FINAL
DECISION DOCUMENT

DEMONSTRATION RANGE (NORTH) MUNITIONS RESPONSE SITE

FORMER PINECASTLE JEEP RANGE

ORANGE COUNTY, FLORIDA

MRS No. I04FL040502

U.S. Army Corps of Engineers

January 2012

EXECUTIVE SUMMARY

ES.1. This Decision Document contains the selected remedy for the Demonstration Range (North) Munition Response Site (MRS) (MRS No. I04FL040502) of the former Pinecastle Jeep Range, Formerly Used Defense Site (Property No. I04FL0405). This MRS is comprised of that land lying south of Lee Vista Boulevard but north of the Mockingbird property line, west of State Highway 417. This land is mostly developed with two residential communities and Odyssey Middle School.

ES.2. The selected remedy for this MRS includes the removal of munitions and explosives of concern (MEC)—specifically unexploded ordnance (UXO) and discarded military munitions (DMM), the removal of contaminated soil discovered during MEC removal, a public education program for residents and school staff, and five-year reviews of the prescribed actions for effectiveness and applicability. Six potential response alternatives were presented that included a range of efforts ranging from No Department of Defense Action Indicated (NDAI) to fencing off the wetland s (rather than MEC removal). However, these two alternatives were not considered practical to support the objective of reducing the risk of exposure to MEC and munitions constituents (MC).

ES.3. Compared to the other MRSs at the former Pinecastle Jeep Range, the Demonstration Range (North) MRS has the greatest risk of human interaction with UXO, DMM, and MC-contaminated soil due to the large residential population. The selected remedy will significantly reduce this risk of exposure. The potential for the existence of MEC will remain underneath existing structures (e.g. buildings, sidewalks, roads). For this reason, five-year reviews will be conducted to evaluate the need for further action.

ES.4. The MEC removal (field activities) at the Demonstration Range (North) MRS is expected to occur over 34 weeks. Additional educational awareness and five-year reviews will occur over 30 years, if required.

ES.5. Assuming that UXO, DMM, or MC-contaminated soil are detected and removed as a result of the remedial action, there will be a reduction in toxicity, mobility, and volume of MEC and MC through their removal.

ES.6. The expected cost associated with the selected remedy for this MRS is $4,237,012. Funding for this project is expected to occur in the 2011 fiscal year.

Table of Contents

PART 1: THE DECLARATION

PART 2: THE DECISION SUMMARY

LIST OF ACRONYMS

AP	armor-piercing
ASR	Archives Search Report
ARAR	applicable or relevant and appropriate requirements
CFR	Code of Federal Regulations
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CESAJ	U.S. Army Corps of Engineers – Jacksonville District
CSM	conceptual site model
CSEM	conceptual site exposure model
DD	Decision Document
DERP	Defense Environmental Restoration Program
DMM	discarded military munitions
DoD	Department of Defense
EcoSSLs	Ecological Soil Screening Levels
ESV	ecological screening values
FDEP	Florida Department of Environmental Protection
FUDS	Formerly Used Defense Site
FS	Feasibility Study
HEAT	high explosive anti-tank
INPR	Inventory Project Report
MC	munitions constituents
MD	munitions debris
MEC	munitions and explosives of concern
MRS	Munitions Response Site
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDAI	No DoD Action Indicated
O&M	operations and maintenance
RAB	Restoration Advisory Board
RAO	Remedial Action Objective

RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
SARA	Superfund Amendments and Reauthorization Act of 1986
SI	Site Inspection
TBC	to be considered
TCRA	time-critical removal action
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
UXO	unexploded ordnance
WP	white phosphorus

PART 1: THE DECLARATION

1.0 Project Name and Location

The Pinecastle Jeep Range, Formerly Used Defense Site (FUDS) (FUDS Property No. I04FL0405) is located in Orange County, Florida. The Demonstration Range (North) Munitions Response Site (MRS) (MRS I04FL040502) is comprised of land lying south of Lee Vista Boulevard but north of the Mockingbird property line, west of State Highway 417. This land is mostly developed with two residential communities and Odyssey Middle School. The location of the MRS is shown in Figure 1.

