project files. All project files will be maintained for seven years.

E.11 SAMPLE HANDLING

Upon collection, all samples will be kept cool by being placed on ice (4 ± 2°C) until analysis has been performed or packaged to ship to a laboratory facility. Once the samples are collected, the following guidelines will be used to initially prepare the sample bottles for shipment to the laboratory:

1. Place containers in bubble pack/sleeve.
3. Place all glass containers in Ziploc-type bag and seal.
4. Use a permanent marker with indelible ink to write the sample ID on the outside of the Ziploc-type bag.
5. Line insulated shipping cooler with a large trash bag and place samples into the lined, insulated cooler then cool (to 4 ± 2°C) using ice.
6. Place all samples in designated cooler. Make sure all samples in the cooler are listed on the COC record. Samples will be placed on ice as soon as possible following collection.

E.12 SAMPLE PACKAGING

The following guidelines will be used to complete the sample packaging procedures for shipment to the laboratory:

1. Seal completed COC record in a ziplock-type plastic bag and tape to the inside of the cooler lid.
2. Pour out water from melted ice and replace with double-bagged fresh ice.
3. Place sample bottles in upright position.
4. Close trash bag and seal with tape.
5. Fill empty spaces in cooler with packaging material for example, bubble pack or vermiculite.
6. Tape cooler drain plug shut.
7. Securely seal shipping container/cooler with packing tape and custody seals (provided by laboratory).
8. Place “This Side Up” labels on all four sides of the cooler and “Fragile” labels on two sides of the cooler.
9. Ship container/cooler to the appropriate laboratory via overnight express.

E.13 SAMPLE SHIPPING

Samples will be sent overnight to:

APPL, Inc.
4203 West Swift
Fresno, CA 93722
Phone: 559-275-2175
POC: Diane Anderson

QA samples for analyses will be sent to the designated government-procured QA laboratory. Once the lab has been identified, a contact name and number and shipping address will be provided for use by the field team.

E.14 INVESTIGATION-DERIVED WASTE (IDW)

Section 3.9 of the Work Plan contains the procedures for the handling of IDW samples. Soil samples will undergo the Toxicity Characteristic Leaching Procedure (TCLP) prior to method analysis. Aqueous samples with less than 0.5% solid will be filtered at the laboratory with a 0.6 to 0.8 µm glass fiber filler, the filtrate is defined as the TCLP extract. Aqueous samples with more than 0.5% solid will be characterized by following SW 1311. Waste samples will be characterized using the methods presented in Table E.4 and will be analyzed for the parameters presented in Table E.5. The final determination for waste characterization will be coordinated with the applicable waste handler prior to sample collection to ensure that all data needed are obtained. Solid samples requiring waste characterization will undergo explosives, TCLP analysis for metals and volatile organic compounds (VOCs)(See Table E.6). In addition, aqueous IDW samples will be tested for pH and ignitability.

Table E.4
IDW Sample Analyses

Parameter	Method	Responsibility	Purpose
TCLP (soil preparation)	SW1311	APPL	Waste Characterization
Explosives (soil)	SW8330	APPL	Waste Characterization
TCLP Metals (soil and aqueous)	SW6020B/7470A	APPL	Waste Characterization
TCLP VOCs (soil and aqueous)	SW8260B	APPL	Waste Characterization
pH (aqueous sample)	EPA 150.1	APPL	Waste Characterization
Ignitability (aqueous sample)	SW1020A	APPL	Waste Characterization

Note: The estimated number of waste characterization samples is presented in Table 3.8, Section 3 of the Work Plan.

Table E.5
IDW Target Compound/Analyte List

TCLP- Metals	
Arsenic	Lead
Barium	Selenium
Cadmium	Silver
Chromium	Mercury
TCLP-VOCs	
Benzene	1,1-Dichloroethylene
Carbon tetrachloride	Methyl ethyl ketone
Chlorobenzene	Tetrachloroethylene
Chloroform	Trichloroethylene
1,2-Dichloroethane	Vinyl chloride
Explosives, according to method SW8330	

E.15 PROJECT LABORATORY ORGANIZATION AND RESPONSIBILITIES

E.15.1 Contract Laboratory

The Laboratory Project Manager will review all data packages prior to reporting. In addition, the Laboratory QA Officer will perform periodic reviews of all QC procedures to ensure compliance with USEPA, NELAC, and DoD QSM current version. Copies of the NELAC certification for APPL for soil matrix are provided in Attachment B. NELAC certification for non-potable water matrix is being obtained at the time this document is being prepared. When obtained, the certificates will be kept on hand in the field.

E.15.2 QA Laboratory

The USAESCH will establish a contract with a laboratory to provide QA analyses for this project. Coordination of the shipment of samples for this laboratory will be coordinated through Michael D'Auben with USAESCH (256-895-1460).

PART II – QUALITY ASSURANCE PROJECT PLAN

E.16 DATA ASSESSMENT ORGANIZATION AND RESPONSIBILITIES

E.16.1 Contract Laboratories

All analytical data will be verified prior to being released by contract laboratory. Verification will include both editorial and technical reviews. The electronic format of the data will be reviewed along with the hardcopy data package. A final review of the data package will be performed and the approved data package signed by the PM, or designee, when complete.

E.16.2 Parsons

The Parsons Project Chemist will validate 100% of analytical data generated during the sampling effort. Validation will include requirements in the specific USEPA methods as well as contractual procedures. The PM will receive data validation reports from the Project Chemist on data quality at the completion of the data validation process.

E.16.3 USAESCH

The USAESCH Project Chemist will be responsible for coordinating with QA lab and will receive all data reports from QA lab. The USAESCH Project Chemist will evaluate all QA data and review all data quality reports prepared by Parsons. The USAESCH Project Chemist for this project is Mr. Michael D'Auben.

E.17 DATA QUALITY OBJECTIVES

E.17.1 DQOs are qualitative and quantitative statements that specify the quality and level of data required to support the decision-making processes during each investigation. Guidance for the DQO development process is contained in Section 4 of EM 200-1-2 Technical Project Planning Process (USACE, 1998), Guidance for the Data Quality Objectives Process, EPA QA/G4 EPA/600/R-96/055 (EPA September 1994) and Data Quality Objectives for Superfund (EPA, 2000). The data collection objectives, data uses, and the appropriate analytical data quality level(s) are identified in this section. Additionally, sampling will be performed in agreement with requirements in the DoD QSM, *Preparation of Sampling and Analysis Plans and Engineer Regulation (ER) 1110-1-263, Chemical Data Quality Management for Hazardous, Toxic, Radioactive Waste Remedial Activities.*

E.17.2 DQOs have been established using the following EPA 7-step method and are presented in Section 2 of the WP:

Step 1: *State the Problem* – Concisely describe the problem to be studied. Review prior studies and existing information to gain a sufficient understanding to define the problem. (see Section 2 of the WP).

Step 2: *Identify the Decision* – Identify what questions the work will attempt to resolve, and what actions may result.

Step 3: *Identify the Inputs to the Decision* -- Identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement.

Step 4: *Define the Study Boundaries* – Specify the times and area to which decisions will apply. Determine when and where data should be collected.

Step 5: *Develop a Decision Rule* – Define the statistical parameter of interest, specify the action level, and integrate the previous DQO outputs into a single statement that describes the logical basis for choosing among alternative actions.

Step 6: *Specify Tolerable Limits on Decision Errors* – Define the decision maker's tolerable decision error rates based on a consideration of the consequences of making an incorrect decision.

Step 7: *Optimize the Design* – Evaluate information from the previous steps and generate alternative data collection designs. Choose the most resource-effective design that meets all DQOs.

E.17.1 Data Use Background

The objective of this sampling effort is to determine the nature and extent of MEC and contamination from MCs at the Former Pinecastle Jeep Range. This work will be accomplished through collection of data of known and documented quality suitable for its intended purpose. Guidance for the procedures to generate data of known quality is contained in ER 1110-1-263, DoD QSM Version 3, EM 200-1-6, Chemical Quality Assurance for HTRW Projects, and EPA National functional Guidelines for Data Review, current version.

E.17.2 Analytical Data Quality Levels

The analytical data quality levels for the data acquisition program are defined as follows:

Definitive analyses of parameters will use the most current promulgated methods for laboratory analyses. This data quality level provides compound-specific results with established quantitation limits, accuracy, and precision. Methods to be used for analyte extraction and analysis are presented in Table E-6.

Table E.6 Analyte Extraction and Analytical Methods

Sample Matrix	Preparation / Extraction Method	Analytical Method
Soil		
Metals	SW3050B	SW6010B
Mercury	SW7471A	SW7471A
Explosives	SW8330A	SW8330A
Water		
Metals	SW3050B	SW6010B

Mercury	SW7470A	SW7470A
Explosives	SW8330A	SW8330A
Perchlorate	SW6850	SW6850
Aqueous (TCLP Leachate)		
Metals	SW3010A	SW6010B
Mercury	N/A	SW7470A
Volatiles	SW5030B	8260B
pH and Ignitability	N/A	EPA 150.1 and SW1020A

E.17.3 Analytical Quantitation Limits

Tables E-7 through E-9 presents the method detection limit (MDL) and practical quantitation limit (PQL) for all target analytes of the primary laboratories and the DQOs. The laboratory will report sample results greater than the MDL but less than the PQL and flag the data with "J" as estimated values.

E.18 QUALITY OBJECTIVES FOR CHEMICAL DATA MEASUREMENT

Data required to complete project objectives must meet adequate QA measures. This section describes DQOs in terms of precision, accuracy, representativeness, completeness, and comparability (PARCC) for both laboratory and field programs.

E.18.1 Laboratory and Field DQO and PARCC Parameters

Control of sampling, analytical, and data reduction errors is important in analyzing the data. DQOs for laboratory analytical data are usually expressed in terms of PARCC parameters. Definitions and descriptions of PARCC parameters are presented in the following subsections. The calculations for precision, accuracy and completeness are presented in Subsection E.22. The field DQOs can be divided into two major segments: those pertaining to field instruments and those related to sample selection, collection, and shipping. The DQOs pertaining to sampling and shipping are presented in the following subsections.

E.18.2 Precision

E.18.2.1 Precision is the measure of the variability of individual sample measurements. Precision will be inferred through the use of laboratory duplicate samples - MS/MSD or parent/MD, laboratory control sample/laboratory control sample duplicate (LCS/LCSD), and parent/FD samples. Frequency of QC sampling is discussed in Subsection A.19. The precision criteria for MS/MSD or laboratory duplicate analyses are listed in Table E-15. Analytes that exceed this value will be flagged during the data validation process.

E.18.2.2 Sampling and shipping precision will be controlled by adhering to the guidelines presented in Subsections A.6 and A.13. Sampling and shipping precision for the quantitative

samples will be inferred through results of the field duplicates sent to the laboratory for analysis. The frequency of the field duplicates is discussed in Subsection E.6.4.1. The precision criteria for field duplicate analyses is 70% (calculated as relative percent difference, RPD, when both results are greater than PQL). Analytes in the field duplicate samples outside the limits will be flagged with "J" during validation.

E.18.3 Accuracy

Accuracy is a measure of analytical bias. Bias is defined as the difference between the actual sample analyte value and the measured/reported laboratory sample analyte value. The exact analytical bias cannot be determined since the actual sample analyte value is not known. Examination of laboratory method blank analytical data, laboratory matrix spiked analytical data (MS/MSDs, LCS/LCSDs), and surrogate compound recoveries (as required by method) allow for assessment of any bias introduced by laboratory sample handling and procedures.

Table E.7
Laboratory MDLs, PQLs, and Action Levels - IDW

Parameters	Human Health-Based Screening Levels	Ecological Screening Levels***	MDL	PQL
IDW Samples				
METALS (TCLP)	**(mg/L)**	**(mg/L)**	**(mg/L)**	**(mg/L)**
Arsenic	5.0	n/a	0.00245	0.010
Barium	100.0	n/a	0.00075	0.005
Cadmium	1.0	n/a	0.00051	0.005
Chromium	5.0	n/a	0.00137	0.005
Lead	5.0	n/a	0.00185	0.010
Mercury	0.2	n/a	0.000064	0.0002
Selenium	1.0	n/a	0.00317	0.010
Silver	5.0	n/a	0.00073	0.001
VOCs (TCLP)				
1,1-Dichloroethene	0.7	n/a	0.00030	0.010
1,2-Dichloroethane	0.5	n/a	0.00014	0.010
2-Butanone	200	n/a	0.0006	0.010
Benzene	0.5	n/a	0.00016	0.010
Carbon tetrachloride	0.5	n/a	0.00010	0.010
Chlorobenzene	100	n/a	0.00021	0.010
Chloroform	6.0	n/a	0.00016	0.010
Tetrachloroethene	0.7	n/a	0.00015	0.010
Trichloroethene	0.5	n/a	0.00016	0.010
Vinyl Chloride	0.2	n/a	0.00023	0.010

Table E.8 Analytical Quantitation Limits for Target Analytes - Soil

Parameter	CAS #	APPL Method Detection Level / Practical Quantitation Limit (mg/kg)*	Human Health Residential Screening Values (mg/kg)		
			FDEP Direct Exposure - Residential	FDEP Leachability Based on Groundwater Criteria	USEPA Region 9 PRGs
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4`	0.080 / 1.0	7.7	0.002	4.4
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	0.080 / 1.0	NA	NA	3100
2,4,6-Trinitrotoluene (TNT)	118-96-7	0.083 / 0.50	28	0.006	16
1,3,5-Trinitrobenzene	99-35-4	0.079 / 0.35	2000	1.0	1800
1,3-Dinitrobenzene	99-65-0	0.063 / 0.30	5.8	0.004	6.1
2,4-Dinitrotoluene	121-14-2	0.083 / 0.35	1.2	0.0004	0.72
2,6-Dinitrotoluene	606-20-2	0.083 / 0.50	1.2	0.0004	0.72
2-Amino-4,6-dinitrotoluene	35572-78-2	0.083 / 0.75	NA	NA	12
2-Nitrotoluene	88-72-2	0.066 / 0.30	400	0.9	0.88
3-Nitrotoluene	90-08-1	0.071 / 1.0	640	1.4	730
4-Amino-2,6-dinitrotoluene	19406-51-0	0.075 / 1.25	NA	NA	12
4-Nitrotoluene	99-99-0	0.095 / 1.0	750	0.9	12
Nitrobenzene	98-95-3	0.075 / 0.50	18	0.02	20
Nitroglycerin	55-63-0	0.185 / 1.0	27	0.03	35
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	0.091 / 1.0	790	NA	610
Pentaerythritol Tetranitrate (PETN)	78-11-5	0.579 / 2.5	NA	NA	NA
Antimony	7440-36-0	0.049 / 0.20	27	5.4	31
Arsenic	7440-38-2	0.043 / 0.35	2.1	NA	0.39
Barium	7440-39-3	0.047 / 0.5	120	1600	5400

Table E.8 Analytical Quantitation Limits for Target Analytes – Soil (continued)

			Human Health Residential Screening Values (mg/kg)		
Parameter	**CAS #**	**APPL Method Detection Level/Practical Quantitation Limit (mg/kg)***	**FDEP Direct Exposure - Residential**	**FDEP Leachability Based on Groundwater Criteria**	**USEPA Region 9 PRGs**
Beryllium	7440-41-7	0.044 / 0.50	120	63	150
Cadmium	7440-43-9	0.028 / 0.50	82	7.5	37
Chromium	7440-47-3	0.029 / 0.50	210	38	210
Cobalt	7440-48-4	0.051 / 0.50	1700	NA	900
Copper	7440-50-8	0.094 / 0.50	150	NA	3100
Lead	7439-92-1	0.092 / 0.50	400	NA	400
Manganese	7439-96-5	0.130 / 0.50	3500	NA	1800
Mercury	7439-97-6	0.0169 / 0.050	3	2.1	23
Molybdenum	7439-98-7	0.074 / 0.50	340	NA	390
Nickel	7440-02-0	0.068 / 0.50	340	130	1600
Selenium	7782-49-2	0.052 / 0.25	440	5.2	390
Silver	7440-22-4	0.036 / 0.50	410	17	390
Strontium	7440-24-6	0.028 / 0.50	6.1	NA	47000
Thallium	82870-81-3	0.041 / 0.5	6.1	2.8	5.2
Vanadium	7440-62-2	0.056 / 0.5	67	980	78
Zinc	7440-66-6	1.145 / 5.0	20000	NA	23000

*** - Final MDL and PQL to be determined in consultation with the Contract Laboratory.**

1 Florida Administrative Code (FAC) 62-77, dtd February 2005
2 USEPA Region 9 PRGs, dtd October 2004 – Residential Soil Criteria
NA Not Available

Table E.9 Analytical Quantitation Limits for Target Analytes - Water

Parameter	CAS #	APPL Method Detection Level / Practical Quantitation Limit (µg/L)+	Human Health Residential Screening Values (µg/L)		
			FDEP Groundwater Criteria	FDEP Surface Water Criteria	USEPA Region 9 PRGs
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4`	0.123 / 0.5	0.3	180	0.61
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	0.115 / 1.0	350	1300	1800
2,4,6-Trinitrotoluene (TNT)	118-96-7	0.133 / 0.5	1.2	49	2.2
1,3,5-Trinitrobenzene	99-35-4	0.130 / 1.0	210	19	1100
1,3-Dinitrobenzene	99-65-0	0.131 / 0.5	0.7	72	3.6
2,4-Dinitrotoluene	121-14-2	0.125 / 0.5	0.05	9.1*	73
2,6-Dinitrotoluene	606-20-2	0.125 / 0.5	0.05	0.7	36
2-Amino-4,6-dinitrotoluene	35572-78-2	0.125 / 1.0	NA	NA	7.3
2-Nitrotoluene	88-72-2	0.126 / 0.5	70	550	0.049
3-Nitrotoluene	90-08-1	0.133 / 0.5	140	380	120
4-Amino-2,6-dinitrotoluene	19406-51-0	0.100 / 1.0	NA	NA	7.3
4-Nitrotoluene	99-99-0	0.133 / 0.5	70	550	0.66
Nitrobenzene	98-95-3	0.126 / 1.0	3.5	90	3.4
Nitroglycerin	55-63-0	0.130 / 1.0	NA	NA	4.8
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	0.133 / 1.0	NA	NA	360
Pentaerythritol Tetranitrate (PETN)	78-11-5	0.607 / 6.0	NA	NA	NA
Antimony	7440-36-0	0.426 / 3.0	NA	4300*	15
Arsenic	7440-38-2	0.654 / 3.5	NA	50*	0.045
Barium	7440-39-3	0.750 / 5.0	NA	NA	2600
Beryllium	7440-41-7	0.070 / 1.0	NA	0.13*	73

Table E.9 Analytical Quantitation Limits for Target Analytes - Water

Parameter	CAS #	APPL Method Detection Level / Practical Quantitation Limit (µg/L)+	Human Health Residential Screening Values (µg/L)		
			FDEP Groundwater Criteria	FDEP Surface Water Criteria	USEPA Region 9 PRGs
Cadmium	7440-43-9	0.299 / 1.0	NA	8.8*	18
Chromium	7440-47-3	1.37 / 5.0	NA	11	NA
Cobalt	7440-48-4	0.317 / 1.5	140	NA	730
Copper	7440-50-8	0.418 / 2.0	NA	**	1500
Lead	7439-92-1	0.366 / 2.0	NA	**	NA
Manganese	7439-96-5	1.23 / 5.0	50	NA	880
Mercury	7439-97-6	0.064 / 0.3	NA	0.012*	11
Molybdenum	7439-98-7	0.530 / 5.0	35	NA	180
Nickel	7440-02-0	0.386 / 5.0	NA	**	730
Selenium	7782-49-2	0.590 / 2.0	NA	5.0*	180
Silver	7440-22-4	0.081 / 0.5	NA	0.07*	180
Strontium	7440-24-6	3.00 / 10	4200	NA	22000
Thallium	82870-81-3	0.320 / 1	NA	NA	2.4
Vanadium	7440-62-2	0.970 / 5	49	NA	36
Zinc	7440-66-6	2.30 / 50	NA	**	11000
Perchlorate	14797-73-0	0.20 / 0.6	4	NA	3.6

+ - Final MDL and PQL to be determined in consultation with the Contract Laboratory.

1 Florida DEP Groundwater and Surface Water Cleanup Target Levels - Administrative Code (FAC) 62-77, dtd February 2005
2 USEPA Region 9 PRGs, dtd October 2004 – Tap Water Criteria
NA Not Available
*Administrative Code (FAC) 62-320.530 – Criteria for Surface Water Quality Classifications – Class III – Recreation, Propogation & Maintenance
** Calculation based upon the hardness or pH of the surface water body – see FAC 62-320.530 for calculation.

Performing all sampling and shipping procedures according to the guidelines presented in Subsections E.6 and E.13 will help assure that adequate accuracy is achieved. The accuracy for the qualitative samples will be inferred through the results of the calibration procedures as described in the instrument manufacturer's manual and results of the equipment blanks. Calibration must take place each time the instrument is turned on prior to sample analysis.

E.18.4 Representativeness

E.18.4.1 Representativeness is the degree to which a set of data accurately reproduces the characteristics of the population. Analyses performed by the analytical laboratory will follow standard analytical methodologies for data representativeness by the methods presented in Subsection E.20. Instrument performance checks, initial and continuing calibrations, laboratory blanks, and internal standards are some of the measures evaluated to determine that representativeness has been achieved.

E.18.4.2 The focus of soil sampling is to bias the effort toward potential soil contamination. Approximate site sampling uniformity will be achieved by selecting sample locations where past military activities occurred. By following the guidelines in Subsection E.20, shipping and handling representativeness can be assumed.

E.18.5 Completeness

E.18.5.1 Completeness is a measure of the amount of data actually collected, analyzed, and validated compared to the amount specified in the ESAP. Laboratory completeness is based on the number of samples shipped to the laboratory and the number of validated analyses performed. The goal for laboratory completeness is 95 percent. The overall measure of completeness achieved will be the ratio of the valid results to the total number of results.

E.18.5.2 Field completeness is based on the number of samples planned and the number of samples taken. The minimum goal for field completeness is 95 percent. However, field teams should take all measures necessary to complete the sampling program. In the event of substantial impact to field completeness, the findings will be thoroughly documented in the final report.

E.18.6 Comparability

E.18.6.1 Comparability expresses the confidence with which one set of data can be compared with another. Comparability can be related to precision and accuracy, as these quantities are measures of data reliability. All measurement data generated will be expressed in units as defined by the method to allow comparability of data among sampling locations, as applicable. The laboratory will maintain a QA/QC program and perform analyses in accordance with applicable USEPA protocols and other applicable standard methods.

E.18.6.2 The analysis data generated will be expressed in units as defined by the method to allow comparability of data among sampling locations. The field team will perform all procedures according to the guidelines in Sections E.6 and E.13 to maintain comparability throughout the sampling effort.

E.19 FIELD QC SAMPLE PROGRAM

The analytical data for all samples must be sufficient in both precision and accuracy to identify the compounds present and the respective concentrations. Field duplicates will be collected and analyzed for laboratory analyses to assess the quality of these data. Duplicate samples will be collected and analyzed to check for sample reproducibility. The Parsons Project Chemist, or the Chemist's designee, will review the data to evaluate precision and accuracy of the data generated. During each sampling effort, a number of QA/QC samples will be collected for laboratory analysis. Described below are the types of QA/QC samples that will be collected and the collection frequency required.

E.19.1 Field Duplicate Samples (FD)

Refer to Subsection E.6.8.1.

E.19.2 Matrix Spike/Matrix Spike Duplicate Samples (MS/MSD)

Refer to Subsection E.6.8.2.

E.19.3 Equipment Rinsate Blanks

Refer to Subsection E.6.8.3.

E.20 SAMPLE RECEIPT, HANDLING, CUSTODY, AND HOLDING TIME REQUIREMENTS

E.20.1 Verification / Documentation of Cooler Receipt Condition

A COC record accompanies the sample container from the field to the laboratory where the sample is obtained, preserved, and then returned to the laboratory. The laboratory's sample custody program must meet the criteria listed below.

- The laboratory has a designated sample custodian responsible for maintaining sample custody and maintaining all associated records documenting sample custody.
- Upon receipt of the samples, the custodian measures and records sample temperature (using the temperature blank) on a cooler receipt form, checks for proper preservation, and checks the original COC documents and compares them with the labeled contents of each sample container for correctness and traceability. The custodian signs the COC record and records the date and time the samples were received. In the event of a discrepancy in the documentation or temperature of temp blank outside $4^{o}C \pm 2^{o}C$, the laboratory will immediately contact the Parsons PM as part of the corrective action process. The Parsons PM will notify USAESCH if samples are received outside the above-listed temperature range.
- A qualitative assessment of each sample container is performed to note any anomalies, such as broken or leaking containers. This assessment will be recorded as part of incoming COC procedures.

- The samples are stored in a secured refrigerator until analyses begin. Refrigerators will be maintained at 4 $\pm$ 2 ^{o}C, and the temperatures recorded daily.
- A copy of the COC and cooler receipt forms will accompany the laboratory report and become a permanent part of the project records.

E.20.2 Corrective Action for Incoming Samples

If any discrepancies are detected during the sample login process at either laboratory, the sample custodian will immediately notify the Laboratory PM and the Parsons PM. The specific procedures for corrective actions will be included in the QA Manual of the selected laboratory and presented in Attachment C.

E.20.3 Holding Times

To maximize representativeness of sample results, all samples will be extracted and analyzed within the holding times specified in each method. Table E-3 presents the maximum holding times allowed for each method. Results of extraction or analysis performed grossly exceeded the holding time may be qualified with "R" during the data validation procedures. Any samples that grossly exceed laboratory holding time for extraction or analysis may be resampled and resubmitted for analysis.

E.21 ANALYTICAL PROCEDURES

E.21.1 This section lists the procedures and methods that will be used to analyze the environmental samples collected during the sampling effort. All laboratory analytical methods will be performed in accordance with the most current promulgated version of USEPA SW-846 and the most current version of the DoD QSM. Table E-4 lists the anticipated analytical parameters and methods to be employed. Note that the laboratory's procedures for subsampling and processing solid matrices must meet or exceed the requirements of SW 846 and the DoD QSM.

E.21.2 Explosives will be analyzed using method SW8330 modified to include target analytes nitroglycerin and Pentaerythritol Tetranitrate (PETN). A copy of the laboratory's Standard Operating Procedures (SOP) for the modified method will be appended to the final QAPP document.

E.21.3 Selected metals will be analyzed using SW 846 methods 6010B and 7471A. Copies of the laboratory's SOPs for the methods will be appended to the final QAPP document.

E.21.1 Preventive Maintenance

All field equipment, instruments, tools, gauges, and other items requiring preventative maintenance will be serviced in accordance with the manufacturer's specified recommendations. Laboratory instruments will be maintained as specified in the laboratory's QA Manual. Maintenance records will be documented and traceable to specific laboratory equipment.

E.21.2 Calibration Procedures and Frequency

E.21.2.1 Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the requirements of the ESAP. Calibration procedures and frequency for the analytical procedures are summarized in Tables E-10.A through E-10.C and in the standard methods. Calibration procedures will meet or exceed the calibration requirements specified in the respective analytical methods and the requirements presented in Tables E-10.A through E-10.C. Calibrations can also be performed at the start and completion of each test run, if required by the method or by Tables E-10.A through E-10.C. Calibration standards used as reference standards will be traceable to the National Institute of Standards and Technology (NIST) or meet the established USEPA criteria, when possible. Calibration, repair, or replacement records will be filed and maintained by the laboratory's personnel performing quality control activities. Calibration records of the assigned laboratory will be filed and maintained at the laboratory location where the work is performed.

E21.2.2 Calibration of field instruments and equipment will be performed at approved intervals as specified in the manufacturer’s recommendations or more frequently as conditions dictate. All calibrations and maintenance of field equipment will be performed according to the manufacturer’s recommendations, provided with the instruments and kept on site.

E.22 LABORATORY QC PROCEDURES

E.22.1 Analytical Sequence QC

Laboratory analyses will be conducted in accordance with the QC requirements listed in the Table E.10.A through E.10.C for appropriate analytical method sequence requirements. The specific analytical sequence varies for each method, but all require a valid calibration and system (method) blank prior to the analysis of samples.

E.22.2 Batch/Matrix-Specific QC

Laboratory QC checks will include method blanks, surrogate, LCS and MS/MSD recoveries,. The frequency, acceptance criteria, and corrective action requirements for each laboratory check are summarized in Tables E-7A and E-7B.

E.22.2.1 Batch-Specific QC

E.22.2.1.1 Batch-specific QCs are those QC procedures applied to an interference-free matrix or a matrix of known composition. Batch-specific QC samples will include blanks, LCSs, and calibration verification standards. They ensure the sampling procedures are appropriate and the analytical methods are being performed in an in-control mode of operation. However, these QC checks provide no information on how well the method is performing with respect to the project sample matrix.

E.22.2.1.2 Method blanks (MB) are analyzed to assess background interference or contamination that exists in the analytical system which might lead to reporting of elevated

concentration levels or false positive data. The MB is defined as a sample of a matrix similar to the batch of associated samples (when available) free from the target analytes and processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses (NELAC). Results of the MB analysis are one of the QC measurements to be used to assess the batch.

E.22.2.1.3 The LCS is analyzed to assess general method performance based on the ability of the laboratory to successfully recover the target analytes from a control matrix. The LCS is a sample matrix, free from the target analytes, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. It is generally used to establish intra-laboratory or analyst-specific precision and bias or to assess the performance of all or a portion of the measurement system (NELAC). Each analyte in the LCS will be spiked with the concentration close to the midpoint of the calibration curve for each analyte. Results of the LCS will be used to assess the batch in conjunction with other QC information.

E.22.2.1.4 The initial calibration curve will be verified as accurate with a standard purchased or prepared from an independent source. This initial calibration verification (ICV) involves analysis of a standard containing all of the target analytes, typically in the middle of the calibration range, each time the initial calibration is performed. The percent recovery of each target analyte in the ICV is determined from the initial calibration and compared with the specifications in each method.

E.22.2.1.5 Continuing calibration verifications (CCV) are analyzed to determine whether the analytical system is working properly, and if a new ICV (and the reanalysis of sample extracts) is required. Calibration verification differs in concept and practice from continuing calibration. In this latter technique, a standard is analyzed and new response factors are calculated, or a new calibration curve is drawn from the analysis of the continuing calibration standard. The Former verifies compliance with the initial calibration curve, but does not overwrite the response factors used for the quantitation, nor allows resloping of the calibration curve. Calibration verification will be used for all analytical methods, calculating a percent drift when the initial calibration is based on regression analysis, and a percent difference when the initial calibration is determined based upon percent Relative Standard Deviation (RSD) values. CCV typically involves analysis of a single primary source standard in the middle of the calibration range, between the concentrations of low-level and mid-level calibration standards.

E.22.2.2 Matrix-Specific QC

E.22.2.2.1 Matrix-specific QCs are those QC procedures applied to field samples to provide information on the precision and bias of the analyses on project samples. These procedures include analyses of field samples in association with MS/MSD, laboratory duplicates, and surrogate compounds, when applicable. Matrix-specific procedures performed on other field samples at the laboratory not associated with the project samples are of no value, because they do not provide information on the matrix under observation.

E.22.2.2.2 The MS is used to assess performance of the method as applied to a particular project matrix. An MS is an environmental sample to which known concentrations of all target

analytes have been added before sample manipulation from the preparation, cleanup, and determinative procedures have been implemented. The spike concentration of the MS should be set at the same level as the LCS. For solid samples, care should be taken to ensure that the original field sample is properly divided into homogeneous fractions when allowed by the method. Results of the MS are evaluated in conjunction with other QC information to determine the effect of the matrix on the bias of the analysis. Sample results will not be corrected for MS excursions.

E.22.2.2.3 The MSD are used to assess performance of the method (accuracy and precision) as applied to a particular matrix and to provide information on the homogeneity of the matrix. Both the MS and MSD are carried through the complete sample preparation, cleanup, and determinative procedures. The normal use of these QC samples would follow the same requirements as described for the MS.

E.22.2.2.4 Surrogates are analyzed to assess the ability of the method to successfully recover these specific non-target analytes from an actual matrix. Surrogates are organic compounds similar to analytes of interest in chemical behavior, but are not normally found in environmental samples. Surrogates to be used are identified within the determinative methods. Depending on the analysis requirements, other compounds may be chosen and used as surrogates, whether they are representative of the compounds being analyzed, and whether they cover the chromatographic range of interest. The surrogates will be spiked into all samples and accompanying QC samples for the explosives analysis prior to any sample manipulation. As a result, surrogates are used in much the same way MSs are used, but cannot replace the function of the MS. Results of the surrogates are evaluated, in conjunction with other QC information, to determine the effect of the matrix on the individual sample determination.

E.23 PERFORMANCE AND SYSTEM AUDITS

E.23.1 General

The laboratory QA Officer will carry out performance or system audits to ensure that data of known and defensible quality are produced during the sampling effort.

E.23.2 Field

Due to the limited time expected to be spent in the field at each installation, field performance audits will not be conducted on this project. However, the Parsons QC Officer will review in detail field procedures and field logs to verify compliance.

E.23.3 Laboratory

Laboratory performance audits will not be conducted by Parsons as part of this project. However, selected laboratory should undergo periodic audits conducted by USACE and NELAC. The contract laboratory must be a NELAC-certified laboratory indicating that it has met the minimum requirements to perform analyses according to NELAC requirements.

E.24 NONCONFORMANCE AND CORRECTIVE ACTIONS

E.24.1 General

When a significant condition adverse to quality is noted at the site or laboratories by the field staff and/or Project Chemist, the cause of the condition will be determined and corrective action taken to preclude possible repetition. Condition identification, cause, reference documents, and corrective action planned will be documented and reported to the Parsons PM, Parsons QC officer, USAESCH Project Chemist, and involved subcontractor management. Implementation of corrective actions will be verified by documented follow-up action. All project personnel have the daily responsibility to promptly identify and report any condition adverse to quality, as well as to solicit the approved corrective action.

E.24.1.1 Corrective Actions

Corrective actions will be initiated at a minimum when:

- predetermined acceptance standards are not attained;
- procedures or data are determined to be faulty; and
- equipment or instrumentation is found faulty.

E.24.1.2 Incoming samples

Problems noted during sample receipt will be documented on an appropriate form (the "Cooler Receipt Form"). The PM or appropriate technical personnel will be contacted immediately for problem resolution.

E.24.2 Sample holding times

If samples cannot be prepared or analyzed within the method-required holding times, the PM or appropriate technical personnel will immediately be notified so an appropriate corrective action plan can be generated. If holding times are exceeded and results reported, the resulting data will be flagged, and a discussion of the impact included within the case narrative.

E.24.2.1 Laboratory QC Samples

The corrective actions for nonconformance in the laboratory QC samples are listed in the Table E-10.

E.24.2.2 Calculation errors

Reports will be reissued if calculation or reporting errors are noted with any given data package. The case narrative will clearly state the reason(s) for reissuing the report.

E.25 DATA REDUCTION/CALCULATION OF DATA QUALITY INDICATORS

E.25.1 Data Reduction

E.25.1.1 Procedures used for calculations and data reduction are specified in each laboratory analytical method referenced in Table E-4. Calculations are required to obtain the final (reported) value for each sample, including factors such as sample dilution ratios and conversion to dry-weight basis for solid samples, as applicable.

E.25.1.2 Data will be reported in the units listed in Tables E-5 and E-6. Concentration units are to be listed on reports and any special conditions, such as dry weight conversions, will be noted. "Non-detects" will be reported as less than the PQL. Also, results reported greater than the MDL but less than the PQL will be reported as estimated and flagged with "J" by the laboratory.

E.25.1.3 Although most sample results are uploaded directly to the laboratory information system, manual data reduction may be necessary in some instances. Data reduction will be performed by the analyst who generates the analytical data. The analyst has the prime responsibility for the correctness and completeness of the data. Each analyst will review his/her work for the following criteria, at a minimum:

- Sample preparation information is correct and complete.
- Analysis information is correct and complete.
- Appropriate laboratory procedures have been followed.
- Analytical results are correct and complete.
- Raw data, including all manual integrations, have been correctly interpreted and documented.
- QC samples are within established control limits.
- Special sample preparation and analytical requirements have been met.
- Data transfers were verified.
- Documentation is complete.

E.25.1.4 The analyst will complete initial review, apply applicable flags as presented in Subsection E.26.2, and document review with a signature. The section leaders or the laboratory Project Manager will perform secondary review including verification and validation according to laboratory's standard operation procedures and quality control manual.

E.25.2 Precision

Precision will be estimated by analyzing duplicate samples. The RPD between the analyte levels measured in the duplicate samples will be calculated using the following equation:

$$RPD = \frac{|V_1 - V_2|}{0.5(V_1 + V_2)} x100\%$$

where:

RPD	=	Relative Percent Difference;
V_1, V_2	=	The two values obtained by making replicate measurements or analyzing duplicate samples;
$\lvert V_1 - V_2 \rvert$	=	The absolute value of the difference between the two measurements; and
$0.5(V_1 + V_2)$	=	The average value of the two measurements.

E.25.3 Accuracy

Accuracy will be estimated by calculating the percent recovery (%R) of MS and MSD samples using the equation below:

$$\% R = \frac{C_j - C_o}{C_t} \times 100$$

where:

%R = Percent Recovery;
C_j = Measured concentration in the spiked aliquot;
C_o = Measured concentration in the unspiked sample; and
C_t = Actual concentration of spike added.

E.25.4 Completeness

Field completeness will be estimated as the percentage of all planned samples that were actually collected and analyzed. The calculation is as follows:

$$\% FC = (A/P) \times 100$$

where:

%FC = Field Percent Completeness;
A = Actual number of samples collected; and
P = Number of planned samples to collect.

Laboratory completeness will be estimated as the percentage of all usable measurements and calculated as follows:

$$\%C = (U/T) \times 100$$

where:

%C = Percent completeness;
U = Number of measurements judged usable; and
T = Total number of measurements.

E.25.5 Method Detection Limits/Practical Quantitation Limit (MDLs/PQLs)

Definitions for MDL and PQL are provided below. Laboratory-specific PQLs and MDLs are presented in Table E-5 and E-6.

- MDL: The MDL is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.
- PQL: The PQL is used to express the lowest concentration of a substance that can be determined within the accuracy and precision limits established for the method. The PQL is established by the lowest initial calibration standard. The actual PQL obtainable for environmental samples is subject to matrix effects and moisture content (solid samples). For samples in which an analyte is not detected, the environmental laboratory will report results as not-detected at the PQL.
- PQL_sa: The PQL_sa is defined as the PQL multiplied by the dilution factor required to analyze the sample, and corrected for moisture and sample size.

E.26 LABORATORY OPERATIONS DOCUMENTATION

The following subsections apply to the chemical analyses performed by the contract laboratory.

E.26.1 Sample Management Records

A copy of the completed COC records and cooler receipt forms for all shipments of samples will be maintained in the laboratory project file. The laboratory will also archive all logbooks associated with the sample management procedures. These records will be filed so they will be easily retrievable in the future, if needed.

E.26.2 Data Reporting Procedures

E.26.2.1 Laboratory Report Requirements

For all analyses, at a minimum, the laboratory report will show traceability to the sample analyzed and will contain the following information required for data validation:

- Case narrative (identifies problems and corrective actions);
- Copy of signed COC;
- Cooler receipt forms documenting the date, time of receipt, condition of samples (including preservation) and labels, temperature of the shipping container, and verification of integrity of the custody seals;
- Laboratory name;
- Client name;
- Date of sample collection;
- Date of sample receipt;
- Date of sample extraction or preparation;
- Date of issue;

- Project name and unique identification number;
- Field sample name/number;
- Laboratory sample number;
- Sample matrix description;
- Analytical method description and reference citation for all analyses, preparation, cleanup procedures;
- Preparation, analysis and other batch numbers;
- Individual parameter;
- Analytical results with correct number of significant figures;
- All confirmation data, when performed;
- Date of analysis (first run and subsequent runs);
- Analysis time;
- Method reporting limits adjusted for sample-specific factors (i.e., aliquot size, dilution/concentration factors, moisture content;
- Method detection limits;
- Concentration units;
- Any data qualifiers assigned;
- Percent moisture or percent solids (all soils reported on dry weight basis);
- Any special conditions;
- Chromatograms, as needed;
- Sample aliquot analyzed;
- Final extract volume;
- Dilution or concentration factors (if dilutions result in non-detect values for all other analytes which showed detected concentrations in previous analyses, results of both runs will be reported with the appropriate notations in the narrative);
- A cross-reference to identify applicable laboratory QC samples with field samples; and
- Corresponding QC summary report.

QC data will be recorded on Contract Laboratory Program (CLP) or CLP-equivalent QC summary forms for the appropriate tests and correlated to the analysis results by the laboratory lot control numbers. QC results are used to prepare control charts for each test and matrix type, and will contain the following items, as appropriate:

- Narratives describing any non-compliant samples;
- Initial and continuing calibration results;

- Method blank;
- Surrogate results;
- LCS results;
- MS/MSD or MS/MD results; and
- Tuning results.

The laboratory will, as a part of the data reduction and validation process, confirm that its documentation is complete, paginated, and legible; qualitative identifications are accurate; calculations are accurate; and results are expressed in the appropriate units. The laboratory will also confirm that data documentation has been approved by the laboratory manager or designee.

E.26.2.2 Electronic Deliverable Requirements

The laboratories also will submit the analytical data for environmental, field, and laboratory QC samples on diskettes or CD-ROM. The electronic data delivery (EDD) will contain the same information as described for the hard copy deliverable in the Automated Data Review (ADR) software format. ADR is a tool developed to aid data users in evaluating the quality of analytical chemistry results. ADR was designed to perform routine data quality accuracy and precision checks traditionally performed through a manual data review. ADR uses a project specific library as a reference for EDD non-conformance checks and automated data review. The project-specific library will be built and maintained by Parsons, and the laboratory and will contain all the methods, target analytes, and QC and validation requirements specified in the QAPP. In general, the EDD submittal will include:

- the laboratory's identification of each field sample;
- field sample identifications;
- analytes;
- results;
- data qualifiers and validation flags;
- concentration units; and
- applicable QC data.

Additionally, the calibration information may be included in the ADR EDD as the laboratory develops the capability to efficiently input the data.

Table E.10.A Explosive Analysis by High Performance Liquid Chromatography (Method 8330)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Demonstrate acceptable analyst capability	Prior to using any test method and at any time there is a significant change in instrument type, personnel, or test method	QC acceptance criteria published by DoD, if available; otherwise method-specified criteria.	Recalculate results; locate and fix problem, then rerun demonstration for those analytes that did not meet criteria	Not applicable (NA)	This is a demonstration of ability to generate acceptable accuracy and precision using four replicate analyses of a QC check sample (e.g., LCS or PT sample). No analysis shall be allowed by analyst until successful demonstration of capability is complete.
Method detection limit (MDL) study	At initial set-up and subsequently once per 12 month period; otherwise quarterly MDL verification checks shall be performed	See 40 CFR 136B. MDL verification checks must produce a response at least 3 times greater than instrument's noise level.	Run MDL verification check at higher level and higher MDL set or re-do MDL study	NA	Samples cannot be analyzed without a valid MDL.
Retention time window width calculated for each analyte and surrogate	At method set-up and after major maintenance (e.g., column change)	Width is ± 3 times standard deviation for each analyte retention time from 72-hour study.	NA	NA	
Minimum five-point initial calibration for all analytes (ICAL)	Initial calibration prior to sample analysis	One of the options below: **Option 1:** RSD for each analyte < 20% **Option 2:** linear – least squares regression: r > 0.995	Correct problem, then repeat initial calibration.	Flagging criteria are not appropriate.	Problem must be corrected. No samples may be run until ICAL has passed.

Table E.10.A Explosive Analysis by High Performance Liquid Chromatography (Method 8330) (Continued)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
		Option 3: non-linear regression: coefficient of determination (COD) r2 ≥ 0.990 (6 points shall be used for second order, 7 points shall be used for third order)			
Second source calibration verification	Once after each initial calibration	Value of second source for all analytes within ± 20% of expected value (initial source)	Correct problem and verify second source standard. If that fails then repeat initial calibration.	Flagging criteria are not appropriate.	Problem must be corrected. No samples may be run until calibration has been verified.
Retention time window position establishment for each analyte and surrogate	Once per ICAL	The center of the retention time window shall be set at midpoint of initial calibration curve.	NA	NA	
Retention time window verification for each analyte and surrogate	Each calibration verification standard	Analyte within established window	Correct problem, and then reanalyze all samples analyzed since the last acceptable retention time check. If they fail, redo ICAL and reset retention time window.	Flagging criteria are not appropriate for initial verification. For CCV, apply a Q-flag to all results for analytes outside the established window.	No samples shall be run without a verified retention time window at the initial verification.

Table E.10.A Explosive Analysis by High Performance Liquid Chromatography (Method 8330) (Continued)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Calibration verification (initial [ICV] and continuing [CCV])	ICV: Daily, before sample analysis CCV: After every 10 field samples and at the end of the analysis sequence	All analytes within ± 20% of expected value from the ICAL	ICV: Correct problem, rerun ICV. If that fails, repeat initial calibration. CCV: Correct problem then repeat CCV and reanalyze all samples since last successful calibration verification.	ICV: Flagging criteria are not appropriate. CCV: Apply Q to all results for the specific analyte(s) in all samples since the last acceptable calibration verification, if reanalysis isn't possible.	If %D for an individual analyte is > 20%, no samples may be analyzed until the problem has been corrected.
Method blank	One per preparatory batch	No analytes detected ≥ ½ RL. For common laboratory contaminants, no analytes detected > RL.	Correct problem. If required, reprep then reanalyze method blank and all samples processed with the contaminated blank.	Apply B-flag to all results for the specific analyte(s) in all samples in the associated preparatory batch	
Laboratory control sample (LCS) containing all analytes required to be reported by the project or contract	One LCS per preparatory batch	QC acceptance criteria specified by DoD, if available; see Table 8.	Correct problem, then reprep and reanalyze the LCS and all samples in the associated batch for failed analytes in all samples in the associated preparatory batch, if sufficient sample material is available (see full explanation in Appendix DoD-D of DoD QSM)	If corrective action fails, apply Q to specific analyte(s) in all samples in the associated preparatory batch	
Matrix spike (MS)	One MS per preparation batch per matrix	For matrix evaluation, use QC acceptance criteria specified by DoD for LCS.	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.	For the specific analyte(s) in the parent sample, apply J if acceptance criteria are not met.	For matrix evaluation only. If MS results are outside the LCS limits, the data shall be evaluated to determine the source of difference and to determine if there is a matrix effect or analytical error.

Table E.10.A Explosive Analysis by High Performance Liquid Chromatography (Method 8330) (Continued)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Matrix spike duplicate (MSD) or sample duplicate	One per preparation batch per matrix	RPD ≤ 30% (between MS and MSD or sample and sample duplicate)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.	For the specific analyte(s) in the parent sample, apply J if acceptance criteria are not met.	The data shall be evaluated to determine the source of difference.
Surrogate spike (analytes identified in Table 7)	All field and QC samples	QC acceptance criteria for LCS specified in Table 7	For QC and field samples, correct problem then reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary.	For the specific analyte(s) in all field samples collected from the same site matrix as the parent, apply J if acceptance criteria are not met. For QC samples, apply Q to specific analyte(s) in all samples in the associated preparatory batch.	Alternative surrogates are recommended when there is obvious chromatographic interference.
Confirmation of positive results (second column or second detector)	All positive results must be confirmed	Calibration and QC criteria same as for initial or primary column analysis. Results between primary and second column RPD ≤ 40%.	NA	Apply J if RPD > 40% from primary column result	Report the result from the primary column unless overlapping peaks are causing erroneously high results, then report the non-effected result and document in the case narrative.
Results reported between MDL and PQL	NA	NA	NA	Apply J to all results between MDL and PQL.	

Table E.10.B Inorganic Analysis by Inductively Coupled Plasma (ICP) and Atomic Absorption Spectroscopy (AA) (Methods 6010B and 7000s Series)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Demonstrate acceptable analyst capability	Prior to using any test method and at any time there is a significant change in instrument type, personnel, or test method	Four LVC runs with 80 - 120%R	Recalculate results; locate and fix problem, then rerun demonstration for those analytes that did not meet criteria	NA	This is a demonstration of analyst ability to generate acceptable accuracy and precision using four replicate analyses of a QC check sample (e.g., LCS or PT sample). No analysis shall be allowed by analyst until successful demonstration of capability is complete.
MDL study	At initial set-up and subsequently once per 12 months; otherwise quarterly MDL verification checks shall be performed	See 40 CFR 136B. MDL verification checks must produce a response at least 3 times greater than instrument noise level.	Run MDL verification check at higher level and higher MDL set or re-do MDL study	NA	Samples cannot be analyzed without a valid MDL.
Instrument detection limit (IDL) study (ICP only)	Every 3 months	Detection limits established shall be ≤ MDL.	NA	NA	Samples cannot be analyzed without a valid IDL.
Linear range or high-level calibration check standard (ICP only)	Every 6 months	Within ± 10% of expected value	NA	NA	

Table E.10.B Inorganic Analysis by Inductively Coupled Plasma (ICP) and Atomic Absorption Spectroscopy (AA) (Methods 6010B And 7000s Series) (Continued)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Initial calibration for all analytes (ICAL) (ICP: minimum one high standard and a blank; CVAA: minimum 5 standards and a blank)	Daily initial calibration prior to sample analysis	ICP: No acceptance criteria unless more than one standard is used, in which case r ≥ 0.995. CVAA: r ≥ 0.995	Correct problem and repeat initial calibration.	Flagging criteria is not appropriate.	Problem must be corrected. No samples may be run until ICAL has passed.
Second source calibration verification	Once after each initial calibration, prior to sample analysis	All analyte(s) within ± 10% of expected value	Correct problem and verify second source standard. If that fails, then repeat initial calibration.	Flagging criteria is not appropriate.	Problem must be corrected. No samples may be run until calibration has been verified.
Continuing calibration verification (CCV)	After every 10 samples and at the end of the analysis sequence	ICP: within ± 10% of expected value CVAA: within ± 20% of expected value	Correct problem, rerun calibration verification. If that fails, then repeat initial calibration. Reanalyze all samples since the last successful calibration.	Flagging criteria is not appropriate.	Problem must be corrected. Results may not be reported without a valid CCV.
Low level calibration check standard (ICP only)	Daily, after one-point initial calibration	Within ±30% of expected value	Correct problem, then reanalyze.	Flagging criteria is not appropriate.	No samples may be analyzed without a valid low-level calibration check standard. Low-level calibration check standard should be less than or equal to the reporting limit.

Table E.10.B Inorganic Analysis by Inductively Coupled Plasma (ICP) and Atomic Absorption Spectroscopy (AA) (Methods 6010B And 7000s Series) (Continued)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Method blank	One per preparatory batch	No analytes detected ≥ ½ RL For common laboratory contaminants, no analytes detected ≥ RL	Correct problem. If required, reprep and reanalyze method blank and all samples processed with the contaminated blank.	Apply B to all results for the specific analyte(s) in all samples in the associated preparatory batch.	
Calibration blank	Before beginning a sample run, after every 10 samples, and at end of the analysis sequence	No analytes detected ≥ MDL	Correct problem, then reprep and reanalyze calibration blank and previous 10 samples	Apply B to all results for specific analyte(s) in all samples associated with the blank.	
Interference check solutions (ICS) (ICP only)	At the beginning of an analytical run	Within ± 20% of expected value	Terminate analysis; locate and correct problem; reanalyze ICS.	Flagging criteria is not appropriate.	No samples may be analyzed without a valid ICS.
LCS containing all analytes required to be reported by the project or contract	One LCS per preparatory batch	80 – 100%	Correct problem, then reprep and reanalyze the LCS and all samples in the associated batch for failed analytes in all samples in the associated preparatory batch.	If corrective action fails, apply Q to specific analyte(s) in all samples in the associated preparatory batch.	
Dilution Test	Each preparatory batch or when a new or unusual matrix is encountered	Five-fold dilution must agree within ± 10% of the original determination	ICP: Perform post-digestion spike (PDS) addition CVAA: Perform matrix spike	Flagging criteria is not appropriate.	Only applicable for samples with concentrations > 50 x MDL (ICP) or > 25 x MDL (CVAA).

Table E.10.B Inorganic Analysis by Inductively Coupled Plasma (ICP) and Atomic Absorption Spectroscopy (AA) (Methods 6010B And 7000s Series) (Continued)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Post-digestion spike (PDS) addition (ICP only)	When dilution test fails or analyte concentration in all samples < 50 x MDL	Recovery within 75-125% of expected result.	Run samples by method of standard addition (MSA) or see flagging criteria.	Apply J to all sample results (for same matrix) for specific analyte(s) for all samples associated with the post-digestion spike addition.	The spike addition should produce a level between 10 and 100 x MDL.
Method of standard addition (MSA)	When matrix interference is suspected	NA	NA	NA	Document use in the case narrative.
MS	One MS per every 20 project samples per matrix	80 – 120%R	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.	For the specific analyte(s) in the parent sample, apply J if acceptance criteria are not met.	For matrix evaluation only. If MS results are outside the limits, the data shall be evaluated to determine the source of difference and to determine if there is a matrix effect or analytical error.
MSD	One per every 20 project samples per matrix	RPD ≤ 20% (between MS and MSD or sample)	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.	For the specific analyte(s) in the parent sample, apply J if acceptance criteria are not met.	The data shall be evaluated to determine the source of difference.
Results reported between MDL and RL	NA	NA	NA	Apply J to all results between MDL and RL	

Table E.10.C: Minimum QC Requirements for MS Methods

QC Element	Minimum Frequency	Criteria/Requirements	Corrective Action/Flagging Criteria	Comments
Holding Time (HT)	All samples	Headspace should be about one-third of the container. HT ≤ 28 days (to be consistent with other EPA requirements) with samples stored at 4 °C +/– 2 °C	None, qualify data with a Q-flag	
Method Reporting Limit	With every initial calibration	Documented in the specific matrix of concern, at or below the applicable regulatory limit Greater than or equal to lowest calibration standard		
Limit of Quantitation (LOQ)	With every initial calibration	Documented in the specific matrix of concern, at or below the applicable regulatory limit Equal to lowest calibration standard. At least 3 times the MDL/LOD	Apply J-flag to all results between LOD and LOQ.	
Method Detection Limit (MDL)	A full MDL study is conducted at initial setup and subsequently once per 12-month period and when major changes occur in the method's operating procedures (e.g., addition of cleanup procedures, column changes, mobile phase changes). If no changes have been made to the method, quarterly MDL verification checks may be performed in lieu of the yearly MDL study.	MDL study must be performed in the matrix of interest using a standard at a concentration that is 1 to 10 times the estimated MDL value. MDL must be validated through the analysis of a low-level spike at ~ 2 times MDL that is taken through the entire preparation process. MDL verification checks must produce a signal at least 3 times the instrument's noise level and meet the isotope ratio criteria of 2.3 to 3.8.	Run MDL verification check at higher level and set MDL higher or re-perform MDL study.	Samples cannot be analyzed without a valid MDL.

Table E.10.C: Minimum QC Requirements for MS Methods

QC Element	Minimum Frequency	Criteria/Requirements	Corrective Action/Flagging Criteria	Comments
Initial Calibration (ICAL)	At method set-up and after major maintenance.	Minimum of 5 calibration standards to establish linearity, r ≥ 0.995 or with an RSD for each analyte (including MRL) of ≤ 20%. The calibration is linear and shall not be forced through the origin. The concentration corresponding to the absolute value of the calibration curve's Y-intercept must be ≤ LOD.	Correct problem, then repeat initial calibration. Flagging criteria are not appropriate.	Problem must be corrected. No samples may be run until ICAL has passed.
Initial Calibration Verification Standard (ICV)	After initial calibration, analysis of a second source standard at the midpoint of the calibration.	%Difference ≤ 15% relative to true value	Correct problem and rerun ICV. If that fails, correct problem and repeat initial calibration. Flagging criteria are not appropriate. No samples may be run until calibration has been verified.	Problem must be corrected. No samples may be run until calibration has been verified.
Continuing Calibration Verification Standard (CCV)	Analysis of mid-level standard after every 10 samples. All samples must be bracketed by the analysis of a standard demonstrating that the system was capable of accurately detecting and quantifying perchlorate.	%Difference ≤ 15% relative to true value	Correct problem and rerun CCV and all samples analyzed since last successful CCV. If that fails, apply Q-flag to all results in all samples since the last acceptable calibration verification, if reanalysis is not possible.	No samples may be analyzed until the problem has been corrected.
Limit of Detection Verification Standard (LODV)	Analyze before and directly after every batch of samples is analyzed. It can be analyzed after every 10 samples in order to reduce the reanalysis rate.	Perchlorate spike concentration is approximately 2 times the limit of detection. Recovery within 30% of its true value. If a sample with perchlorate concentration at or between the LOD and RL is bracketed by a failing LODV, it must be reanalyzed. A sample with concentration above the RL can be reported.	Correct problem and rerun LODV and all samples analyzed since last successful LODV. If that fails, apply Q-flag to all results in all samples since the last acceptable calibration verification, if reanalysis is not possible.	No samples may be analyzed until the problem has been corrected.

Table E.10.C: Minimum QC Requirements for MS Methods				
QC Element	**Minimum Frequency**	**Criteria/Requirements**	**Corrective Action/Flagging Criteria**	**Comments**
Interference Check Sample (ICS)	One ICS is prepared with every batch of 20 samples and must undergo the same preparation and pretreatment steps as the samples in the batch. It verifies the method performance at the matrix conductivity threshold (MCT). At least one ICS must be analyzed daily.	Analysis of a standard containing perchlorate at the RL and interfering anions at the concentration determined by the interference threshold study. Monitor recovery of perchlorate and retention time. Recovery within 30% of the true value.	Correct problem and then reanalyze all samples in that batch. If poor recovery from the cleanup filters is suspected, a different lot of filters must be used to reextract all samples in the batch. If column degradation is suspected, a new column must be calibrated before the samples can be reanalyzed.	No samples may be reported that are associated with a failing ICS.
Method Blanks (MB)	One MB is prepared with every batch of 20 samples and must undergo the same preparation and pretreatment steps as the samples in the batch. .	Perchlorate < ½ of the RL	Correct problem, reprep, then reanalyze method blank and all samples processed with the contaminated blank. Apply B-flag to all results for the specific analytes in all samples in the associated preparatory batch if reanalysis is unsuccessful.	
Laboratory Control Sample (LCS)	One LCS is prepared with every batch of 20 samples and must undergo the same preparation and pretreatment steps as the samples in the batch. The LCS must be spiked at the RL.	Recovery within method requirements, laboratory-generated limits, or 80-120% (whichever is more stringent) to verify calibration and to check method performance.	Correct problem, then reprep and reanalyze the LCS and all associated samples. If corrective action fails, apply Q-flag to all samples in the associated preparatory batch.	
Matrix Spike (MS)	One MS is prepared with every batch of 20 samples and must undergo the same preparation and pretreatment steps as the samples in the batch. The MS must be spiked at the RL..	Recovery within 80-120% or within laboratory generated limits, whichever is more stringent	In the parent sample, apply J-flag if acceptance criteria are not met.	For matrix evaluation only. If MS results are outside the limits, the data must be evaluated to determine the source of the difference and to determine if there is a matrix effect or analytical error.

Table E.10.C: Minimum QC Requirements for MS Methods

QC Element	Minimum Frequency	Criteria/Requirements	Corrective Action/Flagging Criteria	Comments
Matrix Spike Duplicate (MSD) or Laboratory Duplicate (LD)	Collect one per 20 samples per matrix, spiked at the RL. Undergoes same pretreatment steps as the samples.	Recovery within MS limits, relative percent difference < 15%.	In the parent sample, apply J-flag if acceptance criteria are not met.	Evaluate the data to determine the source of the difference.
Laboratory Reagent Blank	Analyzed prior to calibration and after samples with overrange concentration of perchlorate and after each batch is analyzed.	Perchlorate Concentration < ½ RL.	Reanalyze reagent blank (until no carryover is observed) and all samples processed since the contaminated blank. Apply B-flag to all results not preceded by an acceptable reagent blank if reanalysis is not possible.	
Mass Tuning	Optimize setting of the mass spectrometer after mass calibration, after any maintenance is performed, and prior to analyzing a new calibration curve.	Tuning standards must contain the analytes of interest and meet acceptance criteria outlined in the laboratory SOP.	Retune instrument. If the tuning will not meet acceptance criteria, an instrument mass calibration must be performed and the tuning redone.	Sample analysis should not proceed without an acceptable tuning.
Mass Calibration	Instrument must have a valid mass calibration prior to any sample analysis. The mass calibration is updated on an as-needed basis (e.g., QC failures, ion masses show large deviations from known masses, major instrument maintenance is performed, or the instrument is moved).	Mass calibration range must bracket the ion masses of interest without greatly exceeding the range. The most recent mass calibration must be used for an analytical run, and the same mass calibration must be used for all data files in an analytical run. Mass calibration must be verified by acquiring a full scan continuum mass spectrum of a perchlorate stock standard. Perchlorate ions should be within ± 0.3 *m/z* of mass 99, 101, and 107 or their respective daughter ion masses (83, 85, and 89), depending on which ions are quantitated.	If the mass calibration fails, recalibrate. If it still fails, consult manufacturer instructions on corrective maintenance.	No samples may be analyzed under a failing mass calibration.

Table E.10.C: Minimum QC Requirements for MS Methods

QC Element	Minimum Frequency	Criteria/Requirements	Corrective Action/Flagging Criteria	Comments
Isotope Ratio $^{35}Cl/^{37}Cl$	Every sample, batch QC sample, and standard.	Monitor for either the parent ion at masses 99/101 or the daughter ion at masses 83/85 depending on which ions are quantitated. Theoretical ratio ~ 3.06. Must fall within 2.3 to 3.8.	If criteria are not met, the sample must be rerun. If the sample was not pretreated, the sample should be reextracted using cleanup procedures. If, after cleanup, the ratio still fails, use alternative techniques to confirm presence of perchlorate (i.e., a post spike sample, dilution to reduce any interference, etc.). Data must be qualified as estimated (J-flag) and must be noted in the case narrative.	Decision to report data failing ratio check should be thoroughly documented in case narrative.
Internal Standard (IS)	Addition of ^{18}O-labeled perchlorate to every sample, batch QC sample, standard, instrument blank, and method blank.	Measured ^{18}O IS area within +/– 50% of the value from the average of the internal standard area counts of the initial calibration standards. RRT of the perchlorate ion in a sample is the retention time of the perchlorate ion divided by the retention time of the internal standard. The RRT must be 1.0 ± 2% (0.98 – 1.02).	Rerun the sample at increasing dilutions until the +/– 50% acceptance criteria are met. If criteria cannot be met with dilution, the interference are suspected and the sample must be reprepped using additional pretreatment steps. Data must be qualified as estimated with a Q-flag and must be discussed in the case narrative.	If peak is not within retention time window, presence is not confirmed. Use for quantitation and to ensure identification. Failing internal standard should be thoroughly documented in the case narrative.
Interference Threshold Study	At initial setup and when major changes occur in the method's operating procedures (e.g., addition of cleanup procedures, column changes, mobile phase changes).	Measure the threshold of common suppressors (chloride, sulfate, carbonate, bicarbonate) that can be present in the system without affecting the quantitation of perchlorate. The threshold is the concentration of the common suppressors where perchlorate recovery falls outside an 85-115% window.	N/A	This study and site history will determine the concentration at which the ICS suppressors should be set.

Table E.11.A Target Analyte List for Explosives by HPLC

(based on SW-846 Method 8330)

Explosive Compound	CAS #	Comments
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	
1,3,5-Trinitrobenzene	99-35-4	
1,3-Dinitrobenzene	99-65-0	
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	
Nitrobenzene	98-95-3	
2,4,6-Trinitrotoluene (TNT)	118-96-7	
4-Amino-2,6-dinitrotoluene	19406-51-0	
2-Amino-4,6-dinitrotoluene	35572-78-2	
2,4-Dinitrotoluene	121-14-2	
2,6-Dinitrotoluene	606-20-2	
2-Nitrotoluene	88-72-2	
3-Nitrotoluene	99-08-1	
4-Nitrotoluene	99-99-0	
Nitroglycerin	55-63-0	Requires modification to SW8330; must be identified in Lab's SOP
Pentaerythritol Tetranitrate	78-11-5	Requires modification to SW8330 must be identified in Lab's SOP
1,2-Dinitrobenzene (Surrogate)	528-29-0	

Table E.11.B Target Analyte List for Inorganics by ICP and CVAA.