2.0 Statement of Basis and Purpose

2.1. This Decision Document is being presented by the United States Army Corps of Engineers (USACE) to describe the Department of Defense (DoD) selected remedy for the Demonstration Range (North) MRS of the former Pinecastle Jeep Range FUDS in Orange County, Florida. The FUDS Charter designated the Army as the Executive Agent on behalf of the DoD charged with meeting all applicable environmental restoration requirements at FUDS, regardless of which DoD component previously owned or used the property. The Secretary of the Army further delegated the program management and execution responsibility for FUDS to the USACE. The USACE is the lead agency for investigating, reporting, evaluating and implementing remedial actions at the former Pinecastle Jeep Range.

2.2. This Decision Document is a requirement of 42 U.S. Code (USC) § 9617 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as Superfund, and follows the requirements from Engineer Regulation 200-3-1, Formerly Used Defense Site Program Policy and the United States Environmental Protection Agency (USEPA) guidance provided in A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, EPA 540-R-98-031.

2.3. The remedy described in this Decision Document was selected in accordance with CERCLA, 42 U.S. Code § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300 et seq., as amended. The Administrative Record provides supporting documentation for this decision.

3.0 Assessment of Project MRS

An evaluation of site data indicates that munitions and explosives of concern (MEC)—specifically unexploded ordnance (UXO) and discarded military munitions (DMM)—are

present at the Demonstration Range (North) MRS and that risk is associated with a large residential population. If present and acted upon, MEC is a safety hazard and constitutes an imminent and substantial endangerment to on-site personnel. In addition, the munitions constituents (MC) risk assessment indicated that a localized human health risk may be present in specific small areas at the Demonstration Range (North) MRS.

4.0 Description of Selected Remedy

4.1. The following remedy has been selected for the Demonstration Range (North) MRS and will be conducted under CERCLA requirements in accordance with applicable state and federal requirements:

- Removal of MEC – Metallic anomalies will be removed to a maximum of four feet or to the depth of groundwater, whichever is shallower;
- Removal of MC-contaminated Soil – soil contaminated with MC above established cleanup criteria will be remediated (e.g. removed);
- Educational Awareness –a public education program will be implemented to inform residents and school staff in the affected area of the hazards associated with MEC; and
- Five-year Reviews –the chosen alternative will be reviewed every five years, if required, for effectiveness and continued applicability.

4.2. The remedial investigation (RI) completed in 2010 characterized the nature and extent of MEC and of MC associated with the former military activities (e.g. ranges) at the former Pinecastle Jeep Range. MEC and MC were found to exist, specifically within the central/western portion of the site. To address the MEC/MC contamination, the site was divided into four MRSs depending on the presence or lack of MEC/MC discovered during the RI, or on the land use of the MRS. For example, the Demonstration Range (North) MRS was found to contain risks associated with MEC/MC and contained residential areas, a school, and wetlands. The Demonstration Range (South) and Demonstration Range (East) MRSs contained MEC/MC risks, however the (South) MRS is primarily comprised of wetlands and open pasture while the East MRS contains wetlands and industrial facilities—primarily the Orange County Solid Waste Facility. The Remaining Area MRS was found to contain no risks associated with MEC/MC and was recommended for no further action.

4.3. Cleanup prioritization will be given to the Demonstration Range (North) MRS which contains the largest human population. Performing the selected remedy will remove from the MRS the source materials presenting a threat to the public and the environment. Removing MEC will reduce or remove the explosive hazard presented by contact and interaction with UXO and DMM. Likewise, removing the MEC will remove the source of

the MC which can leach from MEC. In areas where MC has been discovered in concentrations above the Florida Department of Environmental Protection (FDEP) criteria, soil will be remediated to reduce or remove the hazards associated with the presence of MC.

5.0 Statutory Determinations

Based on the information currently available, the selected remedy for the Demonstration Range (North) MRS is protective of human health and the environment and satisfies the requirements of CERCLA §121, and to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and uses permanent solutions and alternative treatment technologies to the maximum extent practicable. This remedy also satisfies the statutory preference for treatment as a principal element of the remedy. Reviews conducted every five years will evaluate the effectiveness of the remedy as well as the continued applicability.