(based on SW-846 Methods 6010B and 7000 Series)

Metal	CAS #	Comments
Antimony	7440-36-0	6010B
Barium	7440-39-3	6010B
Beryllium	7440-41-7	6010B
Cadmium	7440-43-9	6010B
Chromium (total)	7440-47-3	6010B
Cobalt	7440-48-4	6010B
Copper	7440-50-8	6010B
Lead	7439-92-1	6010B
Manganese	7439-96-5	6010B
Mercury	7439-97-6	7471A/7470A
Molybdenum	7439-98-7	6010B
Nickel	7440-02-0	6010B
Selenium	7782-49-2	6010B
Silver	7440-22-4	6010B
Strontium	7440-24-6	6010B
Zinc	7440-66-6	6010B

Table E.11.C Perchlorate by HPLC/MS

(based on SW-846 Methods 6850)

Analyte	CAS #	Comments
Perchlorate	14797-73-0	6850

Table E.12 Number of Marginal Exceedances

Number of Analytes in LCS	Allowable Number of Marginal Exceedances of LCS-CLs
> 90	5
71 – 90	4
51 – 70	3
31 – 50	2
11 – 30	1
< 11	0

Table E.13 Poor Performing Analytes

Analyte	Lower Control Limit	Upper Control Limit	Lower ME Limit	Upper ME Limit
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	10	150	0	172

Table E.14 Surrogates

Analyte	Lower Control Limit	Upper Control Limit
8330 Solid:		
1,2-Dinitrobenzene	70	130

Table E.15 MS/MSD and LCS Control Limits For Explosives

SW-846 Method 8330

Solid Matrix

Analyte	Lower Control Limit	Upper Control Limit	Lower ME Limit	Upper ME Limit
1,3,5-Trinitrobenzene	75	125	65	135
1,3-Dinitrobenzene	80	125	70	135
2,4-Dinitrotoluene	80	125	75	130
2,6-Dinitrotoluene	80	120	70	130
2,4,6-Trinitrotoluene (TNT)	55	140	45	155
2-Amino-4,6-dinitrotoluene	80	125	75	130
2-Nitrotoluene	80	125	70	130
3-Nitrotoluene	75	120	70	130
4-Amino-2,6-dinitrotoluene	80	125	75	130
4-Nitrotoluene	75	125	70	135
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	70	135	65	145
Nitrobenzene	75	125	70	130
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	75	125	65	135
Nitroglycerin	68	131	40	150
Pentaerythritol Tetranitrate (PETN)	69	132	40	150

Table E.15 MS/MSD and LCS Control Limits For Explosives

SW-846 Method 8330

Solid Matrix

Analyte	Lower Control Limit	Upper Control Limit	Lower ME Limit	Upper ME Limit
1,2-Dinitrobenzene (Surrogate)	70	130		

Table E.16 MS/MSD and LCS Control Limits for Inorganics

SW-846 Methods 6010B and 7471A

Solid Matrix

Analyte	Lower Control Limit	Upper Control Limit	Lower ME Limit	Upper ME Limit
Antimony	80	120	75	120
Barium	80	120	80	120
Beryllium	80	120	80	120
Cadmium	80	120	80	120
Chromium (Total)	80	120	80	120
Cobalt	80	120	80	120
Copper	80	120	80	120
Lead	80	120	80	120
Manganese	80	120	80	120
Mercury	80	120	N/A	N/A
Molybdenum	80	120		
Nickel	80	120	80	120
Selenium	80	120	75	120
Silver	75	120	70	125
Strontium	80	120	80	120
Thallium	80	120	80	120
Vanadium	80	120	80	120
Zinc	80	120	75	120

Table E.17 MS/MSD and LCS Control Limits For Explosives

SW-846 Method 8330

Water Matrix

Analyte	Lower Control Limit	Upper Control Limit	Lower ME Limit	Upper ME Limit
1,3,5-Trinitrobenzene	65	140	50	150
1,3-Dinitrobenzene	45	160	30	175
2,4-Dinitrotoluene	60	135	50	145
2,6-Dinitrotoluene	60	135	50	150
2,4,6-Trinitrotoluene (TNT)	50	145	35	160
2-Amino-4,6-dinitrotoluene	50	155	35	170
2-Nitrotoluene	45	135	30	150
3-Nitrotoluene	50	130	35	145
4-Amino-2,6-dinitrotoluene	55	155	40	170
4-Nitrotoluene	50	130	35	145
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	50	160	35	180
Nitrobenzene	50	140	35	155
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	80	115	75	120
Nitroglycerin	70	130	40	150
Pentaerythritol Tetranitrate (PETN)	65	115	40	150
1,2-Dinitrobenzene (Surrogate)	70	130		

Table E.18 MS/MSD and LCS Control Limits for Inorganics

SW-846 Methods 6010B and 7470A

Water Matrix

Analyte	Lower Control Limit	Upper Control Limit	Lower ME Limit	Upper ME Limit
Antimony	80	120	80	120
Barium	80	120	80	120
Beryllium	80	120	80	120
Cadmium	80	120	80	120
Chromium (Total)	80	120	80	120
Cobalt	80	120	80	120
Copper	80	120	80	120
Lead	80	120	80	120
Manganese	80	120	80	120
Mercury	80	120		
Molybdenum	80	120	75	120
Nickel	80	120	80	120
Selenium	80	120	75	120
Silver	80	120	75	120
Strontium	80	120	80	120
Thallium	80	120	80	120
Vanadium	80	120	80	120
Zinc	80	120		

Table E.19 MS/MSD and LCS Control Limits for Perchlorate

SW-846 Methods 6850

Water Matrix

Analyte	Lower Control Limit	Upper Control Limit	Lower ME Limit	Upper ME Limit
Perchlorate	85	115	75	125

E.27 DATA ASSESSMENT PROCEDURES

E.27.1 Data QC Review

Verification of all analytical data will comply with the QA/QC criteria set forth in each analytical method, the QA objectives presented in this ESAP, Tables E-6 and E-7, and any applicable USEPA Region SOPs. The laboratories will conduct a systematic data review before submitting the analytical report. To resolve any conflicting QC requirements, the following order is specified: this QAPP, the DoD QSM, applicable USEPA Region SOPs, and then the National Functional Guidelines for Data Review (EPA, 1999, 2002).

E.27.2 Laboratory Data Reporting Flags

The following flags must be used by the laboratory when reporting results of analyses:

Value - If the result is a value greater than or equal to the PQL, the value is reported.

U - Indicates the compound was analyzed for but not detected. The number is the project reporting level (e.g., the non-detect level) for the sample.

J - Indicates an estimated value for results falling between the MDL and the PQL, or estimated due to some QC issues.

B - Indicates the analyte is found in the method blank as well as the samples.

E - Identifies compounds or elements whose concentrations exceed the upper limit of the calibration range of the instruments for specific analysis.

RE - Analysis performed on a re-extracted sample.

R - The data are unusable for all purposes. The analyte was analyzed but the presence or absence of the analyte has not been verified. Resampling and reanalysis are necessary to confirm or deny the presence of the analyte.

E.27.3 Data Validation

E.27.3.1 Data validation for laboratory data will be performed for all sample results in accordance with the requirements contained in the QAPP, DoD QSM, applicable USEPA Region SOPs, and the USEPA National Functional Guidelines for Data Review (USEPA, 1999, 2002) by the Parsons' Project Chemist. The implementation of the USACE ADR software is currently in process and will be used to assist in the data validation process to the fullest extent possible for this project. Additionally, manual validation may be used to evaluate the laboratory data where necessary. Laboratory results will be assessed for compliance with required precision, accuracy, completeness, and sensitivity. Field QC results will be evaluated for compliance with required precision, accuracy, and representativeness. At a minimum, the review of laboratory data will focus on the following subjects:

- COC forms;
- Holding times;
- Method calibration limits;
- Method blanks;

- Laboratory-established detection limits;
- Analytical batch control records, including spike recoveries and spike duplicate results;
- Surrogate standard recoveries, if applicable;
- Internal standard areas and RTs, if applicable;
- Corrective actions;
- Formulas used for analyte quantitation;
- Calculations supporting analyte quantitation; and
- Completeness of data.

E.26.3.2 Data outliers that fall outside the QC criteria outlined in the DoD QAM will be flagged with an appropriate qualifier descriptive of the outlying condition (e.g., precision limits exceeded, etc.). Data will be flagged in laboratory reports as well as during the data validation process. All data validation flags applied will be added to the EDD with explanation prior to submittal.

E.27.3.3 The following definitions provide explanations of the qualifiers to be assigned to analytical results by the data validators. If additional qualifiers are used, a complete explanation of those qualifiers will accompany the data review.

E.27.4 Organic and Inorganic Data Validation Qualifiers

U - The analyte was analyzed and is not present above the level of the associated value. The associated numerical value indicates the approximate concentration necessary to detect the analyte in this sample (*e.g.*, the project reporting level).

J - The analyte was analyzed for and was positively identified, but the associated numerical value may not be consistent with the amount actually present in the environmental sample. The data should be seriously considered for decision-making and are usable for many purposes.

R - The data are unusable for all purposes. The analyte was analyzed but the presence or absence of the analyte has not been verified. Resampling and reanalysis are necessary to confirm or deny the presence of the analyte.

UJ - A combination of the "U" and "J" qualifiers. The analyte analyzed was not present above the level of the associated value. The associated numerical value may not accurately or precisely represent the concentration necessary to detect the analyte in the sample.

E.28 QA REPORTS

The PM will receive reports on the performance of the data quality at the completion of the data validation process from the QC Manager. These reports will at least include:

- Assessment of measurement quality indicators, *i.e.*, data accuracy, precision, and completeness; and

- Significant QA/QC problems and any impact to the data quality.

Any instance of rejected data will be brought to the attention of the PM as soon as it is detected.

ATTACHMENT A
EXAMPLE DAILY QUALITY CONTROL REPORT

PROVIDED ON ELECTRONIC COPY

ATTACHMENT B
LABORATORY NELAC CERTIFICATE

PROVIDED ON ELECTRONIC COPY

ATTACHMENT C
LABORATORY QA MANUAL AND STANDARD OPERATING PROCEDURES (SOPS) FOR ANALYTICAL METHODS

PROVIDED ON ELECTRONIC COPY

ATTACHMENT D
ECOLOGICAL SCREENING VALUES

Attachment D – Ecological Screening Values for the RI/FS at the Former Pinecastle Jeep Range

Parameters	Ecological Screening Levels		
	Soil (µg/kg)	**Sediment (µg/kg)**	**Water (µg/L)**
EXPLOSIVES			
2-Amino-4,6-dinitrotoluene	5,300 (b)	n/a	1,480 (f)
4-Amino-2,6-dinitrotoluene	5,300 †	n/a	n/a
1,3-Dinitrobenzene	660 (c)	8.61 (f)	22 (f)
2,4-Dinitrotoluene	1,280 (c)	41.6 (f)	44 (f)
2,6-Dinitrotoluene	33 (c)	39.8 (f)	81 (f)
RDX	5,800 (d)	n/a	360 (f)
Tetryl	2,000 (b)	n/a	n/a
Nitrobenzene	40,000 (a)	145 (f)	220 (f)
Nitroglycerin	150,000 (b)	n/a	138 (f)
2-Nitrotoluene	4,100 (b)	n/a	440 (f)
3-Nitrotoluene	5,300 (b)	n/a	750 (f)
4-Nitrotoluene	9,400 (b)	4,060 (f)	1900 (f)
HMX	43,000 (b)	4.7 (f)	150 (f)
1,3,5-Trinitrobenzene	380 (c)	2.4 (f)	10 (f)
2,4,6-Trinitrotoluene	8,000 (e)	n/a	n/a
PETN	21,000,000 (b)	n/a	85000 (f)
METALS	**Soil (µg/kg)**	**Sediment (µg/kg)**	**Water (µg/L)**
Aluminum	50,000 (a)	n/a	87 (f)
Antimony	3,500 (a)	12,000	1300 (a)
Arsenic	10,000 (a)	7,240	190 (a)
Barium	165,000 (a)	20,000 (f)	4 (f)
Beryllium	1,100 (a)	n/a	16 (a)
Cadmium	1,600 (a)	1,000	1.79 (a)
Chromium	400 (a)	52,300	984.32 (a)
Cobalt	20,000 (a)	50,000 (f)	23 (f)
Copper	40,000 (a)	18,700	9.22 (a)
Iron	200,000 (a)	20,000,000 (f)	1000 (f)
Lead	50,000 (a)	30,200	33.78 (a)
Manganese	100,000 (a)	460,000 (f)	120 (f)

Attachment D – Ecological Screening Values for the RI/FS at the Former Pinecastle Jeep Range

Parameters	Ecological Screening Levels		
	Soil (µg/kg)	**Sediment (µg/kg)**	**Water (µg/L)**
Mercury	100 (a)	130	2.40 (a)
Molybdenum	2,000 (a)	n/a	n/a
Nickel	30,000 (a)	15,900	789 (a)
Selenium	810 (a)	2,000 (f)	20 (f)
Silver	2,000 (a)	2,000	1.23 (f)
Strontium	n/a	n/a	1500 (f)
Titanium	1,000,000 (a)	n/a	n/a
Zinc	50,000 (a)	124,000	65.04 (f)

Ecological Screening Value: USEPA Region IV Screening Levels – reference (a) below. If not available in reference (a), U.S. Army Engineering Support Center, Final Sampling and Analysis Plan, Military Munitions Response Program Site Inspections. September 2005.

NA – Not available.

† – Value for 4-amino-2,6-dinitrotoluene not available; used 2-amino-4,6-dinitrotoluene as surrogate.

(a) – USEPA, 2000. USEPA Region IV Memorandum: Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders. Attachment 2: Recommended Ecological Screening Values for Soil. June 23, 2000.

(b) – Los Alamos National Laboratory (LANL), ECORISK Database, 2004.

(c) – USEPA Region V Ecological Data Quality Levels.

(d) – USEPA Eco-SSLs.

(e) – Los Alamos Nuclear Lab Screening Levels.

(f) – Munitions Response Site Prioritization Protocol, 1997. Appendices B-2 (Ambient Water Quality Comparison Values) and B-3 (Freshwater and Marine Sediment Comparison Values)

APPENDIX F
FORMS

List of Forms

Plan Acceptance Form, Site Safety and Health Plan
Daily Site Training Outline, Non-Intrusive/Mobilization
Daily Site Training Outline, Intrusive Operations
Daily Site Manager Report
Daily Quality Control Log
Site Specific Training Form
Safety Meeting Attendance Log
Safety Suggestion Form
Safety/Quality Compliance Checklist
Safety Inspection Log
Site Visitors Log
Key Control Register and Inventory
Heavy Equipment Daily Inspection List
Vehicle Inspection
Notice of Subcontractor Violation of Safety and Health Regulations
Notice of Noncompliance with Safety and Health Regulations
Pit Excavation Form
Direct Reading Instrument Log
Container Form
Container Log
Accident Report Form
Accident Report Follow-up
Report and Investigation of Exposure Incident
Post Exposure Evaluation and Follow-up
Motor Vehicle Inspection (Transporting Hazardous Materials) DD Form 626
OSHA 300 Form
Critical Lift Plan
Explosives Usage Record
Explosives Purchase/Receipt/Authorization List
Explosives Theft or Loss Report Form
Geophysical Dig Sheet and Target History

PLAN ACCEPTANCE FORM
SITE SAFETY AND HEALTH PLAN

Instructions: This form is to be completed by each person to work on the subject project work site and returned to the Site Safety and Health Officer.

I have read and agree to abide by the contents of the Site Safety and Health Plan for the following project:

_____

_____
Name (print)

_____
Signature

_____
Date

Return to Site Safety and Health Officer <u>before</u> starting work at the site.

DAILY SITE TRAINING OUTLINE

Non-Intrusive/Mobilization

Topics Covered:	**Completed/Initials**
Personnel responsible for health and safety	_____
• – Site Safety & Health Officer	
• – CEHNC On Site Safety	
• – SUXOS	
• – Project Manager	
• – Site Manager	
Heat/Cold Injuries	_____
• Heat Stress	
• Exhaustion	
• Stroke	
• Hypothermia	
Slips, trips, falls	_____
• Animal Burrows	
• Steep Inclines	
• Partially buried fencing/barbed wire	
• Muddy/Wet Surfaces	
Health and safety procedures	_____

Daily Site Training Outline
Intrusive Operations

Topics Covered:	**Completed / Initials**
Personnel responsible for health and safety	_____

- – Site Safety & Health Officer
- – CEHNC On Site Safety
- – SUXOS
- – Project Manager
- – Site Manager
- **Potential Chemical Hazards** _____
    - o Vehicle and Fuels
        - Gasoline and Diesel
- **Conventional UXO** _____
    - o List all Areas being investigated that would have UXOs.
        - Ordnance used are xxxxxxxx
- ***Note:*** If encountered or suspect, mark the location and leave the item and report to SUXOS or Site Safety Officer.

Heat/Cold Injuries _____

- Heat Stress
- Exhaustion
- Stroke
- Hypothermia

DAILY STATUS REPORT

1. GENERAL

Contract

Delivery Order

Project Location

Date

REPORT NUMBER

CONTRACTING OFFICER – USAESCH

PROJECT MANAGER – USAESCH

PROGRAM/PROJECT MANAGER – PARSONS

DEPTUTY PROJECT MANAGER

SITE MANAGER

UXO SAFETY – PARSONS

PARSONS DAILY QC INSPECTION
AUDIT AND PRODUCTION LOG

Date:

Contract Number: **Delivery Order:**

Location:

MEC/UXO Items Destroyed

QTY	ITEM DESCRIPTION	QTY	ITEM DESCRIPTION

Total MEC/UXO items destroyed today: _____

The following grids have received a Quality Control check and are ready for QA:
Comments (Include any discrepancies or Project Non-Conformance)

_____

Site UXOQCS

Safety Inspection

Date: Time: Contract Number:
Delivery Order Number: Location:
Weather Conditions:

Type of Inspections: Daily Weekly Special Re-inspection

Location inspected: (List by grid number, coordinates, or description)
Activity inspected:

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Safe Access			
Safe Workspace			
Evacuation Technique			
Personal Protection Equipment			
Work Practices			
Site Control			
First Aid Equipment			
Fire Fighting Equipment			
Heavy Equipment			
Personal Decontamination Station			
Site Mobilization/Demobilization			
Sanitation			
Training			

Overall Inspection Results: Satisfactory Unsatisfactory

III.
Comments:

- Work stopped due to safety violation: Yes No
- Safety violations noted:
- Personnel involved:
- Corrective Measures:
- Site Visitors and Purpose:

IV. Signatures:

_____ _____

Site Safety and Health Officer Site Manager/Project Manager

Site Specific Training Form

Instructions: This form is to be completed by each person to work on the subject project work site and returned to the safety manager.

I have attended and been briefed on the Site Specific Training on

_____

for the following project:

Site Location:

Contract Number:

Print Name: _____

Company: _____

Signature: _____

Date: _____

Return to:

Site Safety and Health Officer

Safety Meeting Attendance Log

Date:	**Time:**	**Contract Number:**
Delivery Order Number:	**Location:**	
Weather Conditions: **(Low/High Temp, Wind/Speed/Dir)** **(Severe Weather)**		
Safety Meeting Topic **(Briefly describe)**		
Attendees:		

Name	Signature	Company

SAFETY SUGGESTION FORM

This form is for use by employees who wish to provide a safety suggestion or report an unsafe workplace condition or practice.

Description of unsafe condition or practice _____

_____

_____

_____

Causes or other contributing factors _____

_____

_____

_____

Employee's suggestion for improving safety_____

_____

_____

_____

Has this matter been reported to the area supervisor?_____

Employee Name (optional) _____

Department _____ Date: _____

Employees are advised that use of this form or other reports of unsafe conditions or practices are protected by law. It would be illegal for the employer to take any action against an employee in reprisal for exercising rights to participate in communication involving safety.

The employer will investigate any report or question as required by the Injury and Illness Prevention Program Standard and advise the employee who provided the information or the workers in the area of the employer's response.

SAFETY/QUALITY COMPLIANCE CHECK LIST

LOCATION: **DATE:**

1. Review Scope of Work & WP	**Yes**	**No**	**N/A**	**COMMENTS**
a. Check for Modifications/Changes & Up To Date				
b. Proper Depth of Clearance Identified				
c. Corrective Action Standards Established				
d. Proper Target Ordnance Identified/Test Sources/Test Plot Established				
e. Most Probable Munitions (MPM) Identified				
f. MSD/MFGD Established				
g. Standards for Turn-In of Recovered MPPEH and Range-Related Debris				
h. Exclusion Zone (EZ) identified in WP				
2. Documentation Requirements/Publications	**Yes**	**No**	**N/A**	**COMMENTS**
a. Notice to Proceed from KO				
b. Approval Letter for Work Plan				
c. Contractor Qualifications, Approval Letter for All UXO Personnel Identified by Name & Position				
d. Certificate of Grounding, Lightning Protection (if Required)				
e. Approval Letter, MSD 1/600				
f. Explosive Safety Submission (ESS) (if Required)				
g. Delivery Order & All Modifications & Change Orders				
h. Explosives Permits/License (If Required)				
i. GFE Inventory/Transfer Documentation (If Required)				
j. Dig Permits for Utilities (If Required)				
k. Rites of Entry (ROE) (If Required)				
l. OE Sector SOPs				
m. Other Reference Publications/Materials				

Site Visitors Log

Contract#:
Delivery Order#:

Page ____ of ____ Pages **Week Ending: _____**

Name (Print)	Signature	Company	Escort Required (Yes/No) & Who	Date Time In	Date Time Out	On Site Safety Brief (Date)

KEY CONTROL REGISTER AND INVENTORY

For use of this form see AR 190-11; the proponent agency is ODCSOPS

UNIT/ACTIVITY	PERIOD COVERED

KEY CONTROL NUMBER(S)
(Insert serial number or other identifying number from the key)

1.	11.	21.	31.
2.	12.	22.	32.
3.	13.	23.	33.
4.	14.	24.	34.
5.	15.	25.	35.
6.	16.	26.	36.
7.	17.	27.	37.
8.	18.	28.	38.
9.	19.	29.	39.
10.	20.	30.	40.

KEY ISSUE AND TURN IN

KEY NUMBER	ISSUED (Date/Time)	ISSUED BY (Printed Name/Signature)	ISSUED TO (Printed Name/Signature)	TURNED IN (Date/Time)	RECEIVED BY (Printed Name/Signature)

PARSONS

HEAVY EQUIPMENT DAILY INSPECTION LIST

Date: _____ **Project No.:** _____

Hour Meter: _____

Type of Equipment: _____

Name: _____

Model: _____

Serial No: _____

Item/Function		Item/Function	
Seatbelts	☐	***Hydraulic System***	
Windshield	☐	**Hoses**	☐
Tire Pressure	☐	**Fluid Level**	☐
Fire Extinguisher	☐	**Steering System**	☐
Brakes		***Engine***	
Service	☐	**Oil**	☐
Parking	☐	**Coolant**	☐
Back-up Alarm	☐	**Hoses**	☐
Horn	☐	**Belts**	☐
Attachment Condition	☐	**Grease Points**	☐

Date Last Services: _____

Items Serviced: _____

_____

Operators Signature: _____

KEY ISSUE AND TURN IN ***(Continued)***

KEY NUMBER	ISSUED (Date/Time)	ISSUED BY (Printed Name/Signature)	ISSUED TO (Printed Name/Signature)	TURNED IN (Date/Time)	RECEIVED BY (Printed Name/Signature)

INVENTORIES (JOINT/SEMIANNUAL)

DATE	PRINTED NAME/SIGNATURE	DATE	PRINTED NAME/SIGNATURE

3. QC Files Established	Yes	No	N/A	COMMENTS
a. Daily/Weekly QC Reports/Audits				
b. Approval Letter's, NTP, for Parsons Operations				
c. Weekly/Monthly Reports (If Provided)				
d. CEHNC Form 948 (Copies)				
4. Accident Prevention Plan (APP)/Site-Specific Safety & Health Plan (SSHP)	**Yes**	**No**	**N/A**	**COMMENTS**
a. Hazard Analysis & Risk Assessment for All Task & Equipment				
b. Training, General Site Workers HAZWOPER Qualified & Current 8-Hour Refresher				
c. Personnel Protective Equipment (PPE)				
d. First Aid Equipment Shall be Immediately Available				
e. Emergency Eye-washes/Showers Comply with ANSI Standards				
f. Fire Extinguishers (Specify Type, Size, and Location)				
g. Visitor Safety Briefing				
h. Emergency Notification List Posted & Available				
i. Emergency Routes/Maps Available & Issued to Each Team				
j. Work Task Identified in Hazard Analysis (APP)				
k. MSDS(s) On-Site. APP				
k. Hazard Analysis for Each Piece of Equipment/Operations				
l. Minimum of Two Personnel On-Site 1st Aid/CPR Trained, EM 385-1-1, Section 3, Page 19, Para 03.A.02				
m. 16-Unit 1st Aid Kits Approved by a competent !st Aid person in the Ratio of 1 for every 25 personnel or less. EM 385-1-1, Section 3, Page 19, Para 03.B.03.a				
n. Site Emergency Procedures (Wild Fires/Severe Weather)				
o. Adequate Means of Reporting Accidents/Near Misses to Parsons, & Clients				
5. Facilities. Reference EM 385-1-1	**Yes**	**No**	**N/A**	**COMMENTS**
a. Adequate Work Space & Facilities (Restrooms, etc.)				

b. Good Housekeeping (No Fire Hazards, Tripping Hazards, etc.)				
c. Approved and Suitable Containers for Flammable, Toxic, or Explosive Materials				
d. Approved/Adequate Explosive Storage Facilities				
e. Fire/Emergency Exits Clear & Unbarred. Fire extinguisher location(s), and route of escape posted as appropriate in facility				
f. Personnel Limits Maintained				
g. Site Security Adequate				
h. Toilets IAW EM 385-1-1, Section 2, Page 21, Para 02.B				
i. Washing Facilities IAW EM 385-1-1, Section 2, Page 23, Para 02.D				
6. Equipment. Reference Approved WP/Manufacturers Operators Manual	**Yes**	**No**	**N/A**	**COMMENTS**
a. Tools Appropriate and Serviceable				
b. Personnel Protective Equipment (PPE) Present, Serviceable & Utilized				
c. Equipment Calibrated (Last Cal. Date _____ Next Cal Date _____)				
d. Survey Equipment Inspected & Serviceable				
e. Heavy Equipment Inspected & Serviceable IAW EM 385-1-1, Section 16.B.01, to include back up alarm				
f. Heavy Equipment w/at least 1 Dry Cell or C02 Fire Extinguisher w/a minimum rating of 5-BC				
g. Two Separate Means of Communications, Radio(s)/Cell Phone, Land Line(s)				
h. Geophysical Equipment on-Hand & Serviceable				
i. Site Vehicles Are Equipped With 1sd Aid Kits & 5-BC Fire Extinguisher IAW EM 385-1-1, Section 18A.02(10)				
j. Competent Person Identified to Inspect & Accept Heavy Equipment IAW EM 385-1-1, Section 16.A.01				
7. Explosive Storage/Receipt/Transportation Requirements. Reference EP 1110-1-18	**Yes**	**No**	**N/A**	**COMMENTS**
a. Proper Storage Containers Type 2 Magazines Conforming to Standards Set froth in Section 55.206 of ATFP 5400.7,				
b. Placards will be displayed on the magazine(s) IAW w/DOD 6055.9-STD, Chapter 2 & 3 for Hazard Division stored in the magazine(s)				

c. Explosive Compatibility Groups Segregated Into Appropriate Hazards Divisions listed in Chapter 3, DOD 6055.9-STD				
d. Security Locks for the Magazines Shall Meet the Requirements Listed in Section 55.208 (a) (4), ATFP 5400.7				
e. Key control will be documented in the WP				
d. Lightning Protection System Serviceable & Tested (Test Date _____)				
e. Fire Fighting Placarding Will be Posted on the Fence IAW DOD 6055.9-STD, Chapter 8 & DA PAM 385-64, Chapter 3 for Hazard Division stored in the magazine(s)				
f. Fire Protection Consisting of Extinguishers, 10-BC or Larger Located at Magazine Area & Vegetation & Trash Cleared in & Around Magazine Area.				
g. Quantity Distance From Magazine IAW WP & Explosive Safety Submission (ESS)				
h. Accountability Records Maintained IAW 55.125, ATFP 5400.7				
i. Explosive NEW Limits Do Not Exceed Limits Stated In the WP & ESS j. Licenses/Permits (If Required)				
k. Initial Receipt Procedures & Documentation On-Site				
l. Procedures for Transportation of Explosives IAW EM 385-1-1, Section 29.B				
m. Pre-Operational Checks of Vehicle Transporting Explosives Using Checklist				
n. Cargo Properly Segregated, Blocked, & in Approved Containers.				
o. Receipt Procedures Accounting for Each Item of Explosives/Documentation On-Site				
p. Individuals Authorized to Receive, Issue, and Transport Identified				
q. Final Disposition Procedures Documented				
r. Reconciliation, Lost/Stolen Receipt Documents/Procedures On-site				
s. Inventory Conducted Weekly @ Minimum				
9. MEC Operational Plan. Reference Approved WP & EP 1110-1-18	**Yes**	**No**	**N/A**	**COMMENTS**
a. Contractor Following Methodology Defined in WP				
1) Daily Safety Meeting Conducted by UXOSO				

b. Detection Equipment Used				
1) Pre-Operational Checks Performed Prior to Sweep Operations				
2) Operational Condition Annotated in Log Book				
3) Team Composition				
4) Quality Control				
5) Quality Control Documentation				
c. Operational Teams Operating IAW WP				
1) UXO Supervisor conducted Physical Check Prior to Operation				
2) Pre-Operational/Safety Brief Conducted				
3) Individual Sweep Lanes Marked IAW WP				
4) Contacts Marked & Investigated Properly				
5) Results of Sweep Operation Recorded				
6) All MEC ,Munitions Debris, & MPPEH is Examined & Positively Identified by at Least Two UXO Qualified Personnel				
7) Actions Taken When MEC Items Identified Are Not Consistent With WP				
8)All MEC/UXO Clearly Marked				
d. QC Operations IAW WP				
e. Other Material Being Collected (as Required)				
f. MPPEH Inspected/Vented/Segregated				
g. Geophysical Test Grids Appropriate and IAW SOW				
h. Project Data Base & PDA Entries Are Consistent With Intrusive operations				
10. Disposal Operations IAW WP and 60-1-1-31	**Yes**	**No**	**N/A**	**COMMENTS**
a. Disposal Method IAW WP				
b. Adequate Security For Disposal Operation				
c. Disposal Notification List Available				
d. All Necessary Notifications Made				
e. Movement of MEC Items, or is MEC Consolidation Feasible				

f. Protective Measures/Tamping Being Used/Appropriate for MEC Being Destroyed				
g. Disposal Procedures IAW 60A-1-1-31/WP				
1) Misfire Procedures Properly Performed				
h. Conducted Complete Demolition Briefing				
11. Location Survey & Mapping Plan	**Yes**	**No**	**N/A**	**COMMENTS**
a. Registered Land Surveyor				
b. Surveyors Received Site Specific Training				
c. UXO Escort Provided				
d. Grid Stake, Locations Swept With Geophysical Equipment Prior to Driving Stakes				
e. Survey Notes Being Recorded				
12. Quality Control Plan	**Yes**	**No**	**N/A**	**COMMENTS**
a. QC Operational/Checks Being Conducted IAW WP				
b. QC Grid Sweep Pattern Adequate				
c. Results of QC Checks Being Recorded				
d. Nonconformance reports issued if QC checks show discrepancies, or for QA failures				
e. Intrusive Results/Data Base/PDA Entries Are QC'd				
13. Vegetation Removal	**Yes**	**No**	**N/A**	**COMMENTS**
a. Equipment Operated To Prevent Impact With Possible Surface MEC				
b. Cutting Does Not Present Implement Hazard				
c. UXO Personnel Monitoring Cutting Operation				
d. MEC Discovered Marked/Handled Appropriately				
e. Equipment Being Operated Safely & IAW Operators Manual				

SIGNATURE: _____

COMMENTS: See attached audit memorandum.

Attendees:		
Name	**Signature**	**Company**

Site Safety and Health Officer

2. FIELD INFORMATION

2.1 Statistical Data:

Site	Category	Total	Completed Today	Cumulative No.	Percent Completed	Comments/QC

2.2 Weather:

Significant Comments:

2.3 Detailed OE Listing *(includes comments relating to type of OE located during the week by grid/transect its locations (coordinates), depth, orientation, and disposition. Include a summary of all OE recovered to date by ordnance type*

2.4 Results of Daily Inspections

2.5 Operations Planned for Next Work Day:

2.6 Personnel on Site (excluding Visitors)

Name	Position	Organization	Comments

2.7 Summary of Vehicles and Equipment (*list trailers, backhoes, trucks for Parsons, subs, government agencies, etc)*

Vehicles

Vehicle Type	Source	Cost/Month	VIN/SN	Miles to Date	Assigned To:

*May be recorded weekly.

Equipment

Equipment	Vendor	Assigned to:	Rental Cost	Date on Site	Date off Site

*May be recorded weekly.

2.8 Demolition Materials Accounting

2.9 Site Visitors

Name	Organization	Purpose of Visit	Date of Safety Brief

3.0 INCIDENTS/ACCIDENTS/NEAR MISSES:

3.1 Exposure Data: Week Ending XX/XX/XX

Organization & # of Staff on Site	Man-hours (W)	Vehicle Miles (W)	Total Miles to date	# of Accidents to date

4.0 DAILY QUALITY CONTROL REPORT (DQCR) FOR ENVIRONMENTAL SAMPLING

4.1 Daily Events:

4.2 Departures from the Field Sampling and Analysis Plan

4.3 Instructions from Government Personnel

5.0 COMPLETION STATUS OF SITE ACTIVITIES

Activity	Site Location	Site Location

Topics Covered:	**Completed / Initials**
Slips, trips, falls	_____
• Animal Burrows	
• Steep Inclines	
• Partially buried fencing/barbed wire	
• Muddy/Wet Surfaces	
Health and safety procedures	_____
Safe work practices	_____
• Equipment Spotters	
• Recognized hand signals	
Engineering controls	_____
Emergency procedures/Rally Point	_____
• Emergency Signal (3-5sec blasts)	
• Rally Point (Site Determined)	
Biological Hazards	_____
• Poison Ivy/Oak/Sumac	
• Snakes	
• Bees/Wasps	
Radios/Cellular Phones/GPS	_____
• Channel Frequency	
• Cellular Phones (List of assigned numbers)	
• GPS	
• Communications Checks (Twice all site elements)	
MSDS Logs/Records	_____
Located at Operations/CP	

Topics Covered:	**Completed / Initials**
Vehicle/Heavy Equip traffic	_____
• Use of Seat Belts	
• Sound Horn prior to backing vehicles without warning device	
• Vehicle speeds on Post and in Compound	
Personnel Protective Equipment	_____
• Safety Glasses	
• Leather Work Gloves	
• First Aid Kit (per vehicle)	
• Fire Extinguisher (per vehicle)	
• Maps and Grid Sheets	
• Remote Operations/First Aid Handout	
MSDS Logs/Records	
• Located at Site Office	_____
Hospital/Routes	
• **All Site Related Injuries**	_____
Team will transport to closest Medical Facility	
• List those facilities/phone numbers/provide maps	
o **After Hours – Site personnel will go to XXXX**	
Break Area/Smoking Area	_____
Cardinal Principle	_____

- "Any operation involving explosives, ammunition or toxic chemical agents is to limit the potential exposure to a minimum number of personnel, for a minimum period of time and to a minimum of the hazardous material consistent with a safe and efficient operation"

Topics Covered:	**Completed / Initials**
Today's Safety Tip	_____
Today's operations (-Site Manager's)	_____

_____

SSHO's Signature/Date

Topics Covered:	**Completed / Initials**
Safe work practices	_____
• Equipment Spotters	
• Recognized hand signals	
Engineering controls	_____
Emergency procedures/Rally Point	_____
• Emergency Signal (3-5sec blasts)	
• Rally Point	
Biological Hazards	_____
• Poison Ivy/Oak/Sumac	
• Snakes	
• Bees/Wasps	
Radios/Cellular Phones/GPS	_____
• Channel Frequency	
• Cellular Phones (List of assigned numbers)	
• GPS	
• Communications Checks (Twice all site elements)	
Vehicle/Heavy Equip traffic	_____
• Use of Seat Belts	
• Sound Horn prior to backing vehicles without warning device	
• Vehicle speeds on the roads	
MSDS Logs/Records	_____
• Located at Operations/CP	

Topics Covered:	**Completed / Initials**
Personnel Protective Equipment	_____

- Safety Glasses
- Leather Work Gloves
- First Aid Kit (per vehicle)
- Fire Extinguisher (per vehicle)
- Maps and Grid Sheets
- Remote Operations/First Aid Handout

Hospital/Routes

- **All Site Related Injuries** _____

  Team will transport to closest Medical Facility

- List those facilities/phone numbers/provide maps
  - **After Hours – Site personnel will go to XXXX**

Today's operations (Site Manager's) _____

_____

SSHO's Signature/Date

Vehicle Inspection

Explosive Vehicle Inspection, ON-SITE			
This form must be filled out for any vehicle carrying explosives, prior to loading.			
DRIVERS NAME		LICENSE NUMBER	
COMPANY			
TYPE OF VEHICLE		VEHICLE NUMBER	
INSPECTION DATE/TIME		INSPECTOR	
PART INSPECTED	SAT.	UNSAT.	COMMENT
HORN			
STEERING SYSTEM			
WIPERS			
MIRRORS			
FIRE EXTINGUISHERS (10 ABC, 2 EACH)			
REFLECTORS			
EMERGENCY FLASHERS			
LIGHTS			
ELECTRIC WIRING			
FUEL SYSTEM			
EXHAUST SYSTEM			
BRAKE SYSTEM			
SUSPENSION			
CARGO SPACE			
TIRES, WHEELS, RIMS			
TAILGATE			
TARPAULIN			
INSPECTION RESULTS (INSPECTOR INITIAL)			
ACCEPTED:			
REJECTED:			
REMARKS			
DRIVERS SIGNATURE/DATE			INSPECTORS SIGNATURE/DATE

PARSONS

Notice of Subcontractor Violation of Safety and Health Regulations

Date: _____

Contractor Name: _____

Address: _____

_____

_____

Attention: _____

This letter officially notifies you that you have been found to be in violation of the following Safety Regulations:

_____

on (date) _____, by_____.

Confined Space Entry	___	Lockout/Tagout	___	Hot Work	___	Personal Protective Equipment	___
Knowledge of the environment	___	Awareness of warning alarms	___	Evacuation routes	___	Back-up Alarms	___
Assembly locations	___	Fall Protection	___	Scaffolding	___	Environmental/Hazardous Material Storage	___
Trenching	___	Safe Work Practices	___	Security Practices	___		___

Other: _____

_____

_____

This/These violations occurred at the following locations: _____

_____

at the following times_____ and dates _____

The name of the employees was/were _____

under the supervision of_____.

PARSONS

Notice of Noncompliance with Safety and Health Regulations

Under conditions of this enforcement procedure, check all items that apply:

_____ 1. You are being notified of this violation and should take corrective action to prevent a reoccurrence. The corrective action shall be documented to the Parsons Construction Management representative immediately.

_____ 2. You must submit a plan for compliance to your Parsons Construction Management representative and the Construction Safety Manager within two days of receipt of this letter. The compliance plan must include the means or methods of compliance and the date that the requirements for compliance will be completed. Once compliance has been achieved, a follow up letter must be sent to the Parsons Construction Management representative and Construction Safety Manager. Failure to comply will result in disciplinary action against your Company.

_____ 3. You are required to review the stated procedures with your Parsons Construction Management representative. Work may not commence on the site until the review is complete and the Subcontractor responds formally that the procedure is understood and will comply.

_____ 4. You are required to review the stated procedures with your Parsons Construction Management representative. Work may not commence on the site until the review is complete and you must confirm formally the disciplinary action to be taken against the supervisor and employees.

_____ 5. All work on the site will stop until the Parsons Construction Management representative reviews all the facts with the Subcontractor and determines if the contract between the parties will be terminated.

Sincerely,

_____

Parsons Representative

cc: Issuing Construction Manager Representative
Job File
GBU Safety Manager
Project Manager

PIT EXCAVATION FORM

Site: _____

Anomaly No.: _____

Date Started: _____

Date Completed: _____

Equipment Used: _____

Operator(s): _____

Team: _____

Excavation No.: _____

Dimensions: _____

Maximum Depth: _____

Sketch Excavation in Box Above

Items Found:

Item	No.	Type	Disposition	Comments

Note: For type, use UXO, OE (non-UXO), ORS (ordnance related scrap), SA (small arms), NC (no contact), or OT (other).

PARSONS

DIRECT READING INSTRUMENT LOG

DATE: _____ **JOB NO:** _____

PROJECT: _____ **OPERATOR:** _____

INSTRUMENT: _____ **CALIBRATION:** _____
AMT., COMPONENT, DATA

PROJECT ACTIVITIES: _____

_____

_____

_____

BACKGROUND READING: _____

WEATHER CONDITIONS: _____

TIME	LOCATION	READING (units)	DURATION (Minutes)	COMMENTS

Container Form

U.S. Army Corps of Engineers

PARSONS

Container: _____

Date Generated: _____

Which set of drums: _____
(if applicable)

Container Type (circle):

- Steel Open Top
- Steel Closed Top
- Polyethylene
- Other: (describe) _____

Waste Type (circle):

- Soil
- Decon Water
- Scrap
- PPE

Size: _____

Estimated Weight: _____

Source of container contents, location, and depth:

_____

_____

_____

_____

Sample identifiers:

_____

_____

_____

_____

Comments:

_____

_____

_____

_____

ACCIDENT REPORT FORM

EMPLOYER

1. Name: _____

2. Mail Address: _____
(No. and Street) (City or Town) (State and Zip)

3. Location :_____
(if different from mail address)

INJURED OR ILL EMPLOYEE

4. Name:_____Social Sec. No.:_____
(first) (middle) (last) Employee No:_____

5. Home Address: _____
(No. and Street) (City or Town) (State and Zip)

6. Age:_____ 7. Sex: male ( ) female ( )

8. Date of injury or illness: _____ Time of accident:_____

9. Occupation: _____
(specific job title, not the specific activity employee was performing at time of injury)

10. Department: _____
(enter name of department in which injured person is employed, even though they may have been temporarily working in another department at the time of injury)

THE ACCIDENT OR OCCUPATIONAL ILLNESS

11. Place of accident of exposure:_____
(No. and Street) (City or Town) (State and Zip)

12. Project: _____

13. Was place of accident or exposure on employer's premises? Yes ( ) No ( )

14 How did the accident occur? _____
(describe fully the events that resulted in the injury or occupational illness.

_____

Tell what happened and how. Name objects and substances involved. Give details on all factors that led to

_____

accident. Use separate sheet for additional space).

15. What was the employee doing when injured? _____
(be specific--was employee using tools or equipment
_____
or handling material?)
_____

16 WITNESS TO ACCIDENT _____
(Name) (Affiliation) (Phone No.)
_____
(Name) (Affiliation) (Phone No.)

17 Name the object or substance that directly injured the employee. _____
(for example, object that struck
_____
employee; the vapor or poison inhaled or swallowed; the chemical or radiation that irritated the skin; or in
_____
cases of strains, hernias, etc., the object the employee was lifting, pulling, etc.)

18. Did the accident result in employee fatality? Yes ( ) No ( )

19. Number of lost days ____/restricted workdays ____ resulting from injury or illness?

OTHER

20. Name and address of physician:_____
(No. and Street) (City or Town) (State and Zip)

21. If hospitalized, name and address:_____
(No. and Street) (City or Town) (State and Zip)

22. Initial diagnosis of injury/occupational illness: _____
Date of report: _____ Prepared by:_____
Official position:_____

23. Treatment rendered: r first aid r medical treatment
_____
_____

PARSONS

ACCIDENT REPORT FOLLOW-UP

Employee: _____ Date of injury or illness: _____

ANALYSIS - What caused the accident. Why did it happen:

Primary cause:

_____
_____
_____
_____
_____
_____

Contributing factors:

_____
_____
_____
_____
_____
_____

PREVENTIVE/CORRECTIVE ACTION - State what will be done to prevent re-occurrence.

Immediate action:

_____
_____
_____
_____
_____
_____

Who is responsible _____ Completion date(s): _____

Long-term action:

_____
_____
_____
_____
_____

Who is responsible _____ Completion date(s): _____

Closed by _____

Facility Health and Safety Representative date

PARSONS

REPORT AND INVESTIGATION OF EXPOSURE INCIDENT

Name of exposed person: _____ **Date of incident:** _____

Office: _____ **Time of incident:** _____

Location: _____

Potentially infectious materials involved:

Type: _____ **Source:** _____

_____ _____

Circumstances (work being performed, etc.): _____

_____

_____

How incident was caused (accident, equipment malfunction, etc.): _____

_____

_____

Personal protective equipment being used: _____

_____

_____

Actions taken (decontamination, clean-up, reporting, etc.): _____

_____

_____

Recommendations for avoiding a reoccurrence: _____

_____

_____

Report prepared by: _____

Title: _____ **Date:** _____

PARSONS

POST-EXPOSURE EVALUATION AND FOLLOWUP

The following steps must be taken, and information transmitted, in the case of an employee's exposure to bloodborne pathogens:

Name of exposed person: _____ **Date of incident:** _____

Office: _____ **Time of incident:** _____

ACTION TAKEN	DATE
Employee furnished with documentation regarding exposure incident	_____
Source individual identified	_____
_____ Source individual's name	
Source individual's blood tested and results given to exposed employee	_____
Consent could not be obtained	
Reason: _____	
Exposed employee's blood collected and tested	_____
Appointment arranged for employee with healthcare professional	_____
_____ Professional's name	
Documentation forwarded to healthcare professional	_____

Bloodborne Pathogens Standard
Description of exposed employee's duties
Description of exposure incident, including routes of exposure
Results of source individual's blood testing
Employee's medical records

Report prepared by:: _____

Title: _____ Date: _____

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. GOVERNMENT 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 D $PLAYED ON COMMERCIAL EQUIPMENT*

	YES	NO
a. TRUCK/TRACTOR		
b. TRAILER		

SECTION 11 - MECHANICAL INSPECTION

All items shag be checked on empty equipment prior to loading. Items with an asterisk shag be checked on all incoming loaded equipment.

10. TYPE OF VEHICLE(S)	1 1. VEHICLE NUMBER(S)

12. PART INSPECTED *(X as applicable)*	ORIGIN (1)		DESTINATION (2)			ORIGIN (1)		DESTINATION (2)		COMMENTS (3)
	SAT	UNSAT	SAT	UNSA I		SAT	UNSAT	SAT	UNSAT	
a. SPARE ELECTRICAL FUSES					k EXHAUST SYSTEM					
b. HORN OPERATIVE					1. BRAKE SYSTEM*					
c. STEERING SYSTEM					rn. 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 Govern ment/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 CIFIR					
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 DID FORM 626 FOR DRIVER					
24. SHIPPED UNDER DOT EXEMPTION 868					

25. INSPECTOR SIGNATURE *(Origin)*	26. DRIVER(S) SIGNATURE *(Origln)*
27. INSPECTOR SIGNATURE *(Destination)*	28. DRIVER(S) SIGNATURE *(Destination)*

Designed using Perform Pro, WHS/D10R, Sep 98

Reset

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 Part 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 of lease is carried in all leased vehicles and is available for inspection. (Defense Transportation Regulation (DTR) requirement.)

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. 1 0 1.

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 (Hazardous Materials Driving and Parking Rules). If military operators do not possess this document, shipper may 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.

SECTION 11 - 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 11 *(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 393.8 1)

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)

SECTION 11 *(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)

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 and 396 Appendix G)

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 and 396 Appendix G)

1. 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 396 Appendix G)**

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 396 Appendix G)

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 CFT 396 Appendix G)

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 177.815(e)(1) and 398.94)

p. Landing Gear. Inspect to ensure that landing gear and assembly are in serviceable condition, correctly assembled, adequately lubricated and properly mounted.

SECTION 11 *(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 396 Appendix G)

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. Shipper will instruct the driver to send a "test" emergency message to DTTS by having the driver activate the "emergency (panic) button". Shipper will contact DTTS at 1-800-826-0794 to verify that test message was received. Message must be received by DTTS for system to be considered operational.

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 2 1. Check to ensure each transport vehicle has been properly placarded in accordance with 49 CFR Part 172 Subpart F.

Item 22. Check to ensure operator has been provided shipping papers that comply with 49 CFR Part 172 Subpart C. 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 Exemption 868, ensure that shipping papers are properly** annotated and copy of Exemption 868 is with shipping papers.

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year _____

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 injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

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 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	0
(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) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

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 50 minutes per response, including time to review the instruction, 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 aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ Zip _____

Industry description (e.g., Manufacture of motor truck trailers)

_____

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

___ ___ ___ ___

OR North American Industrial Classification (NAICS), if known (e.g., 336212)

___ ___ ___ ___ ___ ___

Employment information

Annual average number of employees _____

Total hours worked by all employees last year _____

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

_____ Title

_____ Phone

_____ Date

Critical Lift Plan

Site _____ **Date** _____

Make and Model of Crane:	Size of Load: (LxWxH or LXD) ____ units
Weight of Load:	Weight of rigging components:
Total Weight:	
Manufacturer's Load Limits as specified in load charts:	

Geometry of the Lifting Procedure

Crane Position During Lift:	Height of Lift:
Load Radius During Lift:	Boom Length and Angle During Lift:

Name of Crane Operator:
Qualifications:
Name of Rigger:
Qualifications:
Name of Lift Supervisor (operator or rigger can qualify):
Qualifications:

Please provide a sketch of the lifting points involved in this operation.

Describe the rigging procedures and hardware requirements for this lifting operation.
Describe the ground conditions, outrigger or crawler track requirements. (If applicable, include design of mats necessary to achieve a level and stable foundation to bear the capacity of the lift)
For floating cranes or derricks, describe the operating base (platform) conditions and any potential list (tilt).
Are there any adverse weather conditions apparent or forecasted within the timeframe of the operation? (high winds, poor visibility, lightning, etc.) Under what conditions will operations be stopped?, Please list these limiting conditions.
Are all involved personnel involved in the lifting operations familiar with hand signaling/communication procedures that may be needed during the lifting operations?

Are there any known mechanical or safety problems with this crane? If so, please explain them and how they will effect this lifting operation.
Does this Crane have a current and up-to-date maintenance log?
Is the crane equipped with a fire extinguisher meeting the minimum 10-B:C requirement?

All Cranes used on the , Project will meet the requirements of the USACE Safety and Health Requirements Manual.

All Personnel involved in this critical lifting operation must sign and date below:	
Signature	Date

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 SUXOS:

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.

Explosives Purchase / Receipt / Authorization List

Street Address and County: (Home Office)

Street or Post Office Box Address and County: (Field Office)

Federal License #: Expiration Date:

The following individuals are agents, employees, or representatives of the undersigned, and are authorized to order or acquire explosive materials on behalf of Parsons.

Name and Home Address	Driver's License No.	Soc. Sec. Number	Place of Birth

The undersigned certifies the foregoing information to be true and correct to the best of his knowledge and belief, and that he will communicate any additions or deletions to the foregoing list to Parsons.

OE Group Operations Manager and Date (Type or print)	Signature and Date

FIGURE 5
ATF FORM 5400.5, REPORT OF THEFT OR LOSS-EXPLOSIVE MATERIALS

Form Approved, OMB No. 1512-0183 (04/30/96)

DEPARTMENT OF THE TREASURY
BUREAU OF ALCOHOL, TOBACCO AND FIREARMS
REPORT OF THEFT OR LOSS-EXPLOSIVE MATERIALS

DATE

Upon discovery of any theft or loss of any of your explosive materials:
-First, call ATF toll free at 1-800-800-3855 (or call ATF collect at 1-800-800-3855 if you are in Alaska, Guam, Hawaii, Puerto Rico or the Virgin Islands) to report the theft or loss;
-Second, call your local law enforcement office to report the theft or loss; and
-Third, complete this form and attach any additional sheets or invoices necessary to provide the required information, and mail to the nearest ATF office listed on the reverse. We suggest you retain a copy of the completed form. Please complete each item as applicable, to the best of your ability.
NOTE: Section 842(k), 18 U.S.C. Chapter 40, states, "It shall be unlawful for any person who has knowledge of the theft or loss of any explosive materials from his stock to fail to report such theft or loss within twenty-four hours of discovery to the Secretary and to appropriate local authorities." Codified at 27 C.F.R. Section 55.30.

1. NAME, ADDRESS AND TELEPHONE NUMBER OF PERSON MAKING REPORT (include corporate or business name, if applicable)

2. Location of theft or loss (if different from item 1)

3. THEFT OR LOSS	DATE	TIME
a. DISCOVERED		
b. OCCURRED (Show approximate if exact is not known)		
c. REPORTED TO ATF BY TELEPHONE		
d. REPORTED TO LOCAL AUTHORITIES		

4. NAME AND ADDRESS OF LOCAL AUTHORITY TO WHOM REPORTED

5. EXPLOSIVE MATERIALS LOST OR STOLEN (Attach invoices or additional sheets, if necessary)

a. MANUFACTURER OR BRAND NAME (Include date and shift code)	b. QUANTITY (Pounds of Explosives, Number of Caps)	c. TYPE AND DESCRIPTION (Dynamite, Blasting Agents, Detonators, etc. Include for each type, size, MS delay or length of leg wire, as applicable)

6. THEFT OR LOSS OCCURRED FROM (Check applicable box)
☐ PERMANENT MAGAZINE ☐ PORTABLE MAGAZINE ☐ TRUCK ☐ WORK SITE ☐ OTHER (Explain)

7. ENTRY TO MAGAZINE MADE THROUGH (Complete if applicable)
☐ DOOR ☐ ROOF ☐ FLOOR ☐ FOUNDATION
☐ WALL ☐ CEILING ☐ VENTS ☐ OTHER (Explain)

8. NUMBER AND TYPE OF LOCKS FORCED (Complete if applicable)

9. OTHER INFORMATION PERTINENT TO THE THEFT OR LOSS

10. SIGNATURE AND TITLE OF PERSON MAKING REPORT

11. FEDERAL EXPLOSIVE LICENSE OR PERMIT IF ANY

FOR ATF USE ONLY

DATE RECEIVED	TIME RECEIVED	UNIQUE IDENTIFIER

ATF F 5400.5 (1-93) PREVIOUS EDITIONS ARE OBSOLETE

Former Pinecastle Jeep Range RI/FS
Geophysical Dig Sheet and Target History
4/30/2008

Project Geophysicist: John Baptiste
Site Geophysicist:

Project Location: Orlando, FL
Design Center POC: Debra Edwards

Initial Geophsyical Sensor: EM61-MK2
Reacquisition Geophsyical Sensor: EM61-MK2

Original Survey						Reacquisition						Dig Results												Post-Excavation QC Results			Post-Dig Geophysical QC			
AnomalyID	Northing (ft)	Easting (ft)	Chan3 (mV)	Avg (mV)	GeoDB	Response (mV)	Distance (in)	Azim. (deg)	FlagPlanted	Comments	Date	Anomaly Type	Comments	Weight (lbs.)	Dist (in)	Azim. (deg)	Nomenclature	Qty	Orient. (deg)	Inclin. (deg)	Depth (in)	Date	Team	Response (mV)	Date	Initials	Agreement (G, P, or U)	Initials	Date	Comments

APPENDIX G
MINIMUM SEPARATION DISTANCE CALCUATIONS

FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	Practice Round	DODIC:	
Munition:	3 lb AN-Mk 23 Practice Bomb w/ Mk 4 Signal Cart	Date Record Created:	12/2/2005
		Last Date Record Updated:	12/2/2005
Primary Database Category:	Bomb	Individual Last Updated Record:	Crull
Secondary Database Category:	3 lb Practice	Date Record Retired:	
Munition Case Classification:	N/A		

Munition Information and Fragmentation Characteristics

Explosive Type:	Smokeless Pwdr
Explosive Weight (lb):	0.00660
Diameter (in):	2.2047
Max Fragment Weight (lb):	0.000000
Critical Fragment Velocity (fps):	0

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	0
MFR-V [Vertical Range of Max Weight Fragment] (ft):	0
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	0

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	6
Inhabited Building Distance (09 psi), K50 Distance:	7
Intentional MSD (0065 psi), K328 Distance:	48

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	0.00
Mild Steel:	0.00
Hard Steel:	0.00
Aluminum:	0.00
LEXAN:	0.00
Plexi-glass:	0.00
Bullet Resist Glass:	0.00

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.000000
Critical Fragment Velocity (fps)SB:	0
Kinetic Energy 106 (lb-ft2/s2)SB:	0.0000
Required Wall Roof Sandbag Thickness (in)SB:	NA
Expected Maximum Sandbag Throw Distance (ft)SB:	NA
Minimum Separation Distance (ft)SB:	NA

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.000000
Critical Fragment Velocity (fps)W:	0
Kinetic Energy 106 (lb-ft2/s2)W:	0.0000
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	Chemical, WP, & I	DODIC:	
Munition:	4 lb Incendiary AN-M50X-A1	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/11/2007
Primary Database Category:	submunition	Individual Last Updated Record:	Crull
Secondary Database Category:	4 lb	Date Record Retired:	
Munition Case Classification:	N/A		

Munition Information and Fragmentation Characteristics

Explosive Type:	Black Powder
Explosive Weight (lb):	0.02400
Diameter (in):	0.9600
Max Fragment Weight (lb):	0.001110
Critical Fragment Velocity (fps):	3978

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	68
MFR-V [Vertical Range of Max Weight Fragment] (ft):	323
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	406

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	9
Inhabited Building Distance (09 psi), K50 Distance:	11
Intentional MSD (0065 psi), K328 Distance:	74

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	0.56
Mild Steel:	0.10
Hard Steel:	0.09
Aluminum:	0.24
LEXAN:	1.46
Plexi-glass:	0.67
Bullet Resist Glass:	0.46

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.001110
Critical Fragment Velocity (fps)SB:	3978
Kinetic Energy 106 (lb-ft2/s2)SB:	0.0088
Required Wall Roof Sandbag Thickness (in)SB:	12
Expected Maximum Sandbag Throw Distance (ft)SB:	25
Minimum Separation Distance (ft)SB:	200

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.001110
Critical Fragment Velocity (fps)W:	3978
Kinetic Energy 106 (lb-ft2/s2)W:	0.0088
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Bombs	DODIC:	
Munition:	4 lb Frag Bomb M83	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/30/2004
Primary Database Category:	submunition	Individual Last Updated Record:	Crull
Secondary Database Category:	4 lb	Date Record Retired:	
Munition Case Classification:	Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	TNT
Explosive Weight (lb):	0.50000
Diameter (in):	3.1200
Max Fragment Weight (lb):	0.076176
Critical Fragment Velocity (fps):	3266

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	209
MFR-V [Vertical Range of Max Weight Fragment] (ft):	1040
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	1363

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	34
Inhabited Building Distance (09 psi), K50 Distance:	42
Intentional MSD (0065 psi), K328 Distance:	277

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	2.43
Mild Steel:	0.45
Hard Steel:	0.37
Aluminum:	0.95
LEXAN:	3.67
Plexi-glass:	2.29
Bullet Resist Glass:	1.81

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.076176
Critical Fragment Velocity (fps)SB:	3266
Kinetic Energy 106 (lb-ft2/s2)SB:	0.4063
Required Wall Roof Sandbag Thickness (in)SB:	20
Expected Maximum Sandbag Throw Distance (ft)SB:	125
Minimum Separation Distance (ft)SB:	200

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.076176
Critical Fragment Velocity (fps)W:	3266
Kinetic Energy 106 (lb-ft2/s2)W:	0.4063
Water Containment System:	5 gal carboys/ inflatable pool
Minimum Separation Distance (ft)W:	264/200

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	Chemical, WP, & I
Munition:	6 lb Incendiary AN-M69X
Primary Database Category:	submunition
Secondary Database Category:	6 lb
Munition Case Classification:	N/A
DODIC:	
Date Record Created:	7/30/2004
Last Date Record Updated:	7/11/2007
Individual Last Updated Record:	Crull
Date Record Retired:	

Munition Information and Fragmentation Characteristics

Explosive Type:	Tetryl
Explosive Weight (lb):	0.28120
Diameter (in):	2.8750
Max Fragment Weight (lb):	0.007700
Critical Fragment Velocity (fps):	7659

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	113
MFR-V [Vertical Range of Max Weight Fragment] (ft):	672
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	832

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	28
Inhabited Building Distance (09 psi), K50 Distance:	36
Intentional MSD (0065 psi), K328 Distance:	234

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	2.79
Mild Steel:	0.49
Hard Steel:	0.40
Aluminum:	1.09
LEXAN:	3.49
Plexi-glass:	2.12
Bullet Resist Glass:	1.60

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.007700
Critical Fragment Velocity (fps)SB:	7659
Kinetic Energy 106 (lb-ft2/s2)SB:	0.2258
Required Wall Roof Sandbag Thickness (in)SB:	12
Expected Maximum Sandbag Throw Distance (ft)SB:	25
Minimum Separation Distance (ft)SB:	200

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.007700
Critical Fragment Velocity (fps)W:	7659
Kinetic Energy 106 (lb-ft2/s2)W:	0.2258
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Rounds	DODIC:	E207
Munition:	20 lb Frag Bomb M41	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/30/2004
Primary Database Category:	bomb	Individual Last Updated Record:	Crull
Secondary Database Category:	20 lb	Date Record Retired:	
Munition Case Classification:	Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	TNT
Explosive Weight (lb):	2.70000
Diameter (in):	3.6400
Max Fragment Weight (lb):	0.333210
Critical Fragment Velocity (fps):	3303

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	275
MFR-V [Vertical Range of Max Weight Fragment] (ft):	1588
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	2103

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	59
Inhabited Building Distance (09 psi), K50 Distance:	74
Intentional MSD (0065 psi), K328 Distance:	485

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	4.24
Mild Steel:	0.79
Hard Steel:	0.65
Aluminum:	1.61
LEXAN:	5.21
Plexi-glass:	3.63
Bullet Resist Glass:	3.02

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.333210
Critical Fragment Velocity (fps)SB:	3303
Kinetic Energy 106 (lb-ft2/s2)SB:	1.8176
Required Wall Roof Sandbag Thickness (in)SB:	36
Expected Maximum Sandbag Throw Distance (ft)SB:	220
Minimum Separation Distance (ft)SB:	220

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.333210
Critical Fragment Velocity (fps)W:	3303
Kinetic Energy 106 (lb-ft2/s2)W:	1.8176
Water Containment System:	1100 gal tank
Minimum Separation Distance (ft)W:	275

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	Practice Round	DODIC:	
Munition:	100 lb Practice Bomb M38 w/ M1A1 Spotting Charge	Date Record Created:	9/13/2007
		Last Date Record Updated:	9/13/2007
Primary Database Category:	bomb	Individual Last Updated Record:	M Crull
Secondary Database Category:	100 lb practice	Date Record Retired:	
Munition Case Classification:	N/A		

Munition Information and Fragmentation Characteristics

Explosive Type:	Black Powder
Explosive Weight (lb):	3.00000
Diameter (in):	8.0000
Max Fragment Weight (lb):	0.000000
Critical Fragment Velocity (fps):	0

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	0
MFR-V [Vertical Range of Max Weight Fragment] (ft):	0
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	0

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	45
Inhabited Building Distance (09 psi), K50 Distance:	56
Intentional MSD (0065 psi), K328 Distance:	370

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	0.00
Mild Steel:	0.00
Hard Steel:	0.00
Aluminum:	0.00
LEXAN:	0.00
Plexi-glass:	0.00
Bullet Resist Glass:	0.00

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.000000
Critical Fragment Velocity (fps)SB:	0
Kinetic Energy 106 (lb-ft2/s2)SB:	0.0000
Required Wall Roof Sandbag Thickness (in)SB:	NA
Expected Maximum Sandbag Throw Distance (ft)SB:	NA
Minimum Separation Distance (ft)SB:	NA

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.000000
Critical Fragment Velocity (fps)W:	0
Kinetic Energy 106 (lb-ft2/s2)W:	0.0000
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Bombs	DODIC:	
Munition:	250 lb Bomb M 57 - TNT Fill	Date Record Created:	7/30/2004
		Last Date Record Updated:	6/27/2007
Primary Database Category:	bomb	Individual Last Updated Record:	Crull
Secondary Database Category:	250 lb	Date Record Retired:	
Munition Case Classification:	Non-Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	TNT
Explosive Weight (lb):	129.02000
Diameter (in):	10.3600
Max Fragment Weight (lb):	0.289374
Critical Fragment Velocity (fps):	8293

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	534
MFR-V [Vertical Range of Max Weight Fragment] (ft):	1625
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	2032

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	215
Inhabited Building Distance (09 psi), K50 Distance:	268
Intentional MSD (0065 psi), K328 Distance:	1761

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	10.61
Mild Steel:	1.70
Hard Steel:	1.40
Aluminum:	3.53
LEXAN:	7.43
Plexi-glass:	5.79
Bullet Resist Glass:	4.86

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.289374
Critical Fragment Velocity (fps)SB:	8293
Kinetic Energy 106 (lb-ft2/s2)SB:	9.9507
Required Wall Roof Sandbag Thickness (in)SB:	NA
Expected Maximum Sandbag Throw Distance (ft)SB:	NA
Minimum Separation Distance (ft)SB:	NA

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.289374
Critical Fragment Velocity (fps)W:	8293
Kinetic Energy 106 (lb-ft2/s2)W:	9.9507
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Bombs	DODIC:	
Munition:	500 lb Bomb M64A1	Date Record Created:	7/30/2004
		Last Date Record Updated:	6/25/2007
Primary Database Category:	bomb	Individual Last Updated Record:	Crull
Secondary Database Category:	500 lb	Date Record Retired:	
Munition Case Classification:	Non-Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	Comp B
Explosive Weight (lb):	274.00000
Diameter (in):	14.2000
Max Fragment Weight (lb):	0.289082
Critical Fragment Velocity (fps):	8116

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	680
MFR-V [Vertical Range of Max Weight Fragment] (ft):	1991
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	2501

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	293
Inhabited Building Distance (09 psi), K50 Distance:	367
Intentional MSD (0065 psi), K328 Distance:	2406

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	8.94
Mild Steel:	1.46
Hard Steel:	1.20
Aluminum:	3.05
LEXAN:	6.77
Plexi-glass:	5.12
Bullet Resist Glass:	4.24

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.022120
Critical Fragment Velocity (fps)SB:	8116
Kinetic Energy 106 (lb-ft2/s2)SB:	0.7285
Required Wall Roof Sandbag Thickness (in)SB:	NA
Expected Maximum Sandbag Throw Distance (ft)SB:	NA
Minimum Separation Distance (ft)SB:	NA

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.022120
Critical Fragment Velocity (fps)W:	8116
Kinetic Energy 106 (lb-ft2/s2)W:	0.7285
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Bomb	DODIC:	
Munition:	1000 lb GP Bomb AN-M65A1	Date Record Created:	7/27/2007
		Last Date Record Updated:	
Primary Database Category:	bomb	Individual Last Updated Record:	MC
Secondary Database Category:	1000 lb	Date Record Retired:	
Munition Case Classification:	Non-Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	Comp B
Explosive Weight (lb):	595.00000
Diameter (in):	18.8000
Max Fragment Weight (lb):	0.701966
Critical Fragment Velocity (fps):	9385

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	810
MFR-V [Vertical Range of Max Weight Fragment] (ft):	2673
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	3355

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	380
Inhabited Building Distance (09 psi), K50 Distance:	475
Intentional MSD (0065 psi), K328 Distance:	3115

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	17.36
Mild Steel:	2.59
Hard Steel:	2.12
Aluminum:	5.27
LEXAN:	9.46
Plexi-glass:	7.98
Bullet Resist Glass:	6.90

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.701966
Critical Fragment Velocity (fps)SB:	9385
Kinetic Energy 106 (lb-ft2/s2)SB:	30.9100
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:	0.701966
Critical Fragment Velocity (fps)W:	9385
Kinetic Energy 106 (lb-ft2/s2)W:	30.9100
Water Containment System:	N/A
Minimum Separation Distance (ft)W:	N/A

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Bombs	DODIC:	
Munition:	2000 lb Bomb M66A2	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/30/2004
Primary Database Category:	bomb	Individual Last Updated Record:	Crull
Secondary Database Category:	2000 lb	Date Record Retired:	
Munition Case Classification:	Non-Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	Comp B
Explosive Weight (lb):	1146.00000
Diameter (in):	23.2900
Max Fragment Weight (lb):	0.971700
Critical Fragment Velocity (fps):	8316

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	985
MFR-V [Vertical Range of Max Weight Fragment] (ft):	2855
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	3607

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	473
Inhabited Building Distance (09 psi), K50 Distance:	591
Intentional MSD (0065 psi), K328 Distance:	3876

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	15.23
Mild Steel:	2.39
Hard Steel:	1.96
Aluminum:	4.86
LEXAN:	9.15
Plexi-glass:	7.64
Bullet Resist Glass:	6.62

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.971700
Critical Fragment Velocity (fps)SB:	8316
Kinetic Energy 106 (lb-ft2/s2)SB:	33.5994
Required Wall Roof Sandbag Thickness (in)SB:	NA
Expected Maximum Sandbag Throw Distance (ft)SB:	NA
Minimum Separation Distance (ft)SB:	NA

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.971700
Critical Fragment Velocity (fps)W:	8316
Kinetic Energy 106 (lb-ft2/s2)W:	33.5994
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Rounds	DODIC:	
Munition:	2.36" Rocket M6A3 (Case Only)	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/1/2007
Primary Database Category:	rocket	Individual Last Updated Record:	Crull
Secondary Database Category:	2.36 in	Date Record Retired:	
Munition Case Classification:	Non-Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	Pentolite
Explosive Weight (lb):	0.50000
Diameter (in):	2.3600
Max Fragment Weight (lb):	0.006416
Critical Fragment Velocity (fps):	7290

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	125
MFR-V [Vertical Range of Max Weight Fragment] (ft):	630
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	780

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	39
Inhabited Building Distance (09 psi), K50 Distance:	48
Intentional MSD (0065 psi), K328 Distance:	317

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	2.14
Mild Steel:	0.39
Hard Steel:	0.32
Aluminum:	0.87
LEXAN:	3.02
Plexi-glass:	1.76
Bullet Resist Glass:	1.30

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.001035
Critical Fragment Velocity (fps)SB:	8888
Kinetic Energy 106 (lb-ft2/s2)SB:	0.0409
Required Wall Roof Sandbag Thickness (in)SB:	12
Expected Maximum Sandbag Throw Distance (ft)SB:	25
Minimum Separation Distance (ft)SB:	200

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.001035
Critical Fragment Velocity (fps)W:	8888
Kinetic Energy 106 (lb-ft2/s2)W:	0.0409
Water Containment System:	5 gal carboys/ inflatable pool
Minimum Separation Distance (ft)W:	200/200

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 6/30/08

Category:	HE Rounds	DODIC:	
Munition:	5" HVAR Mk 1	Date Record Created:	4/21/2008
		Last Date Record Updated:	
Primary Database Category:	Rocket	Individual Last Updated Record:	Crull
Secondary Database Category:	5 in	Date Record Retired:	
Munition Case Classification:	Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	TNT
Explosive Weight (lb):	8.60000
Diameter (in):	5.0000
Max Fragment Weight (lb):	0.382160
Critical Fragment Velocity (fps):	2872

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	398
MFR-V [Vertical Range of Max Weight Fragment] (ft):	1566
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	2100

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	87
Inhabited Building Distance (09 psi), K50 Distance:	109
Intentional MSD (0065 psi), K328 Distance:	714

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	4.75
Mild Steel:	0.89
Hard Steel:	0.73
Aluminum:	1.83
LEXAN:	5.56
Plexi-glass:	3.96
Bullet Resist Glass:	3.32

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.382160
Critical Fragment Velocity (fps)SB:	2872
Kinetic Energy 106 (lb-ft2/s2)SB:	1.5761
Required Wall Roof Sandbag Thickness (in)SB:	36
Expected Maximum Sandbag Throw Distance (ft)SB:	220
Minimum Separation Distance (ft)SB:	220

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.382160
Critical Fragment Velocity (fps)W:	2872
Kinetic Energy 106 (lb-ft2/s2)W:	1.5761
Water Containment System:	1100 gal tank
Minimum Separation Distance (ft)W:	275

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Rounds	DODIC:	B502
Munition:	37 mm M54	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/9/2007
Primary Database Category:	projectile	Individual Last Updated Record:	Crull
Secondary Database Category:	37 mm	Date Record Retired:	
Munition Case Classification:	Extremely Heavy C		

Munition Information and Fragmentation Characteristics

Explosive Type:	Tetryl
Explosive Weight (lb):	0.10000
Diameter (in):	1.4567
Max Fragment Weight (lb):	0.014300
Critical Fragment Velocity (fps):	4066

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	114
MFR-V [Vertical Range of Max Weight Fragment] (ft):	655
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	834

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	20
Inhabited Building Distance (09 psi), K50 Distance:	25
Intentional MSD (0065 psi), K328 Distance:	165

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	1.87
Mild Steel:	0.35
Hard Steel:	0.28
Aluminum:	0.76
LEXAN:	3.12
Plexi-glass:	1.84
Bullet Resist Glass:	1.42

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.014300
Critical Fragment Velocity (fps)SB:	4066
Kinetic Energy 106 (lb-ft2/s2)SB:	0.1182
Required Wall Roof Sandbag Thickness (in)SB:	12
Expected Maximum Sandbag Throw Distance (ft)SB:	25
Minimum Separation Distance (ft)SB:	200

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.014300
Critical Fragment Velocity (fps)W:	4066
Kinetic Energy 106 (lb-ft2/s2)W:	0.1182
Water Containment System:	6 gal carboys/ inflatable pool
Minimum Separation Distance (ft)W:	200/200

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Rounds	DODIC:	B586
Munition:	57 mm M306	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/9/2007
Primary Database Category:	projectile	Individual Last Updated Record:	Crull
Secondary Database Category:	57 mm	Date Record Retired:	
Munition Case Classification:	Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	Comp B
Explosive Weight (lb):	0.55000
Diameter (in):	2.2441
Max Fragment Weight (lb):	0.012906
Critical Fragment Velocity (fps):	3495

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	167
MFR-V [Vertical Range of Max Weight Fragment] (ft):	828
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	1073

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	37
Inhabited Building Distance (09 psi), K50 Distance:	46
Intentional MSD (0065 psi), K328 Distance:	303

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	2.74
Mild Steel:	0.51
Hard Steel:	0.42
Aluminum:	1.11
LEXAN:	3.73
Plexi-glass:	2.33
Bullet Resist Glass:	1.84

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.012906
Critical Fragment Velocity (fps)SB:	3495
Kinetic Energy 106 (lb-ft2/s2)SB:	0.0788
Required Wall Roof Sandbag Thickness (in)SB:	12
Expected Maximum Sandbag Throw Distance (ft)SB:	25
Minimum Separation Distance (ft)SB:	200

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.012906
Critical Fragment Velocity (fps)W:	3495
Kinetic Energy 106 (lb-ft2/s2)W:	0.0788
Water Containment System:	5 gal carboys/ inflatable pool
Minimum Separation Distance (ft)W:	200/200

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	Chemical, WP, & I	DODIC:	B630
Munition:	60 mm M302 (Chemical)	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/11/2007
Primary Database Category:	mortar	Individual Last Updated Record:	Crull
Secondary Database Category:	60 mm	Date Record Retired:	
Munition Case Classification:	N/A		

Munition Information and Fragmentation Characteristics

Explosive Type:	Tetryl
Explosive Weight (lb):	0.02375
Diameter (in):	2.3622
Max Fragment Weight (lb):	0.025326
Critical Fragment Velocity (fps):	658

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	45
MFR-V [Vertical Range of Max Weight Fragment] (ft):	523
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	688

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	12
Inhabited Building Distance (09 psi), K50 Distance:	16
Intentional MSD (0065 psi), K328 Distance:	102

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	0.76
Mild Steel:	0.08
Hard Steel:	0.06
Aluminum:	0.18
LEXAN:	1.22
Plexi-glass:	0.53
Bullet Resist Glass:	0.35

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.025326
Critical Fragment Velocity (fps)SB:	658
Kinetic Energy 106 (lb-ft2/s2)SB:	0.0055
Required Wall Roof Sandbag Thickness (in)SB:	NA
Expected Maximum Sandbag Throw Distance (ft)SB:	NA
Minimum Separation Distance (ft)SB:	NA

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.025330
Critical Fragment Velocity (fps)W:	658
Kinetic Energy 106 (lb-ft2/s2)W:	0.0055
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	Chemical, WP, & I	DODIC:	
Munition:	75 mm MkII (Chemical)	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/11/2007
Primary Database Category:	projectile	Individual Last Updated Record:	Crull
Secondary Database Category:	75 mm	Date Record Retired:	
Munition Case Classification:	N/A		

Munition Information and Fragmentation Characteristics

Explosive Type:	Tetryl
Explosive Weight (lb):	0.07800
Diameter (in):	2.9528
Max Fragment Weight (lb):	0.078308
Critical Fragment Velocity (fps):	2037

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	115
MFR-V [Vertical Range of Max Weight Fragment] (ft):	873
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	1194

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	19
Inhabited Building Distance (09 psi), K50 Distance:	23
Intentional MSD (0065 psi), K328 Distance:	152

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	2.03
Mild Steel:	0.31
Hard Steel:	0.26
Aluminum:	0.65
LEXAN:	3.13
Plexi-glass:	1.86
Bullet Resist Glass:	1.47

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.078308
Critical Fragment Velocity (fps)SB:	2037
Kinetic Energy 106 (lb-ft2/s2)SB:	0.1625
Required Wall Roof Sandbag Thickness (in)SB:	NA
Expected Maximum Sandbag Throw Distance (ft)SB:	NA
Minimum Separation Distance (ft)SB:	NA

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.078308
Critical Fragment Velocity (fps)W:	2037
Kinetic Energy 106 (lb-ft2/s2)W:	0.1625
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Rounds	DODIC:	C225
Munition:	81 mm M43	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/30/2004
Primary Database Category:	mortar	Individual Last Updated Record:	Crull
Secondary Database Category:	81 mm	Date Record Retired:	
Munition Case Classification:	Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	Comp B
Explosive Weight (lb):	1.29000
Diameter (in):	3.1890
Max Fragment Weight (lb):	0.057300
Critical Fragment Velocity (fps):	4933

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	230
MFR-V [Vertical Range of Max Weight Fragment] (ft):	1097
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	1395

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	49
Inhabited Building Distance (09 psi), K50 Distance:	61
Intentional MSD (0065 psi), K328 Distance:	403

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	3.62
Mild Steel:	0.68
Hard Steel:	0.56
Aluminum:	1.43
LEXAN:	4.51
Plexi-glass:	3.00
Bullet Resist Glass:	2.40

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.057300
Critical Fragment Velocity (fps)SB:	4933
Kinetic Energy 106 (lb-ft2/s2)SB:	0.6972
Required Wall Roof Sandbag Thickness (in)SB:	24
Expected Maximum Sandbag Throw Distance (ft)SB:	125
Minimum Separation Distance (ft)SB:	200

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.057300
Critical Fragment Velocity (fps)W:	4933
Kinetic Energy 106 (lb-ft2/s2)W:	0.6972
Water Containment System:	1100 gal tank
Minimum Separation Distance (ft)W:	200

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	HE Rounds	DODIC:	C266
Munition:	90 mm M71	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/30/2004
Primary Database Category:	projectile	Individual Last Updated Record:	Crull
Secondary Database Category:	90 mm	Date Record Retired:	
Munition Case Classification:	Robust		

Munition Information and Fragmentation Characteristics

Explosive Type:	TNT
Explosive Weight (lb):	1.97500
Diameter (in):	3.5433
Max Fragment Weight (lb):	0.342600
Critical Fragment Velocity (fps):	2335

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	250
MFR-V [Vertical Range of Max Weight Fragment] (ft):	1518
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	1955

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	53
Inhabited Building Distance (09 psi), K50 Distance:	67
Intentional MSD (0065 psi), K328 Distance:	437

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	4.44
Mild Steel:	0.81
Hard Steel:	0.66
Aluminum:	1.66
LEXAN:	5.38
Plexi-glass:	3.80
Bullet Resist Glass:	3.20

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.342600
Critical Fragment Velocity (fps)SB:	2335
Kinetic Energy 106 (lb-ft2/s2)SB:	0.9340
Required Wall Roof Sandbag Thickness (in)SB:	24
Expected Maximum Sandbag Throw Distance (ft)SB:	125
Minimum Separation Distance (ft)SB:	200

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.342600
Critical Fragment Velocity (fps)W:	2335
Kinetic Energy 106 (lb-ft2/s2)W:	0.9340
Water Containment System:	1100 gal tank
Minimum Separation Distance (ft)W:	200

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

Category:	Chemical, WP, & I	DODIC:	C442
Munition:	105 mm M60 (Chemical)	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/30/2004
Primary Database Category:	projectile	Individual Last Updated Record:	Crull
Secondary Database Category:	105 mm	Date Record Retired:	
Munition Case Classification:	N/A		

Munition Information and Fragmentation Characteristics

Explosive Type:	Tetrytol
Explosive Weight (lb):	0.34900
Diameter (in):	4.1339
Max Fragment Weight (lb):	0.217850
Critical Fragment Velocity (fps):	1058

Theoretical Calculated Fragment Range

HFD [Range to No More Than 1 Hazardous Fragment per 600 Square Feet] (ft):	222
MFR-V [Vertical Range of Max Weight Fragment] (ft):	924
MFR-H [Horizontal Range of Maximum Weight Fragment] (ft):	1326

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	31
Inhabited Building Distance (09 psi), K50 Distance:	38
Intentional MSD (0065 psi), K328 Distance:	251

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	2.38
Mild Steel:	0.25
Hard Steel:	0.20
Aluminum:	0.52
LEXAN:	2.86
Plexi-glass:	1.65
Bullet Resist Glass:	1.16

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.217850
Critical Fragment Velocity (fps)SB:	1058
Kinetic Energy 106 (lb-ft2/s2)SB:	0.1219
Required Wall Roof Sandbag Thickness (in)SB:	NA
Expected Maximum Sandbag Throw Distance (ft)SB:	NA
Minimum Separation Distance (ft)SB:	NA

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.217850
Critical Fragment Velocity (fps)W:	1058
Kinetic Energy 106 (lb-ft2/s2)W:	0.1219
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

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FRAGMENTATION DATA REVIEW FORM

Database Revision Date 12/31/07

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

Munition Information and Fragmentation Characteristics

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

Theoretical Calculated Fragment Range

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

Overpressure Distances

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

Minimum Thickness to Prevent Perforation

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

Required Sandbag Thickness

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

Water Containment System and Minimum Separation Distance:

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

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Appendix H – Resumes

JOHN A. CHULICK, P.G.
Project Manager

Experience Summary

John Chulick has 22 years experience as the project manager, technical leader, and project geophysicist on many projects. Duties have included preparation of proposals, management of projects including client communications and correspondence, tracking of budgets, review of invoices, writing and editing reports. John has also been deputy Project Manager for the Chemical Warfare Materiel (CWM) Scoping and Security Study including senior review of documents, conducting site visits, tracking project financial statements, and coordinating the field investigations for the Camp Crowder, Missouri; Harvard, Nebraska; Fort Glenn, Alaska; and Tulalip, Washington field investigations.

Mr. Chulick participates in the planning and management of various geophysical investigations as well as quality review of data, interpretations, and training of personnel.

Years of Experience

22

Years with Parsons

8

Education

M.S., Geophysics, 1986, Saint Louis University

B.S., Applied Geophysics, 1983, Saint Louis University

Registrations

Certified Professional Geologist (Pennsylvania, 1995, PG-003135-6)

Experience Record

Project Manager. Mr. Chulick has managed several delivery orders for contracts with the U.S. Army Engineering & Support Center, Huntsville. Specific projects are:

(2006-2007) U.S. Army Engineering and Support Center, Huntsville (USAESCH). CWM Scoping and Security Study, Nationwide; Project Manager responsible for conducting the Site Inspection and Time Critical Removal Action at the Tulalip Backup Ammunition Storage Depot, Marysville, Washington.

(2003-2005) USAESCH and USA Environmental, Inc., CWM Geophysical Investigation, Chemical Agent Burial Site, Fort Benning, GA: Project Manager responsible for preparing work plans, training of personnel, assisting with set-up of the intrusive investigation, and coordinating a public meeting.

(2004-2006) USAESCH, CWM EE/CA for Former Fort Segarra, Water Island, U.S. Virgin Islands. Project Manager responsible for completion of the EE/CA Report and Action Memorandum.

(2003-2006) USAESCH, CWM EE/CA, Brooksville Army Airfield, FL: Project Manager responsible for coordinating and executing the investigation of three suspect RCWM burial sites.

(2000) USAESCH, UXO Geophysical Mapping of Former EOD Range, Bergstrom AFB, TX: Project Manager responsible for writing work plans, supervising the geophysical surveys, interpreting the data, and preparing a report of the results.

Principal Geophysicist. Mr. Chulick has gathered and interpreted geophysical data for many projects for the U.S. Army Corps of Engineers. As the Project Geophysicist, he provides the primary quality review and interpretation of the geophysical data. He has also developed work plans, geophysical equipment prove-out plans, and other various plans and reports. The purpose of these projects was to locate UXO and CWM to allow for its removal. Projects for the Corps of

Engineers, Huntsville District where Mr. Chulick was the primary Project Geophysicist include:

(2003) USAESCH, Camp Sibert EE/CA, AL: Project Geophysicist responsible for quality review and interpretation of geophysical data. Developed work plans, geophysical equipment prove-out plans, and reports for location and investigation for RCWM.

(2003) USAESCH ,Conway Bombing Range, SC: Project Geophysicist responsible for coordination of digital geophysical mapping surveys and quality review and interpretation of geophysical data.

(2002) USAESCH, Pelham Range CWM Site Investigation, AL: Project Manager responsible for developing work plans, planning and executing the field investigation of three sites for possible buried RCWM.

(2001) USAESCH, EE/CA, Fort McClellan, AL: Project Geophysicist responsible for planning geophysical surveys, geophysical data collection, data quality review and interpretation of geophysical data.

(2001) USAESCH, EE/CA, Camp Bonneville, WA: Project Geophysicist responsible for planning of geophysical surveys. Developed work plans, geophysical equipment prove-out report, and a report of geophysical mapping.

(2001) USAESCH, UXO Removal, McCoy Air Force Base, FL: Project Geophysicist responsible for conducting geophysical mapping and interpretation of geophysical data.

(2000) USAESCH, Badlands Bombing Range, SD: Project Geophysicist responsible for quality review and interpretation of geophysical data.

(2000) USAESCH, UXO EE/CA, Turret Gunnery Range, Brooksville, FL: Project Geophysicist responsible for reacquisition of geophysical anomalies and site management during intrusive investigation.

EDWARD L. GRUNWALD, C.I.H.
Project Safety and Health Officer

Experience Summary

Extensive experience in the development and management of safety and quality assurance programs. Project Manager for several industrial hygiene investigations.

Years of Experience

25

Years with Parsons

20

Education

MS, Public Health (Toxicology Specialization), 1982, University of Massachusetts, Amherst, Massachusetts

BS, Bacteriology, 1978, Ohio Wesleyan University, Delaware, Ohio

Experience record

Corporate Health and Safety Manager (1996-2002). Responsible for the development, standardization, and implementation of health, safety, and training programs throughout Parsons Infrastructure and Technology (Parsons I&T). Authored the Parsons I&T Health and Safety Policies and Procedures Manual, the Health and Safety Training Manual for Hazardous Waste Operations, the Construction Safety Training Manual, the Laboratory Safety Training Manual, and the Health and Safety Training Manual for Supervisors.

Specific duties include:

- Revise, as needed, the Parsons I&T Health and Safety Manual to comply with new regulations or policies.
- Develop and implement safety training programs for employees.
- Manage the occupational medical monitoring program.
- Perform audits of Parsons I&T facilities and projects to verify compliance with established policies, procedures, and plans.
- Investigate accidents and incidents and develop corrective actions.
- Establish procedures to evaluate the safety programs of subcontractors prior to hiring.
- Supervise facility health and safety representatives.
- Publish monthly safety newsletter to notify personnel of new OSHA regulations or corporate requirements.
- Develop health and safety plans for projects.

Program Health and Safety Manager, Fulton County, Georgia (2001-Present). Program Health and Safety Manager of a joint venture that is providing Program and Construction Management (PCM) services for Fulton County's Water Services Division. Responsibilities include:

- Develop contract safety specifications for Fulton County
- Review contractor and subcontractor safety submittals for compliance with bid specifications and OSHA requirements
- Interact with Fulton County Loss Control Division
- Manage contractor and subcontractor OCIP enrollment

- Interface with OCIP insurance carrier and broker
- Develop Health and Safety manual for joint venture team
- Perform inspections to verify contractors and subcontractors are following contract specifications and applicable federal, state, and local safety requirements
- Review accident reports and corrective actions

The Parsons PM Team has received safety awards and commendations from:

1) Georgia Department of Labor- Award of Safety excellence; "in recognition for outstanding workplace safety"

2) Fulton County Board of Commissioners- August 18, 2004 was proclaimed Parsons PM Team day. The Fulton County Commissioners praised Parsons safety record in the performance of difficult and high risk tasks (714 days without an injury)

3) Parsons Water & Infrastructure Group- Project safety award

Program Health and Safety Manager, U.S. Army Defense Environmental Restoration Program OE/CWM and HTW Assessments (1996-present). Provided health and safety program management of multidisciplinary workforce that included 200 Parsons employees from 20 offices and over 30 subcontractors. Specific responsibilities entailed: reviewing and approving project safety and health plans for over 30 OE/HTW sites and 6 CWM sites, developing and implementing site-specific training programs for OE/CWM workers; performing audits of OE/CWM/HTW operations and developing corrective action programs when findings were discovered, assisting field teams prepare for DA safety audits (CWM sites); reviewing near miss and accident reports (3394 form) and developing measures to prevent recurrences, periodically meeting with Parsons OE safety personnel to review the OE/CWM program and assess where improvements can be made, and interfacing with USAESCH safety personnel (involves providing monthly safety reports, periodically developing safety guidance manuals and “White Papers,” and meetings with COE safety and health personnel).

Project Manager (2001) Hired by Delta Airlines to investigate a potential hydrocarbon leak from its fuel farm located at Atlanta Hartsfield Airport. Field tasks involved the:

- Collection of 6 soil borings to evaluate subsurface contamination;
- Installation of 6 ground water monitoring wells and collection of ground water samples; and
- Entry into the Flint River culvert to collect surface water samples to evaluate petroleum infiltration.

The Flint River sampling event was a permit confined space operation that involved entry into the 18-foot wide, 2-mile long culvert that runs under the airport. Eight surface water samples were collected and analyzed for petroleum hydrocarbons. Elevated petroleum hydrocarbon levels were not detected in down-stream samples.

Project Manager (1999-2001). Contracted by Public Works Department of Atlanta, Georgia to provide operations and maintenance employees at five wastewater treatment plants with hazard communication training. The course is designed to provide plant employees with information on the hazards associated with the chemicals in their workplace and the protective measures they can implement when handling these chemicals. Training involves both “hands-on” exercises and multi-media lectures (involving slides, VHS tapes and overheads) to enhance the retention of

information. To date, the training has received excellent reviews from Public Works personnel.

Technical Manager (1997-2000). Retained by BellSouth to: 1) Identify and classify confined spaces located on BellSouth properties and 2) develop a confine space database that provides safety information for each space. To date, over 1,400 confined spaces at 500 BellSouth facilities have been identified. Approximately, a third of these spaces have been classified as a permit-required confined space indicating that the space contains a safety or health hazard.

The confined space database provides hazard and logistic information on each space (space classification, atmospheric measurements, types of safety hazards inside space, location of space on property, space ID number, interior dimensions of the space, and proper entry procedures). When employees or contractors anticipate entry into a permit-required confined space they are required to call BellSouth's Facilities Management Department prior to entry. The Facilities Management Department accesses the database and informs the entrants of the specific hazards associated with the space and the proper procedures to use for entry. This process ensures that workers are informed of the hazards so entry is performed safely.

Project Manager (1998). Retained by the Paulding Country Public Works Department to provide construction safety training. Training topics included:

- Excavation and trenching safety
- Electrical safety
- Personal protective equipment
- Heavy equipment safety
- Fall protection
- OSHA overview

The Director of Public Works praised the training program and recommended it to the County Department of Transportation.

Project Manager (1997) Contracted by insurance company to perform indoor air investigations at 3 homes where there were homeowner complaints. These investigations entailed:

- Interviewing homeowners
- Reviewing architectural drawings
- Performing visual survey of homes
- Conducting moisture testing of walls, floors, and ceiling
- Performing fungal sampling
- Performing volatile organic sampling

At two homes, visible mold was present on basement walls. (The insurance company later remediated the mold and constructed french drains along the perimeter of these homes.) At the third home petroleum hydrocarbons were detected in the basement (a gas station was located adjacent to the home).

Project Manager (1996 - 1997). Retained by the Metropolitan Atlanta Rapid Transit Authority (MART7A) to oversee lead paint abatement operations inside 23 box girders on the MARTA rail-lines. Responsibilities included:

- Review abatement contractor's submittals for compliance with project specifications.
- Oversee field operations. Document deviations from specifications.
- Perform OSHA compliance sampling to evaluate workers' exposure to lead dust.
- Conduct ambient air monitoring to evaluate lead dust emissions during abatement operations.

- Perform wipe sampling to ascertain the presence of residual lead on the surfaces of the box girders after abatement.
- Verify proper disposal of lead waste.

Task Manager (1996). Provided air monitoring services for a petroleum pipeline company. The purpose of the monitoring was to identify and quantify the concentrations of petroleum hydrocarbons vapors inside a cave system located adjacent to a diesel fuel spill site. Quarterly air samples were collected from 31 caves and vents in an effort to determine the exposure potential of recreational spelunkers. Sample results were compared to occupational exposure limits (OSHA PELs and ACGIH TLVs)-- the levels considered safe by the Tennessee Environmental Protection Division.

Technical Manager (1994-1995). Designed exposure monitoring study for Johnson Controls. The national contract with Johnson Controls involved the assessment of employee exposure to the refrigerant 2,2-dichloro-1,1,1-trifluoroethane during scheduled and emergency repair of chiller units. Additionally, the study evaluated mechanical room ventilation systems for adherence to American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) Standards.

Task Manager (1994). Conducted indoor air quality (IAQ) assessment of a Metropolitan Atlanta Rapid Transit Authority office building. The assessment involved:

- Development and distribution of employee questionnaire and the evaluation of data for clusters;
- Visual walkthrough of areas identified as having a high incidence of occupant complaints;
- Inspection of HVAC system and review of maintenance procedures; and
- Collection and evaluation of mold and volatile organic samples.

From collected data, recommendations were made to eliminate employee IAQ complaints.

Task Manager (1994). Conducted 40-hour hazardous waste operations safety training for Mobil Oil employees.

Project Manager (1993). Responsible for the design and implementation of an industrial hygiene air survey for a petroleum pipeline company in Georgia. The study investigated employee exposure to lead and zinc oxide fumes associated with arc welding and oxyacetylene cutting during the construction of a drum storage facility.

Project Manager (1993). Managed several asbestos abatement projects for Metropolitan Atlanta Rapid Transit Authority (MARTA). Responsibilities included:

- Bulk sampling to confirm asbestos containing materials.
- Review abatement contractors qualifications and develop removal specifications.
- Perform oversight of abatement activities
- Conduct background, work area, clearance and OSHA compliance air sampling.

Project Manager (1992). Developed and performed occupational health and training for construction service and engineering personnel employed by MARTA.

Project Manager (1991 - 1992). Responsible for evaluating health and safety risk and recommending measures to control employee exposure at an automotive manufacturing facility located in Georgia.

Task Manager (1991). Developed and provided construction safety training for design and construction service personnel contracted by the

Chinese Petroleum Company to manage the building of the Kaohsiung refinery's wastewater treatment system.

Project Quality Assurance Manager (1985-1990). Two industrial site investigations and contamination assessment projects and two remedial investigation and feasibility study (RI/FS) IRP projects for the U.S. Air Force. Responsibilities included the development of quality assurance project plans, the auditing of field and laboratory procedures, issuance of audit findings, and validation of laboratory and field data.

Toxicologist (1985 - 1990). Authored public health risk evaluations for several multi-site RI/FS projects.

1983 - 1985. NUS Corporation, Atlanta, Georgia. **Regional Safety Manager** (1983 - 1985). Worked as a member of multidisciplinary field investigation team (FIT) under contract with the U.S. Environmental Protection Agency (USEPA). Duties as a safety officer included the instruction of USEPA, FIT, and State Emergency Response Personnel in hazardous waste operations. Topics of the training included the following areas: protective clothing, respiratory protection, air monitoring instrumentation/OSHA regulations, site control, and site characterization. Developed the Health and Safety Standard Operating Procedures for the USEPA Region IV FIT.

As a **Quality Assurance Manager** (1983 - 1985) for the Region IV FIT, developed quality assurance/control standard operating procedures. Performed audits on several RI/FS projects to insure compliance with USEPAs, NEICs, and FITs quality assurance procedures. Coauthored the Quality Assurance Manual for Remedial Response Activities at Uncontrolled Hazardous Substance Facilities, Zone 1. Selected topics from this manual include: the development and control of work plans, document control, remedial design control, data acquisition, field data collection, subcontractor quality assurance requirements, identification and control of laboratory samples, auditing, etc. These procedures were adopted by USEPA and Zone 1 FIT.

Project Manager (1983 - 1985). Site investigations at eight Superfund sites, under contract with USEPA Region IV. The activities performed at these CERCLA sites included the installation of monitoring wells and the sampling of soils, sediments, groundwater, and surface waters. One site involved the excavation, sampling, and removal of drums containing corrosive materials (mineral acids). The level of protection utilized by personnel for this included the use of fully encapsulating suits and self-contained breathing apparatuses. Ranked all sites utilizing the Hazardous Ranking System (HRS).

Professional Affiliations

Certified Industrial Hygienist, Comprehensive Practice, No. 5133

Society of Occupational and Environmental Health

American Board of Industrial Hygienists

American Academy of Industrial Hygienists (Diplomat)

American Industrial Hygiene Association

Georgia Local Section- American Industrial Hygiene Association (Officer)

Hazardous Waste Action Coalition, Health and Safety Subcommittee (Member)

Georgia AIHA Government Affairs Committee (Officer)

Papers and Publications

Crystalline Silica Exposure, Chattahoochee Tunnel Case Study-Presented at Georgia Local Section AIHA Fall 2001 meeting

"Exploding Trailer Incident Investigation," presented at American Industrial Hygiene Conference and Exposition, May 1995.

"Safety Considerations of Underground Storage Tank Investigations," presentation to the Arizona Society of Safety Engineers, 1985.

"Health and Safety Considerations for Hazardous Waste Operations," presented at the USEPA Region IV sponsored Symposium on the Progress of Regional and State Superfund Programs, July 1984.

"Protection by Ascorbate Against Acetylphenylhydrazine Induced Heinz Body Formation in Normal Human and Sheep Erythrocytes," *The Journal of Environmental Science and Health*, Volume 6, pp. 897-902, 1982.

"Ozone-Induced Decrease of Erythrocyte Survival in Adult Rabbits," *Advances in Modern Environmental Toxicology*, Volume 5, 1982.

""The Salmonella/Mammilian-Microsome Mutagenicity Test," presented before the Honor Society of Ohio Wesleyan University, June 1978.

TIEN-YU (TAMMY) CHANG
PROJECT CHEMIST

Experience Summary

Environmental, pharmaceutical, and analytical testing, method development, provide up-to-date technical information to technical staff, assist in RFPs, writing QAPP, determining proper DQOs for different projects, conducting training programs, subcontracting laboratories procurement, overseeing subcontracting laboratories performance, handle all laboratory non-conformance issues, laboratory audits, data interpretation, data validation, quality assurance and quality control experience.

Years of Experience:

18

Years with Parsons:

7.5 yrs

Education

M.S. Chemistry, May 1977, University of Missouri – Kansas City, Kansas City, Missouri

Professional Affiliations

American Chemistry Society

Primary Experience

October 1998 – Date. Parsons, Principal Scientist. Responsible for providing technical support, preparing QAPPs, reviewing work plans and field sampling and analysis plans, establishing proper DQOs for various projects, laboratory procurement, laboratory audits, project quality control, training junior scientists, project field sampling coordination between Parsons and subcontracting laboratories, solving non-conformance issues from the lab, data interpretations and data validation of laboratory reports. Projects involving multiple sites of CWM program/DNSC program/RFIs/risk analyses/SWMU closures at former sanitary and industrial landfills and explosion formulation areas at Lone Star Army Ammunition Plant, Texas; groundwater compliance plan implementation of a closed hazardous waste landfill, X-1 sewage treatment plant, the additional well installation at the Western Industrial Area, RFI, groundwater monitoring programs, excavation of contaminated soil at Building 722, soil and groundwater investigation near Buildings 1025 and 1027, and the Building 433 post-RFI investigation at Red River Army Depot, TX; remedial investigations, RCRA facility investigations, environmental risk assessments, total maximum daily load studies, perchlorate ecological system studies, Air Force bases clean-up and closure activities and treatability investigations.

Other Experience

August 1996 – March 1998. DHL Analytical, QA/QC Manager. Responsible for the development and implementation of QA/QC program, technical training of personnel with respect to the QA/QC program, updating SOPs, data package assembly and final review of all project reports, conducting internal audits, preparation for external audits and any correction action may required.

December 1988 – August 1991. Bolsa Research Associates, Project Manager. Responsible for the development of pesticide residue analysis business, technical training, and management special projects including several agriculture chemical hydrolysis studies.

June 1979 – June 1983. Bayer Pharmaceutical Co., QA Supervisor. Responsible for the Stability Program, Accuracy and Precision Program and training program.

September 1977 – June 1979. Bayer Chemical Co., Chemist II. Responsible for the QC training program and R & D projects.

NORMAN HILMAR, CQA, QC MANAGER

- *26 years experience with Government projects: USACE, other DOD, DOE involving CERCLA/NCP, HTW, MEC, CWM and radiological contaminants*
- *Developed numerous QA/QC programs for diverse SI projects*
- *24 years with Parsons*

Degree/Registration:

BS/1972/Mechanical Engineering/Cal Poly University
BS/1966/Marine Engineering/CA Maritime Academy
ASQC Certified Quality Auditor (CQA)/1997
ISO 9000 Lead Auditor, ANSI-RAB/1998

Norman Hilmar has 26 years experience managing and developing quality assurance (QA) programs for HTW, MEC, CWM and radiological contaminated sites for the USACE and other DoD agencies. He has worked on a wide range of projects including site investigations and characterizations, demilitarization sites, hazardous/nuclear waste management, MEC removal, decontamination and decommissioning, ISO 9000/14000 programs, ASQC E4 programs, CERCLA/RCRA projects, supplier quality evaluations, and nuclear facility audits.

(2004-Present) USAESCH, MRS and CONUS/OCONUS Contract Quality Control Manager: QC Manager responsible for development of overall QCP to establish and describe QC, ;quality improvement, customer satisfaction, lessons learned, and auditing requirements for Parsons munitions-response and other munitions-related services. QCP adheres to DID MR-005-10 and 11 and meets basic requirements of ISO 9001.

(2003-Present) PMACWA, Pueblo Chemical Agent Destruction Pilot Plant (PCAPP), CO: QA Manager for development, training, implementation, and assessment of ISO 9001 QA/QC program for design, procurement, fabrication, quality improvement, and testing process equipment used to dismantle and decontaminate chemical munitions.

(2001-Present) USAESCH, MEC Sector Quality Control Plan (QCP), Huntsville, AL: QC Manager responsible for development of overall QC Plan to establish and describe quality control, quality improvement, customer satisfaction, and auditing requirements for Parsons OE Sector cleanup and UXO removal projects. QCP adheres to DID OE-005-11 and meets basic requirements of ISO 9001, tailored in graded manner to OE type projects.

(2001-2002) USACE, Badlands Bombing Range UXO EE/CA, Pine Ridge Reservation, SD: QA Manager responsible for performing assessment/audit of QA/QC program for geophysical and intrusive investigation, engineering, soil sampling, and data management.

(1999-2000) USACE, Dugway Proving Ground, UT (CA): QA Manager responsible for development and management of QA/QC program meeting USACE requirements covering site investigations, laboratory QA/QC, field sampling, QA/QC data validation, and USACE three-phase QC inspection program.

(1999-2000) Air Force Center for Environmental Excellence, Hazardous Waste Remediation Program, Nationwide: QA Manager for risk-based remediation program for 10 hazardous waste sites at Air Force bases, of which eight have been approved for closure. Measures included intrinsic remediation, bioventing, biosparging, and soil vapor extraction.

(1998-1999) U.S. Army CBDCOM, Chemical Weapons Disposal Project, WA (CA): QA Manager responsible for development of ISO 9001 and ANSI E4 QA program including development of bio-treatment neutralization.

APPENDIX I
TECHNICAL PROJECT PLANNING WORKSHEETS AND CONCEPTUAL SITE MODEL

TPP Team	EM 200-1-2, Paragraph 1.1.1
Decision Makers	
Customer	USACE Jacksonville District (CESAJ)
Project Manager	Wandell Carlton, CESAJ and Betina Johnson, CEHNC
Regulators	Florida Department of Environmental Protection (FDEP), Mary Ann Kraus and Bret LeRoux
Primary Stakeholders	Florida Department of Transportation, City of Orlando, Orange County Environmental Protection Division (Hamp Pridgen), and various private landowners and lessees

Data Types	Data Users	Data Gatherer
Demographics/Land Use	Risk, Responsibility, and Compliance Perspectives	Parsons (Senior Scientist, Risk Specialist)
Site Conditions	Remedy Perspective	Parsons (Geologist, Senior Scientist)
Munitions and Explosives of Concern (MEC)	Risk and Remedy Perspectives	Parsons (Senior UXO Supervisor, Risk Specialist, Senior Scientist)
Munitions Constituents (MC)	Risk and Remedy Perspectives	Parsons (Chemist, Risk Specialist, Senior Scientist)
Archaeology	Compliance and Remedy Perspectives	Parsons (Staff Scientist, Senior Scientist)
Endangered Species	Risk and Compliance Perspectives	Parsons (Staff Scientist, Risk Specialist)

CUSTOMER'S GOALS		EM 200-1-2, Paragraph 1.1.2	
Area of Interest (AOI)	**Issues**	**Future Land Use**	**Site-specific Closeout Goal (if applicable)**
Area A. Avon, Central Park, Lee Vista Square, Newport, Odyssey Middle School, & Tivoli Gardens	MEC, MC	Residential	TBD
Area B. Central Park, Newport, & Warwick	MEC, MC	Residential	TBD
Area C. Avon, Hidden Oaks Elementary School, Newport, Tivoli Village & Tivoli Woods.	MEC, MC	Residential	TBD
Area D. Victoria Landing, Waterside, & Young Pine.	MEC, MC	Residential	TBD
Area E. Mockingbird, L.L.C.	MEC, MC	Planned Development	TBD
Area F. Orange County Landfill	MEC, MC	Landfill	TBD
Area G. Carlsbad, L.L.C.	MEC, MC	Unkown	TBD
Area H. Commerce Business Park	MEC, MC	Business park	TBD

Site Closeout Statement
To manage the munitions and explosives of concern (MEC) and munitions constituents (MC) risk through a combination of remedial action, administrative controls, and public education; thereby rendering the site as safe as reasonably possible to humans and the environment and conducive to the anticipated development.
Customer's Schedule Requirements
RI/FS Field Effort and Reporting Complete by March 2010
Customer's Site Budget
RI/FS: Fully Funded Through Decision Document at $3.4M.

IDENTIFY SITE APPROACH		
EXISTING SITE INFORMATION & DATA EM 200-1-2, Paragraph 1.1.3 and 1.2.1		
Attachment(s) to Phase I TPP Memorandum	**Located at Repository**	**Preliminary Conceptual Site Model**
Preliminary Assessment (Archives Search Report)	Placed in the local repository	No
ASR Supplement	Placed in the local repository	Yes
Site Inspection Report	Placed in the local repository	Yes
POTENTIAL POINTS OF COMPLIANCE EM 200-1-2, Paragraph 1.2.1.3		
Determination of nature and extent of MEC/MC		
Avoidance of sensitive conditions: wetlands, endangered species, archaeological sites		
MEDIA OF POTENTIAL CONCERN EM 200-1-2, Paragraph 1.2.1.4		
Nature and Extent of MEC		
Nature and Extent of MC in soil, surface water and if applicable ground water.		
SITE OBJECTIVES EM 200-1-2, Paragraph 1.2.2		
Collection of sufficient MEC and MC data to determine if concentrations are high enough to warrant further action and to find their nature and extent.		
Eliminate from further consideration those releases that pose no significant threat to public health or the environment.		
Collection of sufficient data to perform MRSPP scoring.		
Complete the SI		
See Site-Specific Work Plan		
See Attached Worksheets Developed by the Project Team		
REGULATOR AND STAKEHOLDER PERSPECTIVES EM 200-1-2, Paragraph 1.2.3		
Regulators	**Community Interests**	**Others**
FDEP requests discrete samples be taken at all BIP locations for both the TCRA and the RI/FS, and at any location where there is evidence of a low order detonation and in any pits to include the two TCRA pits.	Current property values and property owners concerns regarding the hazards and remedy. Future Development (commercial, residential, industrial)	N/A
FDEP is concerned with Gopher Tortoise presence and procedures to avoid harming them.		
PROBABLE REMEDIES EM 200-1-2, Paragraph 1.2.4		
Probable remedies to be evaluated include Remedial Action, Access Controls, and NDAI following RI/FS characterization		
EXECUTABLE STAGES TO SITE CLOSEOUT EM 200-1-2, Paragraph 1.2.5		
Remedial Investigation/Feasibility Study (RI/FS)		
Proposed Plan		
Decision Document		
Remedial Design (RD)		
Remedial Action (as necessary)		
Five Year Reviews		
Time Critical Removal Action (as required)		

IDENTIFY CURRENT PROJECT		
SITE CONSTRAINTS AND DEPENDENCIES	**EM 200-1-2, Paragraph 1.3.1**	
Administrative Constraints and Dependencies		
Rights of Entry (ROE)		
Cultural Resources		
Funding beyond the RI/FS		
Concurrent development programs		
Scheduling		
Technical Constraints and Dependencies		
Property owner/leaseholder site activities (Site access)		
Geophysical mapping interference from utilities, structures and vegetation		
MEC destruction in residential areas.		
Topography/vegetation		
Evacuation of safety zones		
Cultural resources		
Environmentally sensitive areas		
Legal and Regulatory Milestones and Requirements		
Consistent with CERCLA and NCP		
Public, stakeholder & regulatory involvement & review of key documents (see schedule)		
Funding beyond the RI/FS		
Soil screening levels as agreed upon by the Project Delivery Team to include the most conservative between the Florida Administrative Code (FAC) 62-777 Direct Contact (Residential) values, the FAC 62-777 Leachability to Groundwater values, and the Region 9 Preliminary Remediation Goals for explosives and metals.		
CURRENT EXECUTABLE STAGE	**EM 200-1-2, Paragraph 1.3.3**	
Determination of nature and extent of MEC and MC presence in compliance with RI/FS under CERCLA		
Basic (For Current Projects)	**Optimum** (For Future Projects)	**Excessive** (Objectives that do not lead to site closeout)
RI/FS	Remdial Selections	

Acronyms

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CESAJ - U.S. Army Corps of Engineers, Jacksonville District
FDEP - Florida Department of Environmental Protection
FUDS - Formerly Used Defense Sites
MC - munitions constituents
MEC - munitions and explosives of concern
MRSPP - Munitions Response Site Prioritization Protocol
NCP - National Contingency Plan
NDAI - No Department of Defense Action Indicated
PRG - Preliminary Remediation Goal
RI/FS - Remedial Investigation and Feasibility Study
SSL - Soil Screening Level
TBD - To be determined
TCRA - Time Critical Removal Action
TPP - Technical Project Planning

PROJECT OBJECTIVES WORKSHEET

SITE: **Area A**

PROJECT: **Pinecastle Jeep Range**

		Site Objective a			Data Needs	Data Collection Methods	Data Users	Project Objective Classification
Number	Executable Stage [b]		Description	Source				
	Current	Future						
1	Yes		Nature and extent of MEC contamination. What is it, where is it, what hazard does it pose?	ASR, ASR Supplement, SI, TCRA and RI field activities	Are there any MEC? If so what type, where and hazard posed. Future LU.	Conduct DGM and mag and dig at pre-determined locations. Avoid conservation areas except where approved by TPP team.	Risk and Remedy Perspectives	Basic
2	Yes		Determine the nature and extent of MC and if the MC contamination is high enough to pose a risk to human health or the environment	SI results, taking surface soil, sediment and water samples, and if applicable ground water.	Samples taken at BIP, MEC, and low order detonation locations, areas of munitions debris, and if applicable ground water.	Sample collection IAW SAP. Avoid conservation areas except where approved by TPP team.	Risk and Remedy Perspectives	Basic

a Refer to EM 200-1-2, Paragraph 1.2.2

b Refer to EM 200-1-2, Paragraph 1.2.5

Glossery:

ASR - Archive Search Report
IAW - In accordance with
MEC - Munitions and Explosives of Concern
DGM - Digital Geophysical mapping
SAP - Sample and Analysis Plan
RI - Remedial Investigation
LU - Land Use
MC - Munitions Constituents
SI - Site Inspection
TCRA - Time Critical Removable Action
MC - Munitions Constituents

PROJECT OBJECTIVES WORKSHEET

SITE: **Area B**

PROJECT: _ **Pinecastle Jeep Range**

Site Objective [a]					Data Needs	Data Collection Methods	Data Users	Project Objective Classification
Number	Executable Stage [b]		Description	Source				
	Current	Future						
1	Yes		Nature and extent of MEC contamination. What is it, where is it, what hazard does it pose?	ASR, ASR Supplement, SI, TCRA and RI field activities	Are there any MEC? If so what type, where and hazard posed. Future LU.	Conduct DGM and mag and dig at pre-determined intervals in selcted areas. Avoid conservation areas except where approved by TPP team.	Risk and Remedy Perspectives	Basic
2	Yes		Determine the nature and extent of MC and if the MC contamination is high enough to pose a risk to human health or the environment	SI results, taking surface soil, sediment and water samples, and if applicable ground water.	Samples taken at BIP, MEC, and low order detonation locations, areas of munitions debris, and if applicable ground water.	Sample collection IAW SAP. Avoid conservancy and wet lands areas except where approved by TPP team.	Risk and Remedy Perspectives	Basic

a Refer to EM 200-1-2, Paragraph 1.2.2

b Refer to EM 200-1-2, Paragraph 1.2.5

Glossery:

ASR - Archive Search Report

IAW - In accordance with

MEC - Munitions and Explosives of Concern

LU - Land Use

MC - Munitions Constituents

SI - Site Inspection

PROJECT OBJECTIVES WORKSHEET

SITE: **Area C**

PROJECT: **Pinecastle Jeep Range**

Site Objective [a]					Data Needs	Data Collection Methods	Data Users	Project Objective Classification
Number	Executable Stage [b]		Description	Source				
	Current	Future						
1	Yes		Nature and extent of MEC contamination. What is it, where is it, what hazard does it pose?	ASR, ASR Supplement, SI, TCRA and RI field activities	Are there any MEC? If so what type, where and hazard posed. Future LU.	Conduct DGM and mag and dig at pre-determined intervals in selcted areas. Avoid conservation areas.	Risk and Remedy Perspectives	Basic
2	Yes		Determine the nature and extent of MC and if the MC contamination is high enough to pose a risk to human health or the environment	SI results, taking surface soil, sediment and water samples, and if applicable ground water.	Samples taken at BIP, MEC, and low order detonation locations, areas of munitions debris, and if applicable ground water.	Sample collection IAW SAP. Avoid conservation areas.	Risk and Remedy Perspectives	Basic

a Refer to EM 200-1-2, Paragraph 1.2.2

b Refer to EM 200-1-2, Paragraph 1.2.5

Glossery:

ASR - Archive Search Report
IAW - In accordance with
MEC - Munitions and Explosives of Concern
DGM - Digital Geophysical mapping
SAP - Sample and Analysis Plan
RI - Remedial Investigation
LU - Land Use
MC - Munitions Constituents
SI - Site Inspection
TCRA - Time Critical Removable Action
MC - Munitions Constituents

PROJECT OBJECTIVES WORKSHEET

SITE: **Area D**

PROJECT: __ **Pinecastle Jeep Range**

Site Objective [a]					Data Needs	Data Collection Methods	Data Users	Project Objective Classification
Number	Executable Stage [b]		Description	Source				
	Current	Future						
1	Yes		Nature and extent of MEC contamination. What is it, where is it, what hazard does it pose?	ASR, ASR Supplement, SI, TCRA and RI field activities	Are there any MEC? If so what type, where and hazard posed. Future LU.	Conduct DGM and mag and dig at pre-determined intervals in selcted areas. Avoid conservation areas.	Risk and Remedy Perspectives	Basic
2	Yes		Determine the nature and extent of MC and if the MC contamination is high enough to pose a risk to human health or the environment	SI results, taking surface soil, sediment and water samples, and if applicable ground water.	Samples taken at BIP, MEC, and low order detonation locations, areas of munitions debris, and if applicable ground water.	Sample collection IAW SAP. Avoid conservation areas.	Risk and Remedy Perspectives	Basic

a Refer to EM 200-1-2, Paragraph 1.2.2

b Refer to EM 200-1-2, Paragraph 1.2.5

Glossery:

ASR - Archive Search Report

IAW - In accordance with

LU - Land Use

MC - Munitions Constituents

PROJECT OBJECTIVES WORKSHEET

SITE: **Area E**

PROJECT: __ **Pinecastle Jeep Range**

Site Objective [a]					Data Needs	Data Collection Methods	Data Users	Project Objective Classification
Number	Executable Stage [b]		Description	Source				
	Current	Future						
1	Yes		Nature and extent of MEC contamination. What is it, where is it, what hazard does it pose?	ASR, ASR Supplement, SI, TCRA and RI field activities	Are there any MEC? If so what type, where and hazard posed. Future LU.	Conduct DGM and mag and dig at pre-determined intervals in selcted areas. Avoid consevancy areas and wet lands except where approved by TPP team.	Risk and Remedy Perspectives	Basic
2	Yes		Determine the nature and extent of MC and if the MC contamination is high enough to pose a risk to human health or the environment	SI results, taking surface soil, sediment and water samples, and if applicable ground water.	Samples taken at BIP, MEC, and low order detonation locations, areas of munitions debris, and if applicable ground water. Collect soil samples at nitroglycerin detections from SI. Collect soil samples along small arms berms.	Sample collection IAW SAP. Avoid conservancy and wet lands areas except where approved by TPP team.	Risk and Remedy Perspectives	Basic

a Refer to EM 200-1-2, Paragraph 1.2.2

b Refer to EM 200-1-2, Paragraph 1.2.5

Glossery:

ASR - Archive Search Report

IAW - In accordance with

LU - Land Use

MC - Munitions Constituents

PROJECT OBJECTIVES WORKSHEET

SITE: **Area F**

PROJECT: **Pinecastle Jeep Range**

Site Objective [a]					Data Needs	Data Collection Methods	Data Users	Project Objective Classification
Number	Executable Stage [b]		Description	Source				
	Current	Future						
1	Yes		Nature and extent of MEC contamination. What is it, where is it, what hazard does it pose?	ASR, ASR Supplement, SI, TCRA and RI field activities	Are there any MEC? If so what type, where and hazard posed. Future LU.	Conduct DGM along transects. Avoid capped and open landfill areas. Avoid conservation areas except where approved by TPP team.	Risk and Remedy Perspectives	Basic
2	Yes		Determine the nature and extent of MC and if the MC contamination is high enough to pose a risk to human health or the environment	SI results, taking surface soil, sediment and water samples, and if applicable ground water.	Samples taken at BIP, MEC, and low order detonation locations, areas of munitions debris, and if applicable ground water.	Sample collection IAW SAP. Avoid capped and open landfill areas. Avoid conservation areas except where approved by TPP team.	Risk and Remedy Perspectives	Basic

a Refer to EM 200-1-2, Paragraph 1.2.2

b Refer to EM 200-1-2, Paragraph 1.2.5

Glossery:

ASR - Archive Search Report
IAW - In accordance with
MEC - Munitions and Explosives of Concern
DGM - Digital Geophysical mapping
SAP - Sample and Analysis Plan
RI - Remedial Investigation
LU - Land Use
MC - Munitions Constituents
SI - Site Inspection
TCRA - Time Critical Removable Action
MC - Munitions Constituents

PROJECT OBJECTIVES WORKSHEET

SITE: **Area G**

PROJECT: _ **Pinecastle Jeep Range**

Site Objective [a]					Data Needs	Data Collection Methods	Data Users	Project Objective Classification
Number	Executable Stage [b]		Description	Source				
	Current	Future						
1	Yes		Nature and extent of MEC contamination. What is it, where is it, what hazard does it pose?	ASR, ASR Supplement, SI, TCRA and RI field activities	Are there any MEC? If so what type, where and hazard posed. Future LU.	Conduct DGM and mag and dig at pre-determined intervals in selcted areas. Avoid conservation areas and wetlands.	Risk and Remedy Perspectives	Basic
2	Yes		Determine the nature and extent of MC and if the MC contamination is high enough to pose a risk to human health or the environment	SI results, taking surface soil, sediment and water samples, and if applicable ground water.	Samples taken at BIP, MEC, and low order detonation locations, areas of munitions debris, and if applicable ground water.	Sample collection IAW SAP. Avoid conservation areas and wetlands.	Risk and Remedy Perspectives	Basic

a Refer to EM 200-1-2, Paragraph 1.2.2

b Refer to EM 200-1-2, Paragraph 1.2.5

Glossery:

ASR - Archive Search Report
IAW - In accordance with
MEC - Munitions and Explosives of Concern
DGM - Digital Geophysical mapping
SAP - Sample and Analysis Plan
RI - Remedial Investigation
LU - Land Use
MC - Munitions Constituents
SI - Site Inspection
TCRA - Time Critical Removable Action
MC - Munitions Constituents

PROJECT OBJECTIVES WORKSHEET

SITE: **Area H**

PROJECT: **Pinecastle Jeep Range**

Site Objective [a]					Data Needs	Data Collection Methods	Data Users	Project Objective Classification
Number	Executable Stage [b]		Description	Source				
	Current	Future						
1	Yes		Nature and extent of MEC contamination. What is it, where is it, what hazard does it pose?	ASR, ASR Supplement, SI, TCRA and RI field activities	Are there any MEC? If so what type, where and hazard posed. Future land use.	Conduct DGM along transects. Avoid conservation areas and wetlands .	Risk and Remedy Perspectives	Basic
2	Yes		Determine the nature and extent of MC and if the MC contamination is high enough to pose a risk to human health or the environment	SI results, taking surface soil, sediment and water samples, and if applicable ground water.	Samples taken at BIP, MEC, and low order detonation locations, areas of munitions debris, and if applicable ground water.	Sample collection IAW SAP. Avoid conservation areas and wetlands.	Risk and Remedy Perspectives	Basic

a Refer to EM 200-1-2, Paragraph 1.2.2

b Refer to EM 200-1-2, Paragraph 1.2.5

Glossery:

ASR - Archive Search Report
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TCRA - Time Critical Removable Action
MC - Munitions Constituents

CONCEPTUAL SITE MODEL

PINECASTLE JEEP RANGE

ORANGE COUNTY, FLORIDA

Subsite/Range	Acreage*	Suspect Past DoD Activities	Potential MD/MEC Presence	MD/MEC Found Since Closure	Previous Investigations/ Clearance Actions	Post-DoD Land Use and Current Land Use	Potential Receptors	Potential Source and Receptor Interaction	Proposed Field Investigation
AREA A	382	Parts of .30 and .50 caliber machinegun ranges, air-to-ground rocket range, and within estimated bombing range based on targets	Small arms, practice and HE aerial bombs, incendiary and smoke bombs, air-to-ground rockets, smoke mortars, bazooka rockets, 75mm projectiles	Practice and HE aerial bombs, incendiary bombs, practice and HE 2.36" rockets, armor-piercing projectiles, anti-tank grenades, rifle grenades, mortars (1, 4)	April and Sept 1947 dedudding, 1953 clearance, 1994 INPR, 1997 ASR, 2004 ASR Supplement, 2007 SI, 2008 TCRA (in progress)	Residential/commercial/ educational	Human residents, human workers	Yes- Intrusive or non-intrusive activity, MEC at surface and subsurface. Access available.	DGM/mag & dig - residential areas, DGM - transects; dig all MEC anomalies (residential areas), collect soil samples at MEC/MD finds and at BIP locations
AREA B	81	Within estimated bombing range based on targets (outside Pinecastle property)	Practice and HE aerial bombs, incendiary and smoke bombs	2 inert 20-lb bombs (4)	2008 TCRA (in progress)	Residential/commercial	Human residents, human workers	Yes- Intrusive or non-intrusive activity, MEC at surface and subsurface. Access available.	DGM/mag & dig - residential areas, DGM - transects; dig all MEC anomalies (residential areas), collect soil samples at MEC/MD finds and at BIP locations
AREA C	761	Parts of .30 and .50 caliber machinegun ranges and air-to-ground rocket range	Practice and HE aerial bombs, incendiary and smoke bombs, air-to-ground rockets	None	April and Sept 1947 dedudding, 1994 INPR, 1997 ASR, 2004 ASR Supplement	Residential/educational	Human residents, human workers	Yes- Intrusive or non-intrusive activity, MEC at surface and subsurface. Access available.	DGM/mag & dig - residential areas, DGM - transects; dig 20% MEC anomalies (residential areas), collect soil samples at MEC/MD finds and at BIP locations
AREA D	607	Parts of .30 and .50 caliber machinegun ranges and air-to-ground rocket range	Practice and HE aerial bombs, incendiary and smoke bombs, air-to-ground rockets	None	April and Sept 1947 dedudding, 1994 INPR, 1997 ASR, 2004 ASR Supplement	Residential	Human residents, human workers	Yes- Intrusive or non-intrusive activity, MEC at surface and subsurface. Access available.	DGM/mag & dig - residential areas, DGM - transects; dig 20% MEC anomalies (residential areas), collect soil samples at MEC/MD finds and at BIP locations
AREA E	1,582	Parts of .30 and .50 caliber machinegun ranges, other small arms ranges, air-to-ground rocket range, and within estimated bombing range. Includes small arms firing points and bombing targets	Small arms, practice and HE aerial bombs, incendiary and smoke bombs, air-to-ground rockets, smoke mortars, bazooka rockets, 75mm projectiles	Practice and HE aerial bombs, incendiary bombs, practice and HE 2.36" rockets, armor-piercing projectiles, anti-tank grenades, rifle grenades, mortars (1, 3, 4)	April and Sept 1947 dedudding, 1953 clearance, 1994 INPR, 1997 ASR, 2004 ASR Supplement	Undeveloped	Human workers	Yes- Intrusive or non-intrusive activity, MEC at surface and subsurface. Access available.	DGM - transects; dig representative MEC anomalies, collect soil samples at MEC/MD finds and at BIP locations
AREA F	6,781	Parts of .30 and .50 caliber machinegun ranges, other small arms ranges, air-to-ground rocket range, and within estimated bombing range based on targets	Small arms, practice and HE aerial bombs, incendiary and smoke bombs, air-to-ground rockets, smoke mortars, bazooka rockets, 75mm projectiles	M38 100-lb practice bombs, 5-inch rockets, smoke tanks (3)	April and Sept 1947 dedudding, 1953 clearance, 1994 INPR, 1997 ASR, 2004 ASR Supplement	Industrial/residential/ undeveloped	Human residents, human workers	Yes- Intrusive or non-intrusive activity, MEC at surface and subsurface. Access available.	DGM - transects; dig representative MEC anomalies, collect soil samples at MEC/MD finds and at BIP locations
AREA G	3,300	Parts of .30 and .50 caliber machinegun ranges	Small arms	M38 100-lb practice bombs (3)	April and Sept 1947 dedudding, 1953 clearance, 1994 INPR, 1997 ASR, 2004 ASR Supplement	Undeveloped	Human workers	Yes- Intrusive or non-intrusive activity, MEC at surface and subsurface. Access available.	DGM - transects; dig representative MEC anomalies, collect soil samples at MEC/MD finds and at BIP locations
AREA H	925	Parts of .30 and .50 caliber machinegun ranges, other small arms ranges, air-to-ground rocket range, and within estimated bombing range based on targets	Small arms, practice and HE aerial bombs, incendiary and smoke bombs, air-to-ground rockets, smoke mortars, bazooka rockets, 75mm projectiles	5-inch HVAR rocket	April and Sept 1947 dedudding, 1994 INPR, 1997 ASR, 2004 ASR Supplement	Residential/undeveloped	Human residents, human workers	Yes- Intrusive or non-intrusive activity, MEC at surface and subsurface. Access available.	DGM - transects; dig representative MEC anomalies, collect soil samples at MEC/MD finds and at BIP locations
TOTAL	14,419								

*Number represents actual acreage for each individual subsite/range and includes areas outside the property boundaries.

Source:
1 = 1997 ASR
2 = 2004 ASR Supplement
3 = January 2008 History of Pinecastle Jeep Range up to the Site Inspection
4 = preliminary TCRA results – Feb 2008

ASR = Archives Search Report
BIP = Destruction of munitions (blown in place)
DGM = Digital geophysical mapping
DoD = Department of Defense
HE = high explosives
MD = Munitions debris
MEC = Munitions and explosives of concern

APPENDIX J
STANDARD OPERATING PROCEDURES

SOP'S INCLUDED

1. Demolition Operations
2. Explosive Storage and Transportation
3. Hantavirus
4. Heavy Equipment Operations
5. Range and Wildfire Operations
6. Severe Weather Operations
7. Vehicle Operations
8. White Phosphorus
9. Gopher Tortoise

Standing Operating Procedure

(SOP)

Demolition Operations

Approved by:

Michael Short
OE Group Operations Manager:_____ **5/30/2008**
(Signature) **(Date)**

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to the conduct of demolition/disposal operations on sites contaminated with Munitions and Explosives of Concern (MEC).