6.0 Data Certification Checklist

6.1. The following information is included in the Decision Summary section of this Decision Document.

- MEC and MC and their respective concentrations.
- Baseline risk represented by the MEC and MC.
- Cleanup levels established for MEC and MC and the basis for these levels.
- How MEC and MC will be addressed.
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and Decision Document.
- Potential land and groundwater use that will be available at the site as a result of the selected remedy.
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected.

- Key factor(s) that led to selecting the remedy at the Demonstration Range (North) MRS.

6.2. Additional information can be found in the Administrative Record file for this site.

7.0 Authorizing Signature

This Decision Document presents the selected response action at the Demonstration Range (North) MRS at the former Pinecastle Jeep Range in Orange County, Florida. The US Army Corps of Engineers is the lead agency under the Defense Environmental Restoration Program at the Pinecastle Jeep Range Formerly Used Defense Site, and has developed this Decision Document consistent with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan. This Decision Document will be incorporated into the larger Administrative Record file for the former Pinecastle Jeep Range, which is available for public view at 5575 S. Semoran Blvd., Orlando, Florida. This document, presenting a selected remedy with a present worth cost estimate of $4,237,012, is approved by the undersigned, pursuant to Memorandum, DAIM-ZA, September 9, 2003, subject: Policies for Staffing and Approving Decision Documents, and to Engineer Regulation 200-3-1, Formerly Used Defense Sites Program Policy.

APPROVED: DATED:

Christine Godfrey 1-5-11

CHRISTINE A. GODFREY

Acting Chief, Environmental Community of Practice

Directorate of Military Programs

PART 2: THE DECISION SUMMARY

1.0 Project Name, Location, and Brief Description

1.1. The site addressed in this Decision Document is the Demonstration Range (North) MRS (MRS No. I04FL040502) within the former Pinecastle Jeep Range, FUDS Property No. I04FL0405. The USACE is the lead agency for investigating, reporting, evaluating, and implementing remedial actions at the project site. The source of funding for the selected remedy is the USACE's FUDS Program. The Florida Department of Environmental Protection (FDEP) has been a supporting agency of this process, having reviewed and commented on planning documents and the remedial investigation/feasibility study (RI/FS) report.

1.2. The former Pinecastle Jeep Range is located approximately three miles east-northeast of the Orlando International Airport in Orange County, Florida. The Demonstration Range (North) MRS is comprised of the land lying between Lee Vista Boulevard (on the north) and the Mockingbird property boundary (on the south), west of State Highway 417 (Figure 1). The MRS contains property occupied by the Odyssey Middle School, Tivoli Gardens, Lee Vista Square, and wetlands and undeveloped areas.

2.0 Project Site History and Enforcement Activities

2.1 Site History

The U.S. Government established the Pinecastle Jeep Range during 1943 when it leased approximately 12,483 acres for use by the Army Air Corps. The property was also known as the Tactical Demonstration Range, the Orlando Range, Pinecastle Range, Pinecastle Bombing Range, and Pinecastle Chemical Demonstration Range, and was an off-post, or auxiliary site, of Pinecastle Army Air Field—the predecessor to McCoy Air Force Base. Although a sub-installation of the Pinecastle Army Air Field, a number of elements of the Army Air Force Tactical Center headquartered at Orlando Army Air Base used the facility for gunnery range training. The Army Air Forces School of Applied Tactics used the site for Combined Tactical Demonstration exercises for student instruction in employment of aerial weapons. Pinecastle Jeep Range was initially used for small arms training with a Jeep Range for .50 caliber machine gun training, a 45-position rifle range, and a separate 15-target rifle range. The curriculum included at least four choreographed munitions demonstration programs which took place in front of students and observers situated on nearby bleachers. These demonstrations included ordnance demonstrations, convoy strafing demonstrations, chemical warfare demonstrations (using chemical agent simulant), and tactical air forces demonstrations. The War Department declared the Pinecastle Jeep Range surplus effective December 2, 1946, and by December 5, 1947, the War Department terminated the lease on the range property. Range clearance activities were conducted at the former Pinecastle Jeep Range from March to September 1947 and during the summer of 1948. On August 6, 1948, the War Department terminated the lease with Magnolia Ranch, Inc. for the majority of the range (11,833 acres). Magnolia Ranch, Inc.