2.0 SCOPE

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

3.0 REGULATORY REFERENCES

Applicable sections and paragraphs in the documents listed below will be used as references for the conduct of demolition/disposal operations:

- Parsons Corporate Safety and Health Program;
- EP 385-1-95a, Basic Safety Concepts and Considerations for OE Operations;
- EP 1110-1-17, Establishing a Temporary OB/OD Site for Conventional Ordnance and Explosives Projects;
- USACE EM 385-1-1, Safety and Health Requirements Manual;
- DoD 4145.26-M, Contractor's Safety Manual for Ammunition and Explosives;
- DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards;
- DA PAM 385-64, Ammunition and Explosives Safety Standards;
- TM 60A-1-1-31, EOD Disposal Procedures;
- AR 190-11, Physical Security of Arms, Ammunition and Explosives;
- ATF 5400.7, Alcohol Tobacco and Firearms Explosives Laws and Regulations; and
- Applicable sections of DOT, 49 CFR Parts 100 to 199.

4.0 Responsibilities

4.1 Project Manager

The Project Manager (PM) shall be responsible for ensuring the availability of the resources needed to implement this SOP, and shall also ensure that this SOP is incorporated in plans, procedures and training for sites where this SOP is to be implemented.

4.2 Senior UXO Supervisor

The Senior UXO Supervisor (SUXOS) will be responsible for assuring that adequate safety measures and housekeeping are taken during demolition activities, and shall visit demolition locations to ensure that demolition operations are carried out in a safe, clean, efficient and economical manner**.**

4.3 UXO Technician III (Demolition Supervisor)

A designated UXO Tech III shall act as the Demolition Supervisor (DS). There may be more than one DS assigned to a project site due to conducting simultaneous operations and divergent sites. The demolition activities shall be conducted under the direct control of the DS, who will have the responsibility of supervising all demolition operations assigned to him. The DS shall be responsible for training all on-site UXO demolition personnel on his team regarding the nature of the materials handled, the hazards involved and the precautions necessary to conduct a safe demolition operation. The DS will also ensure that the Daily Operational Log, Demolition Shot Records and inventory records are properly filled and accurately depict the demolition events and demolition material consumption for each day's operations. The DS shall be present during all demolition operations.

4.4 UXO Safety Officer

The UXO Safety Officer (UXOSO) for the site is responsible for ensuring that all demolition operations are being conducted in a safe and compliant manner, and is required to be present during all demolition operations. The only exception to this rule is when the project site has multiple sites conducting concurrent munitions response (MR) operations, and it is impossible for the UXOSO to be present at each shot. In that event a demolition team safety officer will be designated. This individual will report to the UXOSO and assume the UXOSO's responsibilities at the designated demolition operation. In this situation, the UXOSO will conduct periodic safety audits of the demolition teams and assist the demolition team's safety officers in the performance of their duties. The UXOSO or demolition team safety officer will inspect the demolition shot(s) for hazards and then assisted by the DS and UXO Tech IIs, will inspect each demolition pit and an area of up to 250 feet in radius after each demolition shot to ensure that no kick-outs of hazardous MEC components or other hazardous items has occurred.

4.5 UXO Quality Control Specialist

The UXO Quality Control Specialist (UXOQCS) is responsible for inspecting, the Daily Operational Log, the Demolition Shot Record and the inventory of MEC and demolition material. The UXOQCS will check the pit/demolition site with a magnetometer and large metal fragments exceeding the pass/fail requirements of the SOW will be removed.

5.0 GENERAL OPERATIONAL AND SAFETY PROCEDURE

All personnel, including contractor and subcontractor personnel, involved in operations on MEC contaminated sites shall be familiar with the potential safety and health hazards associated with the conduct of demolition/disposal operations, and with the work practices and control techniques used to reduce or eliminate these hazards. During demolition operations, general safety provisions listed below will strictly followed by all demolition personnel. Non-compliance with the general safety provisions will result in disciplinary action, to include termination of employment if warranted.

- All safety regulations applicable to BIP and/or demolition range activities and the destruction of MEC materials involved shall be complied with.

- Demolition of any kind is prohibited without the express authorization from the client.

- The quantity of MEC to be destroyed will be determined by the agreed to limit, with the Net explosive weight (NEW) of the demolition explosives factored into the total NEW.

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

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

- The DS is responsible for reporting all injuries and accidents that occur to the UXOSO.

- Demolition team personnel will not tamper with any safety devices or protective equipment.

- Any defect in demolition material or an unusual condition that is not covered by this SOP will be reported immediately to the DS and UXOSO.

- Demolition procedures shall be conducted in accordance with this SOP and applicable references in Section 3.0.

- Adequate fire protection and first aid equipment shall be provided at all times.

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

- Care will be taken to minimize exposure to the smallest number of personnel, for the shortest time, to the least amount of hazard, consistent with safe and efficient operations.

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

- All demolition hand tools shall be maintained in a good state of repair.

- Each heavy equipment and/or vehicle operator will have in his possession a valid operator's permit, i.e., state driver’s license, certificate of training for backhoe/excavator etc.

- Leather or leather-palmed gloves will be worn when handling wooden boxes, munitions or MEC. If bulk or binary explosives are being handled then rubber gloves, such as Nitrile, will be worn

- Lifting and carrying require care. Improper methods cause unnecessary strains. Observe the following preliminaries before attempting to lift or carry:

  - When lifting, keep your arms and back as straight as possible, bend your knees and lift with your leg muscles; and
  - Be sure you have good footing and hold, and lift with a smooth, even motion.

- The demolition BIP location and/or range shall be provided with telephone and radio communication.
- Motor vehicles and material handling equipment (MHE) used for transporting MEC or demolition materials must meet the following requirements:
  - Exhaust systems shall be kept in good mechanical repair.
  - Lighting systems shall be an integral part of the vehicle.
  - One 20 BC rated portable fire extinguisher shall be, if possible, mounted on the vehicle outside of the driver's cab or two 10BC fire extinguishers, with one inside the cab and the other near the front portion of the vehicle bed, nearest the driver.
  - Wheels of carriers must be chocked and brakes set during loading and unloading.
  - No demolition material or MEC shall be loaded into or unloaded from, motor vehicles while the engine is operating.
- Motor vehicles and MHE used to transport demolition material and MEC shall be inspected prior to use to determine that:
  - Fire extinguishers are filled and in good working order.
  - Electrical wiring is in good condition and properly attached.
  - Fuel tank and piping are secure and not leaking.
  - Brakes, steering and safety equipment are in good condition.
  - The exhaust system is not exposed to accumulations of grease, oil, gasoline, or other fuels, and has ample clearance from fuel lines and other combustible materials.
- A red warning flag, such as a "Bravo Flag", a windsock, or rag will be displayed at the entrance to the demolition range and, if applicable, the entrance gate shall be locked when demolition work is in process. This is only applicable if an open detonation (OD) range has been established with demo pits for all shots.
- Unless otherwise directed, all demolition shots will be tamped with a minimum of two feet of clean earth/dirt or the appropriate thickness of sand bags as indicated on the Fragmentation Data Review Form.

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

- Two-way radios shall not be operated while the shot is primed or during the priming process. The charts shown in Attachment 1 of this SOP shall be used for determining the safe distances from transmitter antennas.

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

- A minimum area of 200 feet in diameter shall be cleared of dry grass, leaves and other extraneous combustible materials around the demolition shot/pit area if a demolition range has been established. The area around the BIP location shall be free of any combustible material and wetted down if necessary.

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

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

- No more than two individuals shall ride in a truck transporting demolition material or MEC, and no one shall be allowed to ride in the trailer/bed.

- Vehicles shall not be refueled when carrying demolition material or MEC, and must be 100 feet from magazines or trailers containing such items before refueling.

- All vehicles used for the transport of explosives will be cleaned of visible explosive and other contamination before releasing the vehicles for other tasks.

- Prior to conducting any other task, personnel shall wash their face and hands after handling demolition material or MEC.

- At the demolition site, prior to “check-out” procedures, all blasting caps will be stored in approved containers (IME 22 or equivalent) and separated a minimum of 50 feet “downwind” from all other explosives until they are needed.

- Demolition shots/pits shall be spaced at least 50 feet apart, with no more than 10 shots/pits prepared for a series of shots at any one time.

6.0 SPECIAL REQUIREMENTS FOR DEMOLITION ACTIVITIES

The following safety and operational requirements shall be followed during demolition operations. Any deviations from this procedure shall be allowed only after receipt of written approval from the USAESCH PM and Parsons OE Operations Mananger. Failure to adhere to the requirements and procedures listed in the paragraphs below could result in serious injury or death; therefore complete compliance with these requirements and procedures will be strictly enforced.

6.1 General Requirements

The general demolition range/shot requirements listed below shall be followed at all times:

- Attachment 1 of this SOP, "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites," will be followed when destroying multiple munitions by detonation.

- Attachment 2 of this SOP, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions

- Attachment 3 of this SOP, “Use of Water for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions” may be used when fragmentation throws and fire is a concern.

- Items awaiting explosive destruction and demolition material shall be protected against accidental ignition or explosion from fragments, grass fires, burning embers or detonating impulses originating in materials being destroyed.

- MEC or bulk explosives, acceptable to move, and destroyed by detonation can be detonated in a pit not less than three feet deep and covered with earth which protrudes not less than two feet above existing ground level. The components should be placed on their sides or in a position to expose the largest area to the influence of the demolition material. The demolition material should be placed in intimate contact with the item to be detonated and held in place by tape or earth packed over the demolition materials. The total NEW to be destroyed below ground at one time shall not exceed the agreed to limit.

- Prevailing weather condition information will be obtained from the U.S. Weather Service and the data logged in the Demolition Shot Log before each shot or round of shots.

- All shots shall be dual primed.

- A minimum of 30 seconds will be maintained between each detonation.

- Detonations will be counted to ensure detonation of all shots. After each series of detonations, a search shall be made of the surrounding area for hazardous items. Items such as lumps of explosives or unfuzed ammunition may be picked up and prepared for the next shot. Fuzed ammunition or items that may have internally damaged components will be detonated in place, if possible.

- After each-detonation and at the end of each day's operations, surface exposed munitions debris, shall be recovered from the demolition site and disposed of in accordance with contracted procedures, as well as all applicable environmental regulations. All collected munitions debris metal will be 100% inspected for absence of explosive materials by demolition range personnel and certified by the SUXOS and the UXOQCS.

- When operated in accordance with the conditions of this procedure the demolition shot should not present a noise problem to the surrounding community. However, if a noise complaint is received, the name, address and phone number of the complainant should be recorded and reported to the site manager, who in turn will report it to the Parsons PM and USAESCH PM.

- Whenever possible, during excavation of demolition pits contour the ground so that runoff water is channeled away from the pits. If demolition operations are discontinued for more than two weeks, the pits should be back filled until operations resume.

- Upon completion of the project, all disturbed demolition areas will be thoroughly inspected for MEC. According to the SOW, the site may have to be leveled and seeded to establish a permanent vegetative cover to inhibit erosion. If necessary, this will be coordinated with the contractor representative. At a minimum, the holes/pits will be filled in and contoured.

- Prior to and after each shot, the Demolition Shot Record is to be filled out by the DS with all applicable information.

6.2 Electric Detonator Use

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

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

- Demolition team members handling detonators will first ground themselves by bending down and touching the ground, which will discharge any static electricity.

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

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

- Prior to use, the detonators shall be tested for continuity. To conduct the test, place the detonators in a pre-bored hole in the ground or place them in a sand bag and walk facing away from the detonators and stretch the wires to their full length, or to 25 feet, whichever is less, being sure to not pull the detonators from the hole or sand bag. With the leg wires stretched to their full length, test the continuity of the detonators one at a time by un-shunting the leg wires and attaching them to the galvanometer and checking for continuity. After the test, re-shunt the wires by twisting the two ends together. Repeat this process for each detonator until all detonators have been tested. This process shall be accomplished at least 50 feet down wind from any MEC/demolition materials and out of the personnel and vehicle flow patterns. In addition, all personnel on the demolition range/shot shall be alerted prior to the test being conducted.

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

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

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

- MEC to be detonated or vented shall be placed in the demolition pit/shot and the demolition material placed/attached in such a manner as to ensure the total detonation and/or venting of the MEC. A section of detonation cord, time fuze, or Non-El shock tube will extend from the demolition material to a point outside the tamping material. Once the MEC and demolition material are in place and the shot has been tamped, the detonators will be connected to the demolition material. Prior to handling detonators that are connected to the firing line, personnel shall ensure that they once again ground themselves. The detonators will then be carried to the demolition pit/shot with the end

of the detonators pointed away from the individual. The detonators are then connected to the detonation cord, Non-El, etc., ensuring that the detonator is not covered with tamping material to allow for ease of recovery/investigation in the event of a miss-fire.

- Prior to making connections to the blasting machine, the entire firing circuit shall be tested with a galvanometer for electrical continuity and ohmic resistance to ensure the blasting machine has the capacity to initiate the shot.

- The individual assigned to make the connections at the blasting machine or panel will not complete the circuit at the blasting machine or panel and will not give the signal for detonation until satisfied that all personnel in the vicinity have been evacuated to a pre-determined distance. When in use, the blasting machine or its actuating device shall be in the blaster's possession at all times. When using the panel, the switch must be locked in the open position until ready to fire, and the single key must be in the blaster's possession.

- Prior to initiating a demolition shot(s), a warning will be given, the type and duration of such will be determined by the prevailing conditions at the demolition range/shot. At a minimum, this should be an audible signal using a siren, air horn or megaphone, which is sounded for one minute duration, five minutes prior to the shot and again one minute prior to the shot.

6.3 Detonating Cord Use

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

- Det cord should be cut using approved crimpers and only the amount required should be removed from inventory.

- When cutting det cord, the task should be performed outside the magazine.

- For ease of inventory control, only remove det cord in one-foot increments.

- Det cord should not be placed in clothing pockets or around the neck, arm or waist, and should be transported to the demolition location in either an approved "day box" or a cloth satchel, depending upon the magazine location and proximity to the demolition area.

- When ready to "tie in" either the det cord to demolition materials, or det cord to detonator, the det cord will be connected to the demolition material and secured to the MEC. The cord is then strung out of the hole/tamping material and secured in place with soil, being sure to leave a one-foot tail exposed outside the hole/tamping material.

- Once the hole is filled or tamping in place, make a loop in the det cord large enough to accommodate the detonator, place the detonator in the loop and secure it with tape. The detonator's explosive end will face down the det cord toward the demolition material or parallel to the main line.

- In all cases, ensure there is sufficient det cord extending out of the hole/tamping material to allow for ease of detonator attachment and detonator inspection/replacement should a misfire occur.

- If the det cord detonators are electric, they will be checked, tied in to the firing line and shunted prior to being taped to the loop as described above. If the det cord detonators are non-electric, the time/safety fuse will be prepared with the igniter in place prior to taping the detonators to the det cord loop. If the det cord detonators are Non-El, simply tape the detonators into the loop as described above.

- In the event that a time/safety fuse is used, and an igniter is not available and a field expedient initiation system must be used (i.e., matches), do not split the safety fuse until the detonator is taped into the det cord loop.

6.4 Shock Tube Splicing Procedures

The high reliability of the shock tube initiating system is due to the fact that all of the components are sealed and unlike standard non-electric priming components, cannot be easily degraded by moisture. Cutting the shock tube makes the open end vulnerable to moisture and foreign contamination, therefore care must be taken to prevent moisture and foreign matter from getting in the shock tubes exposed ends. Some general rules to follow are listed below.

- After cutting a piece of shock tube, either immediately tie a tight overhand knot in one or both cut ends or splice one exposed end and tie off the other.

- Always use a sharp knife or razor blade to cut shock tube so as to prevent the tube from being pinched or otherwise obstructed.

- Always cut shock tube squarely across and make sure the cut is clean.

- Use only the splicing tubes provided by the manufacturer to make splices

- Every splice in the shock tube reduces the reliability of the priming system; therefore keep the number of splices to a minimum.

6.4.1 Shock Tube Assembly

Step 1. If you are using a new role of shock tube cut off the sealed end, dispose of the small piece IAW local laws as they relate to flammable material and proceed to the directions listed in Step 3. If you are using a pre-assembled shock tube/detonator assembly proceed to Step 1 in paragraph 6.4.2.

Step 2. If you are using a previously cut piece of shock tube, using a sharp knife or razor blade cut approximately 18 inches from the previously cut end, whether or not it was knotted IAW the above guidance. Dispose of the 18-inch piece of shock tube IAW local regulations.

Step 3. Using a sharp knife or razor cut the sealed end off of the detonator assembly and dispose of the small piece as above.

Step 4. Loosely tie the two shock tube ends to be sliced together in a square knot, leaving at least a two-inch free end of each end of the shock tube beyond the knot. Push the shock tube lightly to tighten the knot, but not so tight as to significantly deform the shock tube.

Step 5. Push one of the shock tube ends to be spliced firmly into one of the precut splicing tubes provided by the manufacturer, at least ¼ inches. Push the other shock tube end firmly into the other end of the splicing tube at least ¼ inches.

Step 6. Spool out the desired length of shock tube and cut it off with a sharp knife or razor blade.

Step 7. Immediately seal off the shock tube remaining on the spool by tying a tight overhand knot in the cut off end.

6.4.2 Firing Assembly Setup

Step 1. Lay out the required length of shock tube from demo area to firing point.

Step 2. If there are multiple items to be destroyed using bunch block(s), supplied by the manufacturer, lay out lead lines at demo site to the shot(s) and secure the bunch block with a sandbag, or some other item which will keep it from moving. Figure 1 illustrates the procedure.

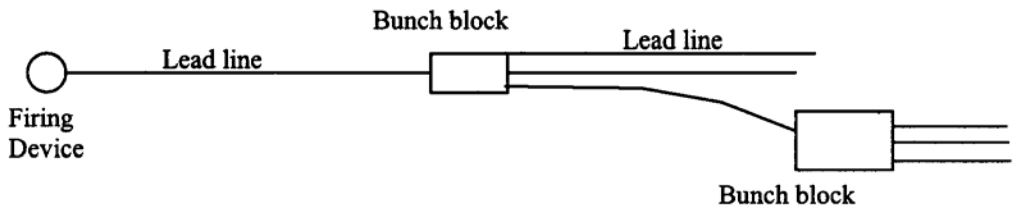

Figure 1

Note: No more than six leads may be used from any one bunch block.

Step 3. If the detonator assembly has not been attached yet then using the splicing tube, splice the detonator assembly to the shock tube lead line as explained in the splicing instructions above.

Step 4. If this is a non-tamped shot place the detonator assembly into the demolition material. If the shot is to be tamped then prepare the demolition material with a detonating cord lead long enough to stick out of the tamping at least one foot.

Step 5. Tape the detonator assembly to the detonating cord lead as shown in Figure 2.

Step 6. Clear the area IAW the approved demolition plan, return to the firing position.

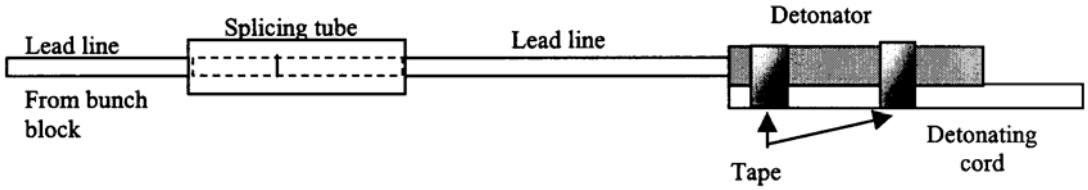

Figure 2

Step 7. Insert a primer into the firing device and connect the shock tube lead line to the firing device ensuring that the shock tube is properly seated in the firing device.

Step 8. Proceed IAW the approved demolition procedures.

6.5 Time/Safety Fuse Use

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

- Prior to each daily use, the burn rate for the time/safety fuse must be tested to ensure the accurate determination of the length of time/safety fuse needed to achieve the minimum burn time of five minutes needed to conduct demolition operations.
- To ensure both ends of the time/safety fuse are moisture free, use approved crimpers to cut six inches off the end of the time/safety fuse roll and place the six inch piece in the time/safety fuse container.
- If quantity allows, accurately measure and cut off a six foot long piece of the time/safety fuse from the roll, and take the six-foot section out of the magazine and attach a fuse igniter.
- In a safe location, removed from demolition materials and MEC, ignite the time/safety fuse, measure the burn time from the point of initiation to the "spit" at the end, and record the burn time in the DS's Log.
- To measure the burn time, use a watch with a second hand, stop watch or chronograph.
- To calculate the burn rate in seconds per foot, divide the total burn time (in seconds) by the length (in feet) of the test fuse.
- Whenever using time/safety fuse, for demolition operations, the minimum amount of fuse to be used will be the amount needed to permit a minimum burn time of five minutes.

6.6 Perforator Use

The following procedures are required when using perforators:

- Only remove from inventory the number of perforators required to perform the task.
- Transport perforators in an approved "day box", cloth satchel or plastic container, depending upon magazine location and proximity to the demolition operations.
- When ready to use, place the det cord through the slot on the perforator and knot the det cord, ensuring the cord fits securely and has good continuity with the perforator.
- Once the det cord is secure, place the perforator in the desired location and secure it in place.
- Proceed from this point as described in paragraph 6.3.

6.7 Use of Two-Component Explosives

The following procedures are required when using two-component (binary) demolition materials:

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

6.8 Demolition Range/BIP Inspection Schedule

The demolition range/BIP inspection schedule outlined in Table 6-1 will be followed at all sites where demolition operations are being conducted. This inspection shall be conducted by the UXOSO and will be documented in the Site Safety Log. If any deficiencies are noted, demolition operations shall be suspended and the deficiency reported to the SUXOS and DS. Once the deficiencies are corrected, demolition operations may be resumed.

Table 6-1 - Demolition Range Inspection Schedule

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

7.0 METEOROLOGICAL CONDITIONS

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

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

- Demolition operations will not be initiated until 30 minutes after sunrise, and will be secured at least 30 minutes prior to sunset.

8.0 PRE-DEMOLITION/DISPOSAL PROCEDURES

8.1 Pre-Demo/Disposal Operational Briefing

It is the belief of Parsons that the success of any operation is dependent upon a thorough brief, covering all phases of the task, which is presented to all affected personnel. The DS will brief all personnel involved in range/shot operations in the following areas:

- Type of MEC being destroyed.
- Type, placement and quantity of demolition material being used.
- Method of initiation (electric, non-electric or Non-El).
- Means of transporting and packaging MEC, if applicable.
- Route to the disposal site.
- Emergency procedures.
- Equipment being used (i.e., galvanometer, blasting machine, firing wire, etc.).
- Misfire procedures.
- Post shot clean up of range.

8.2 Pre-Demo/Disposal Safety Briefing

The UXOSO and DS will conduct a safety brief for all personnel involved in range operations in the following areas:

- Care and handling of explosive materials.
- Personal hygiene.
- Two-man rule and approved exceptions.
- Potential trip/fall hazards.
- Horseplay on the range.
- Stay alert for any explosive hazards.
- Location of emergency shelter (if available).
- Vehicle parking (vehicles must be oriented out of the site for immediate departure, with keys in the ignition).
- Location of emergency vehicle (keep engine running).
- Wind direction (to assess potential toxic fumes).
- Location of first aid kit and fire extinguisher.
- Route to nearest hospital or emergency aid station.
- Type of communications in event of an emergency.
- Storage location of demolition materials and MEC awaiting disposal.

8.3 Task Assignments

Individuals with assigned tasks will report the completion of the task to the DS. The types of tasks that may be required are:

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

8.4 Preparing Explosive Charge for Initiation

To prepare the explosive charge for initiation, the procedures listed below will be followed:

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

9.0 POST DEMOLITION/DISPOSAL PROCEDURES

Do not approach a smoking hole or allow personnel out of the designated safe area until cleared to do so, and follow the below listed procedures:

- After the **"All Clear"** signal, check pit/shot for low orders or kick outs.
- Check pit with a magnetometer and remove any large fragmentation.
- Any MEC items, failing to be properly disposed of, discovered during the post demolition procedures, will be destroyed prior to the end of the day.
- Back fill hole as necessary.
- Police up all equipment.
- Notify police, fire, etc. that the operation is complete.

10.0 MISFIRE PROCEDURES

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

10.1 Electric Misfires

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

- Check firing line and blasting machine connections and make a second initiation attempt.

- If unsuccessful, disconnect and connect to another blasting machine (if available) and attempt to initiate charge.

- If unsuccessful, commence a 60-minute wait period.

- After the maximum delay predicted for any part of the shot has passed, the UXOSO will proceed down range to inspect the firing system, and a safety observer must watch from a protected area.

- Disconnect and shunt the detonator wires from the leg wires, connect a new detonator to the firing circuit, check the replacement detonator for continuity, and prime the charge without disturbing the original detonator.

- Follow normal procedures for effecting initiation of the charge.

10.2 Non-Electric Misfires

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

- If charge fails to detonate at the determined time, initiate a 60-minute wait period plus the time of the safety fuse, i.e., 5-minute safety fuse plus 60 minutes for a total of 65 minutes.
- After the wait period has expired, the designated technician will proceed down range to inspect the firing system. A safety observer must watch from a protected area.
- Prime the shot with a new non-electric firing system and install a new fuse igniter.
- Follow normal procedures for initiation of the charge.

10.3 Non-EL Misfire

The most common cause of misfires is known as "black tube failure". The shock tube propagates up to the detonator but the detonator fails to function, or there is a crimp in the line causing the shock wave to be interrupted. The following steps will be taken in the event of a misfire:

- If the shock tube fails to propagate and the tube remains clear, remove the shock tube from the firing device, cut off six inches of the shock tube, insert a new primer, re-insert the shock tube ensuring that it is properly seated and re-fire. If when you activate the firing device and the shock tube gets blown out of the firing device without activating, cut off six inches of the shock tube, replace the primer and re-insert the shock tube into the firing device.
- If the primer functioned properly and the shock tube was heard or seen to fire, observe the standard one-hour waiting period prior to going downrange.
- After the one-hour waiting period has passed, proceed downrange and check the first component in the priming train i.e. splice, bunch block or detonator assembly. Repeat this process till you reach the detonator assembly. As you conduct this inspection and discover the problem, replace the firing train, which functioned (tube is no longer clear) with a new one and ensure that all the connections are correct and secure.
- After the system has been checked and repaired/replaced return to the firing point and repeat the firing process.

10.4 Detonating Cord Misfire

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

- If there is no problem with the initiating system, wait the prescribed amount of time and inspect the initiator to the cord connection to ensure it is properly connected. If it was a bad connection simply attach a new initiator and follow the appropriate procedures in paragraph 6.0.

- If the initiator detonated and the cord did not, inspect the cord to ensure it is det cord and not time fuze. Also, check to ensure there is PETN in the cord at the connection to the initiator.

- It may be necessary to uncover the det cord and replace it. This must be accomplished carefully to ensure that the demolition charge and the MEC item are not disturbed.

10.5 Perforator Misfire

The use of perforators is considerably safer than the use of C-4 and many other demolition materials. If the perforator is not initiated properly, it could malfunction. Since the perforator is covered with tamping material, det cord is used as the initiator. Therefore, in the event of a misfire, the procedures presented in paragraph 10.4 will be followed, along with the items presented below:

- If everything went but the perforator, one of four things has occurred:

  1. Det cord grain size was insufficient to initiate the perforator;

- Check to ensure the grain size of the det cord is sufficient, with 80-grain size or greater being the recommended size.

  2. The det cord was dislodged from the perforator when placing tamping materials;

- If the det cord connection to the perforator was the problem, ensure that the next connection is secured (use duct tape if necessary).

  3. The perforator was defective;

  4. The perforator was moved during the placement of tamping materials.

- If it is evident that the perforator was moved, ensure it is properly secured for the next shot.

- If cord size and connection are sufficient, replace the perforator, leaving the defective one on the shot.

11.0 RECORD KEEPING REQUIREMENT

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

- Parsons will obtain and maintain all required permits.
- The DS will ensure the accurate completion of the logs, and the SUXOS and UXOQCS will monitor the entries in the log for completeness, accuracy and compliance with meteorological conditions.
- The DS shall enter the appropriate data on the Demolition Shot Record, to reflect the MEC destroyed, and shall complete the appropriate information on the Magazine Data Card, which indicates the demolition materials used.
- The quantities of MEC recovered must also be the quantities of MEC destroyed or disposed of as munitions debris or munitions constituents.
- Parsons and/or its subcontractors will retain a permanent file of all Demolition Records, including permits, Magazine Data Cards, training records, inspector reports, waste manifests if applicable, and operating logs.
- Copies of ATF License and any state or local permits must be on hand.

12.0 SAFETY AND PPE REQUIREMENTS

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

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1. Steel-toed safety boots will not be worn by demolition team personnel conducting demolition/disposal operations, unless a toe crush hazard exists, in which case personnel will wear boots with plastic or fiber toed safety toes;

2. Unless a serious head, eye or face hazard exists, demolition team personnel will not be required to wear hard hats, safety glasses or face shields when conducting operations involving the handling of demolition explosives or MEC, except as stated previously; and

3. In the event that a serious head, eye or face hazard does exist, demolition team personnel will wear the required PPE, but positive restraining means shall be required to secure the PPE to the head, face etc. and prevent it from falling and causing an accidental detonation.

13.0 AUDIT CRITERIA

The following items related to demolition/disposal operations on an MEC contaminated site will be audited to ensure compliance with this SOP:

1. The Demolition Shot Record
2. The Site Daily Operational and Safety Logs;
3. The MEC Operations Daily/Weekly Report;
4. The Safety Training Attendance Forms, for the initial site hazard training;
5. The Safety Training Attendance Forms, for the Daily Tailgate Safety Briefings;
6. The Daily Safety Inspection and Audit Log.

14.0 ATTACHMENTS

The following attachment to this SOP will be reviewed by all UXO-qualified personnel participating in demolition/disposal activities.

- Attachment 1 "Procedures for Demolition of Multiple Rounds Consolidated Shots on Ordnance and Explosives (OE) Sites"
- Attachment 2 Use of Sandbags for Mitigation of Fragmentation and Blasts Effects due to Intentional Detonation of Munitions (HNC-ED-CS-S-98-7)
- Attachment 3 Use of Water for Mitigation of Fragmentation and Blasts Effects due to Intentional Detonation of Munitions (HNC-ED-CS-S-00-3)

ATTACHMENT 1

PROCEDURES FOR DEMOLITION OF MULTIPLE ROUNDS (CONSOLIDATED SHOTS) ON ORDNANCE AND OE SITES

US Army Corps of Engineers
Engineering and Support Center, Huntsville

Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites

AUGUST 1998 (Terminology Update March 2000)

DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
2461 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22331-0600

OCT 27 1998

DDESB-KO

MEMORANDUM FOR DIRECTOR US ARMY TECHNICAL CENTER FOR EXPLOSIVES SAFETY (ATTENTION: SIOAC-ES)

SUBJECT: Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives Sites

References: (a) Memorandum from SIOAC-ESL to Chairman DDESB (ATTN: DDESB-KO), 14 September 1998, SAB

(b) M. Crull and Wayne Shaw, US Army Corps of Engineers, Huntsville, "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites" (August 1998)

The subject procedures forwarded by reference (a) and defined in reference (b) have been reviewed with respect to explosives safety criteria. Based on the information furnished, the procedures proposed in reference (b) for the demolition of consolidated ordnance at OE sites are approved.

Point of contact is Dr. Chester E. Canada, DDESB-KT2 (PH: 703-325-1369, FAX: 703-325-6227, E-MAIL: canadce@hqda.army.mil).

for DANIEL T. TOMPKINS
Colonel, USAF
Chairman

Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites

August 1998

Prepared By

Michelle Crull, PhD, PE
Department of the Army
Huntsville Center, Corps of Engineers
Attn: CEHNC-ED-CS-S
P.O. Box 1600
Huntsville, AL 35807-4301
Telephone: Commercial 256-895-1653
And
Wayne Shaw
Department of the Army
Huntsville Center, Corps of Engineers
Attn: CEHNC-OE-CX
P.O. Box 1600
Huntsville, AL 35807-4301
Telephone: Commercial 256-895-1513

Reviewed by: _____ 8/27/98
Chief, Structural Branch — Date

Reviewed by: _____ 8/27/98
Chief, Civil-Structures Division — Date

Reviewed by: _____ 8/27/98
Chief, OE Center of Expertise — Date

Reviewed by: _____ 8/31/98
Chief, Ordnance & Explosives Team — Date

Reviewed by: _____ 8/28/98
Chief, OE Safety — Date

FOREWORD

The terminology in this report has been updated (March 2000) to reflect terminology used in the field. Specifically the term “personnel separation distance” has been replaced with the term “minimum separation distance for intentional detonations.” This is a change in terminology only, no change in content.

Per discussions with Dr. Chester Canada, Department of Defense Explosives Safety Board (DDESB) and Mr. Cliff Doyle, U.S. Army Technical Center for Explosives Safety (USATCES) this report is not re-submitted to the DDESB for approval.

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LIST OF FIGURES

1. Placement of Munitions for Consolidated Shots 1

1.0 Introduction

The U.S. Army Engineering and Support Center, Huntsville (USAESCH) includes the Ordnance and Explosives Center of Expertise (OE-CX). Part of the OE-CX mission is development of procedures for removal and destruction of munitions found on OE sites. Standard procedures are to destroy the munitions by detonation on site. This includes both single round detonation in-place and multiple round detonation (or consolidated shots) at a pre-determined location. The procedures for multiple round detonation are described in this paper.

There are two situations that may describe the consolidated shot process: 1) munitions may be collected from anywhere on site and detonated at a designated, sited disposal area or 2) munitions may be collected within a grid and detonated at a designated spot within the grid. In either situation the same procedures, as described in the following paragraphs, must be followed.

2.0 Placement of Munitions

Munitions shall be placed with their sides touching such that their axis is horizontal as shown in Figure 1. The munitions shall be placed so that the nose of each munition is pointing in the same direction. Munitions shall be oriented so that lugs and/or strong-backs, and nose and/or tail plate sections are facing away from personnel locations.

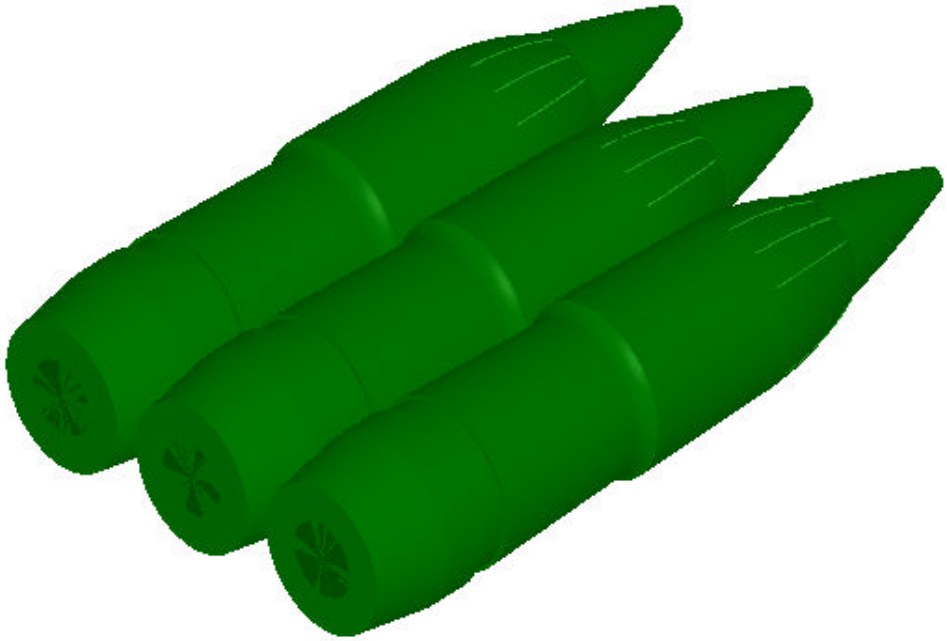

Figure 1 – Placement of Munitions for Consolidated Shots

3.0 Minimum Safe Separation Distance for Intentional Detonations

3.0.1 This document covers procedures for intentional detonations only.

3.0.2 In accordance with DoD 6055.9-STD Chapter 5 paragraph E.4.a(2), the minimum safe separation distance for all personnel will be the greater of the overpressure distance or the appropriate fragment range as determined by the maximum fragment range or the mitigated fragment range.

3.1 Overpressure Distance

In accordance with DoD 6055.9-STD Chapter 5 paragraph E.4.a(2), the allowable overpressure distance will be determined as the scaled distance, K328, based on the total net explosive weight (NEW) of all munitions plus the initiating explosives.

3.2 Fragment Criteria

3.2.1 Maximum Fragment Range

The maximum fragmentation characteristics shall be computed in accordance with HNC-ED-CS-S-98-1. The maximum fragment range shall be computed using these fragmentation characteristics with a trajectory analysis such as the computer software TRAJ. The maximum fragment range shall be the maximum fragmentation distance computed for the most probable munition (MPM) for an OE area at a site, and this shall be the maximum fragment range for a consolidated shot.

3.2.2 Fragment Mitigation

Fragment mitigation may be provided by an appropriate Department of Defense Explosives Safety Board (DDESB) approved engineering control. Typical engineering controls for intentional detonation include tamping and sandbags. The design of such an engineering control shall be based on the maximum fragmentation characteristics of the MPM. The NEW used for the design of the engineering control shall be the total NEW of all munitions plus the initiating explosives. Engineering controls not already approved by DDESB may be submitted (along with appropriate technical data) as part of a site specific explosive safety submission for use at that site. Engineering controls will not be put into use until approved by DDESB and specific applications verified by the appropriate agency; for example, the OE-CX verifies applications for U.S. Army Corps of Engineers.

4.0 Initiation

The consolidated shot shall be initiated in such a manner that detonation of all munitions is simultaneous.

5.0 References

DoD 6055.9-STD, “Department of Defense Ammunition and Explosives Safety Standards”, August 1997.

HNC-ED-CS-S-98-1, Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives, January 1998.

Memorandum, DDESB, DDESB-KO, 27 January 1998, subject: Guidance for Clearance Plans.

ATTACHMENT 2

MITIGATION OF BLAST AND FRAGMENTATION USING SANDBAGS

US Army Corps of Engineers
Engineering and Support Center, Huntsville

Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions

HNC-ED-CS-S-98-7
AUGUST 1998

DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
2461 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22331-0600

DDESB-KO

23 February 1999

MEMORANDUM FOR DIRECTOR US ARMY TECHNICAL CENTER FOR EXPLOSIVES SAFETY (ATTENTION: SIOAC-ES)

SUBJECT: Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonations of Munitions, Report HNC-ED-CS-S-98-7 (August 1998)

References: (a) SIOAC-ESL memorandum, dated 30 Nov 98, same subject

(b) Joseph M. Serena and Michelle Crull, "Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonations of Munitions, Report HNC-ED-CS-S-98-7," (August 1998)

The subject site plan forwarded by reference (a) has been reviewed with respect to explosives safety criteria. The site plan addresses the use of sandbags, IAW reference (b) to mitigate hazards and protect personnel from intentional detonations of munitions up to the 155-mm M107. Based on the information furnished, the proposed use of sandbags for intentional detonations at ordnance and explosives (OE) sites, IAW reference (b) is approved.

A copy of this site plan package and this letter of approval must be available at OE sites where intentional detonations are conducted that use procedures of this siting package.

Point of contact is Dr. Chester E. Canada, DDESB-KT2 (PH: commercial: 703-325-1369, FAX: 703-325-6227, E-MAIL: canadce@hqda.army.mil).

Daniel T. Tompkins

DANIEL T. TOMPKINS
Colonel, USAF
Chairman

cc:
Army Safety Office, ATTN: DACS-SF, Chief of Staff, 200 Army Pentagon, Washington, DC 20310-0200
Commander, U.S. Army Corps of Engineers, ATTN: CESO, 20 Massachusetts Avenue NW, Washington DC 20314-1000
Commander, U.S. Army Engineering and Support Center Huntsville, ATTN: CEHNC-ED-CS and CEHNC-OE-CX-Q, P.O. Box 1600, Huntsville, AL 35807-4301

Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions

Prepared by
Joseph M. Serena, III, PE
Michelle Crull, PhD, PE

August 1998

Department of the Army
Huntsville Center, Corps of Engineers
Attn: CEHNC-ED-CS-S
P.O. Box 1600
Huntsville, AL 35807-4301
Telephone: Commercial 256-895-1650

Reviewed by: _____ 8/13/98
WALLACE WATANABE — Date
Chief, Structural Branch

Reviewed by: _____ 8/[illegible]
PAUL M. LAHOUD, PE — Date
Chief, Civil-Structures Division

EXECUTIVE SUMMARY

The U.S. Army Engineering and Support Center, Huntsville (USAESCH) is currently engaged in projects which require the disposal of uncovered/discarded ordnance and explosives (OE) on public and private lands. The uncovered OE item is often detonated in place if it is too dangerous to move. In some cases, covering and tamping with loose earth is used to contain the blast and fragments. Another method to mitigate the fragmentation and blast effects is to cover the item with sandbags. However, traditionally there has been no method to determine the optimum configuration or the required thickness of such a sandbag enclosure.

The Structural Branch, USAESCH, sponsored a test program in 1997 to evaluate the use of sandbag enclosures for fragment and blast mitigation, for intentional detonations at Ordnance and Explosives (OE) sites. Southwest Research Institute (SwRI), under contract to USAESCH, performed a two phase test program of sandbag enclosures. In phase one, the preliminary explosive test phase, four tests on a 155-mm projectile were performed to refine and optimize the test procedure. This test procedure was used in phase two, the comprehensive explosive test phase. In phase two, a total of fourteen tests with five different munitions were performed to determine the thickness of sandbags required to capture all primary fragments. Measurements were made of the overpressures at various places, sandbag throw distances, depth of fragment penetration, and noise levels. High-speed film cameras, video recorders and digital cameras were used to visually record the events.

Required Wall and Roof Thicknesses for Sandbag Enclosures, with Expected Sandbag Throw Distances and Pressures, for Five Tested Munitions

Munition	Charge Weight, Comp B, lb	Required Wall and Roof Sandbag Thickness, in	Expected Maximum Sandbag Throw Distance, ft	Expected Peak Pressure @ 40 feet, psi	Expected Peak Pressure @ 80 feet, psi	Expected Sound Level @ 100 feet, dB
155-mm M107	15.4	36	220	0.18	0.09	115
4.2-in M329A2	8.17 (TNT)	24	125	0.16	0.06	116
105-mm M1	5.08	24	135	0.18	0.08	120
81-mm M374A2	2.1	20	125	0.14	0.05	119
60-mm M49A3	0.43	12	25	0.08	0.03	118

The results of these tests have been used to develop guidelines for the use of sandbag enclosures. The guidelines include required sandbag thicknesses, configuration and construction of the sandbag enclosures, and withdrawal distances based on the greater of sandbag throw distances or 200 ft. This document provides a summary of the test results and these guidelines.

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1.0 Introduction

The U.S. Army Engineering and Support Center, Huntsville (USAESCH) is currently engaged in projects which require the disposal of uncovered/discarded ordnance and explosives (OE) on public and private lands. The uncovered OE item is often detonated in place if it is too dangerous to move. In some cases, covering and tamping with loose earth is used to contain the blast and fragments. Another method to mitigate the fragmentation and blast effects is to cover the item with sandbags. However, traditionally there has been no method to determine the optimum configuration or the required thickness of such a sandbag enclosure.

The Structural Branch, USAESCH, sponsored a test program in 1997 to evaluate the use of sandbag enclosures for fragment and blast mitigation, for intentional detonations at Ordnance and Explosives (OE) sites. Southwest Research Institute (SwRI), under contract to USAESCH, performed a two phase test program of sandbag enclosures. In phase one, the preliminary explosive test phase, four tests on a 155-mm projectile were performed to refine and optimize the test procedure. This test procedure was used in phase two, the comprehensive explosive test phase. In phase two, a total of fourteen tests with five different munitions were performed to determine the thickness of sandbags required to capture all primary fragments. Measurements were made of the overpressures at various places, sandbag throw distances, depth of fragment penetration, and noise levels. High-speed film cameras, video recorders and digital cameras were used to visually record the events.

The results of these tests have been used to develop guidelines for the use of sandbag enclosures. The guidelines include required sandbag thicknesses, configuration and construction of the sandbag enclosures, and withdrawal distances based on the greater of sandbag throw distances or 200 ft. This document provides a summary of the test results and these guidelines.

2.0 Test Program

2.1 Fragmentation Characteristics of Munitions

Prior to beginning this test program the fragmentation characteristics of a variety of munitions frequently encountered during OE site operations were determined. The fragmentation characteristics were calculated in accordance with procedures outlined in TM5-1300, “Structures to Resist the Effects of Accidental Explosions” [1] and detailed in CEHNC-ED-CS-S-98-1, “Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives” [2]. The fragmentation characteristics were used to predict preliminary thicknesses of sand required to prevent perforation for the five munitions tested.

Optimally, the fragments from the munition will strike the sandbags before the blast wave so that the fragments are penetrating undisturbed sand. To ensure that this will occur it is necessary to reduce the coupling between the explosive charge and the

surrounding soil. This coupling is dependent on the separation distance between the charge and the soil. Full coupling implies that the maximum amount of energy, or velocity, is transferred from the explosive into the soil immediately adjacent to the charge. If an explosive charge is placed in a cavity, so that an air gap exists between the charge and the walls of the cavity, coupling between the explosive and soil is reduced. Therefore, a standoff of some distance is required to reduce the coupling effect. Calculations to determine the velocity of sand particles from a buried explosion were performed. The velocity of the sand particles was compared to the velocity of the design fragment through sand. These calculations suggest that at a distance between 6 and 12 inches from the explosion, the fragment velocity exceeds the particle velocity. Therefore, the initial standoff distances for the tests were 6 and 12 inches.

2.2 Preliminary Explosive Test Phase

In the preliminary explosive tests, four tests of statically detonated 155-mm M107 projectiles were performed. These tests provided the data needed to specify the amount and configuration of sandbags that are required to safely detonate a 155-mm projectile in place, verified that the general test procedure was satisfactory, and defined the instrumentation and data acquisition systems for the subsequent comprehensive explosive tests. Figure 1 shows the site layout for the tests of sandbag enclosures. Although, munitions are rarely oriented vertically for demolition in place, the vertical orientation provided the opportunity to evaluate a greater number of combinations of wall thicknesses and standoff distances. Figures 2 and 3 show the sandbag enclosure configurations for vertical and horizontal weapon tests.

The test matrix for the preliminary explosive tests is shown in Table 1. Two tests were run with the 155-mm in the vertical orientation and two in the horizontal orientation. Each test allowed five standoff distances and five sandbag thicknesses to be evaluated.

The sandbags were made of woven polypropylene, as is commonly used by explosives and ordnance disposal (EOD) personnel, and the volume/weight of the sandbags was either 0.5 ft^3/50 lbs for the large bags or 0.25 ft^3/25 lbs for the small bags. The small bags were used for test two. No additional information was provided by using the small bags so these were not used for any other tests. The bags were filled with a “washed river” sand that was judged to be “typical” by a local soil consultant (Fugro-McClelland Southwest, Inc.).

To determine the sandbag throw distribution some of the sandbags in the first two tests were filled with sand colored with dye. The dye did not improve the quality of the test results. Spray paint was used in the subsequent tests to mark each bag with its original position in the sandbag enclosure. A different color was used to indicate the wall or the roof and numbers were used to indicate the layer in which the sandbag was located.

Detailed descriptions of all tests and results are provided in “Evaluation of Sandbags for Fragment and Blast Mitigation” by Southwest Research Institute [3].

Table 1 – Test Matrix for Preliminary Explosive Tests

Test No.	Orientation	Standoff, in.					Wall Thickness, in. (Bag Size)				Wall Height, in. (Bag Size)	
		S_1	S_2	S_3	S_4	S_R	T_1	T_2	T_3	T_4	H_1	H_2
155-1	Vertical	12	6	6	12	6	32	32.5	45	43	32	20
155-2	Vertical	6	6	6	6	6	18(s)	54	18(s)	53(s)	32	22
155-3	Horizontal	6	6	6	6	6	30	48	24	24	12	30
155-4	Horizontal	6	6	6	6	6	35	36	34	36	12	36

Note: All walls were constructed with large bags, except for those designated with an “s” for small bags.

2.2.1 Preliminary Explosive Test Results

For tests 1 and 2, the 155-mm M107 projectile was detonated using a donor charge of 200 g of C-4 placed in the fuze well and initiated with an Exploding Bridge Wire. For tests 3 and 4, the 155-mm M107 projectile was detonated using a well perforator shaped charge. This approach is typically used for on-site detonations. Time of arrival (TOA) pins were used for all tests to determine if a high order detonation was achieved.

All detonations were high order and results were obtained. The make screens and their frames and the assorted witness screens were scattered across the site. Where possible, each screen was identified and photographed and the number of fragment holes or the condition of the screen was recorded. The results of the first three tests suggested that a wall and roof thickness of 36 inches should be sufficient to contain all of the fragments and to reduce the overpressure levels. The dimensions of test 4 confirmed this configuration.

From the limited data collected on standoff distance, it appears that for standoffs of 6 and 12 inches there is no difference in the thickness of sandbags required to stop fragments. Test 2 showed that the size of the sandbag did not affect the fragment penetration. Test 3 showed that the horizontal orientation of the munition did not greatly effect the fragment penetration. Tests 3 and 4 showed that the base plate of the munition broke up and was stopped by 24 inches or less of sandbags.

The data collected showed that approximately 20 inches of sandbags will completely contain the fragments from the 155-mm M107 projectile. The only indications of fragments exiting the sandbag enclosure came from the two identical 18 inch walls of test 2 (external witness screens on sides 1 and 3 both registered fragment impacts). Internal witness screens at depths of 20 inches to 24 inches for all 4 tests did not indicate any fragment impacts. In tests 2 through 4, the roof witness screens also showed no penetrations for 20 to 36 inches of roof depth. The CONWEP software [4] predicts that 24 inches of sand will stop the design fragment from the 155-mm M107 projectile.

Sandbag throw distances were recorded in 10 foot increments from ground zero to the furthest sandbags. The maximum sandbag throw distances were 150 feet, 191 feet,

157 feet, and 150 feet for tests 1 through 4, respectively. All of the furthest thrown sandbags came from the roof. In most cases, the roof sandbags were found relatively intact while the wall sandbags were often disintegrated. The bulk of the sandbags fell within 100 feet with only a few beyond this distance. An examination of the sandbag throw distances show that the standoff, the size of the bag, and the weapon orientation did not affect the throw distance to any significant degree.

Blast overpressures were recorded for all 4 tests (see Table 2). As shown, the sandbag enclosures greatly reduced the magnitude of the pressure. In test 3, a digital sound meter was placed 100 feet from ground zero and the maximum sound level recorded was 114.7 decibels.

Table 2 – Blast Overpressures from Preliminary Explosive Tests

Test No.	Side 1				Side 4			
	P1 @ 40', psi	P2 @ 40', psi	P3 @ 80', psi	P4 @ 80', psi	P5 @ 40', psi	P6 @ 40', psi	P7 @ 80', psi	P8 @ 80', psi
155-1	0.67	0.71	ND	ND	0.37	0.38	ND	ND
155-2	1.31	1.18	ND	ND	0.74	0.97	ND	ND
155-3	0.16	0.16	0.07	0.06	0.16	0.18	0.09	ND
155-4	0.04	0.04	0.03	0.03	0.07	0.08	ND	0.05

ND = no data

2.3 Comprehensive Explosive Tests

An additional fourteen tests were performed: one more using 155-mm M107 projectiles, four using 105-mm M1 projectiles, three using 4.2-in M329A2 projectiles, four using 81-mm M374A2 mortars, and two using 60-mm M49A3 mortars. The test matrix for the comprehensive explosive tests is shown in Table 3. For all tests performed with the munition in the vertical orientation, detonation was achieved using a donor charge of 100 grams (50 grams for test 60-1) of C-4 in the fuze well. For all tests performed with the munition in the horizontal orientation, detonation was achieved using a well perforator. TOA pins were used for all tests to check if a high order detonation was achieved.

For each of the comprehensive explosive tests, woven polypropylene 0.5 ft^3 sandbags were filled with 50 lbs of washed river sand. The sandbags were painted and numbered as described in Section 2.2 to indicate their original position in the sandbag enclosure. Moisture content was not controlled nor monitored during the test program.

Pressure gages, a sound meter, high speed cameras, digital cameras and video cameras were used for data acquisition during each test. Internal and external witness screens were used to determine how deeply the fragments moved into the sandbag mass and whether any fragments exited the sandbag enclosure.

Table 3 – Test Matrix for Comprehensive Explosive Tests

Test No.	Orientation	Standoff, in.					Wall Thickness, in.				Wall Height, in.	
		S_1	S_2	S_3	S_4	S_R	T_1	T_2	T_3	T_4	H_1	H_2
155-5	Horizontal	7	7	5	6	7	36	36	36	36	13	36
4.2-1	Vertical	5.5	5.5	5.5	5.5	6	20	24	31	36	19	24
4.2-2	Horizontal	6.5	6.5	6	6	7	24	25	24	24	11	24
4.2-3	Horizontal	6	5	5	6	7	24	25	25	24	11	24
105-1	Vertical	5.5	5.5	5.5	5.5	6	20	26	31	35	25	24
105-2	Vertical	0	0	4	6	6	29	25	19	25	26	23
105-3	Horizontal	7	5	5	5	9	24	24	24	24	13	24
105-4	Horizontal	6.5	6	5	6	7	25	25	24	24	11	23
81-1	Vertical	5	5	6	6	6	12	19	23	30	15	18
81-2	Horizontal	7	6	5.5	7	6	18	24	18	24	9	18
81-3	Horizontal	7	6	5	6	7	18	19	18	19	10	18
81-4	Horizontal	6	5.5	5.5	5.5	8	19	20	19	20	11	18
60-1	Vertical	6	6	6	6	6	13	19	23	30	11	12
60-2	Horizontal	6.5	3	5.5	3	6	12	12	12	12	8	13

All detonations were high order and results were obtained. The assorted witness screens were scattered across the site. Where possible, each screen was identified and photographed and the number of fragment holes or the condition of the screen was recorded. Sandbag throw distances were recorded in 10 foot increments from ground zero to the furthest sandbags. Blast overpressures were recorded for all tests at 40 feet and 80 feet from ground zero. A digital sound meter was placed 100 feet from ground zero. A summary of the results is shown in Table 4.

The final test for each munition was a confirmation test. These included tests 155-5, 4.2-3, 105-4, 81-3 and 60-2. The purpose of the confirmation tests was to model as closely as possible the actual use of sandbags in field conditions. In each test the internal witness screens were omitted. Sandbags were staggered both horizontally and vertically. External witness screens were placed over the roof and the two sides facing away from the pressure gages. After each test, the external witness screens were recovered and inspected for fragment penetrations. No such penetrations were identified. Therefore, the sandbag thicknesses defined in Table 4 are those used in the confirmation tests. For two munitions, the penetration data from internal witness panels suggests that somewhat smaller sandbag thicknesses may be sufficient to capture all fragments. As stated above for the 155-mm M107, internal witness screens show no fragment penetrations for sandbag thicknesses of about 24 inches or more. For the 4.2-inch M329A2 mortar, the internal witness screens show no fragment penetrations deeper than about 18 inches. However, the thicknesses of 36 inches for the 155-mm M107 and 24 inches for the 4.2-inch M329A2 are retained for use in the field, since sandbag throw distances are based on these thicknesses. While possibly thicker than necessary from capturing fragments, the increased total mass of the sandbags results in reduced sandbag throw distances.

Detailed descriptions of all tests and results are provided in “Evaluation of Sandbags for Fragment and Blast Mitigation” by Southwest Research Institute [3].

3.0 Guidelines for Use of Sandbags

3.1 Enclosure Geometry

Table 5 summarizes the results of the tests. This table specifies the minimum thickness of sandbag walls and roof that is needed to completely contain the fragments for the five munitions that were tested in this project. It also gives the expected maximum sandbag throw distances, the peak pressures at 40 feet and 80 feet, and the sound level at 100 feet, for the five munitions. For safety and conservatism, the expected sandbag throw distances are approximately 10% larger than the largest distances actually measured in the tests. Thus, the expected sandbag throw distances given in Table 5 are conservative in two ways: first, the largest measured sandbag throw distance from all tests of a particular round is used and second, this value is increased by 10%. Due to the already low values of peak pressures, a similar increase in the expected peak pressures was not deemed necessary or justified.

Table 4 – Summary of Results from Comprehensive Explosive Tests

Munition	Sandbag Thickness (in) to Defeat Fragments	Max. Sandbag Throw Distance (ft)		Max Peak Overpressure (psi) @ 40 ft		Max Peak Overpressure (psi) @ 80 ft		Max Noise Level (dB) at 100 ft
		Side of Round	Nose/Tail of Round	Side of Round	Nose of Round	Side of Round	Nose of Round	
155-mm M107	36	200	130	0.06	0.12	0.04	0.05	114.7
4.2-in M329A2	24	110	70	0.12	0.14	0.04	0.06	115.8
105-mm M1	24	120	50	0.17	0.18	0.07	0.08	119.3
81-mm M374A1	20	110	30	0.14	0.08	0.05	0.03	118.3
60-mm M49A3	12	20	20	0.06	0.08	0.02	0.03	117.3

Obviously, the five munition types do not cover all of the munitions that may be encountered. To determine the minimum wall and roof thickness for a particular shell other than those found in Table 5, the approach is as follows:

(1) Determine the initial fragment velocity (V_F) in ft/s, the maximum fragment weight (W_F) in pounds, and the kinetic energy ($W_F V_F^2/2$) in lb-ft^2/s^2 for the particular munition.

(2) Identify the munition with the next largest kinetic energy, from Table 6.

(3) Use the sandbag wall and roof thickness from Table 5 for the munition with the next largest kinetic energy shown in Table 6.

Table 6 provides the maximum fragment weight, the initial fragment velocity, and the resulting kinetic energy for the 5 munition types. The maximum fragment weight and the initial fragment velocity values were determined with the Mott and Gurney equations, as presented in TM 5-1300 [1] and detailed in HNC-ED-CS-S-98-1 [2].

Table 5 - Required Wall and Roof Thicknesses for Sandbag Enclosures, with Expected Sandbag Throw Distances and Pressures, for Five Tested Munitions

Munition	Charge Weight, Comp B, lb	Required Wall and Roof Sandbag Thickness, in	Expected Maximum Sandbag Throw Distance, ft	Expected Peak Pressure @ 40 feet, psi	Expected Peak Pressure @ 80 feet, psi	Expected Sound Level @ 100 feet, dB
155-mm M107	15.4	36	220	0.18	0.09	115
4.2-in M329A2	8.17 (TNT)	24	125	0.16	0.06	116
105-mm M1	5.08	24	135	0.18	0.08	120
81-mm M374A2	2.1	20	125	0.14	0.05	119
60-mm M49A3	0.43	12	25	0.05	0.03	118

Table 6 - Maximum Fragment Weight, Initial Fragment Velocity and Kinetic Energy for Five Tested Munitions

Munition	W_F, Maximum Fragment Weight, lb	V_F, Initial Fragment Velocity, ft/s	Kinetic Energy, 10^6 lb-ft^2/s^2
155-mm M107	0.467	4667	5.085
4.2-in M329A2	0.079	6391	1.613
105-mm M1	0.155	4870	1.868
81-mm M374A2	0.031	6721	0.700
60-mm M49A3	0.033	3605	0.214

As an example, for a shell such as the 3-in Stokes Mortar Round, the maximum fragment weight and initial fragment velocity are 0.0436 lb and 6189 ft/s, respectively. The resulting kinetic energy is 0.835 x 10^6 lb-ft^2/s^2. The next largest fragment kinetic energy in Table 6 is the 4.2-in M329A2 round. Therefore, a sandbag enclosure with a roof and wall thicknesses of 24 inches should be used to contain the fragments and suppress the blast overpressures. The maximum sandbag throw distance is 125 ft. Therefore, the withdrawal distance is 200 ft.

Based on this procedure, a more complete list of typical munitions is given in Table 7. This table includes the required sandbag wall and roof thicknesses and maximum expected sandbag throw distances to be used for each munition. For other munitions not listed in Table 7, the procedure given above can be used. The procedure should not be used to extrapolate sandbag thicknesses or sandbag throw distances for munitions larger than the 155-mm M107.

3.2 Enclosure Construction Method

The enclosure construction method follows the procedure that was used to build the test enclosures, with a few modifications. Figure 4 illustrates a typical enclosure. Figure 5 shows a photograph of a sandbag enclosure for an 81 mm mortar.

The sandbag fabric should be woven polypropylene. Each bag should have a nominal volume of 0.5 ft^3 and an approximate weight when full of 50 lb. The bags should be filled with washed sand, either dry or in saturated surface dry (that is, slightly moist) condition. Wet sand should not be used. Prefilled sandbags should be protected from the rain by storage on pallets, off the ground surface, and by covering them with a plastic tarpaulin or similar cover to prevent them from becoming saturated with water. The gradations and physical composition of the sand are not critical but it should be at least typical of local construction practice for sand used in foundations and backfill. Minor inclusions of clay or soils materials can be permitted. However, no rocks or stones should be placed in the sandbags. Typically, the sand used for the tests had a density of about 100 pounds per cubic foot and a moisture content of 6-7%.

Four walls of identical thickness should surround the munition. The minimum wall thickness should be the thickness determined using the procedure in Section 3.1 above. The sandbag walls should be stacked to maintain a clear standoff distance of 6 inches between the shell and the inside face of each wall. The interior face of each wall should be vertical but the exterior face can be built with a 1:6 slope (2" horizontal to 12" vertical). If a sloped outer face is used, the thickness of the wall, at the nominal “top” of the wall, 6 inches above the top of the munition, must be no less than the specified required thickness

The sandbags should be placed tightly against each other. All vertical joints should be staggered, so there is no clear line of sight from the munition to the exterior. As the wall is built, each new layer of sandbags should run in opposite direction to the layer below, so that the layers are interlocked (see Figure 6).

At a minimum, a double layer of sandbags shall be used. For example, when a 12” thickness is required, the sandbags should be oriented so that two sandbags are necessary to achieve this thickness (see Figure 7).

After the walls are constructed to a height of 6" above the upper surface of the munition, the shaped charge or other initiator should be placed on the shell. Ideally, the use of shaped charges, such as oil well perforators, is recommended. These add very little to the total charge weight for each detonation, given the highly directional nature of the effects of the shaped charge. Also, the use of shaped charges for initiation parallels test procedures. The shaped charge should be located either on top of the munition or on its side. If it is located on the side of the round, the charge should be tilted downward sufficiently to ensure that the shaped charge jet penetrates the round and is directed into the ground, rather than into the opposite sandbag wall. Generally, a small mound of sand next to the round can be used to establish this orientation.

A sheet of 3/4-inch thick Douglas Fir (or equivalent) plywood should be cut to the dimensions of the cavity between the walls, plus 12 inches in each direction. The plywood sheet is then centered on the walls so that it bears on 6" of each wall. The additional sandbags that make up the roof of the enclosure are then placed on top. As with the side walls, the roof sandbags should be stacked with staggered horizontal joints and alternating directions in each layer. The exterior sides of the roof may also be vertical or have a 1:6 slope. The thickness of the sandbag roof, above the plywood panel, must be the same as the required wall thickness.

After the sandbag layers of the roof have been placed to the correct height, the enclosure is complete and the munition may be detonated.

Table 7 - Required Wall and Roof Thicknesses for Sandbag Enclosures, with Expected Sandbag Throw Distances and Pressures, for Tested and Non-Tested Munitions

Munition	Charge Weight (lb)	W_F, Maximum Fragment Weight, lb	V_F, Initial Fragment Velocity, ft/s	Kinetic Energy, 10^6 lb-ft^2/s^2	Required Wall and Roof Sandbag Thickness, in	Expected Maximum Sandbag Throw Distance, ft	With-drawal Distance, ft
155mm M107*	15.48	0.467	4667	5.086	36	220	220
4.7-in Mark I	6.07	0.591	3566	3.761	36	220	220
105mm M1*	5.08	0.155	4870	1.840	24	135	200
4.2-in M329A2*	8.165	0.079	6391	1.607	24	125	200
4-in Stokes	7.92	0.078	6336	1.570	24	125	200
75mm M48	1.47	0.153	3471	0.922	24	125	200
3-in Stokes	2.1	0.044	6189	0.835	24	125	200
2.75-in M229 Rocket	4.8	0.050	5569	0.777	24	125	200
81mm M374*	2.1	0.031	6721	0.696	20	125	200
37mm MK II	0.53	0.030	5758	0.490	20	125	200
60mm M49A3*	0.42	0.024	5114	0.310	12	25	200
FMU 54A/B	0.357	0.006	9031	0.263	12	25	200
40mm MK2 Mod 0	0.187	0.033	3605	0.215	12	25	200
MK II Grenade	0.125	0.014	3425	0.083	12	25	200
25mm M792	0.096	0.005	5736	0.081	12	25	200
M67 Grenade	0.40625	0.001	7006	0.029	12	25	200
20mm M56A4	0.0264	0.0000011	4941	0.004	12	25	200

* = tested munitions

3.3 Withdrawal Zone

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

4.0 Summary and Conclusions

A test program has been performed to determine the effects of sandbag enclosures for mitigating fragments and blast effects due to an intentional detonation of a munition. A total of eighteen tests on five different munitions were performed. A summary of the test procedures and results are presented in this document.

The results of these tests have been used to develop guidelines for the use of sandbag enclosures to mitigate the fragments and blast effects due to an intentional detonation of a munition. Methods for determining the required sandbag thickness and the resulting sandbag throw distance are detailed in Section 3.0. Figures 4, 5, 6 and 7 show the resulting sandbag enclosures.

5.0 References

1. TM5-1300, “Structures to Resist the Effects of Accidental Explosions”, Departments of the Army, the Navy, and the Air Force, November 1990.

2. HNC-ED-CS-S-98-1, “Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives”, M. Crull, U.S. Army Engineering and Support Center, Huntsville, January 1998.

3. “Evaluation of Sandbags for Fragment and Blast Mitigation”, D. Stevens, Southwest Research Institute, San Antonio, TX, January 1998.

4. “User’s Guide for Microcomputer Programs CONWEP and FUNPRO Applications of TM 5-855-1. “Fundamentals of Protective Design For Conventional Weapons””, Revision 2, D. Hyde, US Army Corps of Engineers Waterways Experiment Station, February 1989.

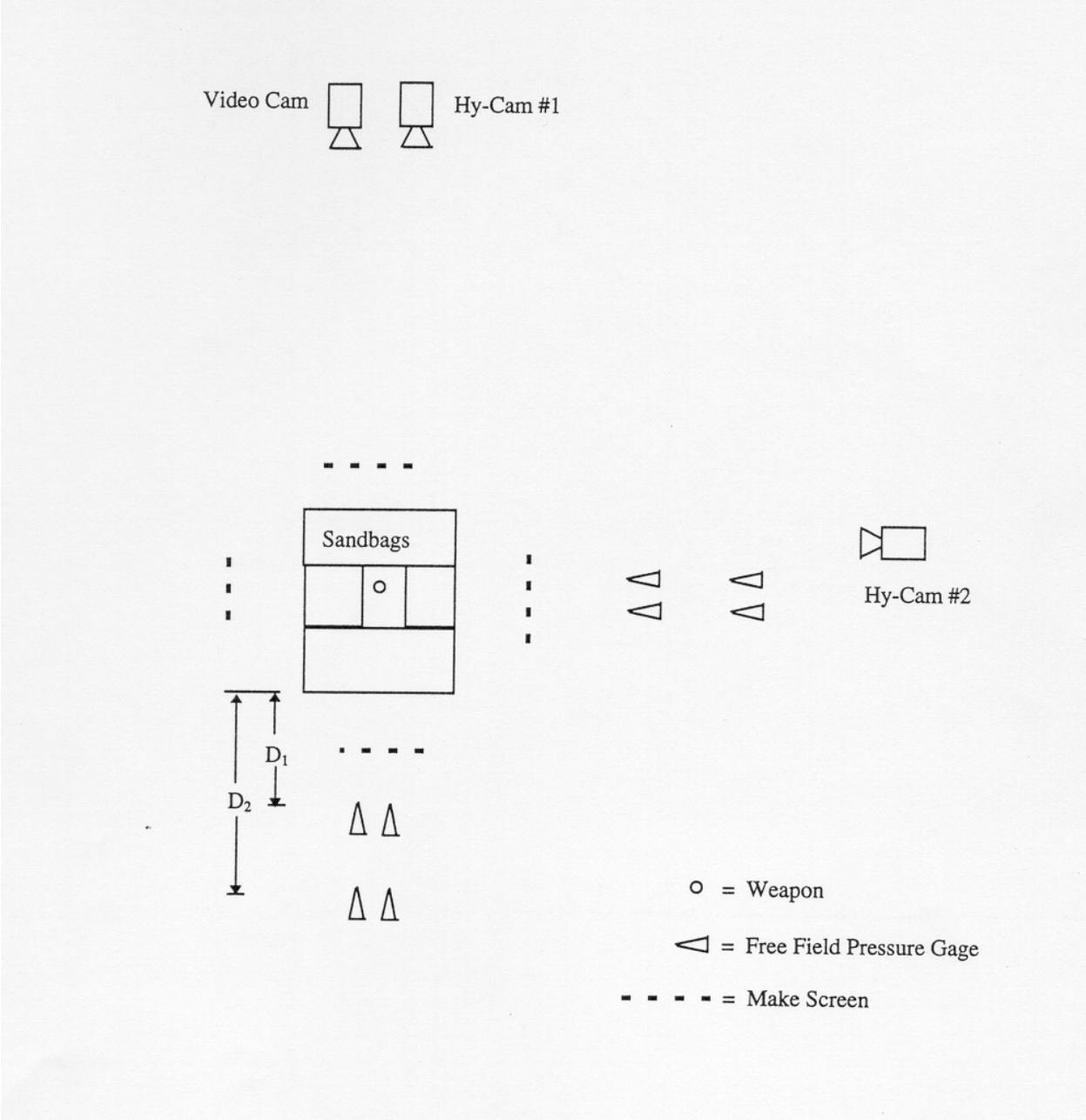


Figure 1 – Site Layout for Tests of Sandbag Enclosures

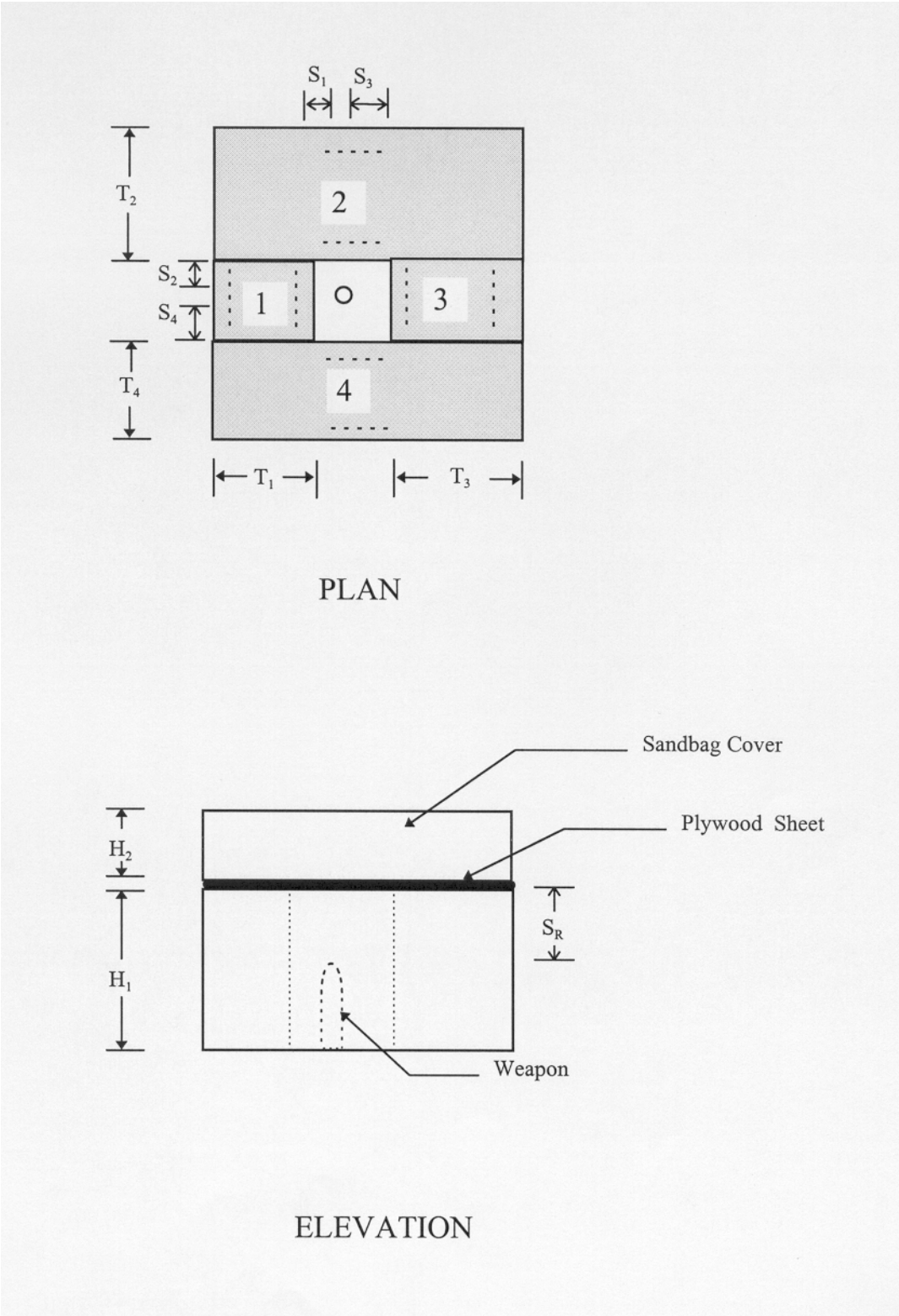


Figure 2 – Sandbag Enclosure Configuration for Vertical Weapon Tests

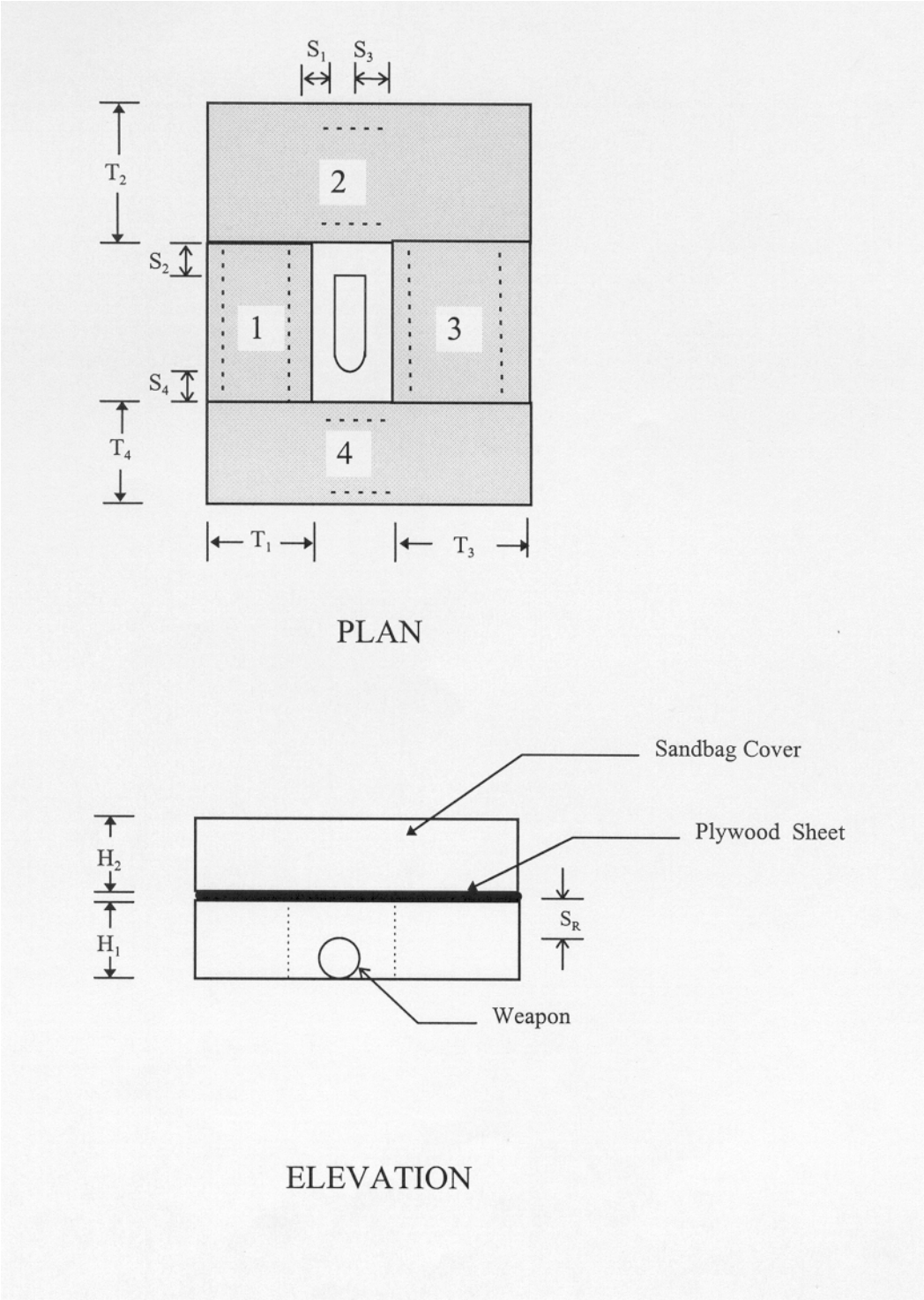
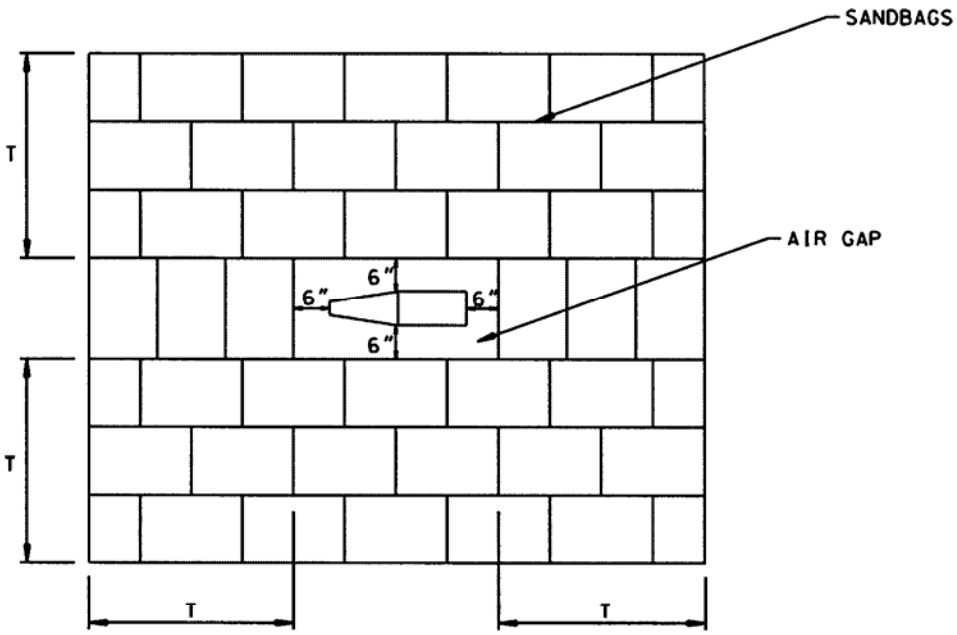
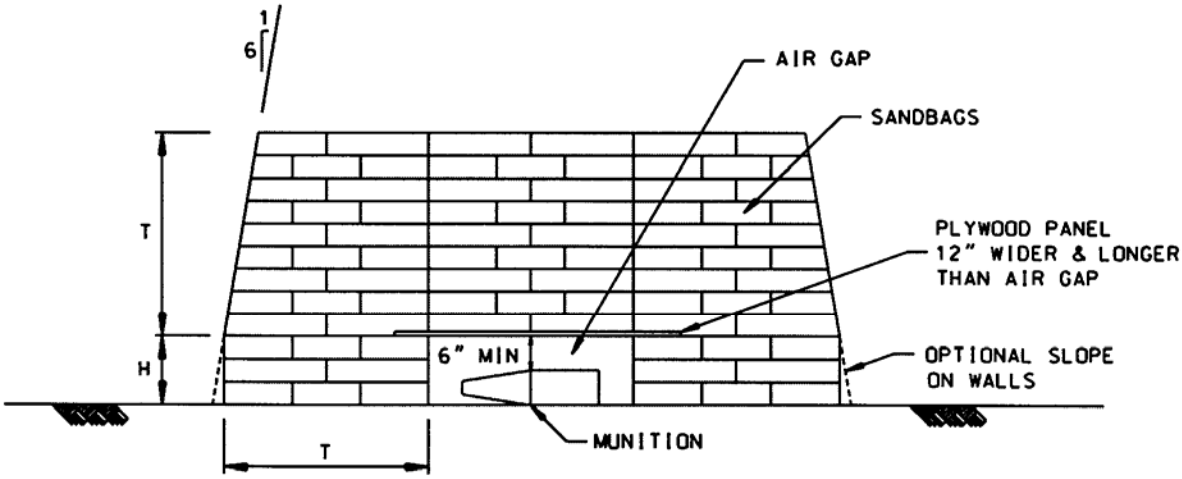


Figure 3 – Sandbag Enclosure Configuration for Horizontal Weapon Tests



T=THICKNESS OF SANDBAGS REQUIRED FOR SPECIFIC MUNITION

PLAN VIEW AT ELEVATION H
SANDBAG ENCLOSURE



SIDE SECTION VIEW
SANDBAG ENCLOSURE

Figure 4 - Typical Sandbag Enclosure

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

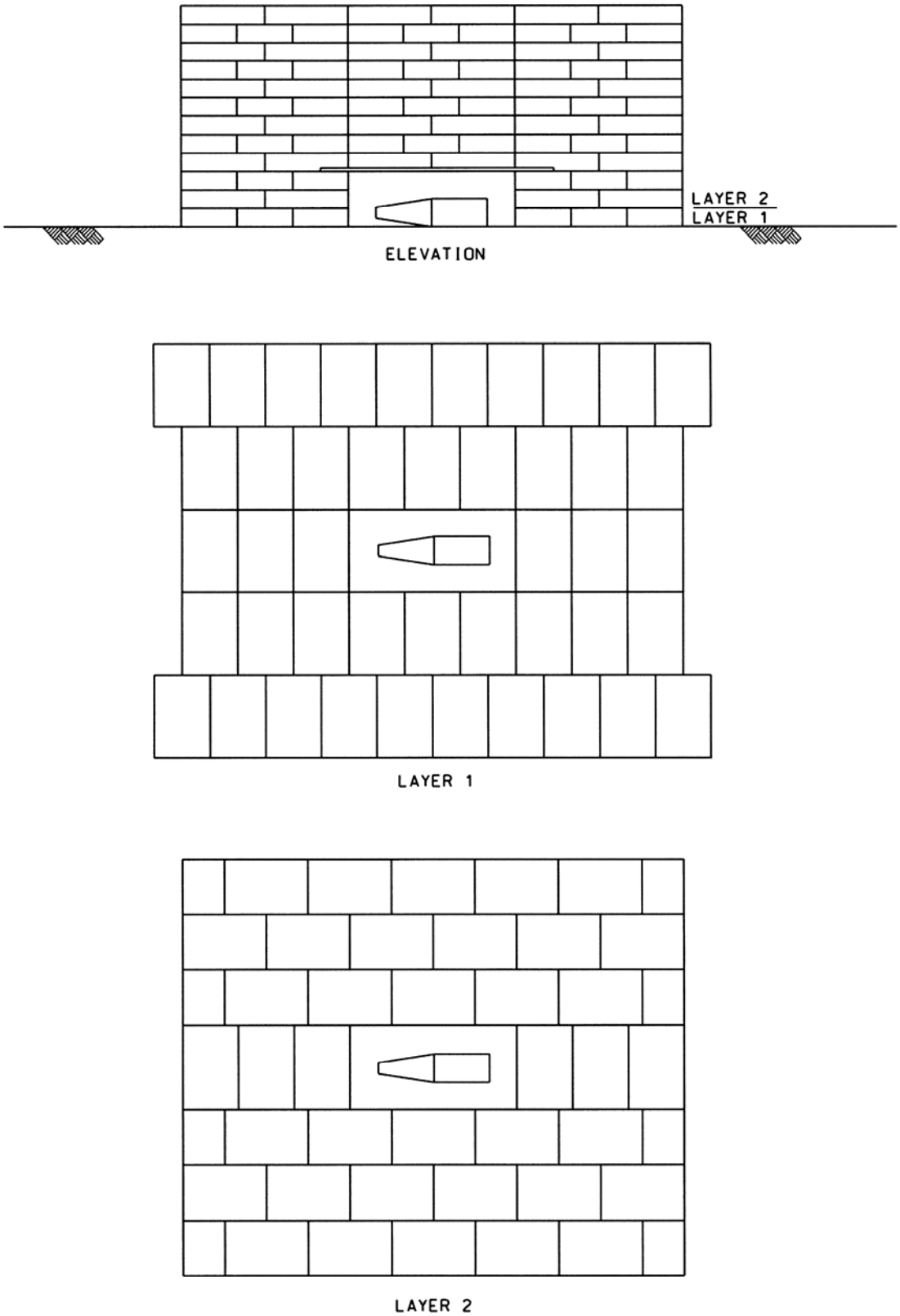


Figure 6 - Interlocking Alternate Layers of Sandbags

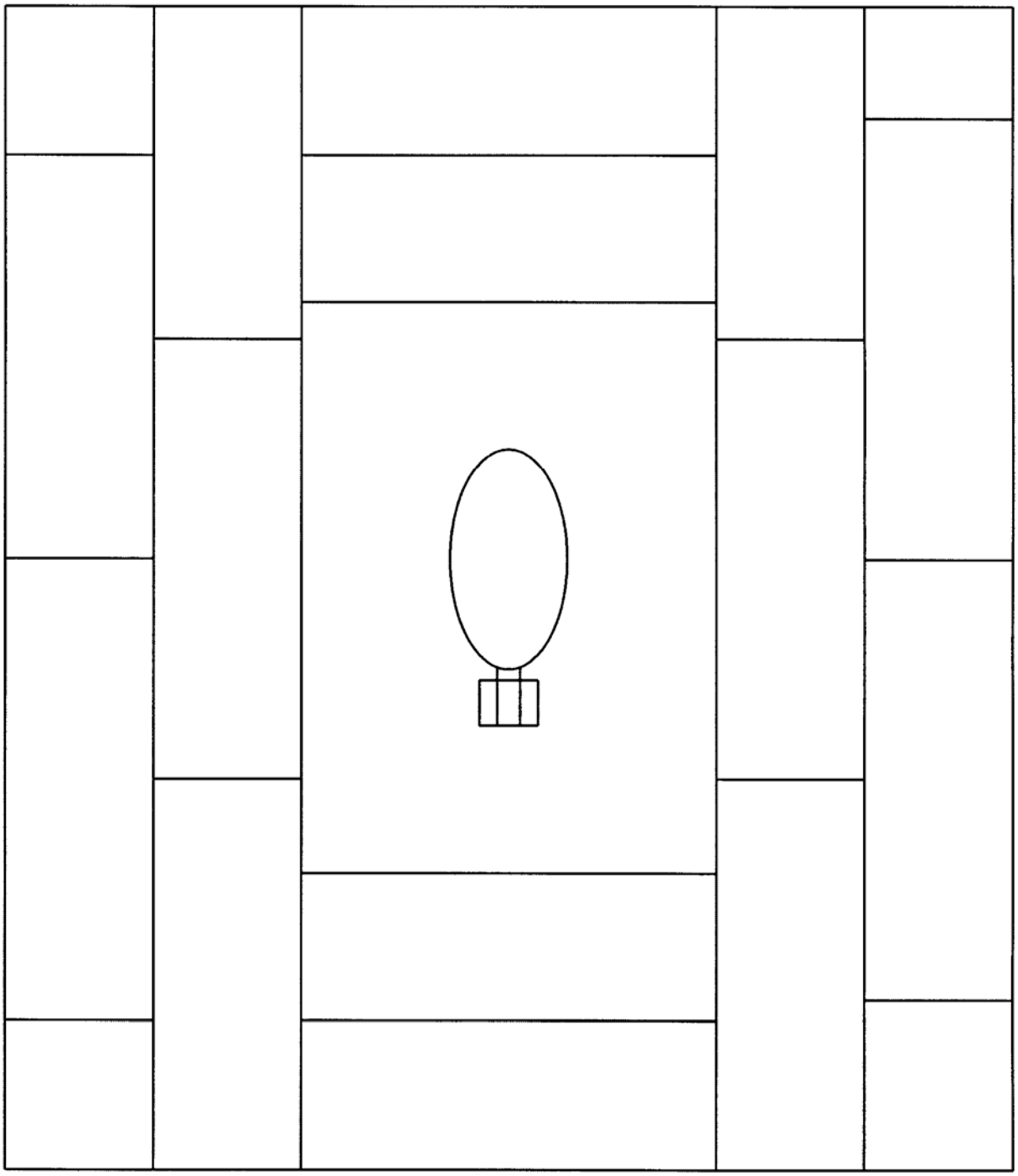


Figure 7 - Configuration for 12” Wall Enclosures

ATTACHMENT 3

MITIGATION OF BLAST AND FRAGMENTATION USING WATER

US Army Corps of Engineers
Engineering and Support Center, Huntsville

USE OF WATER FOR MITIGATION OF FRAGMENTATION AND BLAST EFFECTS DUE TO INTENTIONAL DETONATION OF MUNITIONS

HNC-ED-CS-S-00-3
SEPTEMBER 2000

DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
2461 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22331-0600

DDESB-KT

27 FEB 2001

MEMORANDUM FOR US ARMY DEFENSE AMMUNITION CENTER
(ATTENTION: SMAAC-ESL)

SUBJECT: Use of Water for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonations of Munitions, Report HNC-ED-S-00-3 (December 2000)

Reference: SMAAC-ESL (CESO-E/19 Dec 00) (385[A]) 1st End dated 21 December 2000, Subject: Explosives Safety Submission (ESS) for Use of Water for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonations of Munitions, HNC-ED-S-00-3, September 2000

The Department of Defense Explosives Safety Board (DDESB) Secretariat has reviewed the mitigation technology described in the subject report as requested by the reference. Based on the information furnished in the report the water mitigation techniques for intentional detonations defined in Section 3.0 of the report are approved for field use in Ordnance Explosives (OE) removal action projects.

A copy of this memorandum of approval must be included with a DDESB approved site plan, and be available at OE sites where intentional detonations are conducted that use the approved water mitigation technique.

The DDESB point of contact for this action is Dr. Jerry M. Ward, Director, Technical Programs Division, DSN: 221-2525, Commercial phone: (703) 325-2525; Fax: (DSN) 221-6227 and E-mail: Jerry.Ward@hqda.army.mil.

DANIEL T. TOMPKINS
Colonel, USAF
Chairman

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USE OF WATER FOR MITIGATION OF FRAGMENTATION AND BLAST EFFECTS DUE TO INTENTIONAL DETONATION OF MUNITIONS

HNC-ED-CS-S-00-2

FEBRUARY 2000

Prepared By
Michelle Crull, PhD, PE

Department of the Army
U.S. Army Engineering and Support Center, Huntsville
Attn: CEHNC-ED-CS-S
P.O. Box 1600
Huntsville, AL 35807-4301

Telephone: Commercial (256) 895-1650

Reviewed by: _____

WILLIAM H. ZEHRT, PE DATE
Chief, Structural Branch

Approved by: _____

PAUL M. LAHOUD DATE
Chief, Civil-Structures Division

EXECUTIVE SUMMARY

The U.S. Army Engineering and Support Center, Huntsville (USAESCH) is currently engaged in projects which require the disposal of uncovered/discarded ordnance and explosives (OE) on public and private lands. The uncovered OE item is often detonated in place if it is too dangerous to move. In some cases, covering and tamping with loose earth is used to contain the blast and fragments. Another method to mitigate the fragmentation and blast effects is to cover the item with sandbags. However, both of these methods result in secondary fragments (earth clumps or sandbags) being thrown some distance from the blast. Preliminary tests show that water can be used to mitigate the fragmentation and blast effects and, depending on the method used to contain the water, there may be no hazardous secondary fragments. In addition, the water quenches the fireball and there is no fire hazard associated with the detonation. This last observation is especially important when working in a high fire hazard area.

The Structural Branch, USAESCH, sponsored a test program in 1999 to evaluate the use of water for fragment and blast mitigation, for intentional detonations at Ordnance and Explosives (OE) sites. The U.S. Army Engineer Research and Development Center (USAERDC), with USAESCH performed a two-phase test program of water mitigation of blast and fragmentation. In phase one, tests were conducted using four different munitions to determine the depth of water required to defeat the fragments. In phase two, different water containment systems were tested for these munitions.

For phase one, the munitions were suspended vertically in an aboveground pool in an off-center position. Thus the fragments were dispersed through varying thicknesses of water. Witness panels of 0.032” aluminum were used to record any fragments that might exit the pool. Witness screens were placed in the pool at various distances from the munition to determine if the fragments had penetrated that far.

Once a required water thickness was determined for each of the four munitions in phase one, containers were selected to test for use in actual disposal situations. The points considered in this selection were adaptability to munition size, transportability (empty or pre-filled with water), debris producing potential, adaptability to uneven terrain, and cost. The water containment systems tested were 55-gallon plastic drums, 1100-gallon plastic agricultural chemical tanks, 5-gallon stackable plastic carboys, and inflatable plastic wading pools.

These tests showed that water is a feasible means of mitigating fragments and blast effects from an intentional detonation. The containers that are made of heavy plastic produce secondary fragments that may be thrown some distance from the blast. The inflatable swimming pools did not produce any significant secondary fragments. Some small pieces of these pools were found around the site but, since the pool was made of thin flexible plastic, these pieces were very

lightweight and not hazardous. High-speed photography of the tests shows that there is no fireball. Therefore, there is no fire hazard associated with the detonation.

The results of these tests have been used to develop guidelines for the use of water to mitigate fragments and blast effects due to an intentional detonation of a munition. Methods for determining the required water containment system and the resulting minimum separation distance are detailed in this report. Figures are provided to show the resulting munition/initiator configuration and water containment systems.

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1.0 INTRODUCTION

The U.S. Army Engineering and Support Center, Huntsville (USAESCH) is currently engaged in projects which require the disposal of uncovered/discarded ordnance and explosives (OE) on public and private lands. The uncovered OE item is often detonated in place if it is too dangerous to move. In some cases, covering and tamping with loose earth is used to contain the blast and fragments. Another method to mitigate the fragmentation and blast effects is to cover the item with sandbags. However, both of these methods result in secondary fragments (earth clumps or sandbags) being thrown some distance from the blast. Preliminary tests show that water can be used to mitigate the fragmentation and blast effects and, depending on the method used to contain the water, there may be no hazardous secondary fragments. In addition, the water quenches the fireball and there is no fire hazard associated with the detonation. This last observation is especially important when working in a high fire hazard area.

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For phase one, the munitions were suspended vertically in an aboveground pool in an off-center position. Thus the fragments were dispersed through varying thicknesses of water. Witness panels of 0.032” aluminum were used to record any fragments that might exit the pool. Witness screens were placed in the pool at various distances from the munition to determine if the fragments had penetrated that far.

Once a required water thickness was determined for each of the four munitions in phase one, containers were selected to test for use in actual disposal situations. The points considered in this selection were adaptability to munition size, transportability (empty or pre-filled with water), debris producing potential, adaptability to uneven terrain, and cost. The water containment systems tested were 55-gallon plastic drums, 1100-gallon plastic agricultural chemical tanks, 5-gallon stackable plastic carboys, and inflatable plastic wading pools.

These tests showed that water is a feasible means of mitigating fragments and blast effects from an intentional detonation. The containers that are made of heavy plastic produce secondary fragments which may be thrown some distance from the blast. The inflatable swimming pools did not produce any significant secondary fragments. Some small pieces of these pools were found around the

site but, since the pool was made of thin flexible plastic, these pieces were very lightweight and not hazardous. High-speed photography of the tests shows that there is no fireball. Therefore, there is no fire hazard associated with the detonation.

2.0 TEST PROGRAM

The munitions used in both phases of the tests are the 60 mm M49A4 mortar, the 81 mm M362A1 mortar, the 105 mm M1 projectile and the 155 mm M107 projectile.

2.1 Phase One Tests

Commercially available aboveground swimming pools were used to contain the water in the phase one tests because they were easily obtainable and relatively inexpensive. Different size pools were used for different munitions. In the phase one tests the munitions were suspended vertically in the pool at a specified distance from the edge of the munition to one edge of the pool (off-center). Window screens were suspended from 2”x2” wood beams 180 degrees from the nearest edge of the pool at specified distances from the munition. These were used as witness panels in the pool. Witness panels of 0.032” aluminum were placed around the outside of the pool to record any fragments that might leave the pool. The test layout is shown in Figure 1 and the dimensions of the pool and placement of the munition and witness screens are shown in Table 1. The detonations were initiated using C-4 packed in the fuze well.

TABLE 1 – Phase One Test Parameters

Munition	Pool Diameter	Distance, R1 Edge of Pool	Expected Penetration	Pool Depth	Munition Distance from		Munition to Screen Distance			
					Bottom	Surface	S1	S2	S3	S4
60mm	90"	6"	8"	18"	2"		5"	10"	15"	20"
81mm	90"	12"	18"	24"	2"		10"	15"	20"	25"
105mm	12'	24"	30"	24"	3.5"	3"	30"	30"	40"	50"
155mm	18'	36"	48"	46"	4"	15"	40"	50"	60"	70"

2.1.1 155 mm M107 Projectile

The 155 mm M107 projectile contains 15.4 lbs of Comp B. For the phase one test, the booster was removed and the fuze well was packed with C-4. An 18 ft diameter, 4 ft deep pool was used for this test. The projectile was placed base down to make sure the base plate did not become airborn. Fragments were found all around the pool. One section of the metal pool wall from the near blast region was wrapped in a witness panel and thrown over 200 feet from ground zero.

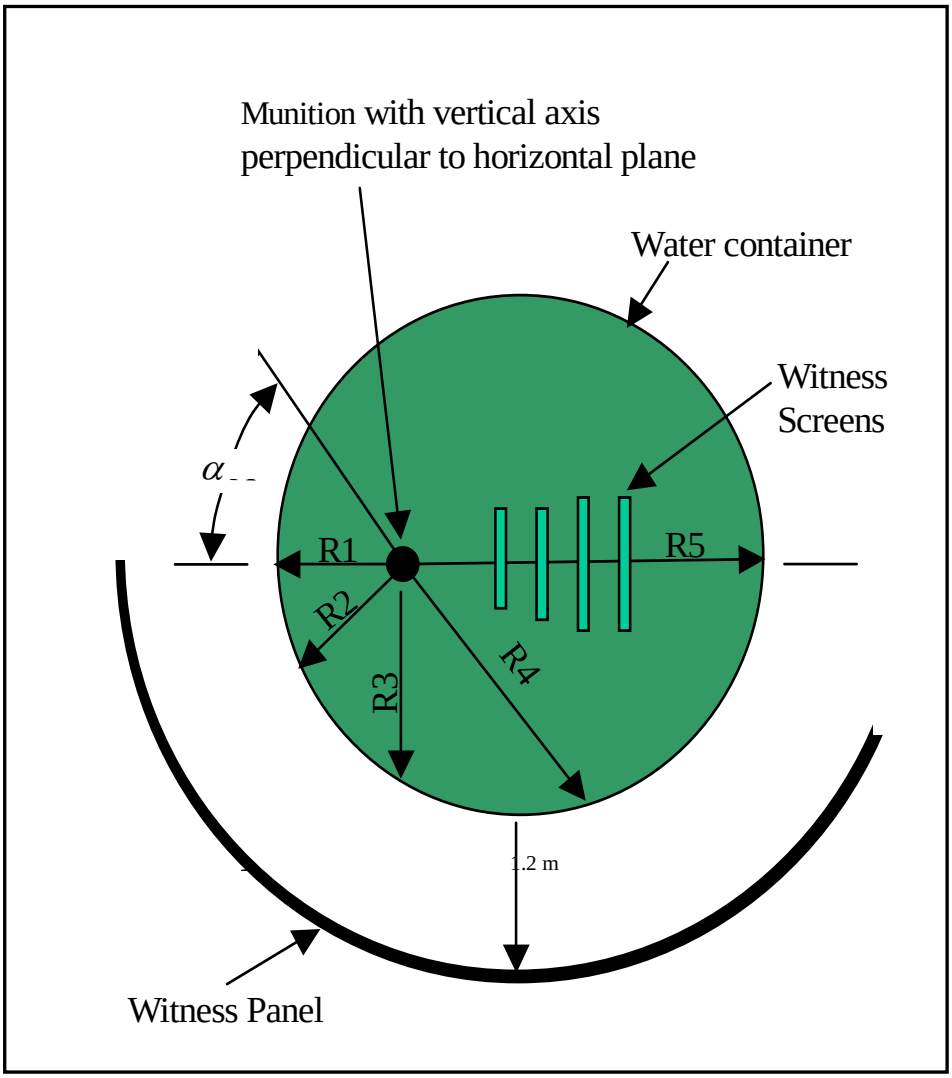


FIGURE 1 – Test Layout for Phase One Tests

TABLE 2 – 155 mm M107 Phase One Results

Perforation of Pool			Fragment Size		Comments	Witness Screens	
Angle A, degrees	Distance D, in.	Height, in.	Length, in.	Width, in		Screen No.	Distance, in.
40.54	70.31		2	1.5		1	24
59.93	96.46		4	2		2	30
66.45	104.96		1	0.125		3	40
						4	50
						5	60
						6	70

Note: Fragment penetrated 5th screen but not 6th.

2.1.2 105 mm M1 Projectile

The 105 mm M1 projectile contains 5.07 lbs of Comp B. For the phase one test the fuze well was packed with C-4. A 12 ft diameter, 2 ft deep pool was used for this test. The projectile was placed base down to make sure the base plate did not become airborn. Fragments were recovered out to a distance of approximately 75 feet from the pool. There were no penetrations in the side or rear of the pool or witness panels, so the explosive mass apparently lofted these fragments along with the water.

TABLE 3 – 105 mm M1 Phase One Results

Perforation of Pool			Fragment Size		Comments	Witness Screens	
Angle A, degrees	Distance D, in.	Height, in.	Length, in.	Width, in		Screen No.	Distance, in.
25.97	38.87	28	5	1		1	30
47.96	53.83	12	6	1	Tear?	2	42
						3	54
						4	66
						5	80

Note: Fragment penetrated 1st screen only.

2.1.3 81 mm M362A Mortar

The 81 mm M362A mortar contains 2.1 lbs of Comp B. For the phase one test the fuze well was packed with 113 grams of C-4. A 90 inch diameter, 24 inch deep pool was used for this test. The mortar was placed nose down in the pool with the nose 2 inches off the bottom. No fragments penetrated the rear side of the pool. The tail fin was recovered 42 feet from the pool. One fragment was recovered 130 feet from the pool.

TABLE 4 – 81 mm M362A Phase One Results

Perforation of Pool			Fragment Size		Comments	Witness Screens	
Angle A, degrees	Distance D, in.	Height, in.	Length, in.	Width, in		Screen No.	Distance, in.
2.56	12.12	17	2.5	0.25		1	10
2.56	12.12	17	1.5	0.125	Dent	2	15
1.79	12.06	36	0.25	2		3	20
7.62	13.05	7	4	2		4	25
7.34	12.97	5	1	0.25	Dent		
7.62	13.05	9	0.75	0.5			
8.46	13.28	12	1	0.5	3 together		
9.61	13.63	14	0.25	0.25	Frag imbedded		
7.62	13.05	22	0.5	0.25			
7.34	12.97	33	2	1			
7.89	13.12	36	1	0.5			
10.50	13.92	9	3	1			
10.80	14.02	37	0.75	0.75			

Note: Fragment penetrated 3rd screen but not 4th.

2.1.4 60 mm M49A4 Mortar

The 60 mm M49A4 mortar contains 0.42 lbs of Comp B. For the phase one test the fuze well was packed with 65.2 grams of C-4. A 90 inch diameter, 18 inch deep pool was used for this test. The mortar was placed nose down in the pool with the nose 2 inches off the bottom. The pool was filled to the top (22 inch depth) but no effort was made to level the ground under the pool. As a result the low side of the pool began to sag before the test. Sandbags were used to prop up this side. No fragments penetrated the rear of the pool, but were found in the bottom of the pool. Fragment holes were found in the lower portion of the witness panel. Several fragments were found 30 to 40 feet from the pool, but the fragment field extended only 30 degrees off a line running through the center of the munition to the nearest point on the side of the pool. No fragments were found in the same region behind the witness panel side, although several fragments penetrated the witness panel.

TABLE 5 – 60 mm M49A4 Phase One Results

Perforation of Pool			Fragment Size		Comments	Witness Screens	
Angle A, degrees	Distance D, in.	Height, in.	Length, in.	Width, in		Screen No.	Distance, in.
2.97	7.32	10	1.75	1.25		1	5
6.07	8.26	4	2.25	0.25		2	10
6.07	8.26	12	0.5	0.125		3	15
6.67	8.49	4	1	0.125	dent	4	20

Note: Fragment penetrated 1st screen but not 2nd.

2.1.5 Phase One Summary and Conclusions

Open front barricade tests using the 60 mm and 81 mm mortars and the 105 mm projectile were also conducted at this test range during this time. The

detonations were all initiated by packing the fuze wells with C-4. It was observed that the fragments from the water tests were significantly larger than those from the barricade tests. This is most likely due to the confinement of the water. Compared to the number of fragment impacts observed in the barricade tests, a very small number of fragments penetrated the witness panels in the water tests. The water contained all but the most energetic fragments. A summary of the penetration distances is presented in Table 6. The screen distance is the distance of the first screen that was not penetrated by fragments. The panel distance is the longest travel distance through water of a fragment impacting the witness panel.

Because these fragments were larger than would be expected from the detonation of a munition not submerged in water, they probably penetrated a greater thickness of water than would be expected in an intentional detonation of a munition in the field. Consequently, in actual field conditions, the thickness of water required to contain munition fragments can be expected to be less than those shown here.

TABLE 6 – Water Penetration Distance, Phase One

Munition	Fragment Penetration, in.	
	Screen	Panel
60 mm M49A4	< 10	8.5
81 mm M362A	< 25	14
105 mm M1	< 42	53
155 mm M107	< 70	105

2.2 Phase Two Tests

Phase Two tests were set up in a manner simulating actual field conditions. For each test the munition was placed in a horizontal orientation in a hole with the top of the munition six inches below the ground surface. A piece of plywood was placed over the hole to keep the water containers from resting on the munition. The detonation was initiated using a GOEX oil well perforator charge containing 26 grams of RDX. The perforator was placed on the side of the munition so that the shaped charge was directed slightly downward. Pressure gages and sound meters were used to measure the blast effects. Video cameras and a high speed digital camera were used to record each test. The test setup is shown in Figure 2.

2.2.1 155 mm M107 Projectile

Two water containment systems were tested with the 155 mm M107 projectile. The first system was two layers of 55 gallon drums and the second system was a single 1100 gallon agricultural tank.

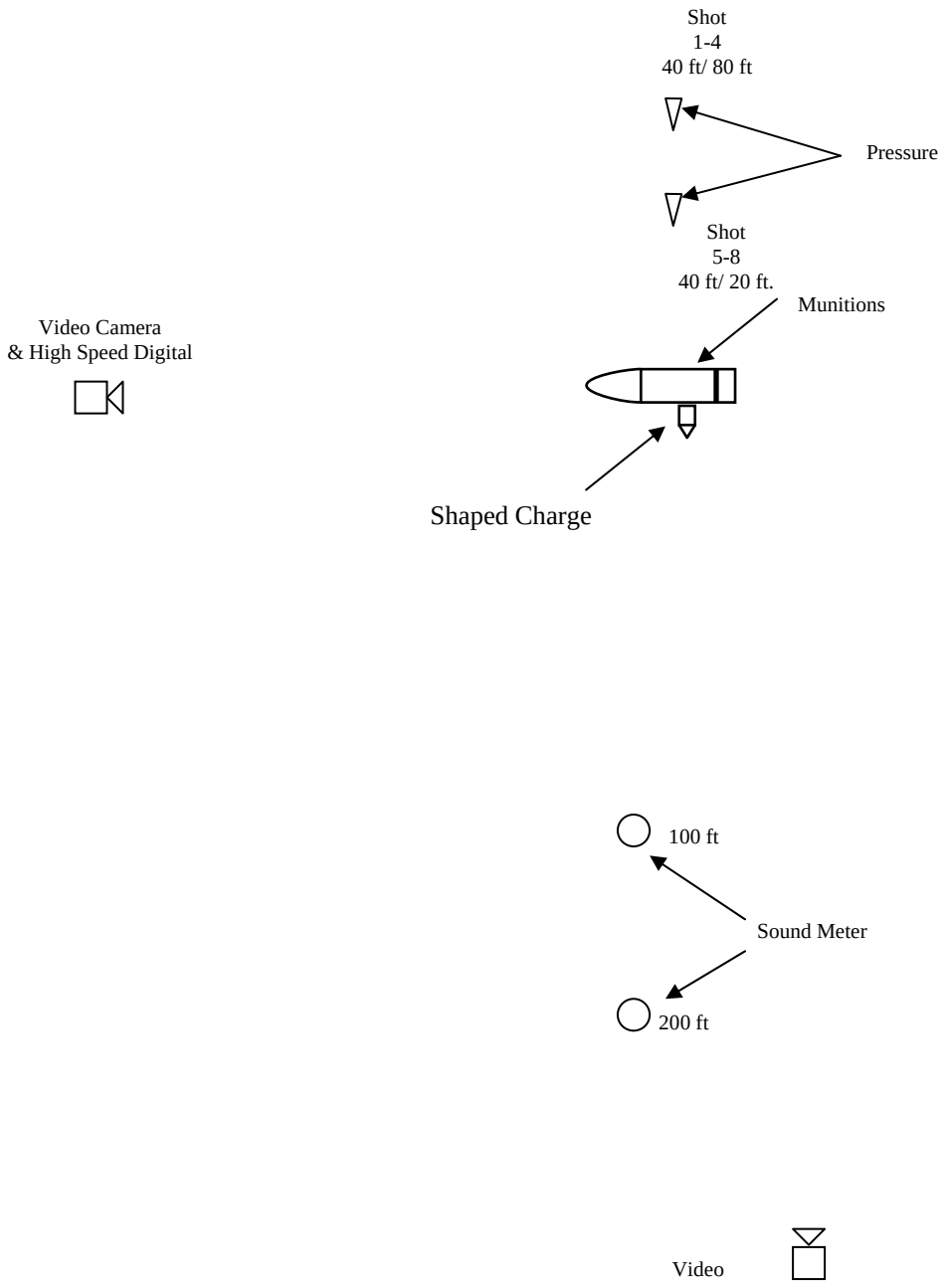


FIGURE 2 – Instrument and Camera Layout for Phase Two Tests

2.2.1.1 Water Contained in 55 Gallon Drums

After placing the 155 mm M107 with the initiator in the hole (see Figure 3), a sheet of ¾ inch plywood was placed over the hole and two layers of 55 gallon drums were placed over the projectile. A total of 28 drums were used with a witness panel placed between the layers and around the outside of the drums. This layout is shown in Figure 4.

The barrels were thrown seventy feet into the air. One barrel, mostly intact, was recovered about 300 feet from ground zero. It had apparently rolled part of this distance. The rest of the barrels were recovered within 100 feet of the crater.

A partially destroyed barrel was recovered approximately 55 feet from the crater with a 3 inch long fragment embedded in the inside surface. Beside this barrel was another fragment about 2 inches long, which may have fallen out of the barrel as it rolled. A small fragment was found inside one of the barrels from the top layer. Several fragments were found between 30 and 40 feet from the crater.

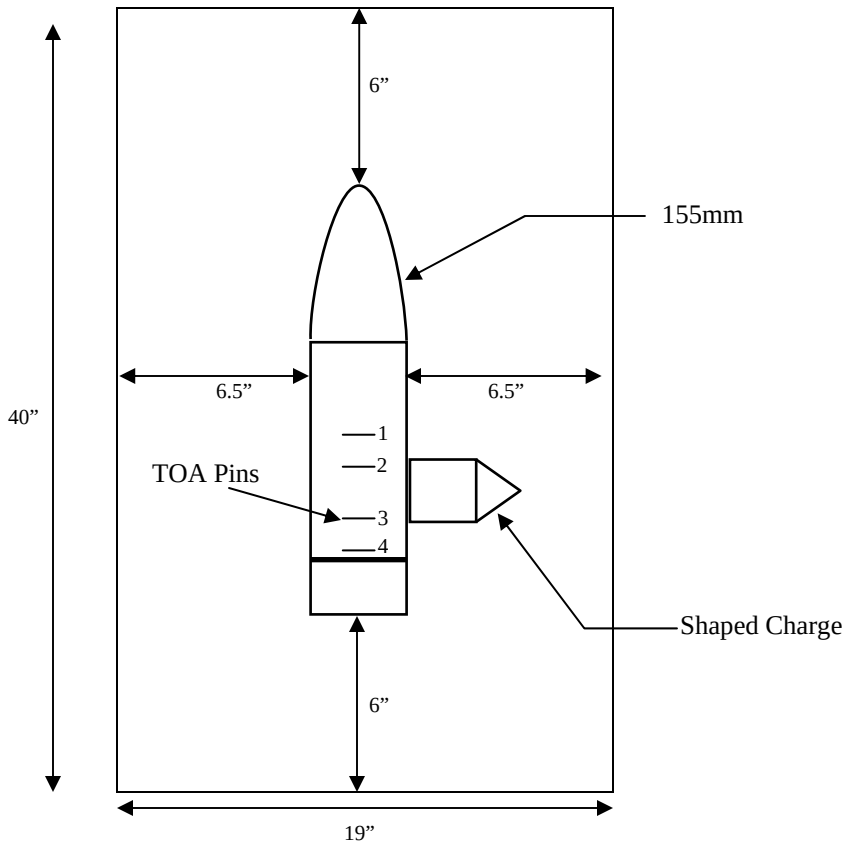
A small fragment hole (about ¼ inch in diameter) was found in the witness plate that was between the layers of barrels. The penetration appeared in the gap between barrels indicating that at least part the fragments path was through air and not water. The top barrel directly over the charge was perforated on the bottom and a circular section over the charge was dented by fragments but not perforated at the top.

Airblast and sound pressure measurements (converted from decibels to psi) are plotted against open-air blast pressure curves for a 155 mm M107 projectile in Figure 5.

Fragments from the 155 mm M107 projectile can penetrate more water than the 3 ft height of the barrels. Because there are significant gaps between the barrels when they are stacked (even more so on uneven ground), a greater area must be covered with barrels to insure that fragments do not escape. This method is very time consuming. Several hours were required to stack and fill all the barrels with water.

2.2.1.2 Water Contained in 1100 Gallon Agricultural Tank

An 1100 gallon agricultural tank was placed over the munition and filled with water. The cylindrical tank was 7 feet in diameter and 58 inches tall. The opaque plastic was approximately 1/8 inch thick. The test layout is shown in Figure 6. The detonation tore the tank into large pieces. One piece was recovered approximately 250 feet from ground zero. One fragment was embedded in the inner side of a piece of the tank but no fragments penetrated the tank.



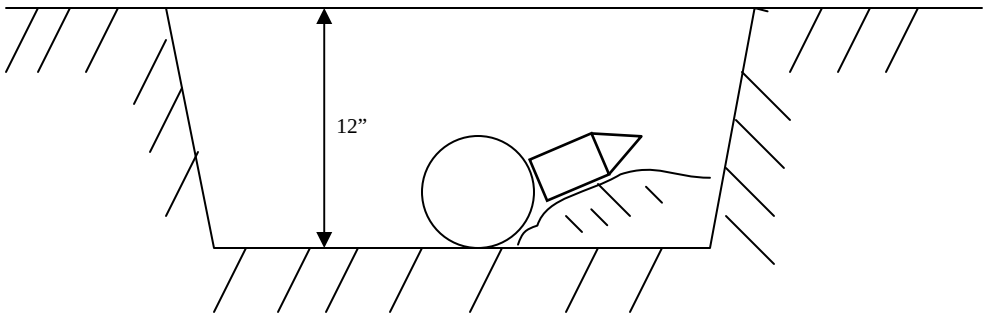


FIGURE 3 – Munition and Initiator Placement for 155 mm M107 Projectiles

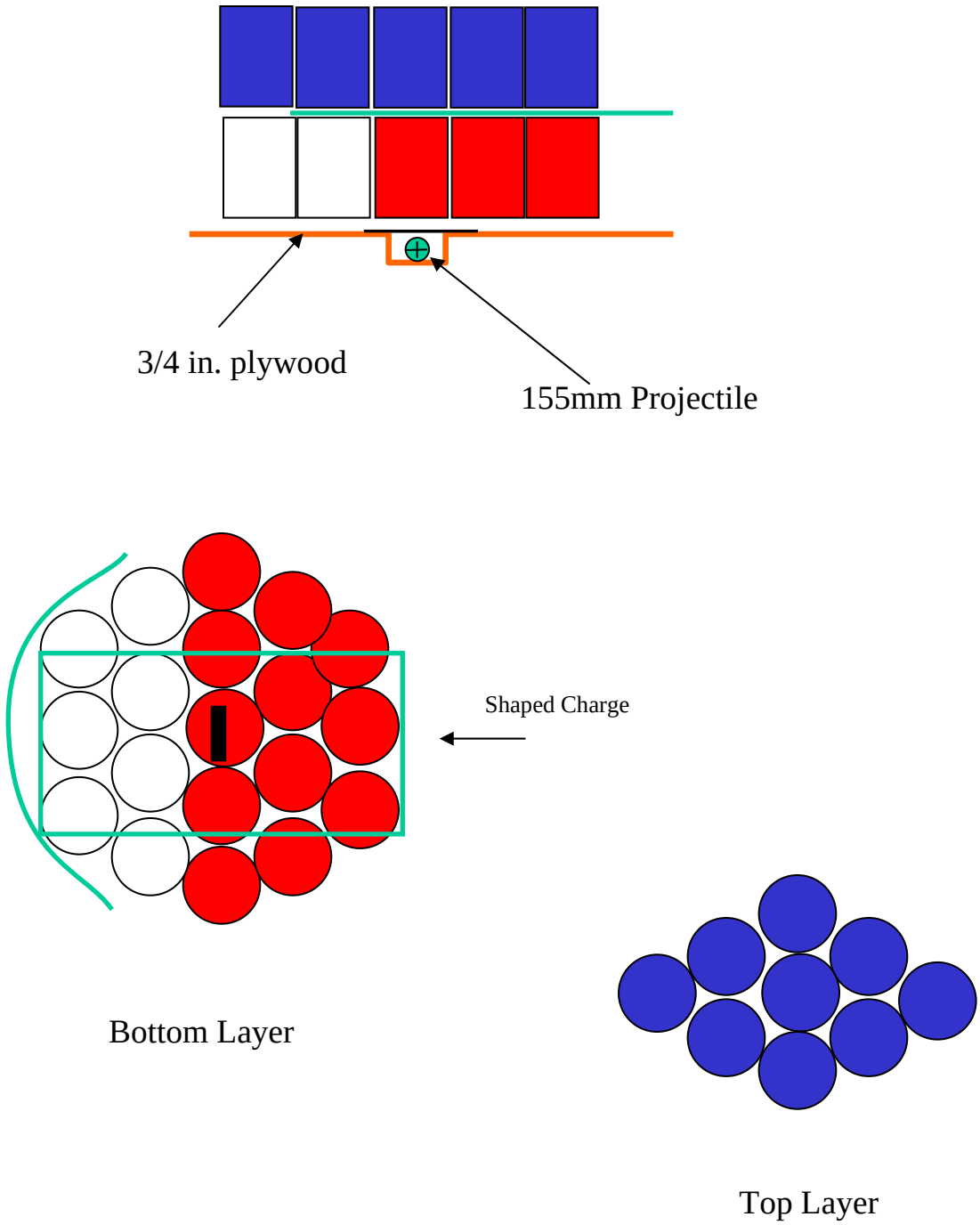


FIGURE 4 – Test Layout for 155 mm M107 Under 55 Gallon Drums

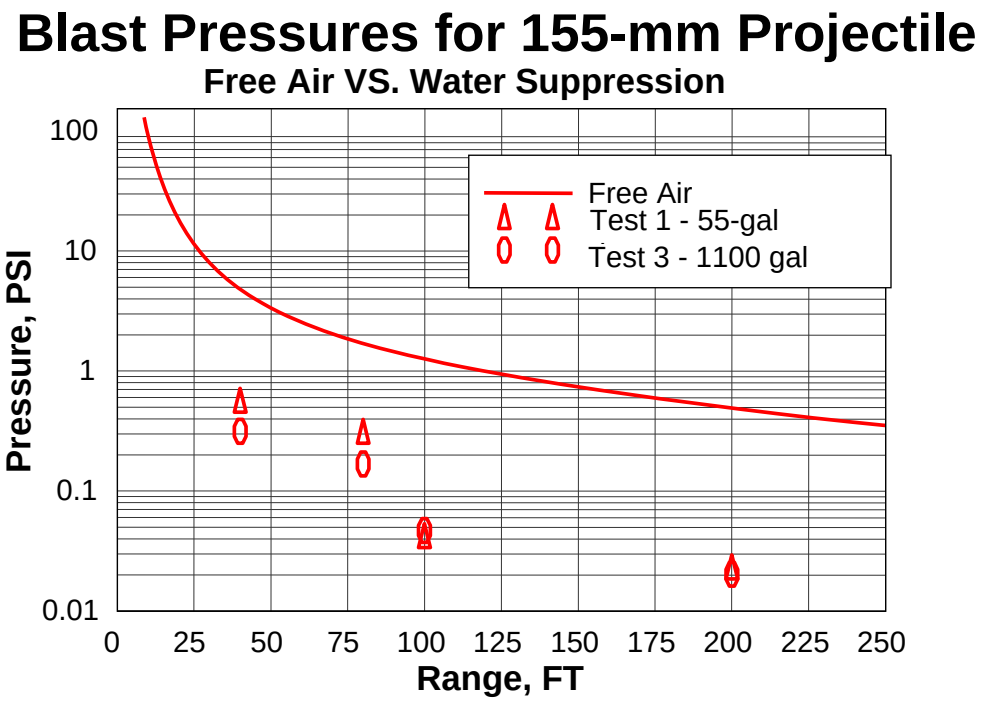


FIGURE 5 – 155 mm M107 Blast Pressures

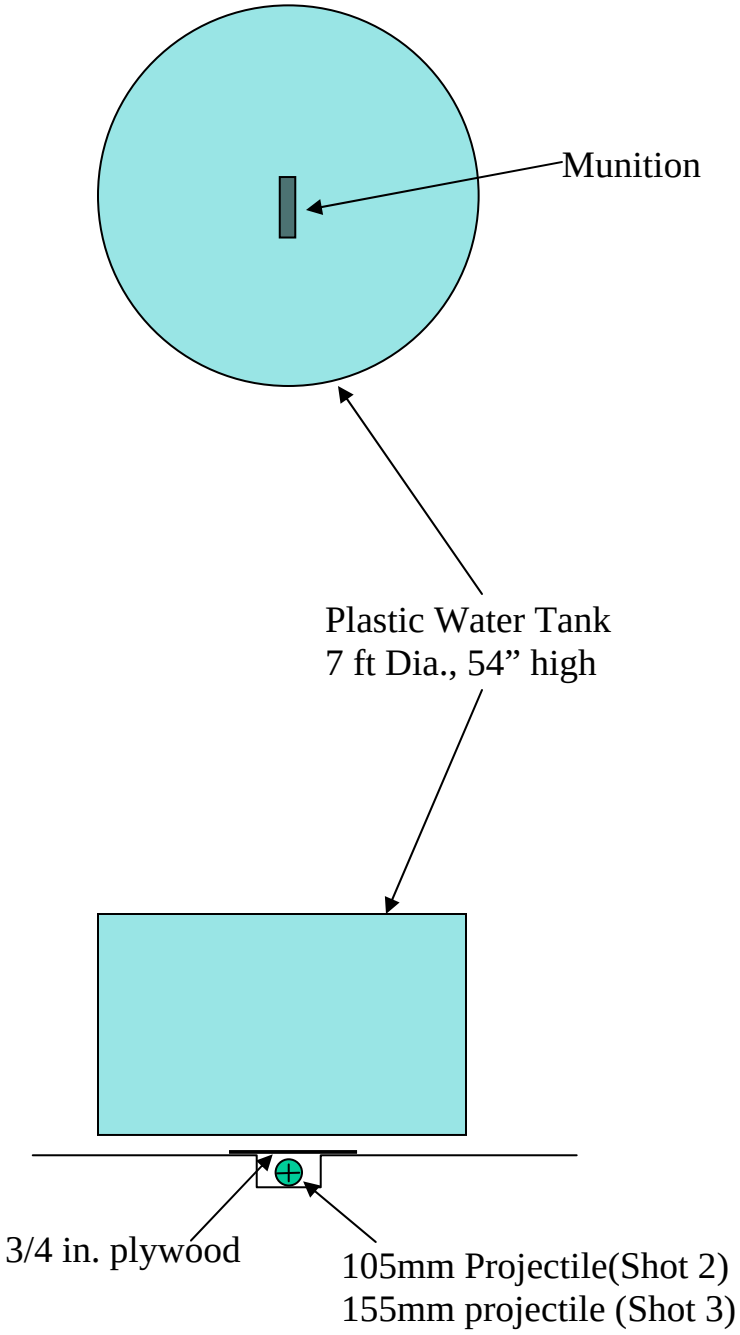


FIGURE 6 – Layout for Tests Using 1100 Gallon Agricultural Tank

2.2.2 105 mm M1 Projectile

Two water containment systems were tested with the 105 mm M1 projectile. The first system was two layers of 55 gallon drums and the second system was a single 1100 gallon agricultural tank.

2.2.2.1 Water Contained in 55 Gallon Drums

After placing the 105 mm M1 with the initiator in the hole (see Figure 7), a sheet of ¾ inch plywood was placed over the hole and two layers of 55 gallon drums were placed over the projectile. A total of 22 drums were used with a witness panel placed between the layers and around the outside of the drums. This layout is shown in Figure 8.

Several fragments penetrated the witness panel between the layers of drums and there were a few dents where the panel was impacted but the fragments did not penetrate. As in the 155 mm M107 test, the fragments penetrating the witness panel were in the gaps between barrels.

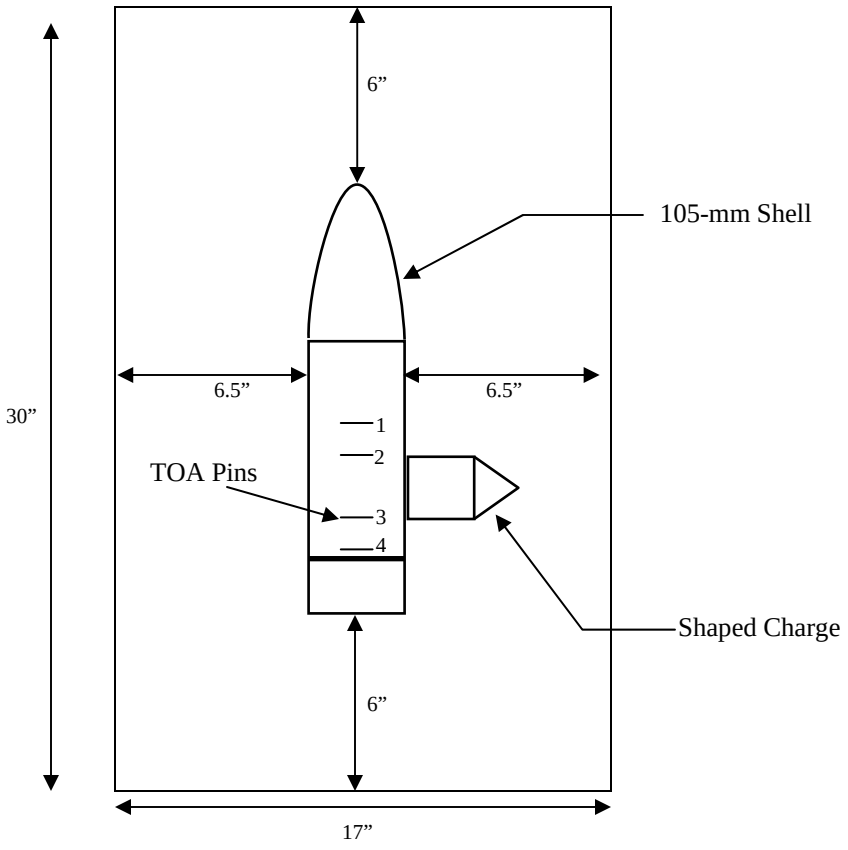
The furthest drum was recovered 70 feet from ground zero. Most of the top layer of drums seemed to come straight back down and land in or near the crater. Two of the drums in the crater were undamaged and full of water.

Airblast and sound pressure measurements (converted from decibels to psi) are plotted against open-air blast pressure curves for a 105 mm M1 projectile in Figure 9.

2.2.1.2 Water Contained in 1100 Gallon Agricultural Tank

The test layout is shown in Figure 6. Most debris was within 35 feet of the crater. A number of fragments were found within 50 feet of ground zero, including a piece of the base plate at 50 feet off the base end of the munition. A large piece of the tank was found at 180 feet. A 6 inch long fragment was stuck in the plastic with the bulk of the fragment on the inside of the tank. There were several dents in the witness panels, but only one complete penetration and the fragment causing this penetration was found within a few feet of the panel. Only one obvious exit hole was found in the side of the tank.

The tank is light, easy to place and, because of a large filler hole, can be filled with water in just a few minutes. This container defeated essentially all of the fragments. The one or two that did penetrate the container had been slowed enough that they did not travel any distance. The container pieces traveled further than these primary fragments.