subsequently filed damage claims and sued the government in the United States Court of Claims in 1952. An additional clearance effort occurred in 1953, and the case was settled in 1955. The ordnance clearances conducted in April and June 1953 resulted in a recommendation that a 500-acre area be restricted to surface use only based on the surface clearance completed. This area included a small portion of the Demonstration Range (North) MRS, specifically the eastern portion of the Odyssey Middle School, the conservation area between Odyssey Middle School and Tivoli Gardens, and the southwestern portion of Tivoli Woods. There was no subsequent documentation that the restricted area was implemented. No records of munitions finds since the 1953 clearance activity until 2009 have been located.

2.2 Previous Investigations

2.2.1. The USACE has completed a series of studies for the former Pinecastle Jeep Range compliant with the CERCLA process.

2.2.2. An Inventory Project Report (INPR) was completed in 1994 to determine the eligibility for the Pinecastle Jeep Range under the DERP-FUDS, establish the preliminary site boundary, assign the FUDS project number, and evaluate whether further action was warranted.

2.2.3. An Archives Search Report (ASR) was completed in 1997 based on available historical records, interviews, and a site visit. The site visit team was not able to access undeveloped areas in the western portion of the site but potential bomb craters were noted from aerial photographs. In 2004, an ASR Supplement was prepared based on the 1997 ASR to form a preliminary conceptual site model (CSM) and to establish areas of concern.

2.2.4. A Site Inspection (SI) was conducted in 2007 to determine if there was evidence of remaining munitions at the former Pinecastle Jeep Range. During the SI, several bomb craters and munitions debris (MD) were discovered, and soil samples were collected which contained concentrations of explosives compounds. In June 2007, several live munitions (UXO) were discovered by a landowner and were subsequently destroyed by military personnel from Patrick Air Force Base. The discovery of these munitions led to a time-critical removal action (TCRA) that began in August 2007 resulting in more UXO and MD being discovered in several areas within the former Pinecastle Jeep Range, including at the Odyssey Middle School, Tivoli Gardens, and a northern portion of the Mockingbird Property adjacent to Odyssey Middle School. During the TCRA, no UXO or MD were found in the Warwick sub-division, which is adjacent to the west of the school property and Mockingbird Property.

2.2.5. Prior to the completion of the TCRA in July 2008, an RI was initiated to characterize the location, concentration, and extent of MEC and MC contamination within the FUDS. To assess the presence of MEC, a geophysical survey was conducted to detect anomalies similar in characteristics to the munitions formerly used. The team selected 51,010 anomalies throughout the FUDS for investigation and found UXO at 20 locations and MD at 599 locations. The remaining 50,391 items consisted of non-munitions debris (e.g., construction debris, sprinklers),

small arms projectiles, anomalies caused by instrument interference or rough terrain, and anomalies which became unavailable due to flooding or a retraction of permission to enter a property.

2.3 CERCLA Enforcement Activities

To date, there have been no CERCLA-related enforcement activities at the project site.

3.0 Community Participation

3.1. In an effort to keep the public informed, public meetings relating to activities within the former Pinecastle Jeep Range were held on four occasions. The public meetings were designed to present the investigation schedule for the site and also to receive questions regarding investigation activities and to solicit views on the reasonably anticipated land uses and potential future land uses of the MRS. Fact sheets were prepared and distributed during these meetings.

3.2. A Restoration Advisory Board (RAB) was established for the former Pinecastle Jeep Range project in an effort to maintain representatives of the community as stakeholders of the project. The RAB members reviewed and commented on site documents before their release to the public. During the RI/FS, ten RAB meetings were held in an effort to include these community representatives in the investigation and remedial alternative evaluation process for the site.