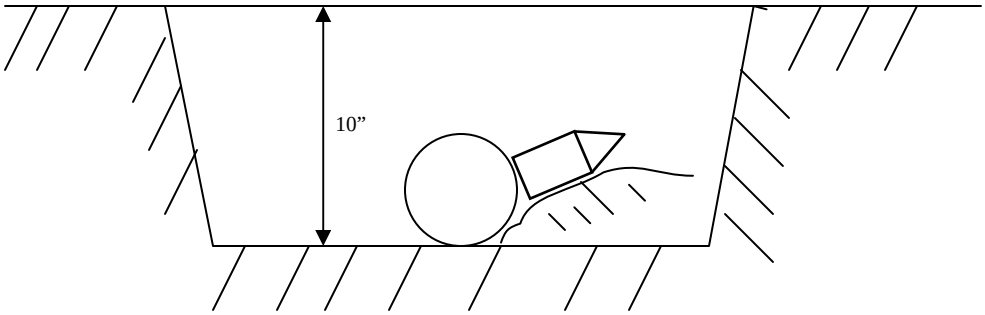


FIGURE 7 – Munition and Initiator Placement for 105 mm M1 Projectiles

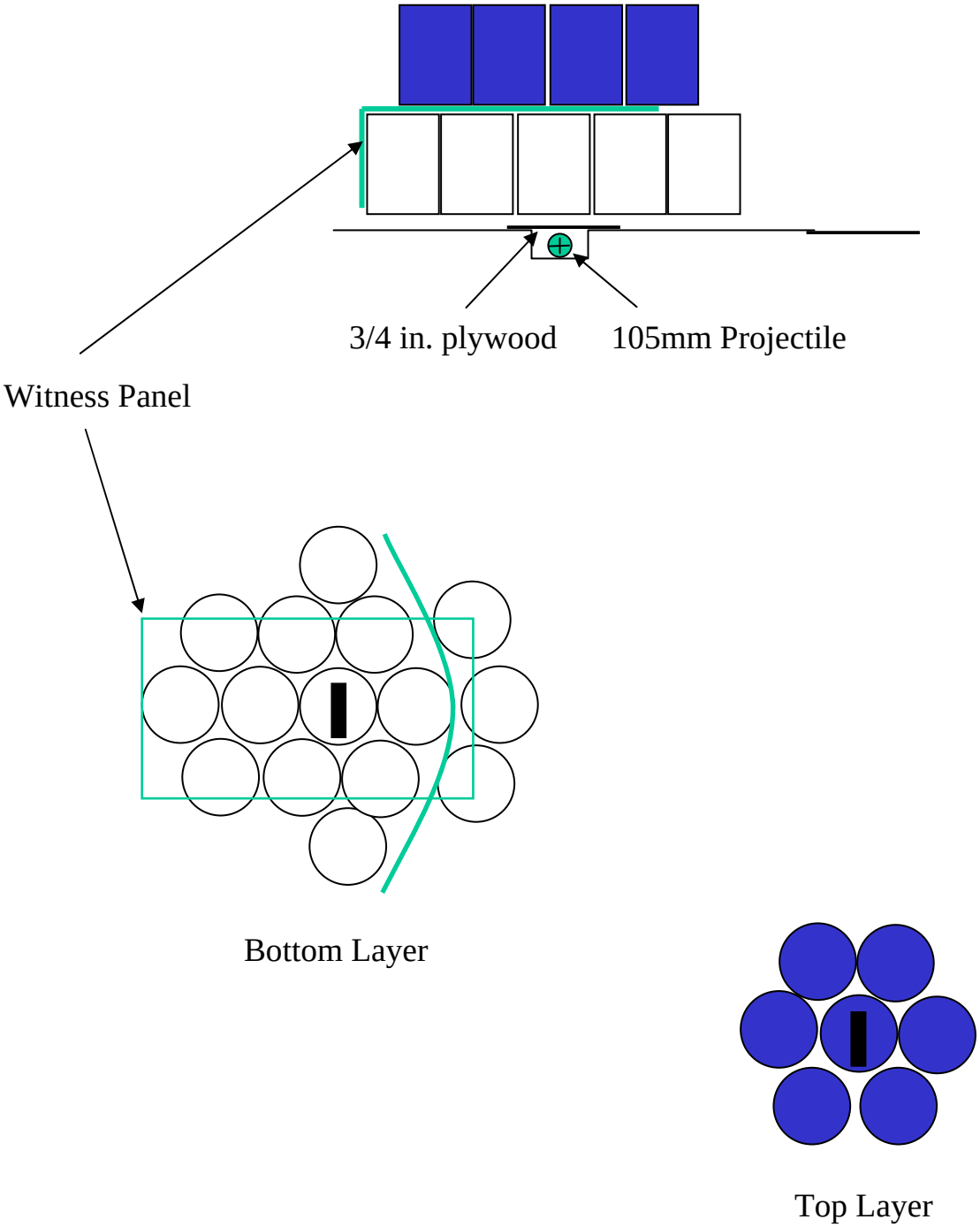


FIGURE 8 - Test Layout for 105 mm M1 Under 55 Gallon Drums

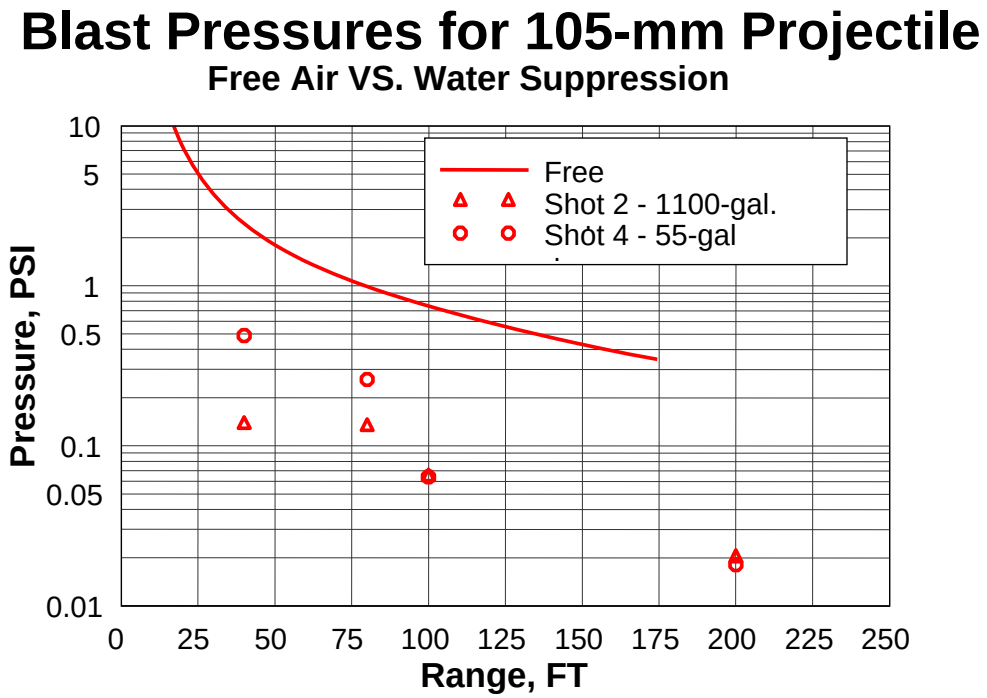


FIGURE 9 - 105 mm M1 Blast Pressures

2.2.3 81 mm M362A Mortar

Two water containment systems were tested with the 81 mm M362A mortar. The first system was two layers of 5 gallon plastic carboys and the second system was a 90 inch diameter inflatable wading pool.

2.2.3.1 Water Contained in 5 Gallon Carboys

After placing the 81 mm M362A with the initiator in the hole (see Figure 10), a half sheet of ¾ inch plywood was placed over the hole and two layers of 5 gallon carboys were placed over the mortar. A total of 31 carboys were used with a witness panel placed between the layers and around the outside of the carboys. This layout is shown in Figure 11.

There was one small fragment hole in the witness panel over the bottom layer of containers and a larger hole about 3 inches long and an inch wide right behind the rear of the munition, probably made by the tail fin. One carboy was found off the side of the stack in the woods at 223 feet and another in a pond about 240 feet off the nose end of the munition. Several were found at distances near 100 feet. Many were still full of water. The tail fin of the mortar was recovered intact directly to the rear of the munition at a distance of 107 feet. Blast pressures from the 81 mm tests are shown in Figure 12.

2.2.3.2 Water Contained in 90 inch Inflatable Wading Pool

After placing the 81 mm M362A with the initiator in the hole, a half sheet of ¾ inch plywood was placed over the hole and a 90 inch diameter inflatable wading pool was placed over the mortar (see Figure 16). The water depth was 18 inches. A witness panel was placed over the pool.

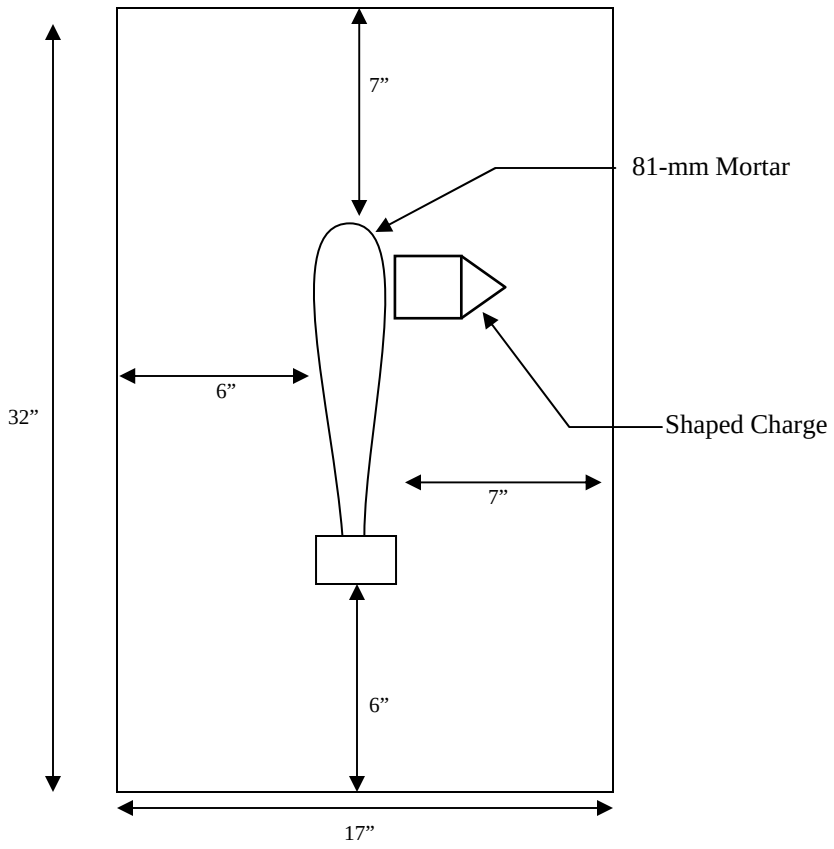
The witness panel was thrown several feet into the air. A hole was blown in the bottom of the pool but the inflated perimeter of the pool was essentially intact. The side of the pool had a small puncture on the inside that caused it to slowly deflate. The witness panel was not perforated.

2.2.4 60 mm M49A4 Mortar

Two water containment systems were tested with the 60 mm M49A4 mortar. The first system was two layers of 5 gallon plastic carboys and the second system was a 90 inch diameter inflatable wading pool.

2.2.4.1 Water Contained in 5 Gallon Carboys

After placing the 60 mm M49A4 with the initiator in the hole (see Figure 13), a half sheet of ¾ inch plywood was placed over the hole and two layers of 5 gallon carboys were placed over the mortar. A total of 11 carboys were used with a



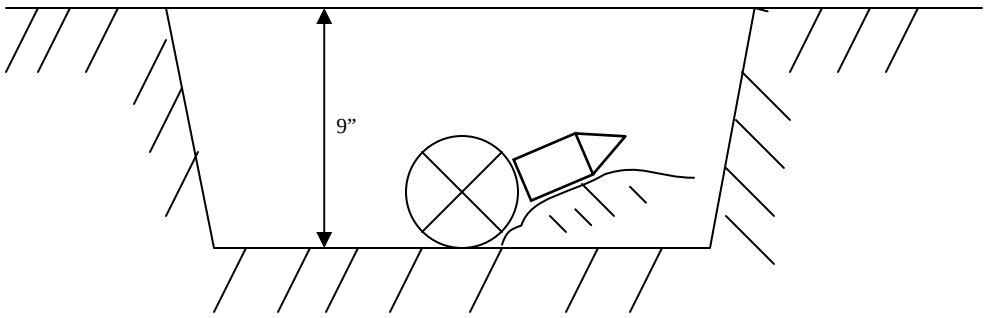


FIGURE 10 – Munition and Initiator Placement for 81 mm M362A Mortars

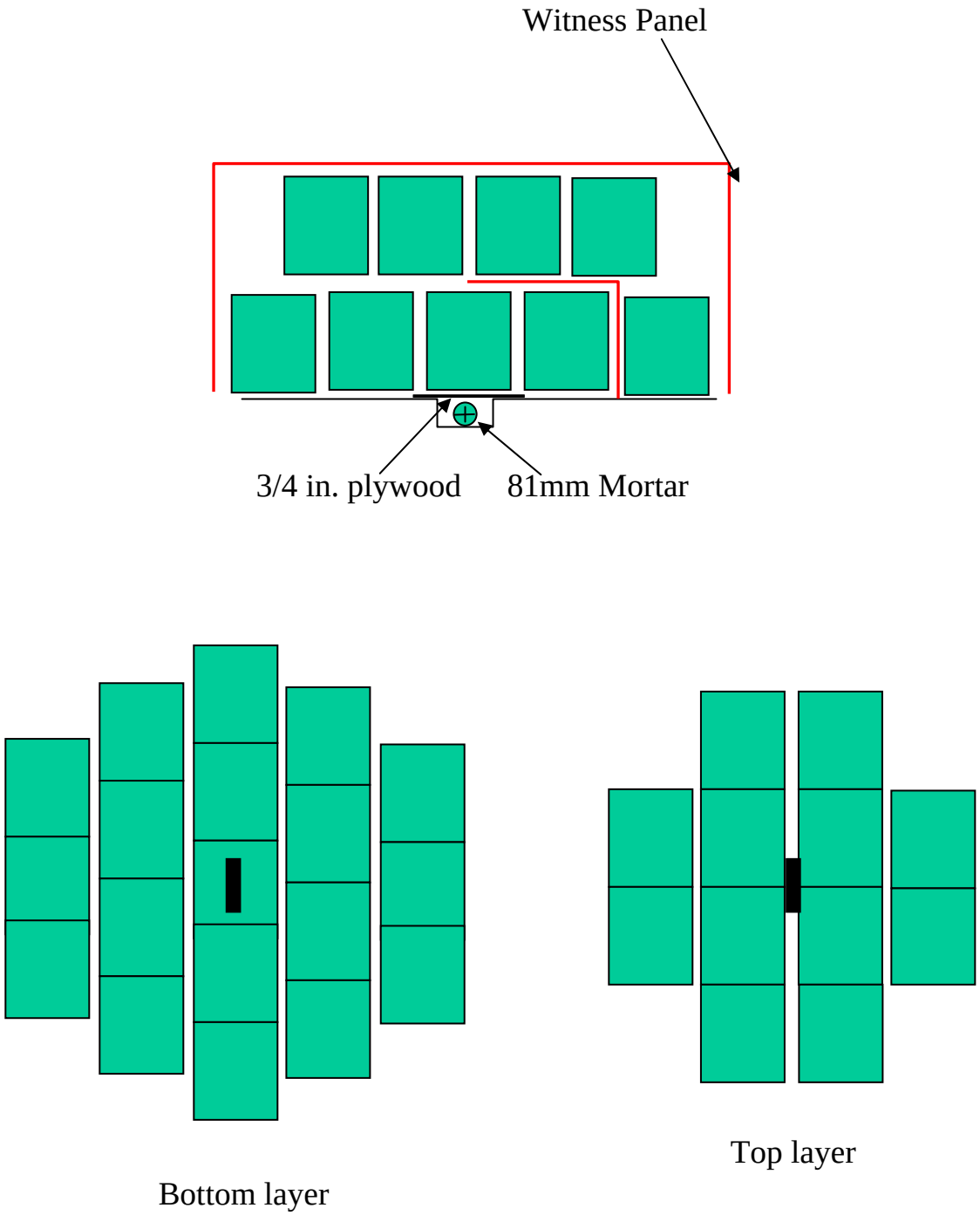


FIGURE 11 - Test Layout for 81 mm M362A Under 5 Gallon Carboys

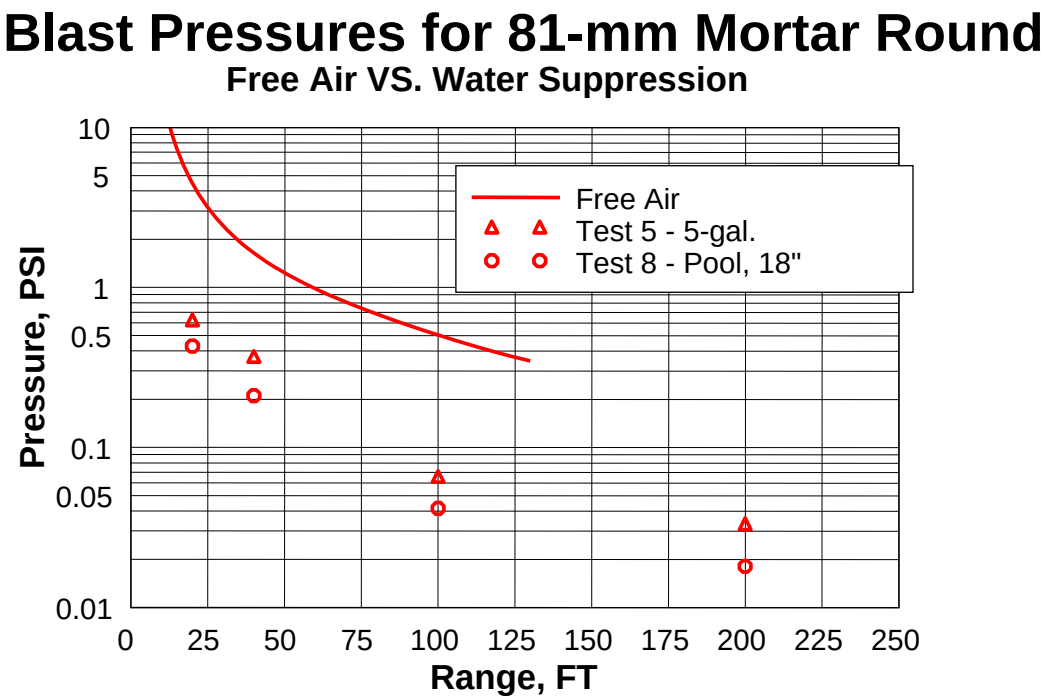


FIGURE 12 - 81 mm M362A Blast Pressures

witness panel placed between the layers and around the outside of the carboys. This layout is shown in Figure 14.

The carboys were thrown more than 100 feet into the air. Those on top landed within 10 feet of the crater. It was observed that the containers on the outer layers are the ones thrown the furthest. The most distant carboy on this test was recovered 44 feet from the nose of the munition. There were no holes in the witness panels. The blast pressures for the 60 mm tests are shown in Figure 15.

2.2.4.2 Water Contained in 90 inch Inflatable Wading Pool

After placing the 60 mm M49A4 with the initiator in the hole, a half sheet of ¾ inch plywood was placed over the hole and a 90 inch diameter inflatable wading pool was placed over the mortar (see Figure 16). The water depth was 18 inches. A witness panel was placed over the pool.

The witness panel was thrown off of the pool. A hole was blown in the bottom of the pool but the inflated perimeter of the pool was not punctured. There were no perforations or even dents in the witness panel.

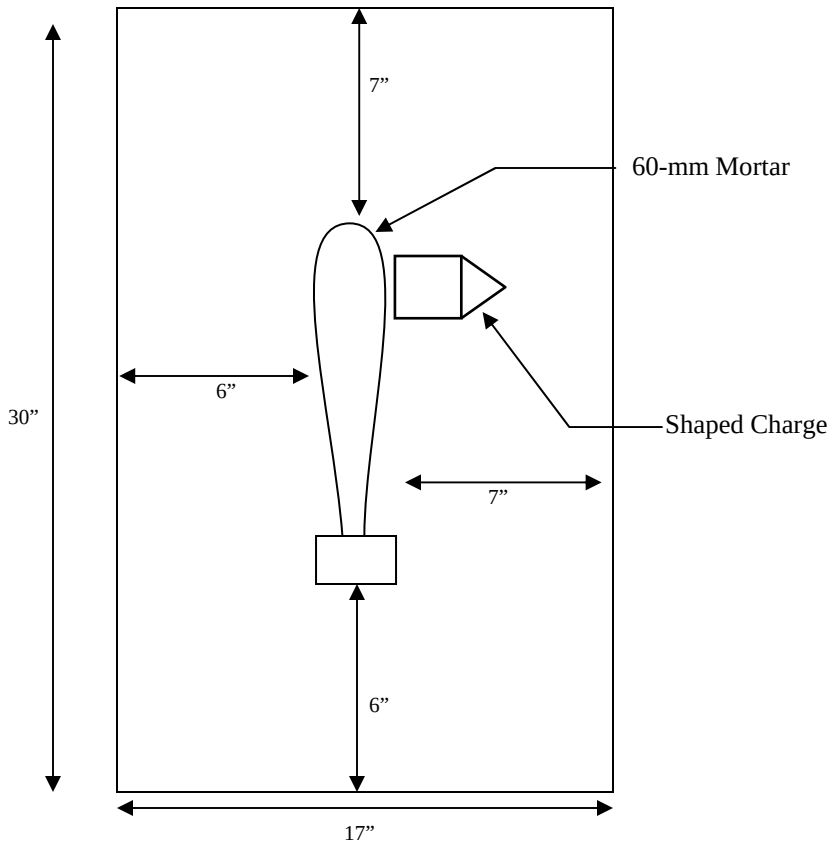
2.2.5 Phase Two Summary and Conclusions

Water is an excellent medium for mitigating blast and fragmentation due to the intentional detonation of unexploded ordnance. Test results show that noise due to detonation is reduced by the water and the fragments from the munitions can be defeated by water.

The best results were obtained using single containers for the water. When multiple containers are used fragments can travel through gaps between containers and the containers are thrown some distance by the blast. Also, containers that are not rigid seem to be a better option than rigid containers because the pieces of the non-rigid containers are smaller, lighter (non-hazardous) and don't travel as far. Non-rigid containers require a more level ground surface but the sides could be supported by soil or sandbags.

As the required thickness of water increases, rigid sides are necessary to contain the large volumes of water and the rigid sides may contribute to the secondary fragment distances. The small pools are readily available at local stores during the spring and early summer but may be difficult to obtain at other times. The agricultural tanks are available any time but may need to be ordered requiring advance planning.

Whenever possible a half sheet (4 ft x 4 ft) of plywood rather than a full sheet (8 ft x 8 ft) should be used under the charge. All of the plywood should be covered by the water container(s) to minimize debris from the plywood.



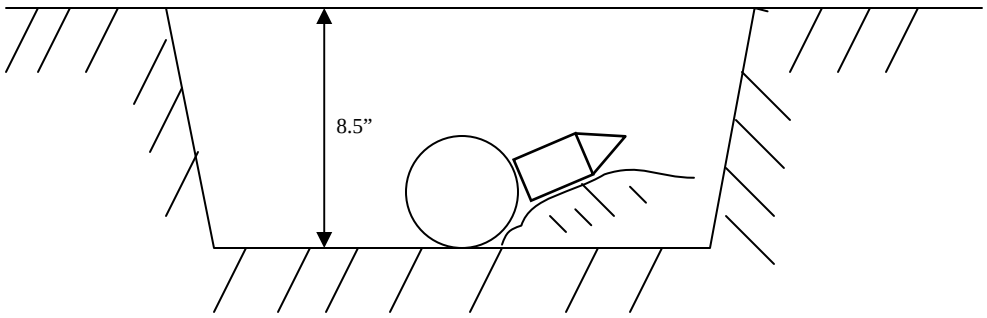


FIGURE 13 – Munition and Initiator Placement for 60 mm M49A4 Mortars

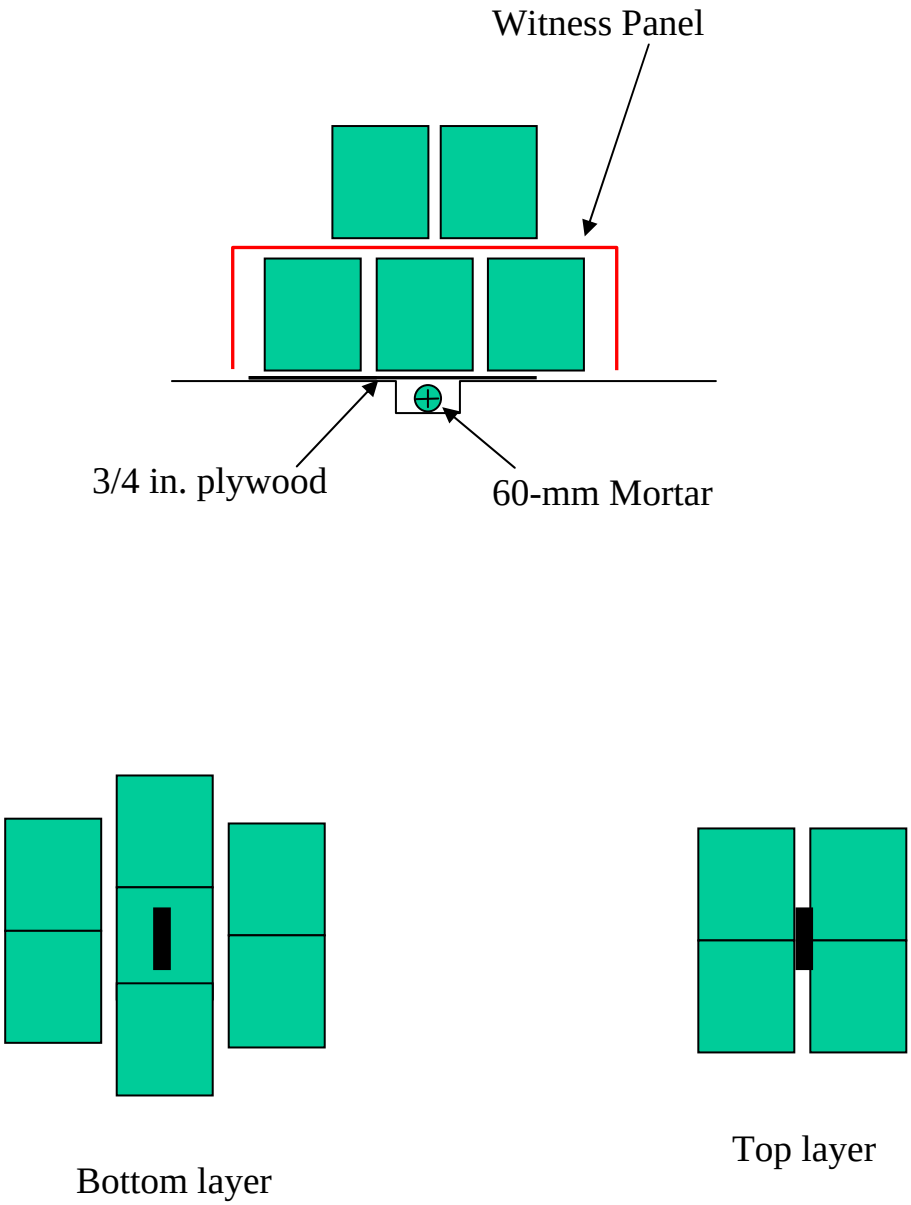


FIGURE 14 - Test Layout for 60 mm M49A4 Under 5 Gallon Carboys

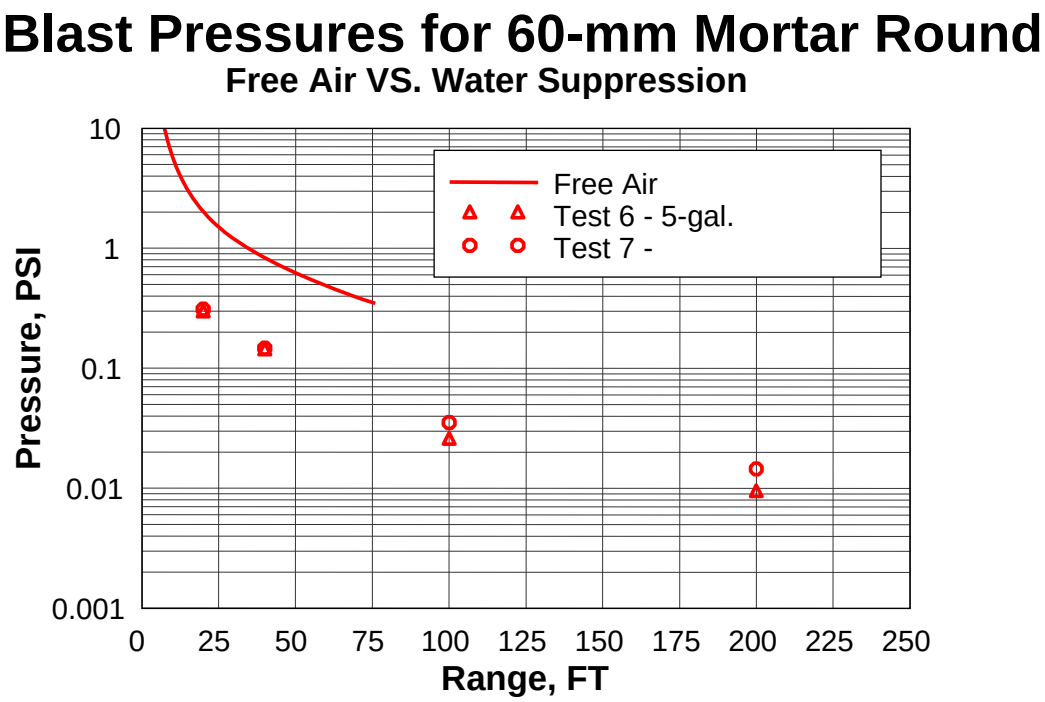


FIGURE 15 - 60 mm M49A4 Blast Pressures

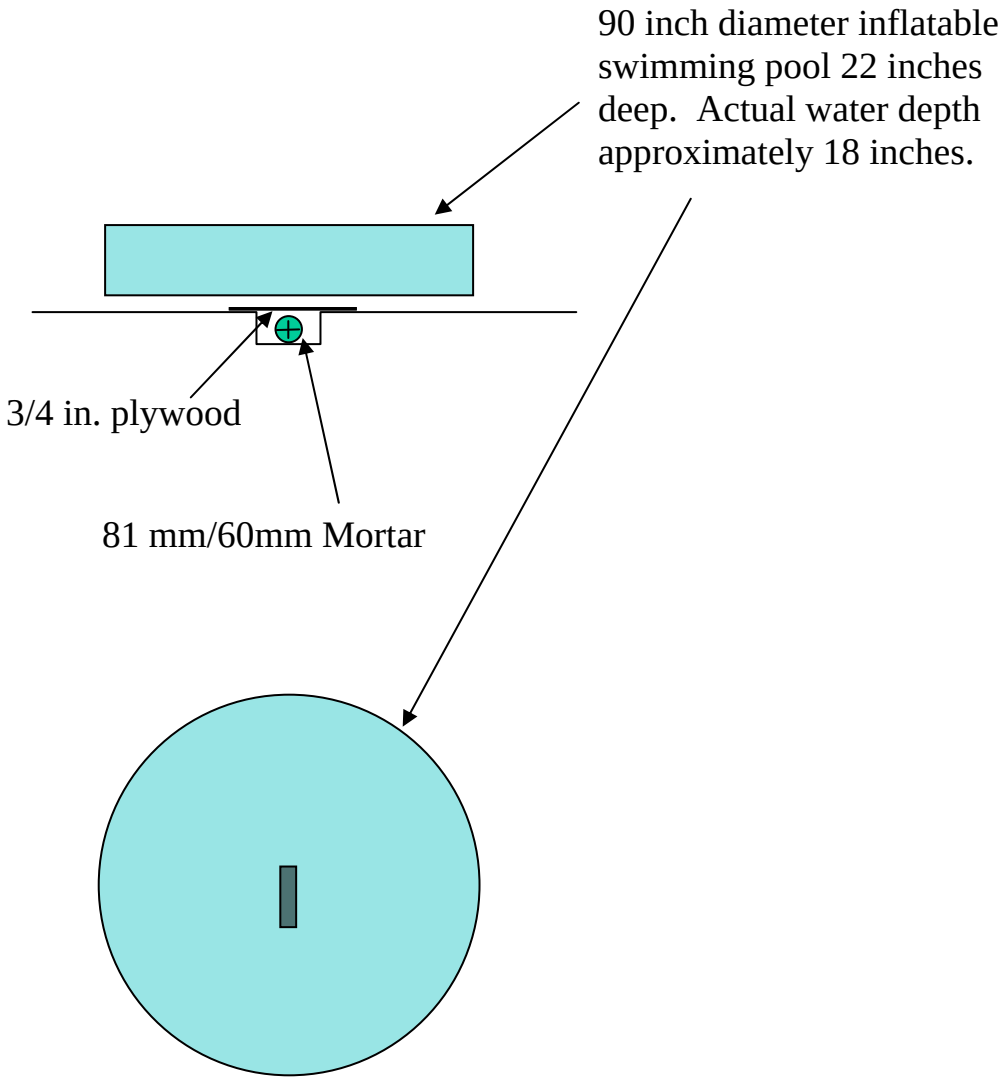


FIGURE 16 - Test Layout for 81 mm M362A and 60 mm M49A4 Under Inflatable Pool

Care should be taken to insure that there are no water spills of sufficient volume to the hole in which the munition is located. This could lead to a misfire. Also, as observed in phase one, the water may cause sufficient confinement to increase fragment size and penetration capabilities.

3.0 Water Mitigation for Intentional Detonations

3.1 Water Containment System

Based on the results from the Phase Two tests, the fragments from an intentional detonation of a 155 mm M107 or a 105 mm M1 projectile are defeated using an 1100 gallon agricultural tank filled with water. The 55 gallon drums are not a viable system for defeating fragments from an intentional detonation because of the gaps between the cylindrical barrels. The fragments from an intentional detonation of an 81 mm M362A or a 60 mm M49A4 mortar are defeated using either a system of 5 gallon plastic carboys or a 90 inch diameter, 18 inch deep wading pool. The results of the Phase Two tests are summarized in Table 7. To be conservative, the maximum secondary debris throw distance shown in Table 7 is 10% greater than the measured maximum secondary debris throw distance. Due to the small values, the overpressures have not been increased from the measured values.

TABLE 7 – Summary of Results From Phase Two Tests

Munition	Water Containment System	Max. Secondary Debris Throw Distance (ft)	Max Peak Overpressure (psi)				
			@ 20 ft	@ 40 ft	@ 80 ft	@ 100 ft[A]	@ 200 ft[A]
155 mm M107	1100 gal. Tank	275		0.28	0.15	0.0415	0.018
105 mm M1	1100 gal. Tank	198		0.136	0.132	0.064	0.02
81 mm M362A	5 gal. Carboys	264	0.61	0.36		0.064	0.0325
81 mm M362A	Inflatable Pool	See note	0.43	0.21		0.0415	0.018
60 mm M49A4	5 gal. Carboys	48	0.29	0.14		0.0251	0.0092
60 mm M49A4	Inflatable Pool	See note	0.31	0.147		0.0352	0.0145

[A]Pressure calculated from measured sound level.
Note: Inflatable pool did not produce any hazardous secondary debris.

The four munition types tested do not cover all of the munitions that may be encountered. To determine the water containment system required for a particular munition other than those tested, the approach is as follows:

(1) Determine the initial fragment velocity (v_f) in ft/s, the maximum fragment weight (W_f) in pounds, and the equivalent weight kinetic energy ($W_f v_f^2/2$) in lb-ft^2/s^2 for the particular munition.

(2) Identify the munition with the next largest kinetic energy from the four tested munitions.

(3) Use the water containment system from Table 7 for the tested munition with the next largest kinetic energy shown.

The maximum fragment weight, the initial fragment velocity, and the resulting kinetic energy for a variety of munitions are provided in Table 8. Table 8 also shows the suitable water containment system for these munitions. The munition/initiator placements and water containment systems are detailed in Figures 3, 6, 7, 10, 11, 13, 14, and 16. The maximum fragment weight and the initial fragment velocity values have been determined with the Mott and Gurney equations, as presented in TM 5-1300 [1] and detailed in HNC-ED-CS-S-98-1 [2]. This procedure should not be used to extrapolate water containment systems for munitions larger than the 155 mm M107 projectile.

3.2 Minimum Separation Distance

A minimum separation distance is required for any detonation. This minimum separation distance applies to everyone, both public and operational personnel. The minimum separation distance is the maximum of the debris throw distance, the distance to an overpressure of 0.065 psi (corresponds to $K328 = 328W^{1/3}$, where W is the net explosive weight), or 200 ft. For all munitions tested the overpressure at 200 ft was substantially less than 0.065 psi. In some cases, the debris throw distance exceeds 200 ft. The minimum separation distances are listed in Table 8.

4.0 Summary and Conclusions

A test program has been performed to determine the effects of water for mitigating fragments and blast effects due to an intentional detonation of a munition. Tests were performed using four different munitions and two water containment systems for each munition.

The results of these tests have been used to develop guidelines for the use of water to mitigate fragments and blast effects due to an intentional detonation of a munition. Methods for determining the required water containment system and the resulting minimum separation distance are detailed in Section 3.0. Figures 3, 6, 7, 10, 11, 13, 14, and 16 show the resulting munition/initiator configuration and water containment systems.

In addition to mitigating the fragments and the overpressure, water quenches the fireball due to an explosion. Therefore, this system insures that there in no fire hazard from an intentional detonation.

5.0 References

1. TM 5-1300, “Structures to Resist the Effects of Accidental Explosions”, Departments of the Army, the Navy, and the Air Force, November 1990.

2. HNC-ED-CS-S-98-1, “Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives”, M. Crull, U.S. Army Engineering and Support Center, Huntsville, January 1998.

TABLE 8 – Water Containment System and Minimum Separation Distance

Munition	Max Fragment Weight (lb)	Critical Fragment Velocity (fps)	Equivalent Weight Kinetic Energy 10^6 (lb-ft^2/s^2)	Water Containment System	Minimum Separation Distance (ft)
20 mm M56A4	0.00058	3183	0.0029503	5 gal carboys/ inflatable pool	200
25 mm M792	0.00820	4256	0.0742528	5 gal carboys/ inflatable pool	200
M31 Rifle Grenade[A]	0.000361	11642	0.0244643	5 gal carboys/ inflatable pool	200
VB Rifle Grenade Mark I	0.0078	3660	0.0522428	5 gal carboys/ inflatable pool	200
37 mm Mk I, LE Practice	0.034207	1368	0.0320079	5 gal carboys/ inflatable pool	200
37 mm MK II	0.02953	5758	0.4894774	5 gal carboys	264
				inflatable pool	200
40 mm M406	0.00036	4508	0.0036986	5 gal carboys/ inflatable pool	200
GP Grenade M42 (submunition)[A]	0.00035	5805	0.0058803	5 gal carboys/ inflatable pool	200
40 mm MK2 Mod 0	0.03306	3605	0.2148275	5 gal carboys/ inflatable pool	200
40 mm HEDP M433	0.00023	11313	0.0147821	5 gal carboys/ inflatable pool	200
M73 Submunition	0.00200	8059	0.0649475	5 gal carboys/ inflatable pool	200
57 mm Chinese	0.01940	5500	0.2933645	5 gal carboys/ inflatable pool	200
57 mm M306	0.01291	3495	0.0788236	5 gal carboys/ inflatable pool	200
MK II Grenade	0.014217	3425	0.0833871	5 gal carboys/ inflatable pool	200
M39 Submunition	0.00011	2338	0.0003006	5 gal carboys/ inflatable pool	200
2.36 " Rocket (Case Only)	0.001035	8888	0.0408807	5 gal carboys/ inflatable pool	200
60 mm M49A3	0.02367	5114	0.3095835	5 gal carboys/ inflatable pool	200
60 mm M49A5	0.01660	6290	0.328382	5 gal carboys/ inflatable pool	200
M15 WP Grenade	0.00340	2685	0.0122557	5 gal carboys/ inflatable pool	200
BLU-59, BLU-26, BLU-36 Submunition	0.00152	6278	0.0299541	5 gal carboys/ inflatable pool	200

TABLE 8 (cont) - Water Containment System and Minimum Separation Distance

Munition	Max Fragment Weight (lb)	Critical Fragment Velocity (fps)	Equivalent Weight Kinetic Energy 10^6 (lb-ft^2/s^2)	Water Containment System	Minimum Separation Distance (ft)
Fragmentation Grenade, M67 (approx)	0.0011828	7006	0.0290283	5 gal carboys/ inflatable pool	200
2.75" M229 Rocket	0.005217	5569	0.0808994	5 gal carboys/ inflatable pool	200
6 lb Incendiary Bomb	0.0021	9431	0.0933909	5 gal carboys/ inflatable pool	200
FMU 54A/B Fuze	0.0064491	9031	0.2629909	5 gal carboys/ inflatable pool	200
75 mm M48	0.15303	3471	0.921814	1100 gal tank	200
3"/50 AP Mk 29	0.42992	1058	0.240619	5 gal carboys/ inflatable pool	200
3 in Stokes Mortar	0.04360	6189	0.835023	1100 gal tank	200
M1A1 Anti-Tank Mine	0.0138139	9891	0.6757199	5 gal carboys	264
				inflatable pool	200
4 lb Frag Bomb M83	0.076176	3266	0.4062754	5 gal carboys	264
				inflatable pool	200
81 mm M374	0.03083	6721	0.6963488	5 gal carboys	264
				inflatable pool	200
81 mm M56	0.03270	5724	0.5356943	5 gal carboys	264
				inflatable pool	200
3.5" M28A2 Rocket Case	0.05242	6126	0.9836056	1100 gal tank	200
90 mm M71	0.3426	2335	0.9339661	1100 gal tank	200
90 mm HEAT M371	0.124	3075	0.5862488	5 gal carboys	264
				inflatable pool	200
20 lb Frag Bomb M41	0.33321	3303	1.8176287	1100 gal tank	275
4 in Stokes Mortar	0.07820	6336	1.5696915	1100 gal tank	200
105 mm M1	0.20573	4055	1.6914479	1100 gal tank	200
105 mm HEAT M456	0.07010	6326	1.4026406	1100 gal tank	200
106 mm M344 (Case)	0.0630543	6238	1.2268048	1100 gal tank	200
4.2 in M3A1	0.07869	6391	1.6069785	1100 gal tank	200
British Naval 4.5"	0.408519	2461	1.237102	1100 gal tank	200
4.5 inch rocket M8	0.1485	5352	2.1268099	1100 gal tank	275
4.7 in Mark I	0.59147	3566	3.7606709	1100 gal tank	275
120mm M356	0.32909	3493	2.0076278	1100 gal tank	275
5 in 38 Caliber Mk 35	0.36485	3563	2.3158861	1100 gal tank	275
6" Trench Mortar	0.11418	3939	0.8857615	1100 gal tank	200
155 mm M107	0.64821	3426	3.8041893	1100 gal tank	275

[A]These rounds contain a shaped charge. Care must be taken that the destruction method does not allow formation of a jet and fragment slug.

Standing Operating Procedure

(SOP)

Explosive Storage and Transportation (ESAT)

Reviewed by:

Michael Short
OE Group Operations Manager: _____ **5/30/2008**
(Signature) **(Date)**

1.0 INTRODUCTION

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum procedures and safety and health requirements applicable to the acquisition, storage, accountability, and transportation of demolition material and munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all site personnel involved in the acquisition, receipt, storage, handling, inventory and transportation of demolition material and MEC. It is to be followed by all Parsons and subcontractor personnel involved in any activity involving demolition material.

3.0 REFERENCES

Procedures and information contained in this document were obtained from the below-listed references:

- ATF P 5400.7, ATF-Explosives Law and Regulations;
- DoD 4145.26-M, Contractors' Safety Manual for Ammunition and Explosives;
- DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards;
- EP 385-1-95a, CEHNC Basic Safety Concepts and Considerations for Ordnance and Explosives Operations;
- EM 385-1-1, USACE Safety and Health Requirements Manual.

4.0 RESPONSIBILITIES

4.1 Project Manager

The Project Manager (PM), in conjunction with the Senior UXO Supervisor (SUXOS) or site manager (SM), is responsible for the initial quantity and type of demolition material ordered. This initial requisition should be of sufficient quantity to support the project for a minimum 90-day period. In the event the project is scheduled to run for less than 90 days, every effort will be made to place one requisition meeting the anticipated needs.

4.2 UXO Safety Officer

The Parsons UXO Safety Officer (UXOSO) is responsible for determining the specific site requirements for licensing, permitting, and placards. The UXOSO is also responsible to ensure the handling, storage, transport, and use of demolition material is in accordance with the approved work plan, SOPs, and federal, state and local regulations.

4.3 UXO Quality Control Specialist

The Parsons UXO Quality Control Specialist (UXOQCS) will oversee all subsequent requisitions of demolition material and will review all Purchase Order Requests (POR) for demolition material to ensure that approved Explosive Siting and Explosive Management Plans are not violated. The UXOQCS is also responsible for the inspection

and auditing of the entire operation and reporting any findings to the PM. These inspections will include the acquisition procedure, documentation, storage, and transport.

4.4 Senior UXO Supervisor

The Parsons or subcontractor Senior UXO Supervisor (SUXOS) is responsible for acquiring the initial quantity and type of demolition material, submit all subsequent requests for demolition material and conduct periodic inspections of the magazine storage areas and their contents.

4.5 Vehicle driver

The vehicle driver will, at a minimum, be a UXO Tech III qualified and have a valid driver's license. This is to ensure that the driver is both experienced with and knowledgeable of demolition material. For additional transportation requirements see section 8.0.

5.0 ACQUISITION

5.1 Requisitions

Prior to ordering demolition materials, the Purchase/Receipt Authorization List (Figure 1) must be completed and forwarded to the explosive distributor(s), along with a copy of the Parsons BATF License. Prior to the initial acquisition of explosives, Parsons must have received work plan approval from the Contracting Officer. The commercial explosives identified in Table 1 are the items approved for use. Upon approval of the WP, the initial acquisition will be processed and must be on site prior to commencing intrusive activities and all subsequent shipments must arrive in such a manner to ensure there is no break in operations.

5.2 Receipt

Only those individuals named on the Authorization list may sign for explosives from the shipper. In order to ensure that the quantity shipped is the same as the quantity listed on the shipping documents, either the SUXOS or UXOQCS, or in his absence the UXOSO, will inventory the shipment prior to signing for it.

5.3 Shipping Documents

The explosive supplier's Bill of Lading (B/L) and the freight company's shipping document generally accompany explosive shipments. The initial inventory will include reconciling the two documents with the actual shipment. Regardless of the outcome of the initial inventory, one copy of the B/L and the freight company-shipping document will be attached to a copy of the POR and the PO. One copy of each of the four documents will be kept on file on site and one complete copy forwarded to the corporate office.

Figure 1 - Explosives Purchase / Receipt / Authorization List

Explosives Purchase / Receipt / Authorization List

Street Address and County: (Home Office)

Street or Post Office Box Address and County: (Field Office)

Federal License #: **Expiration Date:**

The following individuals are agents, employees, or representatives of the undersigned, and are authorized to order or acquire explosive materials on behalf of Parsons.

Name and Home Address	Driver's License No.	Soc. Sec. Number	Place of Birth

The undersigned certifies the foregoing information to be true and correct to the best of his knowledge and belief, and that he will communicate any additions or deletions to the foregoing list to Parsons.

OE Group Operations Manager and Date (Type or print)	**Signature and Date**

Table 1 - DOD Hazard Classifications for Commercial Explosives

DOT EX #	NOMENCLATURE	DOD HAZARD CLASS	DATE
9806054	Cord, Detonating	1.1D	02 Dec 98
9303282	Cord Detonating, Commercial	1.1D	14 Jan 98
9207009A	Cord, Detonating	1.4D	04 Apr 00
9202035	Cord, Detonating, Commercial	1.1D	19 Sep 97
8210044	Cord, Detonating	1.1D	12 Jan 99
9709010	Cap, Blasting, Electric, Instant	1.4B - Only when in DOT packaging	27 Jan 99
9707051	Cap, Blasting, Non-electric	1.4B – Only when in DOT packaging	2 Dec 98
9303278	Cap, Non-electric, Commercial	1.1B	14 Jan 98
9104118	Cap, Blasting, Electric, Commercial	1.4B	19Sep 97
8511062	Cap, Blasting, Non-electric, Commercial	1.4B	27 Oct 97
9803207	Detonator, with Fuse Assembly	1.1B	12 Jan 99
9303277	Detonator, Cap, Electric, Commercial	1.4B	04 Apr 00
8912113	Demo Charge, C-4, Commercial	1.1D	27 Jan 99
9608031	Booster, 1 LB	1.1D	14 Jan 98
9308432	Booster, Pentolite	1.1D	14 Jan 98
8611125	Booster, Pentex	1.1D	14 Jan 98
9303285	Booster, Cast. Austin	1.1D	14 Jan 98
9508033	Fuse Lighter, Commercial	1.4S	27 Oct 97
9201092	Fuse, Time, safety	1.4S	2 Dec 98
8311105	Fuse, Safety, Commercial	1.4S	27 Oct 97
9404156	Shock Tube, Shock Star MS	1.4S	14 Jan 98
9106259	Shock Tube, Excel MS	1.4S	14 Jan 98
9608028	Shaped Charge, Commercial	1.4D	19 Sep 97
9405290	Shaped Charge, Commercial	1.4D	10 Mar 99
9409002	Shaped Charge, commercial	1.4D	27 Oct 97
8601111	Shaped Charge, Commercial	1.4S	10 Mar 99

5.4 Receipt Discrepancies

Upon receipt, the type, quantity, and lot number of each item will be checked against the manifest and entered on the Magazine Data Card(s) (Figure 2). In the event there is a discrepancy between the amount shipped and the amount received, the SUXOS or the UXOQCS will immediately contact the explosive supplier and inform him of the discrepancy. It then is the responsibility of the supplier and shipper to rectify the situation and inform Parsons of the results. The supplier and/or shipper must then correct their documents and forward them to the site. In any event, only the amount received will be entered on the Magazine Data Card(s), which will be annotated for each transaction.

5.5 Reporting Lost or Stolen Explosives

5.5.1 Loss or theft of explosives will be reported as required in 27 CFR Part 55, Sub part C paragraph 55.30. ATF Form 5400.5 will be completed, within 24 hours and forwarded to the ATF, with a copy to the contracting officer. A copy of this form is provided in Figure 5.

5.5.2 The following individuals will be notified immediately upon discovery of theft of explosive:

- Site Manager, Parsons Project Manager, and USAESCH PM
- Explosives Distributor
- Bureau of Alcohol, Tobacco and Firearms (ATF) at 1-800-800-3855

6.0 STORAGE AND SECURITY

Approved explosive storage facilities may be provided at the site, either by the U.S. Army Corps of Engineers (USACE) or by the installation. Parsons will use the existing magazines for explosive storage and comply with local storage criteria and procedures. The SUXOS and/or UXOQCS will prepare Magazine Data Card(s) (Figure 2). If no explosives storage facilities are available, Parsons will:

- Use approved BATF Type 2 structures;
- Locate, install, and maintain the magazines to comply with the magazine criteria and quantity distance requirements established in *DOD 6055.9-STD, DOD Ammunition and Explosives Safety Standards;*
- Install sufficient magazines to comply with the explosive compatibility requirements, (i.e., bulk explosives, initiating explosives);
- Establish security, such as fencing, to prevent unauthorized access and/or theft, as required.

Figure 2 - Magazine Data Card

					MAGAZINE DATA CARD			
Product Code / FSN:		Nomenclature:			Site Name: Address:			
Date Code / Lot Number		Hazard Class	UN or NA	Quantity / Case:				
Date	Bill of Lading /Voucher Number	Received From	Quantity Received	Quantity Issued	Issued To	Current Balance	Initials	
							Issuer	Receiver

6.1 Exterior Construction

BATF Type 2 magazines are required to have the exterior and doors to be constructed of not less than 3/16-inch steel and lined with at least two inches of hardwood. Magazines with top openings will have lids with water-resistant seals, or which overlap the sides by at least one inch when in a closed position.

6.2 Hinges and Hasps

Hinges and hasps will be attached to doors by welding, riveting, or bolting with the nuts on inside of door. Hinges and hasps will be installed so they cannot be removed when the doors are closed and locked.

6.3 Locks

Each door will be equipped with two padlocks fastened in separate hasps and staples. Padlocks must have at least five tumblers or five blades, and a casehardened shackle of at least 3/8-inch diameter. Padlocks will be protected with not less than 1/4-inch steel hoods constructed so as to prevent sawing or lever action on the locks, hasps, and staples.

6.4 Signage/Placards

ATF and DoD require that all magazines be appropriately posted for content hazard class, fire fighting hazard, and an emergency notification list. Magazines will be placarded in accordance with *DoD 4145.26M and DA Pam 385-64.* In most instances, this will require a Fire Division Class 1 for the recovered UXO storage magazines and a Fire Division Class 3 for the demolition material, excluding detonators, which are Fire Division Class 4. If in doubt label the contents with the next highest hazard. In the event there are two different fire division or hazard class items in the same magazine, use the higher hazard division/class placard.

6.5 Lightning Protection

Appropriate lightning protection will be installed on all site(s), IAW *DA Pam 385-64, Chapter 6, paragraph 6-13; Table 6-1 and 6-2 and Chapter 12, paragraphs 12-5, 12-8:*

- A qualified person will conduct a resistivity test, over several points of the proposed site. Test boring will be used for deciding on an adequate earth electrode system. The minimum resistance is 25 ohms measured on a Ground Resistance Tester (*Biddle Ground Megger®).*
- An Earth Electrode Subsystem will be placed at uniform intervals around the protected facility as required; grouping of earth electrodes on one side of a facility is prohibited. Earth electrodes will be set not less than 3 feet or more than 8 feet from the structure(s).
- Grounding Rods will not be less than ¾” in diameter and 10 feet in length. Rods will be copper-clad steel, solid copper or stainless steel and free of paint or other non-conductive coating. The minimum number of rods for the facility is two, yet may be increased to assist in the reduction of resistivity. Rods will be located clear of paved surfaces, walkways and roadways and will be driven into the ground so that the tops are at least 12” below finished grade.

In the event of shallow topsoil over bedrock or dense coral preventing the burial of rods, use extended down conductors or buried open plates, as described in *Chapter 3 of National Fire Protection Association 780.*

- Bonding is used to reduce the possibility of a side flash and to ensure lightning current produces no electrical potential differences. For a building 36 feet in height or less, a bonding strap is required for large masses of metal (400 in sq) located on the exterior (door), or within the facility.
- Lightning warning systems provide a positive, reliable means of continuously monitoring and recording atmospheric voltage gradient. For those sites without a lightning warning system, the UXOSO will establish criteria for terminating ammunition and explosive operations and evacuate the facility to the MSD distance, as outlined in the Work Plan.
- Periodical inspections and test requirements for the grounding system will be accomplished every 6 months for visual inspections and every 24 months for electrical tests. The grounding system will have a resistance of 25 ohms or less and the bonding strap 1 ohm or less. The results of these tests will be kept on file at the site.

Sites that do not need a Lightning Protection System (LPS) must meet the following requirements, in accordance with *EM 1110-1-4009, Chapter 11.*

- The magazine is constructed of metal that is 3/16-inch steel or larger.
- The magazine is grounded as described in Figure 3.
- The magazine is located at least 7.0 feet from the nearest fence. Figure 3 is an example of a typical site not requiring an LPS.

6.6 Fencing Protection

Appropriate fencing (physical security) protection will be installed on all site(s), in accordance with *AR 190-11, paragraph 5-3:*

- Fence Fabric will be of chain link (galvanized, aluminized or plastic coated woven steel) 2-inch square mesh 9-gauge diameter wire, including coating.
- Posts, bracing and other structure members will be located on the inside of the fence fabric. Galvanized steel or aluminized wire-ties equal in gauge to fencing will be used to secure the fence fabric to the posts or other structural members.
- The minimum height of the fence fabric will be 6 feet without an outrigger.
- The bottom of the fence fabric will extend to within 2 inches of firm ground. A 9-gauge retaining wire, of the same material as the fence, will be interwoven along the bottom portion of the fence from post to post, in order to prevent anyone from pushing the fence in at the bottom. Surfaces will be stabilized in areas where loose sand, shifting soils, or surface waters may cause erosion and thereby assist an intruder in penetrating the fenced area. Where surface stability is not possible or is impracticable, concrete curbs, sills

or other suitable type anchoring devices, extending below ground level will be provided.

- The barrier will have a minimum number of vehicular and pedestrian gates, consistent with the operational requirements. These gates will be structurally comparable to the adjacent fence. Gates will be provided with an approved lock and hinge pins and hardware will be welded or otherwise modified to prevent easy removal.

6.7 Emergency Notification List

An emergency notification list containing the names, telephone numbers, and local addresses of the individuals to be notified in the event of an emergency, will be posted on the outside and inside of the magazine door. These individuals should be the same individuals authorized to sign for explosives, as well as the site manager and UXOSO if they are not on the authorized signature list.

6.8 Compatibility

Explosive compatibility will be maintained in accordance with *DA PAM 385-64 and TM9-1300-206.* Table 2 lists the various storage compatibility groups and Table 3 is the storage compatibility chart. In certain instances, it may be necessary to store incompatible items in the same magazine. If this should occur, a waiver will be requested IAW DOD 6055.9-STD., and then a barricade, such as sandbags, within the magazine, will physically separate the incompatible items.

6.9 Key Control

Magazines will remain locked except when receipts and issues are being made. The two locks on the magazines will require two different keys to unlock. The SUXOS will keep one key and the second key will be kept by the UXOQCS, or in his absence, the UXOSO. This procedure ensures that no one individual can gain access to the magazines.

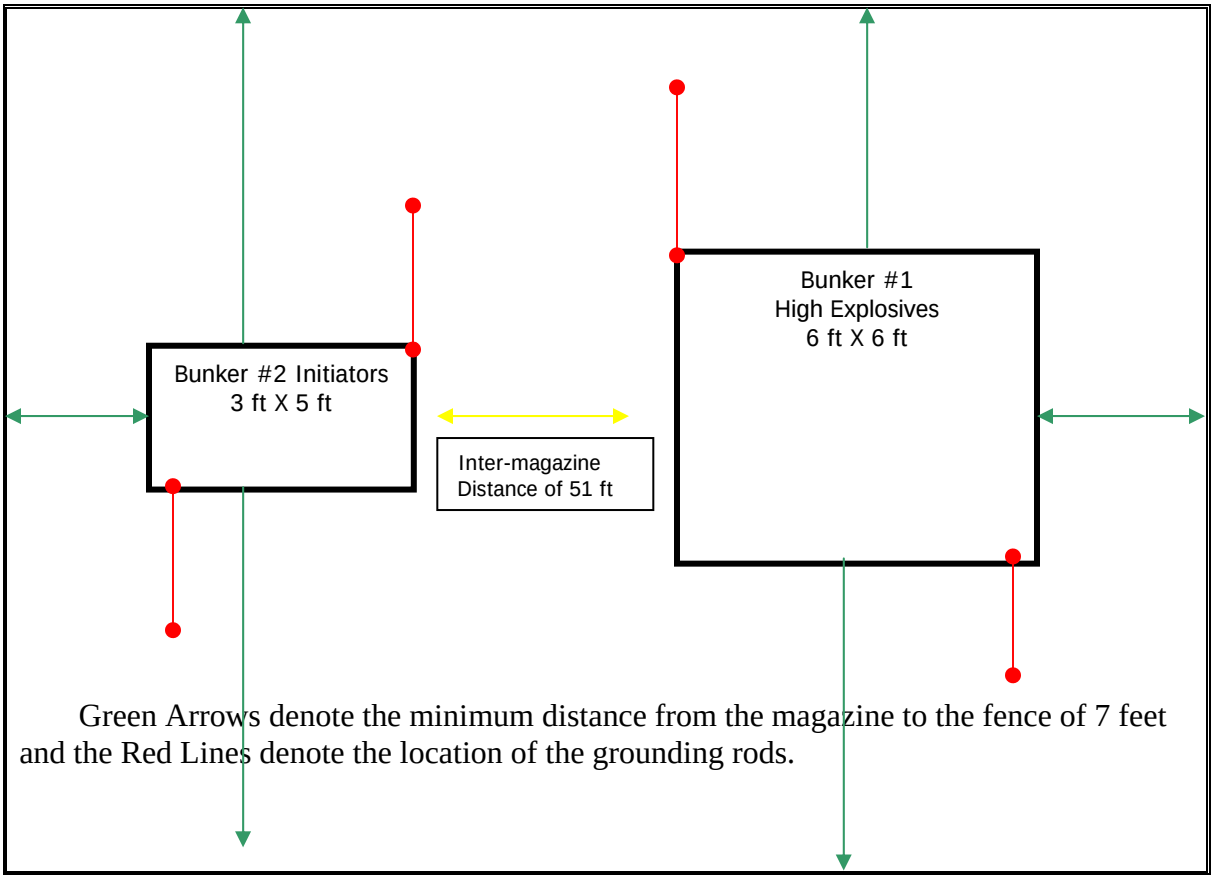
6.10 Inspection

At the start of each workday, a physical check will be made of the magazine storage area to ensure security has not been compromised.

6.11 Security

Physical security of the explosive storage location, if on a military installation, is provided by the installation. Parsons provides security of the explosive storage location on civilian property, which consists of the required fencing and daily inspections excluding non-work days unless the magazine is considered to be vulnerable to being vandalized.

Figure 3 - Typical Layout of a Non-LPS Storage Site



Notes: Based on *Table C9.T5, DOD 6055.9STD a* minimum of 51 feet for inter-magazine distance (100 lbs NEW) is required (yellow arrow). The fenced area is 1,520 square feet, based on 76ft in length and 20ft wide. It is recommended that a single magazine, equipped with an attached detonator outrigger be used whenever possible in order to decrease the size of the fenced area required.

Table 2 - Storage Compatibility Groups

STORAGE COMPATIBILITY GROUPS FOR EXPLOSIVES AND AMMUNITION	
GROUP A	
Cyclonite (RDX), dry	Mercury fulminate, wet
HMX, dry	PETN, dry
Lead azide, wet	RDX (cyclonite), dry
Lead styphnate, wet	Tetracene, wet
GROUP B	
Fuses (except chemically-actuated fuses containing ampules which may initiate, directly or indirectly, explosives and explosives-loaded components which are assembled in the conventional manner to form the finished explosive fuse).	Detonators
	Mines, practice, AP, M17
	Percussion elements
	Primer detonators
GROUP C	
Ammunition, blank and saluting, cannon	Cartridge, 90mm, canister, AP
Ammunition, .50 caliber, except API/incendiary	Cartridges, practice, over 40mm
Ammunition, 20mm, practice and high pressure test	Catapults, aircraft ejection seat, M3A1, M4A1, M5
Ammunition, 25mm, with inert projectile	Charge, propelling, not assembled to projectiles EC powder
Ammunition, 27mm, caseless	Detonating cord (primacord)
Ammunition, 30mm, ball and high pressure test	Nitrocellulose
Ammunition, 30mm, practice and training	Fuel (solid), emergency power unit
Ammunition, 37mm and 40mm, TP and AP	Propellant
Ammunition, 40mm, practice, M407A1, M382, and M385	Rockets, practice, 3.5-inch
Benite	Rocket motors, M3, M5, M6, M10, M13, M26, M30, M37, M42, M53, M66; Pershing 1st and 2nd stages; Spartan 1st, 2nd, and 3rd stages
Baron potassium nitrate	
GROUP D	
Adapter booster	Explosive D
Ammonium nitrate, except in original shipping container or equivalent	Explosives, cratering
Ammonium perchlorate, except when particle size is over 15 microns and in original shipping container or equivalent	Grenades, rifle, AT (except pentolite loaded)
Ammonium picrate (Explosive D)	HMX, wet
Bangalore torpedoes	Mine, APERS, MN, M14 (w/integral fuse)
Baratol	Mines, antipersonnel (bounding type
Black powder, bulk	Mines, antipersonnel (cast iron block)

Table 2 – Storage Compatibility Groups (Cont'd)

Bombs, demolition	Mines, HEAT Nitrocellulose wet 8-30% water exposed to detonation hazards at less than intra line distance
Bombs, fragmentation	Nitroguanidine
Bombs, general purpose	Nitrostarch Octol
Boosters	PBX
Boosters, auxiliary	pentolite
Bursters	PETN, wet
Charge, demolition, snake	Picratol
Charge, springing earth rod, blast driven	Picric acid
Charge, supplementary, HE	Projectiles, HE, fuzed or unfused
Compositions A, A-2, A-3, A-4, B, B-3, C, C-2, C-3, and C-4	RDX (Cyclonite), wet
Cutter, cable M1	Rocket heads, HE and HEAT (except pentolite loaded) w/o motors
Cyclonite (RDX), wet	Shaped charges
Cyclotol	Tetranitrocarbazole (TNC)
Demolition Blocks	Tetryl
Destructor, HE, M10	Tetrytol
Detonating cord (primacord) exposed to detonation hazard at less than intra line distance	TNT
Dynamite	Tritonal
Ednatol	Torpex

Table 2 – Storage Compatibility Groups (Cont'd)

GROUP E	
Ammunition, HEP	Ammunition, fixed and semifixed, 90mm through 106mm, loaded with ammonal, amatol, Explosive D, composition B or TNT
Ammunition, 20mm, HE, HEI and functional packs containing HE and HEI	Cartridge, heavy mortar, over 81mm (including 81mm M56), except chemical loaded
Ammunition, 30mm, HEDP	Cartridge, light mortar, 81mm or less (excluding 81mm M56), except chemical loaded
Ammunition, 37mm, HE	Redeye guided missiles, packaged 3 complete rounds w/launcher
Ammunition, 40mm, HE, RDX loaded	
Ammunition, 40mm, HE, M406, M386, M441, and M463	Rockets, HEAT, 3.5-inch, complete round
Ammunition, 57mm through 81mm, except WP smoke, HEP and blank	Rockets, HE, 2.75-inch (in LAU-3/A rocket launcher)
GROUP F	
Grenades, hand offensive	Grenades, fragmentation
GROUP G	
Ammunition, .50 caliber API and incendiary	Grenades, hand, CN1, ABC, M25A1, w/fuse C12
Ammunition, 20mm, API	Grenades, hand, CM1, ABC, M25A2, w/fuse C12
Ammunition, 20mm, incendiary and functional packs containing incendiary, except those containing HE or HEI	Grenades, illuminating and incendiary
Ammunition, 40mm, riot control and pyrotechnic loaded, except WP smoke	Grenades, practice, w/spotting charge
Bombs, photoflash	Grenades, rifle, smoke, XM48E1 and M22 and M23
Cartridge, igniter, M2	Grenades, smoke (except WP and PWP)
Cartridge, illuminating	Grenades, riot control, CS1, M25A2
Cartridge, photoflash	Igniter, spotting charge
Cartridge cases, primer (w/o propellant)	Igniters for rocket motors (e.g., M12, M18, M20 and M29)
Charge, igniter assembly, for practice hand grenades	Ignition cartridge for trench mortar ammunition
Charge, spotting, APR practice, M8	Illuminating compositions (consolidated in final press operations)
Chemical ammunition, Group B, tear or smoke producing, w/explosive components, over 40mm	Mines, practice, w/spotting charge and/or fuse
Chemical ammunition, Group B, tear or smoke producing, w/o explosive components	Nuclear fire marker device 11-F2

Table 2 – Storage Compatibility Groups (Cont'd)

Chemical ammunition, Group D, containing flammable solids, except for TEA or TPA, w/o explosive components	Photoflash powder
Chemical ammunition, Group D, fixed or semi-fixed rounds, containing flammable solids, except for TEA or TPA	Primers, artillery and cannon, percussion and electric
Clusters, incendiary bomb, M31 and M32 (w/o fuzing components)	Projectiles, illuminating
Destroyer, file, M4	Rocket, riot control agent, CS, 2.75-inch FFAR, MX99
Detonation, simulator, explosive M80	Simulators, M110, M115, M116, M117, M118, M119 and XM142
Grenade, hand, smoke, HC, M8	Smoke pots
Grenades, hand, CN, M7A1, w/fuse M201A1	Spotting charges (cartridge for miniature practice bombs)
Grenades, hand, CS, M7A3, w/fuse M210A1	
GROUP H	
Chemical ammunition, Group C	Grenade rifle, WP, M19
Grenades, WP	
GROUP J	
Chemical ammunition, Group D, containing flammable liquids or gels, with or w/o explosive components	Chemical ammunition, Group D, fixed and semifixed rounds, containing flammable liquids or gels with or without explosive components
GROUP K	
Chemical ammunition, Group A, with or without explosive components	Chemical ammunition, Group B, with or without explosive components, designed for toxic or incapacitating effects greater than lachrymation
Rockets, toxic chemical agents, complete rounds	

Table 2 – Storage Compatibility Groups (Cont'd)

GROUP L	
Aluminum powder	Fuzes, chemically-actuated, containing ampoules which may initiate directly or indirectly, explosives and explosives loaded components which are assembled in the conventional manner to form the finished explosive fuse
Ammonium nitrate	Magnesium powder
Ammonium perchlorate	Grenades, rifle, AT (pentolite loaded)
Ammunition, pentolite loaded	Nitrates (inorganic), except ammonium nitrate (in original shipping container or equivalent)
Chemical Ammunition, Group A, without explosive components	Perchlorates
Chemical ammunition, Group B, without explosive components, designed for toxic or incapacitating effects more severe than lachrymation	Peroxides, solid
Chemical ammunition, Group D, TEA or TPA components	Rocket heads, pentolite loaded, w/o motors
Chlorates	Zirconium (types I and II, spec. FED 1665)
DNT	
GROUP S	
Ammunition, 40mm, canister and multiple projectile	Fuse lighters
Ammunition, small arms, less than .50 caliber	Fuse safety
Explosive bellows	Squibs commercial
Firing devices	

Table 3 - Storage Compatibility Chart

Groups	A	B	C	D	E	F	G	H	J	K	L	N	S
A	**X**	**Z**											
B	**Z**	**X**	**Z**	**Z**	**Z**	**Z**	**Z**					**X**	**X**
C		**Z**	**X**	**X**	**X**	**Z**	**Z**					**X**	**X**
D		**Z**	**X**	**X**	**X**	**Z**	**Z**					**X**	**X**
E		**Z**	**X**	**X**	**X**	**Z**	**Z**					**X**	**X**
F		**Z**	**Z**	**Z**	**Z**	**X**	**Z**					**Z**	**X**
G		**Z**	**Z**	**Z**	**Z**	**Z**	**X**					**Z**	**X**
H								**X**					**X**
J									**X**				**X**
K										**Z**			
L													
N		**X**	**X**	**X**	**X**	**Z**	**Z**					**X**	**X**
S		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**			**X**	**X**

Notes:

1. The marking “X” at the intersection of the above chart indicates that these groups may be combined in storage. Otherwise, mixing is either prohibited or restricted per Note 2 below.
2. The marking “Z” at an intersection of the above chart indicates that, when warranted by operational considerations or magazine non-availability, and when safety is not sacrificed, these groups may be combined in storage.
3. The marking “U” on the above chart indicates that leaking toxic chemical munitions of one agent type, i.e., GB, with or without explosive components, may be stored together in one magazine specifically designated for storage of leakers of that agent type.
4. Equal numbers of separately packaged components of complete rounds of any single type of ammunition may be stored together. When so stored, compatibility is that of the assembled rounds; i.e., WP Filler in Group H, HE Filler in Groups D, E, or F, as appropriate.

5. Group K required not only separate storage from other groups, but also requires that munitions having different toxic chemical agent fillers be stored separately from each other.
6. Ammunition designated "PRACTICE" by NSN and nomenclature may be stored with the fully loaded ammunition it simulates.

7.0 INVENTORY

Upon receipt and verification of explosive demolition material, the Magazine Data Card(s) is/are filled out and kept by the demolition team leader until after the demolition task and then returned to the SUXOS.

7.1 Usage Inventory

Following each occurrence of a receipt or issue of explosive material, the UXOQCS will conduct a joint inventory in conjunction with the demo team leader, verifying that the explosives received from the distributor were used and that none remain. If there are any demolition material remaining after the demolition operation then the material will be inventoried and returned to the distributor the same day.

7.2 Discrepancies

In the event there is a discrepancy during any inventory, the item will be recounted a minimum of two additional times. If a discrepancy still exists, the site manager, Parsons PM, USAESCH PM, USAESCH Contracting Officer, and BATF will be telephonically notified and a written report will be submitted within 24 hours of the discovery.

7.3 Procedures for Return to Distributor of Explosives not Expended

Explosives that were delivered and issued for use but were not expended will be returned daily to the distributor at the completion of disposal operations. The Demolition Team Leader will secure the unused explosives in an IME 22 type storage container awaiting arrival of the distributor and complete the Explosives Use Record (Figure 4).

Figure 4 – Explosives Usage Record

Explosive Usage Record

Team Number: Date: **Project**

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 SUXOS:

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.

8.0 Transportation

Transportation of MEC will comply with all Federal, state, and local regulations. Permits are not required under CERCLA for on-site or on Federal installation transportation of demolition material or MEC. Off-site transportation of demolition material or MEC will not be necessary.

8.1 General Highway Transport

In most instances, the following data presented is sufficient to meet the requirements for explosive transport.

8.2 Commercial Motor Vehicle Requirements *(49CFR Part 383.5)*

Commercial motor vehicle (CMV) means a motor vehicle, or a combination of motor vehicles, used in commerce to transport passengers or property if the motor vehicle

- Has a gross combination weight rating of 11,794 or more kilograms (26,001 pounds or more), inclusive with a towed unit with a gross vehicle weight rating of more than 4,536 kilograms (10,000 pounds); or

- Has a gross vehicle weight rating of 11,794 or more kilograms (266,001 pounds or more); or

- Is designed to transport 16 or more passengers, including the driver; or

- Is of any size and is used in the transportation of materials found to be hazardous for the purposes of the Hazardous Materials Transportation Act, and which require the motor vehicle to be placarded under the *Hazardous Materials Regulations (49 CFR part 172, subpart E).*

FIGURE 5
ATF FORM 5400.5, REPORT OF THEFT OR LOSS-EXPLOSIVE MATERIALS

Form Approved, OMB No. 1512-0183 (04/30/96)

DEPARTMENT OF THE TREASURY BUREAU OF ALCOHOL, TOBACCO AND FIREARMS REPORT OF THEFT OR LOSS-EXPLOSIVE MATERIALS	DATE

Upon discovery of any theft or loss of any of your explosive materials:
-First, call ATF toll free at 1-800-800-3855 (or call ATF collect at 1-800-800-3855 if you are in Alaska, Guam, Hawaii, Puerto Rico or the Virgin Islands) to report the theft or loss;
-Second, call your local law enforcement office to report the theft or loss; and
-Third, complete this form and attach any additional sheets or invoices necessary to provide the required information, and mail to the nearest ATF office listed on the reverse. We suggest you retain a copy of the completed form. Please complete each item as applicable, to the best of your ability.
NOTE: Section 842(k), 18 U.S.C. Chapter 40, states, "It shall be unlawful for any person who has knowledge of the theft or loss of any explosive materials from his stock to fail to report such theft or loss within twenty-four hours of discovery to the Secretary and to appropriate local authorities." Codified at 27 C.F.R. Section 55.30.

1. NAME, ADDRESS AND TELEPHONE NUMBER OF PERSON MAKING REPORT (include corporate or business name, if applicable)			2. Location of theft or loss (if different from item 1)
3. THEFT OR LOSS	DATE	TIME	
a. DISCOVERED			
b. OCCURRED (Show approximate if exact is not known)			4. NAME AND ADDRESS OF LOCAL AUTHORITY TO WHOM REPORTED
c. REPORTED TO ATF BY TELEPHONE			
d. REPORTED TO LOCAL AUTHORITIES			

5. EXPLOSIVE MATERIALS LOST OR STOLEN (Attach invoices or additional sheets, if necessary)

a. MANUFACTURER OR BRAND NAME (Include date and shift code)	b. QUANTITY (Pounds of Explosives, Number of Caps)	C. TYPE AND DESCRIPTION (Dynamite, Blasting Agents, Detonators, etc. Include for each type, size, MS delay or length of legwire, as applicable)

6. THEFT OR LOSS OCCURRED FROM (Check applicable box)
☐ PERMANENT MAGAZINE ☐ PORTABLE MAGAZINE ☐ TRUCK ☐ WORK SITE ☐ OTHER (Explain)

7. ENTRY TO MAGAZINE MADE THROUGH (Complete if applicable)	8. NUMBER AND TYPE OF LOCKS FORCED (Complete if applicable)
☐ DOOR ☐ ROOF ☐ FLOOR ☐ FOUNDATION ☐ WALL ☐ CEILING ☐ VENTS ☐ OTHER (Explain)	

9. OTHER INFORMATION PERTINENT TO THE THEFT OR LOSS

10. SIGNATURE AND TITLE OF PERSON MAKING REPORT	11. FEDERAL EXPLOSIVE LICENSE OR PERMIT IF ANY

FOR ATF USE ONLY

DATE RECEIVED	TIME RECEIVED	UNIQUE IDENTIFIER

ATF F 5400.5 (1-93) PREVIOUS EDITIONS ARE OBSOLETE

Figure 6 – Emergency Response Information

SHIPPING PAPER AND EMERGENCY RESPONSE INFORMATION FOR HAZARDOUS MATERIALS					
THIS VEHICLE IS TRANSPORTING HAZARDOUS MATERIALS					
Date Prepared:	Date of Travel:			Page_____of_____	
Proper Shipping Name	**Hazard**	**ID No.**	**PG**	**Qty/Units**	**Weight**
Emergency notification. In all cases of accident, incident, breakdown or fire, prompt notification must be given. **FOR EMERGENCY RESPONSE INFORMATION, SEE BACK OF THIS FORM**					
Remarks:					
Certification: This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.					
Signature of Shipper Representative:	Signature of Vehicle Operator(s):				
24-Hour Emergency Assistance Telephone Numbers:	Work Hours Emergency Phone Numbers:				

Figure 6 – Emergency Response Information (Cont'd)

EMERGENCY RESPONSE INFORMATION

Guide Number 46 and 50 from the U.S. Department of Transportation Emergency Response Guide Book P 5800.6 are reproduced hereon. These guides are applicable to Hazard Class 1 Materials (Explosives).
Mark an X in the appropriate box:

☐ **USE GUIDE 46 FOR EXPLOSIVES (1.1), (1.2), (1.3), (1.5), AND (1.6)**

☐ **USE GUIDE 50 FOR EXPLOSIVES (1.4)**

For all other hazardous materials or substances, annotate appropriate Emergency Response Guide Book Guide Number in the block below, and attach a copy of the guide number page or pages.

Guide Numbers:

GUIDE 46 (ERG 93)

POTENTIAL HAZARDS
FIRE OR EXPLOSION:
May explode and throw fragments 1 mile or more if fire reaches cargo.
HEALTH HAZARDS:
Fire May produce irritating or poisonous gases.

EMERGENCY ACTION
If fire reaches cargo, do not fight fire.

If you know or suspect that heavily-encased explosives, such as bombs or artillery projectiles are involved, stop all traffic and begin to evacuate all persons, including emergency responders, from the area in all directions for 5000 feet (1 mile) for rail car or 4000 feet (3/4 mile) for tractor/trailer.

When heavily-encased explosives are not involved, evacuate the area for 2500 feet (½ mile) in all directions.

Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.

CALL Emergency Response Telephone Number on Shipping paper FIRST. If Shipping Paper NOT AVAILABLE or NO ANSWER, CALL CHEMTREC AT 1-800-424-9300.

FIRE
Cargo Fires: DO NOT FIGHT FIRE WHEN IT REACHES CARGO. Withdraw from area and let fire burn.

Truck and Equipment Fires: Try to prevent fire from reaching the explosive cargo compartment. Flood with water; if no water is available use Halon, dry chemical or earth.

Promptly isolate the scene by removing ALL PERSONS from the vicinity of the incident if there is a fire. First, move people out of line-of-sight of the scene and away from windows. Then, obtain more information and specific guidance from competent authorities listed on the shipping papers.

SPILL OR LEAK
Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch or walk through spilled material.

FIRST AID
Call emergency medical care.
Use first aid treatment according to the nature of the injury.

GUIDE 50 (ERG 93)

POTENTIAL HAZARDS
FIRE OR EXPLOSION:
May explode and throw fragments 1/3 mile or more if fire reaches cargo.
HEALTH HAZARDS:
Fire May produce irritating or poisonous gases.

EMERGENCY ACTION
If fire reaches cargo, do not fight fire.

Stop all traffic and begin to evacuate all persons, including emergency responders, from the area for 1500 feet (1/3 mile) in all directions.

Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.

CALL Emergency Response Telephone Number on Shipping paper FIRST. If Shipping Paper NOT AVAILABLE or NO ANSWER, CALL CHEMTREC AT 1-800-424-9300.

FIRE
Cargo Fires: DO NOT FIGHT FIRE WHEN IT REACHES CARGO. Withdraw from area and let fire burn.

Truck and Equipment Fires: Try to prevent fire from reaching the explosive cargo compartment. Flood with water; if no water is available use Halon, dry chemical or earth.

Promptly isolate the scene by removing ALL PERSONS from the vicinity of the incident if there is a fire. First, move people out of line-of-sight of the scene and away from windows. Then, obtain more information and specific guidance from competent authorities listed on the shipping papers.

SPILL OR LEAK
Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch or walk through spilled material.

FIRST AID
Call emergency medical care.
Use first aid treatment according to the nature of the injury.

SUPPLEMENTAL INFORMATION
Packages bearing the 1.4S label contain explosive substances or articles that are designed or packaged in such a manner that when involved in a fire, may burn vigorously with localized detonations and projection of fragments; effects are usually confined to immediate vicinity of packages.

If fire threatens cargo area containing packages bearing the 1.4S label, consider initial isolation of at least 50 feet in all directions. Fight fire with normal precaution from a reasonable distance.

8.3 CDL Requirements

As long as site personnel are not using vehicles that weigh more than 26,000 pounds and are not transporting any materials that must be placarded under the DOT Hazardous Materials Regulations (i.e., they are only transporting 1.4 explosives), then the vehicle being used need not be classified as a CMV and the operator of the vehicle need not have a Commercial Driver's License (CDL). This is the typical situation for site personnel since they usually transport relatively small quantities of 1.4 demolition materials. However, if a CDL is required, the PM or UXOSO will ensure that the requisite license/permits are obtained.

8.4 Federal Installations/On-Site

Transportation of demolition material and MEC on-site and on Federal installations will comply with the following:

- Vehicles will be inspected per occurrence and will be properly placarded;
- Explosives will be transported in closed vehicles whenever possible. When using an open vehicle, explosives will be covered with a flame resistant tarpaulin (except when loading/unloading);
- Vehicle engine will not be running. Wheel chocks and brakes set when loading/unloading explosives;
- Beds of vehicles will have either a plastic bed liner, dunnage, or sandbags to protect the explosives from contact with the metal bed and fittings;
- Vehicles transporting explosives will have a first aid kit, two 10 ABC rated fire extinguishers, and communications capabilities;
- Initiating explosives, such as detonators, will remain separated from other high explosives during loading, unloading, and while on vehicles;
- Compatibility requirements will be observed;
- Operators transporting explosives will have a valid drivers license; and
- Drivers will comply with posted speed limits, but will not exceed a safe and reasonable speed for conditions. Vehicles transporting explosives off-road will not exceed 25 mph.

8.5 Off-Site Transportation of Explosives over Public Highway

8.5.1 DOT Certificate of Registration

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

8.5.2 Mixed Packaging Requirements

Explosives of compatibility Group S may be packed with explosives of all other explosive compatibility groups except A and L. To determine the compatibility of the materials typically transported by site personnel, check the Material Data Sheets presented in Attachment 1.

8.6 General Placard Requirements

Those munitions response sites that require placards will accomplish this IAW 49 CFR 172.504. The placard requirements listed below will apply to explosives transportation, if applicable:

> "(a) Except as otherwise provided, each bulk packaging, freight container, unit load device, transport vehicle or rail car containing any quantity of a hazardous material must be placarded on each side and each end with the type of placards specified in Tables 4 and 5, in accordance with other requirements and exceptions."
>
> "(c) Exceptions for less than 454 kg (1,001 pounds). Except for bulk packaging and hazardous materials subject to § 172.505, when hazardous materials covered by Table 5 of this section are transported by highway or rail, placards are not required on:
>
> (1) A transport vehicle or freight container which contains less than 454 kg (1,001 lbs.) aggregate gross weight of hazardous materials covered by Table 5 of paragraph (e) of this section; or
>
> (2) A rail car loaded with transport vehicles or freight containers, none of which is required to be placarded."

The exceptions provided in paragraph (c) provided above do not prohibit the display of placards in the manner prescribed in this subpart, if not otherwise prohibited (see § 172.502), on transport vehicles for freight containers, which are not required to be placarded.

Table 4: General Placard Requirements

Category of material (Hazard class or division number and additional description, as appropriate)	Placard name	Placard Design Section Ref. (§)
1.1	Explosives 1.1	172.523
1.2	Explosives 1.2	172.524
1.3	Explosives 1.3	172.525
2.3	Poison Gas	172.532
4.3	Dangerous When Wet	172.528
6.1 PG I, inhalation hazard only)	Poison	172.542
7 (Radioactive Yellow III label only)	Radioactive	172.544

Table 5: General Placard Requirements

Category of material (Hazard class or division number and additional description, as appropriate)	Placard name	Placard Design Section Ref. (§)
1.4	Explosives 1.4	172.523
1.5	Explosives 1.5	172.524
1.6	Explosives 1.6	172.525
2.1	Flammable Gas	172.532
2.2	Non-Flammable Gas	172.528
3	Flammable	172.542
Combustible liquid	Combustible	172.544
4.1	Flammable Solid	172.546
4.2	Spontaneously Combustible	172.547
5.1	Oxidizer	172.550
5.2 (Other than organic peroxide, Type B, liquid or solid, temperature controlled).	Organic peroxide	172.552
6.1 (PG I or II, other than Zone A or B inhalation hazard).	Poison	172.554
6.1 (PG III)	Keep Away from Food	172.553
6.2	(None)	
8	Corrosive	172.558
9	Class 9	172.560
ORM-D	(None)	

8.7 Documentation

Any time demolition material or MEC are being transported, this chapter to include the completed copies of documents described below will be in the vehicle.

- Instructions for Motor Vehicle owners (Emergency Response Information) - Figure 6.
    - Only those items, which are being transported, will be entered in the form with the applicable qty/units and weight columns completed. It is imperative that the NEW limitations of 55 lbs not be exceeded. All required data will be entered on the front and the Guide 50 block should be checked on the back of the form.
- Explosives Purchase/Receipt/Transport Authorization List - Figure 1
    - The form will be completed ensuring the pertinent data for all those transporting explosives is included on the form. As with the other required forms, this one will be part of the transport paperwork. Only the route shown will be used unless there is an emergency or the route is blocked.

- Any deviation from the planned route will be reported to and coordinated with the UXOSO.

- Motor Vehicle Inspection Checklist - Figure 7.
  - The form is to be completed prior to placing any explosives in the vehicle and will accompany the shipment.

- BATF Permit/License.
  - A copy of the current BATF license will accompany the vehicle and be readily available.

9.0 FIRE PROTECTION PLAN

9.1 Explosive Vehicle Carrier

In the event of a fire at or near a vehicle containing explosives, all site personnel will be evacuated to a distance outside the NEW for Inhibited Building Distance (IBD), as stated in Chapter 4, of the approved Site Work Plan. An honest attempt to fight the fire will be made with all available fire-fighting equipment on hand. A reasonable decision will be made by the UXOSO when these means have been exhausted and any further attempts will endanger site personnel. At no time will anyone attempt to evacuate the explosives from the vehicle unless the fire is in the front of the vehicle and not near the bed.

The UXOSO will meet the responding local fire department and brief them on the following –

- Total Quantity of Explosives, by hazard classification, inside the vehicle
- Time the fire started
- The amount of time the vehicle have been engulfed by flames

9.2 General Housekeeping

Periodic housekeeping (bi-weekly or as needed) will be conducted in the vehicle bed and cab. All trash will be removed from the vehicle and any spilled liquids cleaned up.

Figure 7 - Explosive Vehicle Inspection Form

EXPLOSIVE VEHICLE INSPECTION FORM			
This form must be filled out for any vehicle carrying explosives, prior to loading.			
DRIVERS NAME		LICENSE NUMBER	
COMPANY			
TYPE OF VEHICLE		VEHICLE NUMBER	
INSPECTION DATE/TIME		INSPECTOR	
PART INSPECTED	**SAT.**	**UNSAT.**	**COMMENT**
HORN			
STEERING SYSTEM			
WIPERS			
MIRRORS			
FIRE EXTINGUISHERS (10 ABC, 2 EACH)			
REFLECTORS			
EMERGENCY FLASHERS			
LIGHTS			
ELECTRIC WIRING			
FUEL SYSTEM			
EXHAUST SYSTEM			
BRAKE SYSTEM			
SUSPENSION			
CARGO SPACE			
TIRES, WHEELS, RIMS			
TAILGATE			
TARPAULIN			
INSPECTION RESULTS (INSPECTOR INITIAL)			
ACCEPTED:			
REJECTED:			
REMARKS			
DRIVERS SIGNATURE/DATE			INSPECTORS SIGNATURE/DATE

Attachment 1

Material Data Sheets

CORD DETONATING (1.4D) (UN0289)

New Explosive Weight (New)

FORMULA: .00229 OZ = 1 Grain
80 gr. X .00229 = .1832 oz.
.1832 oz. Per ft. x 100' = 18.32 oz. Total Net Explosive Weight / 100 feet

HAZARDOUS CLASS OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name:
CORD DETONATING, FLEXIBLE UN0289 1.4D

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

CFR 49 173.63 (a)

Packaging Exceptions

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

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

UN0065 and UN0289 Use Packaging Instruction #139

Research and Special Programs Administration, DOT § 173.62

Packing Instruction	Inner Packagings	Intermediate Packagings	Outer Packagings
139 ..... PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS: 1. For UN 0065, 0102, 0104, 0289 and 0290, the ends of the detonating cord must be sealed, for example, by a plug firmly fixed so that the explosive cannot escape. The ends of CORD DETONATING flexible must be fastened securely. 2. For UN 0065 and UN 0289, inner Packagings are not required when they are fastened securely in coils.	Bags ..... Plastics Receptacles ..... Fiberboard Metal Plastics Wood Reels ..... Sheets ..... Paper Plastics	Not necessary	Boxes. Steel (4A). Aluminum (4B). Wood, natural, ordinary (4C1). Wood, natural, sift proof walls (4C2). Plywood (4D). Reconstituted wood (4F). Fibreboard (4G). Plastics, solid (4H2). Drums. Steel, removable head (1A2). Aluminum, removable head (1B2). Plywood (1D). Fibre (1G). Plastics, removable head (1H2).

SHAPE CHARGE (1.4S) (UN0441)

HAZARDOUS CLASS OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name:

CHARGES, SHAPED, COMMERCIAL W/O DETONATOR UN0441 1.4S

CFR 49 172.101 TABLE OF HAZMAT MATERIAL

CHARGERS, SHAPED, COMMERCIAL WITHOUT DETONATOR UN0441 1.4S

CFR 49 173.62

Packaging & Instructions #137

49 CFR ch. 1 (10-97 Edition) § 173.62

Packing Instruction	Inner Packagings	Intermediate Packagings	Outer Packagings
137 ..... PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS: For UN 0059, 0439, 0440, and 0441, when the shaped charges are packed singly, the conical cavity must face downwards and the package marked "This Side Up". When the shaped charges are packed in pairs, the conical cavities must face inwards to minimize the jetting effect in the event of accidental initiation. 2. For UN 0065 and UN 0289, inner Packagings are not required when they are fastened securely in coils.	Bags ..... Plastics Boxes ..... Fiberboard Tubes ..... Fiberboard Metal Plastics Dividing partitions in the outer Packagings.	Not necessary ...	Boxes. Steel (4A). Aluminum (4B). Wood, natural, ordinary (4C1). Wood, natural, sift proof walls (4C2). Plywood (4D). Reconstituted wood (4F). Fibreboard (4G).

DETONATOR, NON-ELECTRIC (1.4B) (UN0267)

HAZARD CLASSIFICATION OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name

DETONATOR, NON-ELECTRIC UN0267 1.4B

CFR 49 172.101 TABLE OF HAZARDOUS MATERIALS

DETONATOR, NON-ELECTRIC UN0267 1.4B

Special Provisions (column #7)

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

CFR 49 173.63 (g)

Packaging Exceptions

(g) Detonators that are classed as 1.4B or 1.4S and contain no more than 1 g of explosive (excluding ignition and delay charges) may be packed as follows in which case they are excepted from the packaging requirements of § 173.62:

(1) No more than 50 detonators in one inner packaging;

(2) IME Standard 22 container is used as the outer packaging;

(3) No more than 1000 detonators in one outer packaging; and

(4) Each inner packaging is marked "1.4B Detonators" or "1.4S Detonators", as appropriate.

DETONATOR, ELECTRIC (1.4B) (UN0244)

HAZARDOUS CLASSIFICATION OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name

DETONATOR, ELECTRIC UNO244 1.4B

CFR 49 172.101 TABLE OF HAZARDOUS MATERIALS

DETONATOR, ELECTRIC UN0255 1.4B

Special Provisions (column #7)

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

CFR 49 173.63 (f) & (g)

Packaging exceptions:

(f) Detonators containing no more than 1g explosive (excluding ignition and deadly charges) that are electric blasting caps with leg wires four feet long or longer, delay connectors in plastic sheaths, or blasting caps with empty plastic tubing twelve feet long or longer, may be packed as follows, in which case they are excepted from the packaging requirements of § 173.62:

(1) No more than 50 detonators in one inner packaging;
(2) IME Standard 22 container or compartment is used as the outer packaging;
(3) No more than 1,000 detonators in one outer packaging; and
(4) No material may be loaded on top of the IME Standard 22 container and no material may be loaded against the outside door of the IME standard 22 compartment.

(g) Detonators that are classed as 1.4B or 1.4S and contain no more than 1g of explosive (excluding) ignition and delay charges) may be packed as follows in which case they are excepted from the packaging requirements of § 173.62:

(1) No more than 50 detonators in one inner packaging;
(2) IME Standard 22 container is used as the outer packaging;
(3) No more than 1,000 detonators in one outer packaging; and
(4) Each inner packaging is marked "1.4B Detonators" or "1.4S Detonators", as appropriate.

CFR 49 173.62 SPECIAL PACKING REQUIREMENTS FOR EXPLOSIVES
(Explosives Table) UN0267 PI# 131

Research and Special Programs Administration, DOT § 173.62

Table of Packing Methods - Continued

Packing Instruction	Inner Packagings	Intermediate Packagings	Outer Packagings
131 ..... PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS: 1. For UN 0029, 0267, and 0455, bags and reels may not be used as inner packagings. 2. For UN 0030, 0255, and 0455, inner packagings are not required when detonators are packed in pasteboard tubes, or when their leg wires are wound on spools with the caps either placed inside the spool or securely taped to the wire on the spool, so as to restrict freedom of movement of the caps and to protect them from impact forces. 3. For UN 0360, 0361, and 0500, detonators are not required to be attached to the safety fuse, metal-clad mild detonating cord, detonating cord, or shock tube, inner packagings are not required if the packing configuration restricts freedom of movement of the caps and protects them from impact forces.	Bags ..... Paper Plastics Receptacles ..... Fiberboard Metal Plastics Wood Reels	Not necessary ...	Boxes. Steel (4A). Aluminum (4B). Wood, natural, ordinary (4C1). Wood, natural, sift proof walls (4C2). Plywood (4D). Reconstituted wood (4F). Fibreboard (4G). Drums. Steel, removable head (1A2). Aluminum, removable head (1B2). Fibre (1G). Plastics, removable head (1H2).

CFR 49 173.63 PA PACKAGING EXCEPTIONS (Enclosure 1)
(g) (2) IME Standard 22 container
Publication: Institute of Makers of Explosives SLP #22 May 1993
Publication: Guide for the Use of the IME 22 Container Oct. 1, 1993

IGNITER, M2/M60 F/TIME BLASTING FUSE (1.4S) (UN0131)

HAZARD CLASSIFICATION OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name:

LIGHTERS, FUSE 1.4S UN0131

CFR 172.101 TABLE OF HAZARDOUS MATERIALS

LIGHTER, FUSE 1.4S UN0131

CFR 173.62

Packaging Instruction #142

49 CFR ch. 1 (10-97 Edition) § 173.62

Table of Packing Methods - Continued

Packing Instruction	Inner Packagings	Intermediate Packagings	Outer Packagings
142	Bags ..... Paper Plastics Receptacles ..... Fiberboard Metal Plastics Wood Sheets ..... Paper Trays, fitted with dividing partitions plastics	Not necessary ...	Boxes. Steel (4A). Aluminum (4B). Wood, natural, ordinary (4C1). Wood, natural, sift proof walls (4C2). Plywood (4D). Reconstituted wood (4F). Fibreboard (4G). Plastics, solid (4H2). Drums. Steel, removable head (1A2). Aluminum, removable head (1B2). Fibre (1G). Plastics, removable head (1H2).

FUSE, BLASTING TIME M700 (1.4S) (UN0105)

HAZARD CLASSIFICATION OF US MILITARY EXPLOSIVES AND MUNITIONS

Proper Shipping Name:

FUSE, SAFETY UN0105 1.4S

CFR 49 172.101 TABLE OF HAZARDOUS MATERIALS

FUSE, SAFETY UN0105 1.4S

CFR 49 173.62

Packing Instructions #140

Research and Special Programs Administration, DOT § 173.62

Table of Packing Methods - Continued

Packing Instruction	Inner Packagings	Intermediate Packagings	Outer Packagings
140 ..... PARTICULAR PACKING REQUIREMENTS OR EXCEPTIONS: 1. If the ends of UN 0104 are sealed, no inner packagings are required. 2. For UN 0101, the packaging must be sift-proof except when the fuse is covered by a paper tube and both ends of the tube are covered with removable caps. 3. For UN 0101, steel or aluminum boxes or drums must not be used.	Bags ..... Plastics Reels ..... Sheets ..... Paper, kraft Plastics	Not necessary ...	Boxes. Steel (4A). Aluminum (4B). Wood, natural, ordinary (4C1). Wood, natural, sift proof walls (4C2). Plywood (4D). Reconstituted wood (4F). Fibreboard (4G). Plastics, solid (4H2). Drums. Steel, removable head (1A2). Aluminum, removable head (1B2). Fibre (1G).

Attachment 2

Motor Vehicle Inspection
DoD Form 626

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. GOVERNMENT 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 D $PLAYED ON COMMERCIAL EQUIPMENT*

	YES	NO
a. TRUCK/TRACTOR		
b. TRAILER		

SECTION 11 - MECHANICAL INSPECTION

All items shag be checked on empty equipment prior to loading. Items with an asterisk shag be checked on all incoming loaded equipment.

10. TYPE OF VEHICLE(S)	1 1. VEHICLE NUMBER(S)

12. PART INSPECTED *(X as applicable)*	ORIGIN (1)		DESTINATION (2)			ORIGIN (1)		DESTINATION (2)		COMMENTS (3)
	SAT	UNSAT	SAT	UNSA I		SAT	UNSAT	SAT	UNSAT	
a. SPARE ELECTRICAL FUSES					k EXHAUST SYSTEM					
b. HORN OPERATIVE					1. BRAKE SYSTEM*					
c. STEERING SYSTEM					rn. 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 Govern ment/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 CIFIR					
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 DID FORM 626 FOR DRIVER					
24. SHIPPED UNDER DOT EXEMPTION 868					

25. INSPECTOR SIGNATURE *(Origin)*	26. DRIVER(S) SIGNATURE *(Origln)*
27. INSPECTOR SIGNATURE *(Destination)*	28. DRIVER(S) SIGNATURE *(Destination)*

Designed using Perform Pro, WHS/D10R, Sep 98

Reset

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 Part 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 of lease is carried in all leased vehicles and is available for inspection. (Defense Transportation Regulation (DTR) requirement.)

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. 1 0 1.

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 (Hazardous Materials Driving and Parking Rules). If military operators do not possess this document, shipper may 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.

SECTION 11 - 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 11 *(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 393.8 1)

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)

SECTION 11 *(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)

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 and 396 Appendix G)

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 and 396 Appendix G)

1. 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 396 Appendix G)**

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 396 Appendix G)

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 CFT 396 Appendix G)

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 177.815(e)(1) and 398.94)

p. Landing Gear. Inspect to ensure that landing gear and assembly are in serviceable condition, correctly assembled, adequately lubricated and properly mounted.

SECTION 11 *(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 396 Appendix G)

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. Shipper will instruct the driver to send a "test" emergency message to DTTS by having the driver activate the "emergency (panic) button". Shipper will contact DTTS at 1-800-826-0794 to verify that test message was received. Message must be received by DTTS for system to be considered operational.

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 2 1. Check to ensure each transport vehicle has been properly placarded in accordance with 49 CFR Part 172 Subpart F.

Item 22. Check to ensure operator has been provided shipping papers that comply with 49 CFR Part 172 Subpart C. 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 Exemption 868, ensure that shipping papers are properly** annotated and copy of Exemption 868 is with shipping papers.

Standing Operating Procedure

(SOP)

Hantivirus Pulmonary Syndrome (HPS) Operations

Approved by:

Michael Short
OE Group Operations Manager: _____ **5/30/2008**
(Signature) **(Date)**

1.0 PURPOSE

The purpose of this SOP is to provide the minimum procedures and safety and health requirements applicable to the conduct of operations involving potential exposure to Hantavirus Pulmonary Syndrome (HPS).

2.0 SCOPE

This SOP pertains to all site personnel who may come in contact with potential exposure to HPS. There have been confirmed cases of fatal HPS infection in the United States in recent years. As a result, this SOP has been developed to provide guidance to personnel whose occupational activities might expose them to sources of this virus.

3.0 RESPONSIBILITIES

3.1 Project Certified Industrial Hygienist (CIH)

The Project CIH will be responsible to ensure the availability of the resources needed to implement this SOP, and ensure that this SOP is incorporated into plans, procedures, and HPS training.

3.2 Site Manager

The Site Manager (SM) will ensure that this SOP is implemented for HPS operations. The SM will also ensure that relevant sections of this SOP are discussed in the initial Site Specific Safety Training, and that information related to its daily implementation is documented in the Site Operations Log.

3.3 UXO Safety Officer

The UXO Safety Officer (UXOSO) will be responsible for ensuring that the safety hazards and mitigation techniques associated with this SOP are discussed during the tailgate safety briefings. The UXOSO will be responsible for ensuring that only identified HPS site personnel are at or in those areas, before commencing any operation. The UXOSO will conduct daily inspection of HPS equipment and HPS operations to ensure their compliance with this SOP.

3.4 Site Personnel

All personnel operating in an area of HPS concern will strictly adhere to the procedures stipulated in this SOP.

4.0 METHOD OF TRANSMISSION

HPS is transmitted to humans through the inhalation of aerosolized excreta (feces, urine, and saliva) and contaminated dust from rodents and their nests. This includes rats, deer mice, brush mice, and western chipmunks. Some sites where personnel will be working are infested with significant numbers of rat nests that may be encountered during the conduct of activities.

5.0 SYMPTOMS OF HPS

Workers infected with HPS develop febrile or respiratory illness within 45 days of their exposure. The initial symptoms are flu-like and may progress to life threatening respiratory distress. Other symptoms include fever, chills, headaches, nausea and abdominal pain. Besides supportive measures, there are no proven therapeutic agents available at this time for HPS. Workers showing symptoms should seek medical attention immediately. The physician should be informed that HPS is a potential occupational risk and a blood sample be drawn for analysis and confirmation.

6.0 SPECIALIZED TRAINING

Specialized training regarding HPS is conducted during site-specific training for personnel who will be employed at the site. It includes use of protective equipment, safe and effective use and application of functional tools and equipment, work procedures and practices, medical surveillance requirements, recognition of symptoms and signs of exposure, physical nature of possible sources of exposure, and appropriate first aid.

7.0 EXPOSURE PREVENTION

The following procedures will be used to minimize exposure to HPS.

7.1 Indoor Work Areas

It is not anticipated that employees will be involved in indoor work areas where there is a potential for exposure to HPS. If this should occur, or if additional buildings or housing to support operations are acquired that have been closed up or vacant for long periods of time, the following procedures will apply:

- Open building and air it out for at least 30 minutes prior to clean up;
- Spray the area heavily with an EPA and DOD-approved insecticide, such as RAID; and
- Spray the indoor area with a household disinfectant.

7.2 Abandoned Outbuildings and Sheds

There are numerous abandoned outbuildings and sheds located at many of the munitions response (MR) sites that are considered to be contaminated with HPS. These structures will be entered only as necessary to determine if MEC items are present prior to demolition. The project supplied portable field toilet facilities (port-a-johns) will be used within the work sites.

7.3 Outdoor Work Areas

Rat and mice nests may exist in varying numbers throughout the project site. It is expected that these are the prime threat of exposure for personnel. When encountered during the course of brush clearing activities, the rat nests are cordoned off with engineer's tape and avoided. During brush clearing in close proximity to the nests, care is exercised to avoid disturbing or creating dust clouds from them. The presence of these nests is recorded in the log by the team leaders. During the conduct of geophysical and MEC activities, cordoned-off rat nests are avoided and the engineer's tape left in place.

7.4 Excavation Team Operations

After all brush cutting, geophysical and MEC activities in the grid are complete, the UXO excavation team disinfects, searches, and clears the areas beneath the nests of MEC.

7.5 Decontamination Method

HPS is easily killed in the environment with common disinfectant solutions such as household bleach or rubbing alcohol. These solutions and direct sunlight will kill the virus in less than one hour.

7.6 Decontamination Equipment

The below-listed equipment may be used for nest decontamination and destruction:

- Backhoe;
- Backpack fire pumps;
- 5 gal. water containers, buckets, and brushes;
- Plastic storage and disposal bags;
- Drop cloth;
- Bleach and alcohol
- Rakes and pitchforks; and
- Other search and clearance equipment normally carried by teams.

8.0 PERSONNEL PROTECTIVE EQUIPMENT (PPE)

Level "C" is the PPE required for personnel engaged in activities where a possibility of exposure to HPS exists. The UXOSO, in conjunction with the CIH, will make any applicable changes. Level "C" items include:

- Half-face, air purifying respirator (APR) with filter cartridges (N/P/R 99,100) and non-vented goggles;
- Coveralls with hood (disposable if possible); rubber or plastic gloves; rubber boots or disposable shoe covers;
- Wrist and ankles will be sealed with tape; and
- Hard hats will be worn in vicinity of earth moving equipment (backhoe).

9.0 CLEARANCE OF RODENT NESTING AREAS

The below-listed procedures are used by the excavation team when disinfecting, searching, and clearing nests:

- All members of the team dress out in prescribed PPE listed in Section 8.0;
- If the backhoe is to be used, the operator positions the backhoe in such a manner as to access nest(s);
- The nest is drenched with bleach solution (5% or greater);
- Nest materials are swept clear of the next location with the backhoe or the rakes and pitchforks, with care being taken not to spread the materials over too large an area;
- The nest area is checked with a magnetometer:
    - If no anomalies are detected, the team continues to the next area;
    - If an anomaly is detected, the team proceeds to the next step;
- Contacts are excavated as necessary, leaving materials dislodged;
- Spray again with bleach solution. Drench all materials and original nest site.

  Warning: Be prepared for rodents or snakes to flee the nest as activities progress.
  The decision to use the backhoe or rakes and hand tools to clear nests is at the team leader's discretion, based on considerations of:

    - Access to the nests with the backhoe;
    - Nest size, quantity and locations;
    - Environmental impact to the area (i.e., tire ruts, impressions and outrigger disturbance of top soils).

10.0 FIELD SANITATION

Upon completion of work in a potential HPS contamination area, team personnel process themselves through the team field sanitation station.

- Waste materials are placed in plastic bags with disinfectant solution that will completely wet the disposed item. The plastic bag is then placed in trash receptacles for disposal as ordinary waste:
- Non-waste materials (coveralls, gloves, etc.,) are placed in plastic bags with disinfectant solution, which will completely wet the items. Upon return to the support compound, the items are then processed for ordinary laundering.

11.0 RESPIRATOR FIT TESTING, INSPECTION, AND MAINTENANCE

Employees required to wear a respirator must be fit tested IAW 29CFR1910.134, Appendix A. In addition, the following maintenance and inspection procedures shall be performed:

- The wearer of a respirator will inspect it prior to its use;
- Supervisory personnel will periodically spot check respirators for fit and condition;
- Respirators not discarded after use will be cleaned after use, according to the manufacturer's instructions, by the user;
- Respirators not discarded after use will be stored in a suitable container away from areas of contamination; and
- Inspection and maintenance of respirators will be documented in the team leader's notebook.

NOTE - The wearer must be clean-shaven in the area, which creates a seal, prior to donning a mask or respirator.

Standing Operating Procedure (SOP)

Heavy Equipment Operations

Approved by:

Michael Short
OE Group Operations Manager: _____ **5/30/2008**
(Signature) **(Date)**

1.0 INTRODUCTION

The purpose of this SOP is to provide the minimum procedures and safety and health requirements applicable to the operation of heavy equipment, hereinafter referred to as earth moving machinery (EMM).

2.0 SCOPE

This standing operating procedure (SOP) contains information specific to the operation of EMM. It will include manuals and publications relevant to operation, lubrication and preventive and scheduled maintenance of the EMM that may be leased, purchased or otherwise employed on the site. It is incumbent upon all designated operators to familiarize themselves with this SOP and to periodically review it an effort to remain current with safe EMM operations.

3.0 REFERENCES

Procedures and information contained in this document were obtained from the below listed references:

- USACE EM 385-1-1, Safety and Health Requirements Manual;
- USACE EP 385-1-95a, Basic Safety Concepts and Considerations for Ordnance and Explosives Operations;
- OSHA Regulation 29CFR1926, Subpart P, Appendix A and 29CFR1926.652, Subpart P, Appendix F, Safety and Health Requirements for Construction;
- AR 385-55, Prevention of Motor Vehicle Accidents; and
- Parsons Policies and Procedures for Health and Safety

4.0 EMM Operations

4.1 Team Composition

The minimum team make-up will be:

- One qualified operator, either a UXO Technician or Non-UXO trained individual;
- One ground guide, UXO Technician I or II, (the EMM Safety Observer can fill this role and that of safety Observer if conditions permit); and
- One EMM Safety Observer, UXO Technician III.

4.1.1 Team Leader

An UXO Technician III (Team Leader) will serve as the EMM Team Leader and overall Safety Observer, directing the site personnel and equipment during the operation. Depending on the complexity of the operation, he may also serve as the backup guide. The EMM Team Leader will be trained, as a competent person when required. (See paragraph 6-4, this SOP).

4.1.2 Ground Personnel

Team members working on EMM operations will be qualified through non-the-job training (OJT) and will perform such tasks as magnetometer checks, manual excavation and checks of the excavation for UXO items. When using a UXO Tech I for manual excavation, a UXO Technician III must be present to supervise.

4.1.3 Equipment Operators

All site personnel, regardless of affiliation, who operate EMM equipment, will be qualified through documented formal training, equivalent previous employment experience or OJT. Documentation of this training will be kept on file at the site. The operator, when engaged in EMM operations, will perform daily inspection and maintenance functions (See Figure 1), or as directed by the operator's manual for that specific equipment.

4.1.4 Use of Non-UXO Personnel

Use of Non-UXO personnel as operators on UXO sites is authorized. When the operation has come within one foot of the UXO item or anomaly being investigated, unless the operator has been designated essential personnel, the Non-UXO operator must move outside the pre-designated Minimum Safe Distance (MSD), until recalled by the EMM UXO Technician III.

4.2 Equipment Procedures

4.2.1 The hazards associated with heavy equipment involve moving parts and exposure to possible pinch points. Safe operating procedures for each type of equipment or activity must be reviewed and followed. Safety protection, including equipment guards, which must not be removed, shall be provided to mitigate this problem. Site personnel operating or working within close proximity to heavy equipment will wear hard hats, eye protection, steel-toed boots, and hearing protection (as necessary).

4.2.2 Heavy equipment used on the site must meet the requirements of OSHA, DOT, and general industry standards. The operator will be responsible for completing daily written inspections of all heavy equipment and provide copies of the inspection as well as required certifications to the Site Manager (SM). All personnel who operate equipment must use any safety devices, such as seat belts, that the equipment is equipped with during operation. All operators will follow the following heavy equipment operating rules:

- Only personnel trained in the operation of heavy equipment are permitted to operate such equipment;
- Personnel may only operate equipment for which they have received training and certification. Trainees may operate heavy equipment, but only under competent supervision;
- Before operating any heavy equipment, the operator must conduct a pre-operational check of the piece of equipment. Brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be checked daily and maintained in good working order throughout the duration of its use. If it is found to be unsafe, the operator must report the condition immediately to the appropriate supervisor, and the piece of equipment placed in an unserviceable status until it has been repaired or replaced.
- The operators of heavy equipment will complete a daily inspection form (See Figure 1).
- All heavy equipment will not be backed up unless the vehicle has a reverse signal alarm audible above the surrounding noise level, backup warning lights, or the vehicle is backed up using a ground guide.

- Heavy equipment will be provided with necessary safety equipment including seat belts, roll-over protection, emergency shut-off during roll-over, backup warning lights, and audible alarms as applicable.
- Blades and buckets will be lowered to the ground and parking brakes will be set before shutting off any heavy equipment.
- Special consideration must be given to the proper functioning of tires, horns, lights, batteries, controllers, lift systems (including forks, chains, cable and limit switches), brakes, and steering mechanisms;
- All heavy equipment must be operated at an authorized safe speed, consistent with conditions, and at a safe distance from other vehicles. Heavy equipment must be under positive control at all times;
- No riders other than the driver are permitted on heavy equipment at any point;
- When heavy equipment is left unattended, loads must be lowered, controls neutralized, power shut off, and brakes set. Wheels should be chocked if the equipment is parked on an incline.
- Backhoe support struts (downriggers) shall be equipped with cleated pads for use in soft sandy soil rather than rubber pads (for hard surfaces).
- When working near a backhoe or excavator, field personnel will maintain sight contact with the operator. Field personnel shall not work within the swing radius of the equipment while the equipment is operating. The swing radius will be defined with traffic cones, barrier tape, or other suitable means, such as inscribing the radius on the soil surface using the backhoe bucket.
- Personnel will not cross the demarcated line without first establishing eye contact with the operator. The operator will cease vehicle operations and remove his hands and feet from the controls and/or turn the equipment off, before allowing personnel access to the area within the swing radius. Operations will resume only after all personnel have left the area within the swing radius.

5.0 PERSONNEL PROTECTIVE EQUIPMENT (PPE)

Modified Level D PPE will be required for personnel engaged in EMM operations. Clothing items will be:

- Coveralls or work clothing as prescribed by APP;
- Work gloves, leather or canvas, as prescribed by APP;
- Safety glasses - as wind conditions and airborne particulate matter dictates;
- Hardhats;
- Highly Visible Safety Vests;
- Work Boots, steel toe - Sturdy and of sufficient height to aid in ankle support;
- Hearing Protection - Will be determined through a Noise Survey (Sound Level Meter) for any EMM equipment brought on site. Until the survey is completed and the degree of attenuation determined, personnel on the EMM team will wear appropriate hearing protection; and
- Dust Masks - as wind conditions and airborne particulate matter dictates.

NOTE: *If the EMM equipment is being used for the clearance in support of other operations, PPE will be IAW that specific matrix (i.e. rat nests - Hantavirus SOP or RCWM projects).*

6.0 GENERAL SAFETY PRECAUTIONS

6.1.1 Underground Utilities

Utilities companies shall be contacted within established or customary local response times advised of the proposed work and asked to locate underground utilities (sewer, telephone, electric, water, gas or any other utility) prior to start of actual excavation. When these locations cannot be established, the excavation may proceed, provided the EMM operation does so with caution, and only after site personnel, using detection equipment, have made an attempt to locate utilities. While the excavation is opened, and underground utilities exposed, they shall be protected, supported or removed as necessary to safeguard workers.

6.1.2 Exposure to Vehicle Traffic

EMM team members exposed to vehicular traffic shall be provided and wear warning vests or other suitable garment with a highly visible (reflector) material. Traffic direction paddles or sawhorse type barricades may also be required to halt or redirect vehicular traffic around the excavation site.

6.1.3 Exposure to Falling Loads

No worker shall be permitted underneath loads handled by lifting or digging equipment. Workers are required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling material.

6.1.4 Equipment Warning Device

All EMM equipment will be equipped with an audile warning system that sounds when the equipment is backing up. EMM equipment needing to be moved adjacent to an excavation or approach the edge, and the operator does not have a clear and direct view of the edge, will institute a warning system, such as barricades, stop logs or arm and hand signals from the safety observer.

6.1.5 Loose Rock or Soil

Workers will be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. All equipment or materials will be placed at least 2 feet (0.61m) from the edge of excavations, or by use of retaining devices that are sufficient to prevent the equipment or material from falling or rolling into the excavation. Also scaling the excavation face to remove loose rock or soil and the installation of protective barriers at intervals on the face to stop or contain falling material will be used when appropriate.

6.1.6 Cave-In

Excavations will be protected from cave-ins by adequate protective systems (sloping and benching or shielding and support).

6.1.7 Operation of EMM

EMM will not be operated without a spotter. This includes moving, repositioning, and using the front and rear attachments. Prior to starting an excavation, a safety arc will be etched in the ground with the front or rear boom, fully extended. If operating on a hard surface, the safety arc will be marked on the ground, with bright spray paint. Prior to anyone entering the safety arc, the operator will:

- Swing the boom fully to one side;
- Lower the bucket to the ground;
- Place engine in idle speed; and
- Hold his hands clear of the controls or in the "Hands Up" position.

6.2 UXO Precautions

All EMM operations will adhere to the MSD as described in the site Work Plan. The lateral distances will be maintained when conducting EMM operations on a UXO site. These distances may be reduced or extended by the UXOSO based on an assessment of site history, size of site, expected UXO, terrain features or other such factors that may apply. The following distances shall apply as applicable:

- The applicable MSD or the K-40 factor distance, whichever is greater, from non-UXO trained site personnel unrelated to the operation.
- The K-40 factor distance from another EMM operation or other manual intrusive operations.
- All EMM excavations will be conducted offset laterally for the suspected UXO item or anomaly being investigated.
- The EMM will uncover no more than twelve (12) inches of earth per dig.
- The EMM will not be used to excavate closer than 12 inches from UXO.
- Suspend all operations immediately upon approach of an electrical storm.
- Observe the hazards of electromagnetic radiation (EMR) precautions when working in the vicinity of electrically initiated or susceptible UXO.
- Do not handle any MEC unnecessarily.
- Incorporate appropriate property protective measures for shock and fragmentation when conducting MEC operations.

6.3 Equipment Safety Precautions

All EMM operators will conduct familiarization and OJT with the EMM equipment prior to any excavation operation. All EMM equipment on site will have:

- Roll-Over Protection (ROP) and certificate on file at site.
- Back-up Warning System.
- 5A:B:C fire extinguisher.
- Site Radio.
- Operator's Manual and Lubrication Order.

6.4 Training

6.4.1 Competent Person

The EMM Team Leader will serve, as the "Competent Person", for all EMM operations. The project Health and Safety Officer (PHSO) or the project Certified Industrial Hygienist (CIH) will conduct this training, during the site specific training. This training will be documented and kept on file at the site. Minimum elements of training will include:

- Review of OSHA Regulation for Safety and Health Requirement for Construction/Excavations – OSHA Regulation 29CFR1926, Subpart P, Appendix A and 29CFR1926.652, Subpart P, Appendix F, (Annex A of this SOP)
- Proper Shoring and Sloping Techniques
- Soil classification and evaluation at the excavation site.
- Responsibilities of a Competent Person.

HEAVY EQUIPMENT INSPECTION REPORT

Date:	**Vehicle Make:**	**Rental/Lease/Private** *(circle one)*
Lic Plate #:	**Veh VIN#:**	
Starting Mileage/Hours for Week:	**Ending Mileage/Hours for Week:**	

Check [ ] with X for repair needed; OK; + for adjustment made

1. Windshield [ ]	**3. Vehicle Interior [ ]**
2. Vehicle Exterior [ ]	**4. Leaks [ ]**
5. Lights: • **Headlights [ ]** • **Tail lights [ ]** • **Turn Signals [ ]** **Brake Lights [ ]** **Back-up Alarm [ ]**	
6. Brakes [ ]	**10. Belts [ ]**
7. Horn [ ]	**11. Defroster [ ]**
8. Tires/Tracks • **Tread/Track Wear [ ]** • **Pressure [ ]**	**12.Radiator/Hoses [ ]**
9. Windshield Wipers/Washer [ ]	**13. Battery [ ]**
14. Fluid Levels: (Circle approximate level) **Oil Full 1qt low Added_____** **Coolant: Full Need coolant Added_____** **Transmission: Full 1pt low** **Fuel: Full ½ ¼ Empty** **Added_____**	**Hydraulic Fluid Full 1qt low Added_____** **Grease Fittings Full Added_____** **ROPS Certificate Yes No**
Comments/Repairs/Service(s) Needed: Next Service @_____hrs	

Figure 1

Annex A

Soil Classification for EMM Operations

1.0 Soil Types

The following soil types may be encountered in the course of excavating soil. A knowledge of soil characteristics of the soil types is beneficial to understanding the hazards associated with each.

- **Cemented Soil** – A soil in which a chemical agent, such as calcium carbonate, holds the particles together whereas a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.
- **Cohesive Soil** – A fine-grained soil (clay) or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical side-slopes and is "plastic" when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.
- **Dry Soil** – A soil that does not exhibit visible signs of moisture content.
- **Fissured Soil** – A soil material that has a tendency to break along definite planes of fracture with little resistance or a material that exhibits open cracks, such as "tension cracks," in an exposed surface.
- **Granular Soil** – Means gravel, sand, or silt (coarse-grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.
- **Layered System** – Means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.
- **Moist Soil** – Means a condition in which a soil looks and feels damp. Moist cohesive soils can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.
- **Plastic Soil** – means a property of a soil, which allows the soil to be deformed or molded without cracking, or appreciable volume change.
- **Saturated Soil** – Means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a penetrometer or sheer vane.

2.0 Soil classification

If personnel are to enter the excavation, the soils of the excavation must be classified to determine the design of the appropriate protective system. Each soil and rock deposit at an excavation site must be classified by a competent person, as either stable rock, Type A, Type B, or Type C soil.

The soil classification results must be made based on the results of at least one visual test (tension cracks or signs that the soil has been previously disturbed) and one manual test (use of

pocket penetrometer or shear-vane to measure unconfined compression strength). The definitions of the various soil classifications are presented below.

- **Stable Rock** is natural solid mineral matter that can be excavated with vertical sides and will remain intact while exposed.
- **Type A Soils** are cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (tsf) (144 kPa) or greater. Examples of Type A cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. A soil cannot be classified as Type A if it is fissured; subject to vibration from traffic, pile driving, or similar effects; has previously been disturbed, is part of a sloped, layered system where the layers dip into the excavation on a slope of 4 horizontal to 1 vertical (4H:1V) or greater; or has seeping water.
- **Type B Soils** are cohesive soils with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa). Examples of other Type B soils are: angular gravel; silt; silt loam; previously disturbed soils unless otherwise classified as Type C; soils that meet the unconfined compressive strength or cementation requirements of Type A soils but are fissured or subject to vibration; dry unstable rock; and layered systems sloping into the trench at a slope less than 4H:1V (only if the material would be classified as a Type B soil).
- **Type C Soils** are cohesive soils with an unconfined compressive strength of 0.5 tsf (48 kPa) or less. Other Type C soils include: granular soils such as gravel, sand and loamy sand, submerged soil, soil from which water is freely seeping, and submerged rock that is not stable. Also included in this classification is material in a sloped, layered system where the layers dip into the excavation or have a slope of four horizontal to one vertical (4H:1V) or greater.

Table 1-1
Maximum Allowable Slopes

Soil or Rock Type	**Maximum Allowable Slopes (H:V) for Excavations less than 20 feet in depth**	
Stable Rock	Vertical	(90 deg.)
Type A	¾:1	(53 deg)
Type B	1:1	(45 deg)
Type C	1 ½:1	(34 deg)

Exception: Simple slope excavations, which are open 24 hours, or less (short term) and 12 feet or less in depth shall have a maximum allowable slope of ½:1.

Annex B

Refresher Examination for EMM Operations

EMM EQUIPMENT REFRESHER EXAM

LOCATION_____

NAME_____DATE_____

ORGANIZATION_____

Circle the correct answer or fill in the blank

1. When performing preventive/pre-operational maintenance on EMM equipment, with out a lubrication chart, where should you look for grease fittings?

a. Behind the wheels.
b. At every pivot point.
c. On the bucket teeth.
d. At a local service station.

2. Before starting to excavate what should you check for?

a. Underground utilities.
b. Overhead utilities.
c. Endangered wildlife habitats and vegetation, as outlined in the Work Plan.
d. All the above.

3. ROPS stands for?

a. Read Operational Standards.
b. Round Off Posts Stops.
c. Roll Over Protection System.
d. Roll Or Push Slowly.

4. According to Corps Safety Concepts how close can you excavate to UXO?

a. 6”.
b. 1’.
c. 1 ½’.
d. 2’.

5. What simple safety rule must be followed to make ROPS effective?

a. Wear gloves.
b. Wear hardhat.
c. Wear seatbelt.

d. Wear pantyhose.

6. The type soil most likely to collapse?

a. A.
b. B.
c. C.
d. D.

7. If the excavation is below 5' deep what precaution must be taken before a man can enter the hole?

a. Get a ladder.
b. Get a harness.
c. Get a tape measure.
d. Sloping or engineer approved shoring.

8. In type "C" soil what is the minimum slope required? (Slope to depth)

a. 1:1
b. 1 ½:1
c. 2:1
d. 3:1

9. What should you as an operator do to protect ground personnel?

a. Mark the maximum arc of the bucket.
b. Remove hands and feet from controls before allowing entry into the arc.
c. Have "eye contact" between operator and assistant.
d. Signal the assistant that it is okay to enter the arc.
e. All of the above.

10. According to the COE Safety Concepts what is the minimum safe separation distance that multiple backhoes can operate from each other?

a. 100'.
b. 200'.
c. Same as intrusive team separation.
d. Both b and c are correct.

11. When the backhoe is delivered who is responsible for loading and unloading.

a. Owner.
b. Renter.
c. Government
d. Home Depot

12. Before accepting delivery you should.

a. Check fluids.
b. Operate all controls then check for leaks.
c. Check all safety equipment.
d. Check for proper routing of hoses.
e. All the above.

13. How many people can ride on the backhoe?

_____.

14. How many people can you lift in the front bucket for tree trimming?

_____.

15. What is the minimum distance you can pile your spoil from the edge of the excavation?

a. 1'
b. 2'
c. 3'

d. 4'

Standing Operating Procedure

(SOP)

Range Fire and Wildfire Operations

Approved by:

Michael Short
OE Group Operations Manager: _____ **5/30/2008**
(Signature) **(Date)**

1.0 INTRODUCTION

The purpose of this procedure is to provide the minimum requirements and site personnel actions in the event of Range Fires or Wildfires.

2.0 SCOPE

This SOP applies to all site personnel involved in field operations regardless of affiliation. This SOP is not intended to contain all of the requirements needed to ensure complete compliance, and should be used in conjunction with project plans and applicable Federal, state and local regulations. Consult the documents listed in Section 3.0 of this SOP for additional compliance issues.

3.0 REFERENCES

Applicable sections and paragraphs in the documents listed below will be used as references for the conduct of Range/Wildfire operations:

- Parsons Corporate Safety and Health Program;
- EP 385-1-95a, CEHNC Basic Safety Concepts and Considerations for OE Operations;
- EM 1110-1-4009, Ordnance and Explosive Response; and
- EM 385-1-1, USACE, Safety and Health Requirements Manual.

4.0 RESPONSIBILITIES

4.1 Site Manager

Upon notification from UXOSO, the Site Manager (SM) will notify the local public or government Emergency Response element, as described in the Accident Prevention Plan (APP) (Emergency Notification), and relay to both the UXOSO and Parsons PM that those notifications have been made. The SM will remain at the site office and maintain radio communications with the UXOSO. Upon arrival at the site office, the SM will conduct a head count of all site personnel and visitors, using that day's Safety Brief Sign-In Roster and Site Visitors Log as verification of number of personnel present.

4.2 Site Supervisory Personnel

Upon notification from UXOSO, supervisory personnel will not assist with fire fighting; they will maintain control of their assigned personnel, assess what mission essential equipment should be evacuated, prepare their remaining personnel for evacuation to the site office and maintain radio communications with the UXOSO.

4.3 UXO Safety Officer (UXOSO)

4.3.1 Upon notification that a range fire or wildfire is present in the area, the UXOSO will notify the SM and site personnel by radio or cellular phone. If MEC intrusive operations are being conducted, either the UXOSO or SUXOS will cease all operations and have the intrusive team return to the site office, by the quickest means possible.

4.3.2 The UXOSO will direct all non-essential site personnel to conduct fire fighting procedures with available fire fighting equipment for those fires that immediately threaten site

operations. An attempt to fight the fire will be made with all available fire-fighting equipment on hand. A reasonable decision will be made by the UXOSO when these means are exhausted and any further attempts will endanger site personnel.

4.3.3 All other personnel will secure mission essential equipment and prepare to evacuate the area to the site office. The UXOSO will maintain radio communications with all site supervisory personnel, necessary support elements and maintain on site log of events.

4.4 Individual/Personnel Initially Reporting the Fire

The individual or personnel initially reporting a range fire or wildfire will report immediately to either the UXOSO or Team Leader by the quickest means possible. These personnel will not attempt to begin any fire fighting actions or conduct any other notifications. The team leader immediately notifies the SUXOS and UXOSO.

4.5 Site Personnel

Upon the notification to evacuate the work site, personnel will do so in an orderly manner. Vehicle operators will not exceed the posted or site enforced speed limit or prudent speeds for road conditions. Site personnel providing fire-fighting support will use the fire extinguishers, as described on the fire extinguishers safe operating label and approach the fire always upwind or crosswind from the fire.

4.6 Responding Local Authorities (Police, Fire and Ambulance)

Upon requesting the assistance from local authorities and other support elements, these responding personnel will be met by either UXOSO or SUXOS at a pre-designated location near the fire, outside of the minimum separation distance (MSD) for the Munitions with the Greatest Fragmentation Distance (MGFD), and receive a UXO Safety Brief on the associated MEC items and hazards that may be present. The responders may elect to move back to a safer area and prepare a fire break rather fight the fire directly. Site personnel will assist the local responders as requested.

5.0 EXPLOSIVE STORAGE AREA

As with approaching lightning, no work will be conducted in or near any explosive storage area (ESA) when a range/wildfire threatens this area. All site personnel and any affected residents near the ESA will be evacuated to a distance outside the ESA's approved Inhibited Building Distance (IBD), as stated in the Explosives Siting Plan. At no time will site personnel attempt to fight a range/wildfire that threatens the ESA.

6.0 REMOTE SITE LOCATION(S)

Those site personnel assigned duties within the work site that are considered remote; meaning only one route in or out; excessive distance from the site office; limited communications or extreme terrain features, will report the fire, but not engage in any fire-fighting duties and evacuate, by the safest means possible.

Standing Operating Procedure

(SOP)

Severe Weather Operations

Approved by:

Michael Short
OE Group Operations Manager: _____ **5/30/2008**
(Signature) **(Date)**

1.0 PURPOSE

The purpose of this procedure is to provide the minimum requirements and site personnel actions in the event of site evacuation, as a result of severe weather at any operation.

2.0 SCOPE

This SOP applies to all site personnel involved in field operations regardless of affiliation. This SOP is not intended to contain all of the requirements needed to ensure complete compliance, and should be used in conjunction with project plans and applicable Federal, state and local regulations. Consult the documents listed in Section 3.0 of this SOP for additional compliance issues.

3.0 REFERENCES

Applicable sections and paragraphs in the documents listed below will be used as references for the conduct of Severe Weather operations:

- Parsons Corporate Safety and Health Program;
- EP 385-1-95a, CEHNC Basic Safety Concepts and Considerations for OE Operations; and
- EM 385-1-1, USACE, Safety and Health Requirements Manual

4.0 RESPONSIBILITIES

4.1 Site Safety and Health Officer (UXOSO)

Upon notification that a severe weather situation exists, the UXOSO will notify site personnel, by radio, cellular phone or sound a horn for 3 five-second blasts. If operations, that might put site personnel at risk, are on going at the time, the UXOSO will cease all operations and have all teams/crews evacuate to either the site office or the closest “Safe Haven”.

The UXOSO will direct site personnel as to the nature of severe weather and to ready site vehicles for evacuation. During this type of emergency site personnel should not be concerned with assigned vehicles. Time permitting, a select number of site personnel will attempt to safely secure mission essential equipment (e.g. Geophysical GPS/Radio Relay Systems, RTK GPS Systems, computers, etc.) and prepare to evacuate the area to the recommended “Safe Haven”. The UXOSO will maintain radio communications with all site personnel, necessary support elements and record the events in the site Safety Log.

Upon arrival at the “Safe Haven,” the UXOSO will conduct a head count of all site personnel and Site Visitors, using that day’s Daily Safety Brief Sign-In Roster and Site Visitors Log.

4.2 Individual/Personnel initially reporting Severe Weather

The individual or personnel initially spotting a severe weather situation (lightning, tornado) will immediately report it to either the UXOSO or Team Leader by the quickest means possible.

4.3 Site Personnel

Upon the notification to evacuate the work site for the designated Rally Point, site personnel will do so in an orderly manner. Vehicle operators will not exceed the posted or site enforced speed limit, however that speed will not exceed the conditions of the roadway.

5.0 GENERAL INFORMATION

The majority of field operations are conducted at either heavily wooded sites, or sites that consist of large rolling and sloping pastures and grasslands, consisting of clay or loose sand, and some even contain large areas of ravines and drop-offs. As a result of this, even small amounts of rain could cause vehicle entry/exit problems and personnel slipping hazards that may result in damage or injury to site personnel and equipment.

Almost all of the areas are susceptible to severe thunderstorms, with heavy downpours of rain, lightning, hail, strong microburst winds, flash floods and tornadoes. These storms are known to manifest themselves very quickly and leave very little time to react. In the event of severe weather in the area, the UXOSO maintains a portable Severe Weather Alert radio and the Site Manager will have access to the National Weather Advisory system, via the internet or by phone.

5.1 Thunderstorms

Thunderstorms affect relatively small areas when compared with hurricanes and winter storms. Despite their small size, ALL thunderstorms are dangerous. The typical thunderstorm is 1.5 miles in diameter and lasts an average of 30 minutes. In order for a thunderstorm to form it needs three things; Moisture – to form clouds and rain; Unstable Air – warm air that can rise rapidly; and Lift – cold or warm fronts, sea breezes, mountains, or the sun's heat are capable of lifting air to help form thunderstorms.

The life cycle of a thunderstorm constitutes three distinct stages, which are detailed below:

- Developing Stage – Towering cumulus cloud indicates rising air; little if any rain during this stage; and occasional lightning.
- Mature Stage – Most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes; storm occasionally has a black or dark green appearance; and lasts an average of 10 – 20 minutes but may last much longer in some cases.
- Dissipating Stage – Rainfall decreases in intensity; can still produce a burst of strong winds; and lightning remains a danger.

How Far Away is the Thunderstorm?

- Count the number of seconds between a flash of lightning and the next clap of thunder.
- Divide the number of seconds by five (5) to determine the distance to the lightning in miles.

5.2 Lightning

Lightning poses the greatest potential threat to site personnel and site operations, due to its unpredictable nature. Lightning results from the buildup and discharge of electrical energy between positively and negatively charged areas. Rising and descending air within a

thunderstorm separates these positive and negative charges. Water and ice particles also effect distribution.

A cloud-to-ground lightning strike begins as an invisible channel of electrically charged air moving from the cloud toward the ground. When one channel nears an object on the ground, a powerful surge of electricity from the ground moves upward to the clouds and produces the visible lightning strike.

In accordance with current policies, all operations cease when lightning is observed and the "Flash to Bang Time" is 30 seconds or less (approx 6 miles from site). The safe evacuation of personnel is paramount and equipment is secondary.

Those site personnel in and around the site office will seek shelter inside the building. Site personnel working out in the field will seek shelter inside a site vehicle with the windows rolled up and the doors closed.

Site personnel that are using any electronic equipment with an antenna (i.e. RTK system, G-858 or EM-61, etc.) will cease all operations and seek shelter upon visually seeing lightning at any distance.

5.2.1 30/30 Lightning Safety Rule

Go indoors or seek shelter if, after seeing lightning, you cannot count to 30 before hearing thunder. Stay indoors or under shelter for 10 minutes after hearing the last clap of thunder.

5.2.2 Lightning Safety Rules

- Move to a sturdy building or car. Do not take shelter in small sheds, under isolated trees, or in convertible automobiles. Stay away from tall objects such as towers, fences, telephone poles, and power lines.
- If lightning is occurring and a sturdy shelter is not available, get inside a hard top automobile and keep the windows up. Avoid touching any metal.
- Utility lines and metal pipes can conduct electricity. Unplug appliances, office machines etc. not necessary for obtaining weather information. Avoid using the telephone or any electrical item. Use phones ONLY in an emergency.

5.2.3 If Caught Outdoors and No Shelter is Available

- Find a low spot away from trees, fences, and poles. Make sure the place you pick is not subject to flooding.
- If you are in the woods, take shelter under the shorter trees.
- If you feel your skin tingle or your hair stand on end, squat low to the ground on the balls of your feet. Place your hands over your ears and your head between your legs. Make yourself the smallest target possible and minimize your contact with the ground. DO NOT lay down.

5.3 Tornadoes

Tornadoes produce extreme high destructive winds and devastation. Tornadoes are generally produced along the leading edges of thunderstorms that form, with little or no warning. Before thunderstorms develop, a change in wind direction and an increase in wind speed with increasing height create an invisible, horizontal spinning effect in the lower atmosphere. Rising

air within the thunderstorm updraft tilts the rotating air from horizontal to vertical. An area of rotation, 2 – 6 miles wide, now extends through much of the storm. Most tornadoes form within this area of strong rotation.

Most project sites do not afford adequate tornado "Safe Havens", or adequate "Safe Havens" are so far away that they afford little or no help to those site personnel working in remote site locations (Remote Operations are discussed further in this SOP).

The UXOSO and Site Manager will attempt to locate those "Safe Havens" and brief site personnel of their locations, during the Daily Tailgate Safety Briefing.

5.3.1 When and Where Tornadoes Occur

- Tornadoes can occur any time of the year.
- Tornadoes have occurred in every state, but they are most frequent east of the Rocky Mountains during the spring and summer months.
- In the southern states, peak tornado occurrence is March – May, while peak months in the northern states are during the late spring and summer.
- Tornadoes are most likely to occur between 3 and 9 p.m., but can occur anytime.
- The average tornado moves from southwest to northeast.
- Tornadoes can accompany tropical storms and hurricanes as they move onto land.

5.3.2 Tornado Safety Rules

- In a building, move to a pre-designated shelter, such as a basement.
- If a below ground shelter is not available, move to a small interior room or hallway on the lowest floor and get under a sturdy piece of furniture. Put as many walls as possible between you and the outside.
- Stay away from windows.
- Get out of automobiles.
- Do not try to outrun a tornado in your car; instead, leave it immediately for safe shelter.
- If caught outside or in a vehicle, lie flat in a nearby ditch or depression and cover your head with your hands.
- Be aware of flying debris. Flying debris from tornadoes causes most fatalities and injuries.
- Office trailers, even if tied down, offer little protection from tornadoes. You should leave an office trailer and go to the lowest floor of a sturdy nearby building, or follow the procedures detailed in the 6th bullet above.

5.4 Flash Floods/Floods

Due to the massive amounts of rain that can be dropped from thunderstorms the site may be susceptible to flash floods. Some of the existing roads may be unimproved dirt and are easily turned into mud, creating an unsafe driving environment. Those roadways that are paved also place the vehicle in low-lying areas that may be washed out. Do not attempt to cross any roadway that has become submerged by water.

Flash Flood/Flood Safety Rules

- If you are in a low lying area, at the first sign of rain evacuate to high ground.
- Designate an evacuation route in the event of flooding.
- Avoid walking or driving in flood waters.
- Stay away from high water, storm drains, ditches, ravines, or culverts. If the water is moving swiftly, even water only six (6) inches deep can knock you off your feet.
- If you come upon flood waters, stop, turn around, and go another way.

5.5 Straight-line/High Winds

When this is associated with a passing front generating potential severe weather, the winds can increase in speed rather rapidly. Dust and debris pose an eye hazard. High winds can rip vehicle doors and rear hatches from site personnel's grasp causing damage and injury. Site personnel in the field should select an area or park the vehicle in such a matter that provides a windbreak. If this can not be accomplished, open doors and hatches with care. Vehicles should not be left with doors, hoods or hatches open.

Straight-line/High Winds Safety Rules

- In a building, move to a pre-designated shelter, such as a basement.
- If a below ground shelter is not available, move to a small interior room or hallway on the lowest floor and get under a sturdy piece of furniture. Put as many walls as possible between you and the outside.
- Stay away from windows.
- If caught outside, lie flat in a nearby ditch or depression and cover your head with your hands.
- Be aware of flying debris. Flying debris from tornadoes causes most fatalities and injuries.
- Office trailers, even if tied down, offer little protection from straight-line/high winds. You should leave an office trailer and go to the lowest floor of a sturdy nearby building, or follow the procedures detailed in the 4th bullet above.
- Move to a sturdy building or car. Do not take shelter in small sheds, under isolated trees, or in convertible automobiles.
- If high winds are occurring and a sturdy shelter is not available, get inside a hard top automobile and keep the windows up.

5.6 Hail

5.6.1 Hail can occur in conjunction with a thunderstorm and can cause damage to equipment and injuries to personnel. Hail occurs when strong rising currents of air within a storm, called updrafts, carry water droplets to a height where freezing occurs. These water droplets become frozen and the ice particles grow in size, becoming too heavy to be supported by the updraft, and fall to the ground. Speeds of the falling ice particles, hail, can exceed 100 miles an hour, with size exceeding that of a softball.

5.6.2 Hail Safety Rules

- Seek shelter, preferably in a building, or hard-top automobile.
- If in the open, seek shelter in a culvert if there is no flooding under a rock outcrop or under trees if there is no lightning associated with the hailstorm.

- Exercise caution when driving on hail, it is very slippery, so avoid it if possible.
- If driving when a hail storm starts pull under an overpass if possible, if not pull well off the road with your lights on in order that advancing motorists can see you.

Standing Operating Procedure

(SOP)

Vehicle Operations

Approved by:

Michael Short
OE Group Operations Manager: _____ **5/30/2008**
(Signature) **(Date)**

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum safety and health requirements and procedures applicable to the operations involving the use of on and off-road motor vehicles.

2.0 SCOPE

This SOP applies to all site personnel, to include contractor and subcontractor personnel, involved in the conduct of operations involving motor vehicles. This SOP is not intended to contain all requirements to ensure regulatory compliance. Consult documents listed in Section 3.0 of this SOP for additional compliance issues.

3.0 REGULATORY REFERENCES

The following Occupational Safety and Health Administration (OSHA) standards and Department of Defense requirements directly apply to vehicle operations. References used in preparation of the document are listed below:

- Applicable sections of OSHA Construction Industry Standard 29 CFR, Part 1926.601;
- Applicable sections of Department of Transportation 49 CFR, Parts 100-199; and 571
- USACE Engineer Manual (EM) 385-1-1, Section 18.

4.0 RESPONSIBILITIES

4.1 Project Manager

The Project Manager (PM) will be responsible for ensuring the availability of the resources needed to implement this SOP, and shall also ensure that this SOP is incorporated into plans, procedures, and training for sites where vehicular equipment is to be used.

4.2 Site Manager

The Site Manager (SM) will ensure that this SOP is implemented for motor vehicle operations. The SM will also ensure that relevant sections of this SOP are discussed in the tailgate safety briefings, and that information related to its daily implementation is documented in the Site Operations Log.

4.3 UXO Safety Officer

The UXO Safety Officer (UXOSO) will be responsible for ensuring that the safety hazards and mitigation techniques associated with this SOP are discussed during the initial Site Specific Safety Training. The UXOSO will also be responsible for daily inspection of site operations and conditions to ensure their initial, and continued, compliance with this SOP and other regulatory guidelines. The UXOSO will also compile a monthly total of mileage or hours of usage of all site vehicles, post those totals predominately in the Site Field Office and report them to the Parsons OE Sector Administrative Assistant (See Figure 1).

4.4 Vehicle Operators

All personnel operating a vehicular piece of equipment will posses a valid drivers license, proof of proficiency on the item in question, i.e., certificate of training, and strictly adhere to the procedures stipulated in this SOP.

5.0 PROCEDURES

All personnel, including contractor and subcontractor personnel, involved in motor vehicle operations shall be familiar with the potential safety hazards associated with the operation of vehicular equipment, and with the work practices and mitigation techniques to be used to reduce or eliminate these hazards.

5.1 General Requirements

5.1.1 Motor Vehicle shall mean any vehicle propelled by a self-contained power unit, or equipment designed for use on paved roads. All-purpose utility vehicle (APUV) shall mean any four-wheeled or greater, vehicle propelled by a self-contained power unit, designed for off-road use, such as a Gator, or MULE. From this point forward the term vehicle shall constitute both motor vehicle and APU vehicles unless otherwise stated. Every individual operating a vehicle shall possess a permit (as required by state or federal law) valid for the equipment being operated. No vehicle shall be placed in service until it has been inspected and found to be in a safe operating condition (See Figure 2).

5.1.2 All vehicles shall be inspected and maintained IAW the manufactures recommendations and this SOP. Vehicles being used shall be checked at the beginning of each day to ensure that all parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use. The parts, equipment, and accessories of concern include service brakes, including trailer brake connections; parking system (hand brake); emergency-stopping system (brakes); tires; horn; steering mechanism; coupling devices; seat belts and lap-shoulder restraints; operating controls; and safety devices. These requirements also apply to equipment such as lights, reflectors; windshield wipers, defrosters, fire extinguishers and first aid kits, where such equipment is required. Vehicles not meeting safe operating conditions shall be removed from service, repaired or replaced, and re-inspected prior to being placed back in service.

5.1.3 All vehicles operated between sunset and sunrise shall have the following:

- Two headlights, one on each side;
- Directional signal lights, both front rear;
- Rear Brake Lights, one on each side, and
- Rear Back-up Lights, one on each side

5.1.4 All vehicles, except APUV's, trailers or semi-trailers, having a gross weight of 5,000 pounds or less, shall be equipped with service brakes and manually-operated parking brakes. Service and parking brakes shall be adequate to control the movement of, to stop, and to hold the vehicle under all conditions of service. Service brakes on trailers and semi-trailers shall be controlled from the driver's seat of the prime mover.

5.1.5 Braking systems on every vehicle shall be designed as to be in approximate synchronization on all wheels and develop the required braking effort on the rearmost wheels first, unless the vehicle is equipped with an "Anti-lock Braking System" (ABS). The design shall also provide for application of the brakes by the driver of the prime mover. Exceptions to this are vehicles in tow by an approved tow bar hitch.

5.1.6 Every motor vehicle shall be equipped with the following:

- A working speedometer
- A fuel gauge
- An audible warning device (horn)
- A windshield equipped with an adequate powered windshield wiper

- An operable defrosting and defogging system
- Adequate rear view mirror, or mirrors
- Cabs, cab shields, and other protection to protect the driver from hazards of falling or shifting materials/loads
- Non-slip surfaces on steps
- Safety glass in windshields, windows, and doors
- No cracked or broken glass
- All towing devices that are structurally adequate for the weight drawn, and properly mounted
- A power-operated starting device
- One fire extinguisher, rated at 5 BC units (project provided)
- One First Aid Kit and other appropriate first aid equipment (project provided)

5.1.7 All trailers will be equipped as follows:

- A locking device, or double safety system, shall be provided on every fifth wheel mechanism and tow bar arrangement, which will prevent the accidental separation of towed and towing vehicles;
- Every trailer shall be coupled with safety chains or cables to the towing vehicle. Such chain or cable shall prevent the separation of the vehicles in the event of failure of the tow bar;
- While unhooked from the towing vehicle, all trailers shall be equipped with the approved and adequate wheel chocks to prevent roll-back; and
- A manufacturer's attached support leg system at or near the tongue of the trailer to prevent trailer collapse. In event the trailer is not equipped with a support leg system; the use of intact "cinder blocks" may be used. Note: Once the "cinder blocks" are observed with cracks or become broken, they will be replaced and not used again as a support leg.

5.1.8 All buses, trucks, and combination of vehicles with a carrying capacity of 12 tons or greater, when operated on public highways, shall be equipped with emergency equipment required by state laws but not less than those listed below:

- One red flag, not less than 12 inches square, and 3 reflective markers, which shall be available for immediate use, in case of emergency stops;
- Two approved wheel chocks for each vehicle, or each unit of a combination of vehicles;
- One fire extinguisher rated at 20 BC units or two 10 BC rated units, being required for flammable cargoes, including explosives and Munitions and Explosives of Concern (MEC);
- Vehicle exhaust control, so as to present no hazard to the operator, passengers, or other personnel; and
- All rubber-tired motor vehicles should be equipped with fenders. However mud flaps may be used in lieu of fenders, whenever motor vehicle equipment is not designed for fenders.

5.2 Safe Operating Rules

No vehicle shall be driven at a speed greater than the posted speed limit, with due regard for weather, traffic, intersections, width, and character of the roadway, type of vehicle, and any other existing conditions. The operator must, at all times, and under all conditions, have the vehicle under such control as to be able to bring it to a complete stop within the clear distance ahead. To accomplish this, the operator shall follow the safe operating rules presented below:

- No vehicle shall be driven on a downgrade with gears in neutral or with clutch disengaged;
- Every vehicle, upon approaching an unguarded railroad crossing or drawbridge, shall sloe down to a speed as to permit stopping before reaching the nearest track or the edge of the bridge, and shall proceed only if the course is clear;
- No vehicle shall be stopped, parked, or left standing on any road, or adjacent thereto, or in any area in such a manner, as to endanger the vehicle, other vehicles, equipment, or personnel using or passing that area;
- No vehicle shall be left unattended until the motor has been shut off, the key removed (unless the WP directs otherwise), the parking brake set, and the gear engaged in park (automatic) or placed in neutral (manual);
- If stopped on a hill or grade, front wheels shall be turned or hooked into the curb or the wheels securely chocked;
- Personnel shall not be permitted to get between a towed and towing vehicle, until the towing vehicle has been placed in park, parking brake set, and engine turned off;
- When backing or maneuvering buses, trucks, or truck/trailer combination not equipped with an audible backing warning device, the operator will use a ground guide. All other vehicle types, when backing or maneuvering, will check the area and sound their horn;
- Operators of vehicles transporting personnel, explosives, or flammable or toxic substances shall stop at railroad crossings or drawbridges, and shall not proceed until the route is determined to be clear. A stop shall be required at a crossing within a business or residential district that is protected by a watch person, traffic officer, or by a traffic signal giving positive indication to approaching vehicles;
- When a bus, truck, or truck/trailer combination is disabled or parked on the traveled portion of a highway or the shoulder adjacent thereto, red flags shall be displayed during the daytime and reflector, flares, or electric lights at night (An exception may be made in residential or business sections or municipalities);
- The principles of defensive driving shall be practiced at all times;
- Seat belts and lap-shoulder restraints will be installed and worn IAW 49 CFR 571 (DOT);
- If the windshield wipers are in use due to rain, headlights will be activated; and
- During high winds, extreme care is required when opening vehicle doors, hoods and hatches. High winds can rip vehicle doors and rear hatches from a persons grasp causing damage and injury. Site personnel should select an area or park the vehicle in such a manner that provides a windbreak. Vehicles should not be left with doors, hoods or hatches open.

5.3 Transportation of Personnel

The number of passengers in passenger-type vehicles shall not exceed the number of seats with approved seat belts. Trucks used to transport personnel shall be equipped with a seating arrangement that is securely anchored, a rear gate, a guardrail, and steps or ladders for mounting and dismounting. The beds of trucks which are not equipped with the appropriate safety devices, as described in this paragraph, will not be used to transport personnel unless absolutely necessary, and never on a public highway, unless it is an emergency. Additional personnel transportation requirements are listed below:

- All tools and equipment shall be guarded, stowed, and secured when transported with personnel;
- No person will be permitted to ride with arms or legs outside of the truck's body, in a standing position on the body, on running boards, or seated on side fenders, cabs, cab shields, rear of truck, or on the cargo load;
- All motor vehicles transporting personnel during cold or inclement weather shall be enclosed;
- No explosives, flammable materials (except normal fuel supply), or toxic substances shall be transported in the cabs of any vehicle or beds of vehicles being used to transport personnel;
- No vehicle transporting personnel shall be moved until the driver has ascertained that all individuals are seated, belted, the guardrail and rear gate are in place, and doors are closed; and
- Getting on or off any vehicle while in motion is prohibited.

5.4 Fueling

All vehicles shall be shut off during fueling operations, operators and passengers will refrain from using cellular telephones, and no smoking or open flames will be permitted within 50 feet of fueling operations. Care should be taken not to spill fuel, and only that fuel recommended by the vehicle manufacturer shall be used. When fueling from a portable fuel tank system, the vehicle and portable tank will be bonded to each other (Example of this – using "jumper" cables to connect the tank and vehicle). During fueling, when there is a potential for fuel contact with the skin, especially during cold weather, personnel will wear protective gloves, as specified in the SSHP.

5.5 Loading

Drivers of trucks and similar vehicles shall leave the cab, if the cab of the vehicle being loaded is exposed to danger from suspended or overhead loading operations, unless the cab is adequately protected. No motor vehicle shall be loaded so as to obscure the driver's view ahead or to either side, or to interfere with the safe operation of such vehicle. All vehicles carrying loads which project more than 4 feet beyond the rear of the vehicle shall carry a red light at or near the end of the projection at night, or when atmospheric conditions restrict visibility. During daylight periods, or other non-restricted conditions, a red flag not less than 12 inches square shall be used. The load shall be distributed, checked, tied down, or secured.

5.6 All-Terrain Vehicles

During the operation of all-purpose utility vehicles (APUV's), every operator shall possess a valid state driver's license and have completed, as a minimum, an approved on-site

APUV training course prior to operation of the vehicle. See USACE EM 385-1-1, Section 18D for additional information. The operation of APUV's shall be conducted according to the procedures listed below:

- The manufacturer's recommended payload shall not be exceeded at any time;
- Gloves and an approved motorcycle helmet with face shield or goggles shall be worn at all times while operating an APUV;
- APUV's are to be used on off-road terrain and gravel and dirt roads, never on a public road;
- APUV's shall be driven during daylight hours only;
- Only four-wheel, or greater, APUV's shall be used;
- Passengers are prohibited on APUV's, unless they are designed to accommodate additional passengers, i.e., additional seats, and any passenger shall be required to wear a motorcycle helmet with fact shield or goggles; and
- All APUV's shall be equipped with warning signal devices and a horn.

5.7 Maintenance

5.7.1 All vehicles will be maintained IAW the manufacturer's requirements and guidelines. All vehicles will be inspected prior to operation and on a weekly basis for safety and basic operational equipment for deficiencies and parts needing repair. These will be brought to the attention of both the operator's supervisor and the UXOSO. Vehicles requiring repair or manufacturers required maintenance (except of oil changes, lubrication or tire rotation) will be repaired and dead-lined until the repairs are made.

5.7.2 All vehicles will be cleaned weekly and trash will be removed on a daily basis from inside the cab and truck bed. Excessive trash inside the operator's or passenger's compartment is unsafe and a health hazard for others. Excessive build up of mud inside the motor vehicle's wheel wells preclude the operator to observe any vehicle deficiencies and cause unsafe vehicle operations. All motor vehicles at Parsons sites will display a clean and up-kept appearance at all times, regardless of the site's operation, unless otherwise directed by local water restrictions.

5.8 Log Books and Operating Manuals

All motor vehicles will have their Operating Manuals and Log Books, for those vehicles, with the vehicle at all times. The log book will be up-to-date and complete.

ATTACHMENTS

- Figure 1 – Parsons Form D0038.xls (Monthly Mileage Report)
- Figure 2 – Parsons Form (Weekly Vehicle Inspection)
- Figure 3 – Parsons Activity Hazard Analysis (All-Terrain Vehicles)

WEEKLY EXPOSURE DATA REPORT

Parsons
Week of:

Hours This Week (1)	Hours To Date	Vehicle Miles This Week	Vehicle Miles To Date	Lost Work Days This Week (2)	Lost Work Days To Date (2)
Remarks:					

(1) - Including Subcontractors
(2) - Due to On-the-Job Accidents

Site Safety & Health Officer

Figure 1

Figure 2

Certification of Task Hazard Assessment

TASK NAME: ALL TERRAIN VEHICLE (ATV)

1.0 PRINCIPAL TASK STEPS

Principal Steps:	**Potential Site Hazards** (See 1.1 list):	**Recommended Controls** (See 1.2 list):
1. Accepted/Inspected at Site	Vehicle Safety	A through D
2. Placed in Operation	A1-2, B1-3, C, D1-2, F, H2-4, J1, K1-3	A through O
3. Vehicle Maintenance	Vehicle Safety	A through D

1.1 Potential Hazards: Items checked are known or anticipated site hazards, or may occur as a result of site operations **(Check Appropriate Box)**

A ( ) Thermal Stress	E( ) Manual Lifting Hazards	J( ) Radiation
A1( ) Heat Stress	F( ) Slip, trip or fall	J1( ) UV
A2( ) Cold Stress	G( ) Chemical Hazards	J2( ) Ionizing
B( ) Biological Hazards	G1( ) Respiratory	K( ) MEC Environment
B1( ) Toxic/Hazardous plants	G2( ) Skin	K1( ) Potential MEC items
B2( ) Hazardous animals/insects	H( ) Vehicle Operations	K2( ) Unplanned Detonation
B3( ) Hanta Virus, when present	H1( ) High Noise (>85 dBA)	K3( ) Near Surface
C( ) Vehicle traffic in work area(s)	H2( ) Overhead Hazards	
D( ) Fire Hazards	H3( ) Pinch Points Hazards	
D1( ) Vegetation (high grass areas)	H4( ) Hot Surfaces	
D2( ) Flammable Liquids		

1.2 Recommended Controls:

A. Observe all MEC safety precautions and use safe work practices, IAW EP 385-1-95a, Basic Safety Concepts for O&E Operations, Jun01 and EM 385-1-1, Safety and Health Requirements Manual.
B. All ATV Equipment will be inspected and tested, in accordance with manufacturer's recommendations and certified in writing by a component person prior to being placed in use, IAW Section 18, EM 385-1-1.
C. All ATV operators will be licensed and trained by a recognized accredited ATV Training Course or in-house resource that is certified as a Trainer by an accredited organization, prior to operations of the vehicle.
D. Wear the appropriate PPE for the task being performed.
E. Use recognized hand and arm signals to communicate between the operators. Cease any operation, when this fails.
F. Maintain safe and appropriate separation distances between ATV, when traveling as a group.
G. ATVs will be used only off road, unless equipped for paved road use by manufacturer.
H. ATVs will only be operated during daylight hours, unless equipped for night use by manufacturer.
I. Only ATVs with four or more wheels may be used.
J. The manufacturer's recommended payload will not be exceeded at any time.
K. Passengers are prohibited on Class I ATVs (Class I ATV – single seat centered over the engine).
L. All ATVs will be equipped with mufflers, spark arrester, tail lights, stop lights and an audible signal device (horn).
M. Use of "ground guides" will be used, when vehicle(s) are not equipped with an audible warning device and/or has an obstructed view. When transporting equipment by trailers, the trailer will be "chocked" with approved devices when unhooked from the transporting vehicle. When attempting to hook onto the trailer, "ground guides" will not place any part of between the trailer and vehicle.
N. Be alert. Mark, avoid, and report any suspect MEC items.
O. Do not handle wildlife. Review characteristics of potential toxic/poisonous plant life known in the area.

2.0 DEGREE OF OVERALL TASK HAZARD: Anticipated degree of hazard, based on the hazards associated with this task.

Chemical Hazard:	**Physical Hazard:**	**Biological Hazard:**
( ) Low ( ) Serious	( ) Low ( ) Serious	( ) Low ( ) Serious
( ) Moderate ( ) Unknown	( ) Moderate ( ) Unknown	( ) Moderate ( ) Unknown

3.0 PROTECTIVE MEASURES: Items checked will be used to control or mitigate the above mentioned hazards

( ) Tailgate Safety Briefing	( ) Engineering Controls	( ) Administrative Controls
( ) Specialized Training	( ) Lockout/Tag Out	( ) Rotate Workers
( ) Proper operations of equipment	( ) Site Control Zones	( ) Limit Exposure Time
( ) Equipment Safety hazards	( ) Communications	( ) Decontamination
( ) Personal protective equipment	( ) Establishing Safe Work Areas	**( )** Wash Hands at break regardless of activity
	( ) Designate Smoking/Break Area	
	( ) Proper use of vehicles	
	( ) Proper use of seat belts	
Other: _____	Other: _____	Other: _____

TASK NAME: ALL TERRAIN VEHICLE (ATV)

4.0 Applicable SOPs/Programs: Site Specific Safety/ Health Plan (SSHP)			
5.0 PPE: PPE has been assigned based on the potential for exposure as identified by this hazard assessment			
Level of Protection	( ) A ( ) B	( ) C ( ) D	( ) Modified
Respiratory Protection	( ) SCBA ( ) Airline Respirator	( ) Full face APR ( ) ½ face APR	( ) Cartridge Type _____ ( ) No respirator needed
Protective Clothing	( ) Fully encapsulated ( ) Tyvek F, with hood	( ) Saranex ( ) Coveralls, Cotton	( ) Work Clothes ( ) Other:
Gloves (specify inner/outer)	( ) Nitrile ( ) Butyl	( ) Neopene ( ) Latex	( ) Leather ( ) Cotton
Head/Face/Eye/Ear Protection	( ) Safety Glasses–ANSIZ87.1 ( ) Ear plugs or muffs	( ) Safety goggles ( ) Wire or Nylon Face Shield	( ) Hard Hat ( ) Other:
Foot/Leg Protection	( ) Work Boots ( ) Steel-toed boots	( ) Steel Toe covers ( ) Snake Leggings	( ) Chemical over boots ( ) Kevlar Leg Chaps
Other Protection	( ) Motor Cycle Helmet w/full face shield or goggles	( ) Hi-Visibility Vests	
5.1 PPE Modifications Required: Elevated PPE posture when dealing with suspected "Hanta Virus" locations.			

6.0 Training Requirements

6.1-UXO personnel are EOD trained and approved by CEHNC-Huntsville
6.2-All Site personnel are OSHA qualified, both 40-hr and current 8-hr Refresher, IAW 29 CFR 1910.120
6.3- All Site personnel operating a vehicle maintain a current state driver's license.
6.4- UXO identification and safety precautions training for all Site Personnel. (Performed by UXOSO)
6.5-ATV operators will provide a copy of their qualifications and competency to the UXOSO, prior to any equipment operation.
6.6-Daily Safety and Operations Briefing. (Performed by UXOSO)
6.7-All Site personnel will attend "Site Specific Training" for safe work practices and hazard protection, IAW SSHP. (Performed by UXOSO).
6.8-Site personnel will be briefed on Material Safety Data Sheets (MSDS) for fuels and oils. (Performed by UXOSO)
6.9-Knowledge of emergency response and notifications IAW SSHP.
6.10-Maintain equipment IAW manufacturer's specifications and operate IAW owner's manual.

7.0 Equipment to be used and Inspection Requirements

Type	**Inspection Frequency (Daily/Weekly/Monthly)**		
Heavy Equipment (checks will be done prior, during and after operation)	Daily by Operator	Weekly as needed	Monthly as needed
First Aid Kits	Daily by Team Leader	Weekly by UXOSO for missing items	Monthly by UXOSO for expired items
Communications Equipment	Daily by Team Leader	Weekly by Team Leader	Monthly, as needed
Communication Checks w/radios (Cellular phones as back-up)	Twice Daily with all site elements. All "operations" will cease until communications have been re-established with at least another site element to relay information		
Fire Extinguishers	Daily by Team	Weekly by UXOSO	Monthly by UXOSO

8.0 Certification: The control methods, PPE and other procedures used in the conduct of this task have been selected as a result of a hazard assessment conducted by the individual identified below:

Printed Name: **Edward Grunwald, C.I.H., Project Safety and Health Officer** **Date:**

Standing Operating Procedure

(SOP)

White Phosphorus

Approved by:

Michael Short

OE Group Operations Manager: _____ **5/30/2008**

(Signature) **(Date)**

1. 0 INTRODUCTION

This SOP is designed to ensure that every possible precaution is taken to prevent accidents involving the handling and destruction of white phosphorus (WP). It is meant to be used as a supplement to the approved Parsons demolition SOP, TM 60A-1-1-22, EP 385-1-95a and other applicable publications.

2.0 OPERATIONS

2.1 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Once WP has been positively identified it will not be moved if fuzed IAW EP 385-1-95a, however if not fuzed it may be safely relocated if the individual is wearing nomex gauntlet type gloves and welders or nomex apron, and a face shield.

2.2 WP PRECAUTIONS

If WP is suspected the UXO teams will either have buckets/containers of loose sand, mud, water, oil, dirt or some other smothering agent in the event that when recovering a WP round it should commence smoking. The bucket/container should be large enough so that when the item is placed in the bucket/container it is completely submerged/covered. If, when moving the round, it starts to smoke it may not be picked up and placed in the bucket but the contents of the bucket may be poured on the item and the team retreats from the site and awaits a minimum of 30 minutes prior to reentering the area.

2.3 WP DEMOLITION OPERATIONS

As stipulated in TM60 Series publications all known and suspected WP rounds will be destroyed by blowing the round into the air from underneath. This will be accomplished by placing a demolition charge at a one-to-one ratio underneath the item to be destroyed i.e., if there is one pound of WP to be destroyed there will be a minimum of one pound of demolition material used. This rule is a guide and is not intended to require individuals to cut or needlessly break boosters in order to achieve the ratio. It is better to use more than less. At no time will more than five (5) pounds of WP i.e., full up 81mm, M57, be destroyed in any one shot. In most cases shots will not be more than two (2) pounds of WP, i.e., tail section of 81mm, M57. The area around the demo site will be cleared of vegetation if possible and wetted down, local authorities notified and the team properly equipped and placed in the most advantageous upwind positions to respond in the event of a fire.

3.0 AVOIDANCE

In an effort to further reduce the possibility of a fire involving WP, the following steps will be taken:

- If at al possible avoid conducting clearance/removal activities in known WP contaminated areas during the dry season.
- If you encounter a WP in the morning immediately conduct demolition operations while the grass is still wet and the winds are light.
- If necessary construct a containment barricade, which will contain the shot after which the team will remove the barricade and carefully expose the pieces

of WP, which were not consumed to the air ensuring they are completely consumed.

- If possible move those items, which are safe to move to a more suitable i.e., less combustible area for demolition.
- Either have the local fire department provide fire fighting equipment and personnel on site or construct a pick-up truck towed trailer containing a multi-gallon container and gasoline operated pump with hose to assist in fighting a fire.

STANDARD OPERATING PROCEDURE
FOR
GOPHER TORTOISES

9.0 GOPHER TORTOISE PROCEDURES

9.1 PURPOSE

The purpose of these procedures is to describe actions to be followed in areas where gopher tortoises and gopher tortoise burrows are located. Gopher tortoises are species of special concern in Florida and therefore require protective consideration as part of the project.

9.2 BACKGROUND

9.2.1 Description

The gopher tortoise (*Gopherus polyphemus*) averages 9-11 inches long, but can attain lengths of 15 inches. They can weigh up to 15 pounds. The tortoise occurs throughout Florida but prefers sandy, well drained upland areas. It eats grasses, bean-family plants, fruits, and grass-like plants of the sunflower family. They excavate burrows averaging 15 feet in length, but some burrows can be up to 48 feet long and up to six feet deep. Gopher tortoise burrows may be used by many other species, including the Florida mouse and indigo snake.

9.2.2 Protection

In Florida, the gopher tortoise is a species of special concern, and it is illegal to take, possess, transport, or sell gopher tortoises, or their eggs, except as authorized by the Florida Fish and Wildlife Conservation Commission (FWC). Permits from the FWC are required to relocate tortoises (source: FWC website http://myfwc.com/CRITTERS/gopher_tortoise.htm).

9.2.3 Habitat

Gopher tortoises, or "gophers" as they are commonly called, live in dry habitats, such as longleaf pine-scrub oak sandhills and clayhills, live oak and red oak hammocks, sand pine scrub, wire grass flatwoods, dry prairies, and coastal dune ecosystems. Tortoises can also live in some man-made environments, such as pastures, old fields and grassy roadsides. Three conditions are needed for healthy tortoise populations: well-drained sandy soils for digging burrows, sufficient low plant growth for food, and open, sunny areas for nesting (source: University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS) http://edis.ifas.ufl.edu/UW048).

9.3 SCOPE OF PROCEDURE

This SOP pertains to all site personnel who may come near gopher tortoises and their burrows.

9.4 RESPONSIBILITIES

9.4.1 Site Manager

The Site Manager (SM) will ensure that this SOP is implemented for all field operations. The SM will also ensure that relevant sections of this SOP are discussed in the initial Site Specific Safety Training, and that information related to its daily implementation is documented in the Site Operations Log.

9.4.2 Site Personnel

All personnel operating in a gopher tortoise habitat will strictly adhere to the procedures stipulated in this SOP.

9.5 MINIMIZING THE EFFECT OF PROJECT ACTIVITIES ON GOPHER TORTOISES

9.5.1 Avoiding Gopher Tortoises and Burrows

9.5.1.1. Field teams including those conducting geophysical surveys, land surveying, brush clearing and intrusive investigation of anomalies, should avoid influencing the tortoises in any way.

- Do not approach or handle the tortoises.
- Do not draw attention to the tortoises.
- Do not harass or interfere with the tortoises.
- Avoid the burrows.
- If a tortoise is observed, move to another work area (and return later if needed).

9.5.1.2 To facilitate field operations, document the locations of tortoises and burrows (record the coordinates), so that future operations in the area can be planned with consideration of the tortoises and burrows. If a tortoise burrow is encountered, using pin flags, mark the entrance and place a minimum of three pin flags, approximately five-feet apart, along the direction that the burrow proceeds in without stepping on the tunnel – if the direction can be estimated based on looking into the entrance.

9.5.2 Intrusive Investigation of Anomalies

When investigating geophysical anomalies, anomalies within 50 feet of a tortoise burrow will be replaced with similar alternative anomalies greater than 50 feet from the burrow. This replacement of anomalies is possible because the objective of the project is to characterize the presence of MEC and MC, not to conduct a complete removal.

9.5.3 Demolition Operations

If the situation arises that a potential unexploded ordnance (UXO) has been encountered within 50 feet of a gopher tortoise burrow, operations must halt until it can be determined if a tortoise may be harmed by the demolition. This can be done by having an approved biologist inspect the burrow with a video camera. If a tortoise or other sensitive species are not present,

the demolition may proceed. If a tortoise or other species are present, the FWC must be contacted for guidance on how to proceed. A permit from FWC may need to be obtained to impact gopher tortoises as part of intrusive or demolition operations.

APPENDIX K
EVAUCATION PLAN

FINAL

Evacuation Plan
Former Pinecastle Jeep Range
Orange County, Florida

1.0 INTRODUCTION

1.1 Authorization

1.1.1 The U.S. Army Corps of Engineers (USACE) plans to perform a remedial investigation and feasibility study (RI/FS) to assess the nature and extent of munitions hazards within the former Pinecastle Jeep Range in Orange County, Florida. Munitions and Explosives of Concern (MEC) exist on property formerly owned or leased by the Department of Army. MEC and munitions constituents (MC) are a safety hazard and may constitute an imminent and substantial endangerment to the local populace and site personnel.

1.1.2 The RI/FS falls under the Defense Environmental Restoration Program – Formerly Used Defense Sites (DERP-FUDS) and will be performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104, and the National Contingency Plan (NCP), Sections 300.120(d) and 300.400(e).

1.1.3 All activities involving work in areas potentially containing unexploded ordnance hazards shall be conducted in full compliance with Department of Defense (DoD), Department of Army, USACE, state and local requirements regarding personnel, equipment, and procedures. 29 CFR 1910.120 applies to all actions taken at this site.

1.2 Applicability of Evacuation Process

1.2.1 Evacuation is required when non-essential personnel are within a safety zone. This may occur during three types of scenario:

1. Non-essential personnel are within the pre-established safety zone used for intrusive excavation of anomalies. Each site area has a safety zone established as part of the Explosives Siting Plan (Chapter 6). This scenario is classified as a planned evacuation.
2. Non-essential personnel are within the safety zone of an unplanned-for munition identified during intrusive excavation of anomalies. This situation may occur in the unlikely event that a larger munition is identified and the resulting safety zone encompasses non-essential personnel. This scenario is classified as an unplanned evacuation.
3. Non-essential personnel are within the safety zone of a munition within the project area identified as part of project activities other than intrusive investigation of anomalies. This amounts to an unexpected discovery by the project team. This scenario is classified as an unplanned evacuation.

1.2.2 Other scenarios, such as residents or non-military contractors encountering MEC, are not addressed by this plan. The process for such situations will be for local law enforcement to be notified, who may in turn notify active military Explosive Ordnance Disposal (EOD) teams for response. The project team may only respond to this other scenarios if requested by the USAESCH.

1.2.3 Evacuation will not be required for non-intrusive field operations such as geophysical surveys, surveying, brush clearing, or reacquisition of geophysical anomalies. Landscaping restoration work will also not require evacuation.

2.0 EVACUATION PROCESS FOR PLANNED EXCAVATIONS

The process for evacuating non-essential personnel from the safety zone around planned excavations and planned demolition of munitions will consist of notification, evacuation, verification of evacuation, and release from evacuation. The steps for the evacuation process are provided below. A separate process is provided for emergency evacuations (Section 3.0).

2.1 Notifications

2.1.1 The nature of planned excavations allow sufficient time for a series of notifications to be sent to residents, landowners, and other stakeholders. Such notifications will be in the form of general announcements, letters fliers, emails, door hangers, and knocking on doors.

2.1.2 In addition to the notifications to those residents and landowners directly affected by the evacuation, local officials such as city, county, and law enforcement will also be notified as part of the general coordination effort. The information conveyed to officials will be the locations of the evacuations, timing, need for road closure and other similar information.

2.1.3 Table K.1 provides the general sequence and nature of the notifications to be conducted as part of this process. The following sections describe the timing, content, distribution, and responsibility for each type of notification.

2.1.1 Meeting Announcements

When: During any public meeting or RAB meeting that occurs approximately in the period up to one to two months prior to the planned excavation of anomalies.

Content: The announcement of the general areas and timing of planned excavations should be provided as part of the agenda of these meetings.

Recipients: Meeting attendees, representatives of local governments and agencies who are present, news media in attendance.

Responsibility: The USACE Jacksonville District should make the announcement. Parsons will assist by providing information on locations and schedule.

2.1.2 Letter, Email, Flier

When: Approximately two weeks before evacuation is required, letters, emails, and fliers will be distributed.

Content: The letter will contain an explanation for the need for evacuation stressing the necessity for everyone in the area to evacuate. The letter will describe the process including explaining the sequence of geophysical surveys, anomaly reacquisition (placing of flags), and the mag and dig and intrusive investigation of anomalies. It will discuss the areas needing evacuation, planned duration, and the location of a hospitality center.

Contact information will be provided for people requiring special needs so they may request assistance (e.g. people in hospice care, people with language or communications problems). Emails will contain the same information as the letters. Fliers will be prepared that identify the areas being evacuated and the timing of the evacuation. Fliers will also be designed for posting in community areas.

Recipients: Letters will be mailed to residents of homes, apartments, townhouses, and businesses within the affected area. Letters will also be mailed to landowners. In addition to a letter, emails will be sent to those affected residents who have provided email addresses. Fliers will be mailed to homeowner's associations, businesses, and other organizations that are in or directly serve the affected areas.

Responsibility: The USACE Jacksonville District will send the letters, emails, and fliers. Parsons will assist by providing content information.

2.1.3 Door-Hangers and Email

When: Two to three days before the intrusive excavation of anomalies is scheduled in the affected area.

Content: Door-hangers and emails will be used as a reminder of the evacuation and will provide details, such as:

- Dates and hours for the planned evacuation;
- Location of hospitality suite;
- Information for people with pets;
- Reminders to reschedule lawn service, in-house appointments, etc.;
- Reminders to notify all occupants about the evacuation;
- Who to contact for help with special needs; and
- Who to contact with any other concerns.

Recipients: Door-hangers will be placed on the front doors of each residence and business within the affected area. In addition to the door-hangers, emails will be sent to those affected residents who have provided email addresses.

Responsibility: Parsons will place the door-hangers. The USACE Jacksonville District will send the emails. Parsons will assist by providing content information and identify the affected area.

2.1.4 Knock on Door

When: Each residence and business in the affected area will be visited in the morning of each day that intrusive work will be conducted.

Content: The visit will be used to confirm that the occupant has evacuated or will shortly evacuate. Persons conducting the visit will document either no response, or the name of the person answering the door (if given) plus the time and location.

Recipients: All residences and businesses within the affected area.

Responsibility: Parsons will conduct the visits.

Table K.1
Notifications for Evacuations

Timing (Approx.)	Form of Notification	Recipients	Content	Primary Responsibility
1-2 months prior	Announcements at meetings	Meeting attendees, RAB, news media, officials	General intrusive schedule, areas to be covered, expected evacuations	CESAJ
2 weeks prior	Letter	Landowners and residents in affected area, officials	Upcoming need for evacuation, dates, areas	CESAJ
	Email	Landowners and residents in affected area, officials	Same as letter	CESAJ
	Fliers	Homeowner's associations and other organizations within the affected area	Same as letter	CESAJ
2-3 days prior	Door-hanger	Residents in affected area	Evacuation need, location of hospitality suite, times, contact info	Parsons
	Email	Landowners and residents in area, officials	Same as door-hangers	CESAJ
Day of intrusive work	Knock on door	Residences and businesses in affected area		Parsons

2.2 Securing the Safety Zone

2.2.1 Parsons field personnel will oversee the withdrawal from the evacuation zone and restrict re-entry during investigation work hours. The Site Safety and Health Officer is responsible for confirming the safety of the evacuation zone. At the beginning of each workday, the assigned personnel will visit each affected residence within the evacuation zone, knock on doors, and look for signs of anyone being present. If any unauthorized persons are determined to be within the evacuation zone, they will be asked to depart and investigation work will not begin until they have left the evacuation zone. The safety personnel will also post signs or erect barriers to close affected streets and walkways to restrict unauthorized entry to the evacuation zone. Personnel will be stationed in appropriate locations outside the evacuation zone to monitor activities continuously during the investigation workday. In the event that unauthorized persons enter or are found within the evacuation zone, investigation activities will be halted until the persons are clear of the area.

2.2.2 If unauthorized persons fail to leave the evacuation zone, law enforcement will be contacted for assistance in clearing the area. If residents or other authorized occupants refuse to leave, intrusive excavation may not proceed.

2.3 Hospitality Services during Work Hours

Residents within the evacuation zone who are required to evacuate from their residences during the day may use the services provided by the project team hospitality center at a predetermined hotel or other similar facility. A hospitality center will be established depending on work schedules, resident's needs, and availability of space. Specific information regarding hospitality center operational hours and amenities will be provided in the letter mailed out to the affected residents in accordance with the schedule provided above. These services may include refreshments, telephones, television, and other amenities. In the unlikely event that residents are prevented from returning to their homes for the evening, suitable overnight accommodations will be made available to them.

2.4 Special Needs

The project team will establish a point of contact to address special needs such as transportation; child care coordination; boarding of pets; assistance with frail, ill, or disabled household members; temporary accommodations for residents who normally conduct business from residence offices; damage to property caused by a detonation at the project site; and other specials needs identified through the community notification efforts. Special needs will be addressed on a case-by-case basis. Identification of special needs in advance is important in the event of unplanned evacuations.

3.0 UNPLANNED EVACUATIONS

As stated above, unplanned evacuations will be required when an unexpected UXO is encountered (larger than the basis for the planned safety zone) or when a UXO is unexpectedly found during non-intrusive activities. These evacuations constitute an emergency and consist of the following activities:

- Evacuation of the (revised) safety zone;
- Notification of Evacuation Requirement;
- Disposal or Mitigation Operations; then
- Notification of All Clear

3.1 Evacuation of the Safety Zone

3.1.1 First priority will be to move any non-essential personnel out of the safety zone. Members of the field team will visit each residence or business within the safety zone and tell all occupants that everyone will need to leave the zone. Parsons field personnel will oversee the withdrawal from the evacuation zone and restrict re-entry until the emergency has passed. The occupants will be told of the location of the hospitality center if it is operational. The Site Safety and Health Officer is responsible for confirming the safety of the evacuation zone. The safety personnel will also assist with posting signs or erecting barriers to close affected streets and walkways to restrict unauthorized entry to the evacuation zone. Personnel will be stationed in appropriate locations outside the evacuation zone to monitor entry and egress.

3.1.2 Local law enforcement will be contacted for assistance with blocking roadways and persuading occupants and unauthorized persons who are reluctant to leave. The may also assist with suggesting evacuation routes.

3.2 Notification of Evacuation

3.2.1 Notifications in the event of an unplanned evacuation consist of two primary groups: community notifications and notifications within the Army organization. Notice of the need for evacuation will come from the field team through the USAESCH Safety Specialist. The initial persons to be notified from the field are local law enforcement and the USACE Project Manager.

3.2.2 Subsequent notifications will be conducted as follows:

<u>USACE Project Manager (Internal Information Clearinghouse):</u>
Wandell Carlton (904) 232-1804 Cell: (904) 697-6980

- Notify Community Relations Team (see below)
- Keep Project Delivery Team informed (contact USAESCH PM)
- Notify school system, city, county and state
- Notify Savannah District
- If necessary, arrange for hospitality center
- Verify notification of Lt Reynolds (law enforcement)
- Coordinate activities with USAESCH and Parsons
- Keep Mike Ornella informed

Upward Reporting within USACE:
Mike Ornella (904) 232-1600 Cell: (904) 614-1908

- Notify DP and SAJ Colonel
- Situation Report

- Keep PM informed of upward concerns
- Chief Corps Spokesperson

Community Relations:
Nancy Sticht (904) 232-1667 Cell: (904) 334-1054
Amanda Ellison (904) 232-1567 Cell: (904) 614-2240

- Inform Community Associations and Organizations within affected area
- Keep media informed
  - News Releases
  - Courtesy calls to news media
- Review draft notification documents
- Copy documents for distribution
- Take photos
- Keep USACE PM informed

Congressional Liaison:
Matt Gapinski

- Notify Congressional staff of situation

RI/FS Contractor – Parsons:
Project Manager - John Chulick (678)969-2409 Cell: (770)294-4393
Technical Director – Michael Short (678)969-2451

- Notify Project Safety and Health Officer
- Support and coordinate field operations

Doug Ralston, USA Environmental (813) 500-1099

3.2.3 Lists of key contacts and news media contacts are provided in Attachments K.1 and K.2 of this plan.

3.3 Disposal or Mitigation Operations

Once the non-essential personnel have been cleared from the safety zone, operations for the disposal or mitigation of the suspected UXO can be conducted. Procedures are provided in Appendix J – SOPs. Following the destruction or neutralization of the UXO, the Parsons Site Safety and Health Officer and the USAESCH Safety Specialist will review the worksite and verify that conditions are safe for return of evacuated persons.

3.4 Notification of All Clear

Notification of the all clear for evacuated persons to return will be conducted by the same persons who did the initial notifications. If in use, the hospitality center will be contacted so that all persons can return. Local law enforcement and officials will also be notified.

ATTACMENT K.1
KEY CONTACTS

City of Orlando (Web site: www.cityoforlando.net)
Buddy Dyer (Elected 2003, reelected 2004)
Mayor
400 S. Orange Avenue
P.O. Box 4990
Orlando, FL 32802-4990
Phone: 407-246-2221
Fax: 407-246-2842
E-mail: buddy.dyer@cityoforlando.net

Joe Robinson
Chief of Staff
400 S. Orange Avenue
P.O. Box 4990
Orlando, FL 32802-4990
Phone: 407-246-2221
Fax: 407-246-2842

Bruce Hossfield
Senior Planner, City Planning
P.O. Box 2975
Orlando, FL 32802
Phone: 407-246-3355
Bruce.hossfield@cityoforlando.net

Lt. Dale Reynolds
Acting Commander, Arson/Bomb Squad
City of Orlando Fire Department
Orlando City Hall
400 S. Orange Avenue
P.O. Box 4990
Orlando, FL 32802-4990
Phone: 407-246-4002
Cell: 321-229-2091

Phil Diamond
Commissioner, District 1
400 S. Orange Avenue
P.O. Box 4990
Orlando, FL 32802-4990
Phone: 407-246-2001
Fax: 407-246-3010
E-Mail: Phil.Diamond@cityoforlando.net

Florida Department of Environmental Protection (Web site: www.dep.state.fl.us)
Main Office
3900 Commonwealth Boulevard M.S. 49
Tallahassee, Florida 32399
Phone: 850-245-2118
Fax: 850-245-2128

Central District Office
3319 Maguire Blvd, Suite 232
Orlando, Florida 32803-3767
Phone: 407-894-7555
Fax: 407-897-6499

Contact: Mary Ann Kraus, P.G.
Waste Cleanup Section, Central District
Phone: 407-893-3331
Fax: 407-893-3599
Mary.kraus@dep.state.fl.us
(Supervisor: Bret LeRoux)

Odyssey Middle School (Web site: www.odms.ocps.net)
Principal – Patricia Bowen-Painter
bowenpp@ocps.net
9290 Lee Vista Boulevard
Orlando, FL 32829
Phone: 407-207-3855
Fax: 407-207-3873

Orange County (Web site: www.orangecountyfl.net)
Richard Crotty
County Mayor
201 S. Rosalind Ave., 5th Floor
Orlando, FL 32801
Phone: (407) 836-7370
Fax: (407) 836-7360
E-Mail: mayor@ocfl.net

Linda Stewart
County Commissioner, District 4
201 S. Rosalind Ave., 5th Floor
Orlando, FL 32801
Phone: 407-836-7350
Fax: 407-836-5935
E-Mail: district4@ocfl.net

Kevin Beary
County Sheriff
2500 W. Colonial Drive
Orlando, FL 32804
407-254-7000

Orange County Public Schools (Web site: www.ocps.net)
Ronald Blocker
School Superintendent
Educational Leadership Center
445 W. Amelia Street
Orlando, FL 32801
Phone: 407-317-3209
Fax: 407-317-3401
E-mail: Supt@ocps.net

Rickey Harris
Senior Director, Safety, Security and Environmental
Services
445 W. Amelia Street
Orlando, FL 32801
Phone: 407-317-3468
Cell: 321-229-4745
E-mail: harrisr@ocps.net

Lindsley (Lin) Wright
Senior Manager, Construction Communications
6501 Magic Way, Bldg. 200
Orlando, FL 32809
Phone: 407-317-3700, ext. 5927
Fax: 407-317-3768
E-mail: wrightl@ocps.net

Dylan Thomas
Director, Community Relations
Phone: 407.317.3368
E-mail: thomasp1@ocps.net

Katherine P. Marsh
Senior Manager, Media Relations
Educational Leadership Center
445 W. Amelia St.
Orlando, FL 32801
Phone: 407-317-3200 ext. 2901
E-mail: marshk1@ocps.net

Orange County School Board
Karen Ardaman, Chair
P.O. Box 271
Orlando, FL 32802
Phone: 407-317-3236
Cell: 407-716-6862
E-mail: ardamak@ocps.net

Daryl Flynn, District 2 representative
P.O. Box 271
Orlando, FL 32802
Phone: 407-317-3236
Cell: 407-832-5017
E-mail: flynnd@ocps.net
Assistant: Denise Santia – E-mail santiad2@ocps.net

Orlando Public Library (Houses Information Repository)
101 E. Central Blvd.
Orlando, FL 32801
407-835-7323
Point of contact: Debbie Tour, 407-835-7420

Orlando Public Library (Closest branch to school; maintains Information Repository)
Southeast Branch
5575 South Semoran Boulevard
Orlando, FL 32822
Point of contact: Paolo Melillo, 407-835-7323

Vista Lakes Community
Ron Cumello
President, Vista Lakes Community Association
6702 Vista Park Boulevard
Orlando, FL 32829
407-243-2334 (Home)
301-717-0613 (Cell)
E-mail: rcumello@bellsouth.net

Vista Lakes Community Association, Inc.
Carol Rumely, Association Manager
8009 South Orange Avenue
Orlando, FL 32809-6711
Tel: 407-447-9955
Fax: 407-447-9899

YMCA

9055 NorthLake Pkwy.
Orlando, FL 32827
407-852-3520

U.S. Congress

Senator Bill Nelson
- Democrat – elected Nov 2000.
- Born in Miami, fifth-generation Floridian
- Committees: U.S. Senate Armed Services, Budget, Commerce, Foreign Relations, Intelligence and Aging

Orlando Office
Local contact: Celeste Brown
Landmark Two
225 East Robinson Street, Ste 410
Orlando, Florida 32801
Phone: 407-872-7161
Fax: 407-872-7165
Washington Office
United States Senate
716 Senate Hart Office Building
Washington, DC 20510
Phone: 202-224-5274
Fax: 202-228-2183
Senator Mel Martinez
- Republican; elected Nov 2005.
- Florida native, first Cuban-American in Senate
- Committees: Armed Services, Banking, Housing and Urban Affairs, Energy and Natural Resources Committees and the Special Committee on Aging

Orlando Office:
Local contact: John Newstreet
315 East Robinson Street
Landmark Center 1, Suite 475
Orlando, FL 32801
Main: 407-254-2573
Fax: 407-423-0941
Toll Free: 866-630-7106

Washington Office:
United States Senate
356 Russell Senate Office Building
Washington, DC 20510
Main: 202-224-3041
Fax: 202-228-5171

U.S. Rep Ric Keller

- Republican, 4th term, seeking reelection in 2008
- Native of Orlando
- Committees: House Education & Labor, House Judiciary

Orlando Office:
605 E. Robinson St., Suite 650
Orlando, FL 32801
Phone: 407-872-1962
Fax: 407-872-1944

Washington Office:
419 Cannon House Office Building
Washington, D.C. 20515
Phone: 202-225-2176
Fax: 202-225-0999

ATTACHMENT K.2
ORLANDO MEDIA

Orlando Sentinel
633 N. Orange Avenue
Orlando, FL 32801
407-420-5000
www.orlandosentinel.com
Reporter: Rich McKay
Orange/Seminole Editor: Jennifer Greenhill-Taylor 407-420-5359 Office; 407-883-5295 Cell; E-mail: jgreenhill@orlandosentinel.com

East Orlando Sun
13000 Avalon Lake Drive
Suite 205
Orlando, FL 32828
407-658-2404
www.eosun.com
Reporter: Megan Shannon
Phone: 407-658-2404
Email: megans@eosun.com

Orlando Business Journal
315 E. Robinson Street
Suite 250
Orlando, FL 32801
Phone: 407-649-8470
Fax: 407-420-1625
Email: orlando@bizjournals.com

El Sentinel (Weekly - Spanish)
Reporter: JoAnna Ramos
Phone: 321-206-3033
E-mail: jramos@endorlando.com

Miami Herald
Central Florida Bureau
3615 18th Street
Vero Beach, FL 32960
Phone: 772-562-1746
Cell: 772-562-1874
Fax: 772-559-5263
E-Mail: plong@miamiherald.com
Reporter: Phil Long, Staff Writer

ABC Affilitate – WFTV Ch. 9
490 E. South Street
Orlando, FL 32801
Phone: 407-841-9000
Newsroom: 407-822-8353
www.wftv.com
Managing Editor: Joel Davis
- 407-822-8301 Office
- 407-409-6145 Cell
- 407-649-8211 Fax
- E-mail: joel.davis@wftv.com

Assignment Manager: Susan Falcon
- 407-822-8299 Office
- 407-448-3467 Cell
- E-mail: susan.falcon@wftv.com

Reporter: Tim Wetzel, 407-402-9089 Cell; E-mail: tim.wetzel@wftv.com

Cox Television Station – WRDQ Ch. 27 (Partner to Ch. 9 above)
490 E. South Street
Orlando, FL 32801
Phone: 407-841-9000
Newsroom: 407-822-8353
Programming: 407-822-5915
www.wrdq.com

CBS Affiliate – WKMG Ch. 6
4466 N John Young Pkwy
Orlando, FL 32804
(407) 291-6000
407-521-1323
www.local6.com
Anchor/reporter: Lauren Rowe, host of Sunday evening talk show "Flashpoint"
E-mail: lrowe@local6.com
(Partners: USA Today, Washington Post, CNN)

NBC Affiliate – WESH Ch. 2
1021 N. Wymore Road
Winter Park, FL 32789
(407) 645-2222
www.wesh.com
(Partners: CNN.com, Bloomberg.com, MSNBC)

Fox Affiliate – WOFL Ch. 35
35 Skyline Drive
Lake Mary, FL 32746
(407) 644-3535
Fax: (407) 741-5189
www.myfoxorlando.com
Reporter: Shannon Butler (Shannon.butler@foxtv.com)

Central Florida News – Ch. 13
20 North Orange Ave., Suite 13
Orlando, FL 32801
Main Line 407-513-1300
Assignment Desk 407-513-1313
Fax: 407-513-1399
www.cfnews13.com
Reporter: Paul Milliken 407-513-1361; E-mail: pmilliken@cfnews13.com

WMFE - Public Broadcasting System – Ch. 24
11510 East Colonial Drive
Orlando, FL 32817
Phone: 407-273-2300
www.wmfe.org
Local programming: "This Week" – 30 minute news program, "delivering the biggest stories affecting...central Florida." Host, Jerry Eisinger
Programming: tvprogramming@wmfe.org

WMFE-FM 90.7 - National Public Radio
11510 East Colonial Drive
Orlando, FL 32817
Phone: 407-273-2300
Call-in program: "On the Line"
E-mail: wmfenews@wmfe.org
Programming: fmprogramming@wmfe.org

WTMO Telemundo Orlando
1650 Sand Lake Road, Suite 340
Orlando, FL 32809
Phone: 407-888-2288
Fax: 407-888-2916
E-mail: tufuente@telenoticias.net
Cameraman: Luis Sepulveda

AM-580 - WDBO (News/Talk radio)
4192 N. John Young Pkwy
Orlando, FL 32804
(407) 295-5858 - www.580wdbo.com

APPENDIX L
PUBLIC COMMENTS

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The responses to public comments from the March 27, 2008 Public Workshop will be provided separately.