3.3. A news release was issued on July 18, 2010, to announce the completion of the final RI/FS Report and a Proposed Plan. A draft final version of the Proposed Plan was issued on July 22, 2010. The Proposed Plan was posted on the USACE-Jacksonville District (CESAJ) website and placed in the local administrative repository with the RI/FS Report and other documents for the site. The USACE sent a letter to all property owners within the boundary of the FUDS that explained the results of the RI/FS Report and the CERCLA process. The local residents and other interested parties were encouraged to review the Proposed Plan and submit comments during their attendance at the July 22, 2010 Public Meeting. Public comments on the Proposed Plan were accepted during a 30 day public review and comment period (i.e., July 22 – August 23, 2010).

4.0 Scope and Role of Response Action

4.1. Similar to many FUDS, the problems at the former Pinecastle Jeep Range are complex. As a result, the USACE organized the site into four MRSs to facilitate the cleanup. These four MRSs are as follows:

- Demonstration Range (North) MRS;
- Demonstration Range (South) MRS;

- Demonstration Range (East) MRS; and
- Remaining Area MRS.

4.2. The USACE has selected the remedies for these MRSs. Apart from the Remaining Area MRS, which has been selected for No DoD Action Indicated, the Demonstration Range MRSs have been prescribed similar remedies with the goal of reducing the threat posed by UXO and MC contamination. The MRSs were divided accordingly due to their different land uses, each mandating a different approach to achieve their respective remediation goal. Whereas the Demonstration Range (North) MRS includes residential properties, a school, and wetlands, the other MRSs contain either open pastures and wetlands (Demonstration Range (South) MRS) or wetlands, commercial developments, and a large landfill facility (Demonstration Range (East) MRS). Separate Decision Documents have been created for each MRS to address the specific characteristics of each, as well as to present their selected remedy.

4.3 For the Demonstration Range (North) MRS, the subject of this DD, the Response Action will begin with the removal of MEC and MC-contaminated soil in areas identified during the RI. The remedial action will be conducted within the Odyssey Middle School property, parcels within Tivoli Gardens which were not previously cleared, the conservation area between Tivoli Gardens and Odyssey Middle School, parcels within Lee Vista Square which were not previously cleared, and all other parcels within the Demonstration Range (North) MRS not previously cleared of UXO and DMM. Underbrush will be removed from the undeveloped areas (including wetlands) and geophysical surveys will be conducted to identify the locations of potential remaining MEC. Anomalies identified from the surveys will be investigated and UXO and DMM removed. The UXO and DMM may require destruction in place by detonation. Soil sampling will be conducted to ensure MC concentrations are below the cleanup criteria established in Section 8.2.

5.0 Project Site Characteristics

5.1 Conceptual Site Model

5.1.1 During the RI and TCRA, UXO and DMM were discovered at the Demonstration Range (North) MRS. Since additional UXO are expected to remain, the exposure pathway is considered complete for MEC on the surface and in subsurface soil. Data gathered during the TCRA and RI fieldwork support the historical reports indicating that the Demonstration Range (North) MRS was used for military weapons training and demonstration activities.

5.1.2 A Jeep Track was constructed (with the northern half being within the Demonstration Range (North) MRS and the southern half being within the Demonstration Range (South) MRS) for training of aircrews with small arms (.30 and .50 caliber machineguns) against a moving target that moved behind berms. The Jeep Track range fan was pointed due east. Evaluation of

the soils in the area, including the existing portion of the Jeep Track to the south, did not identify any significant hazards due to MC (metals). Small arms do not pose an explosives hazard.

5.1.3 Weapons demonstrations were focused on the eastern side of the Jeep Track where observers sat on wooden bleachers. This area is now the southeastern portion of the Odyssey Middle School property. Historical records show that incendiary devices, including thermite grenades and bombs, were demonstrated in front of the bleachers. This area was also used to fire bazookas (2.36-inch rockets – practice and HE) toward the wetland east of the Jeep Track (east of the school property). Also, various calibers of anti-aircraft artillery (37mm to 90mm) were demonstrated by being fired horizontally to the east. High velocity aircraft rockets (5" HVAR) were fired to the east from an aircraft parked on the ground. These demonstrations resulted in UXO from surface to relatively shallow depths in a roughly triangular area east of the Jeep Track (that also extended partly into the Demonstration Range (South) MRS to the south). This understanding was supported by the depths and locations of UXO and MD identified from the TCRA and RI.

5.1.4 Based on historical data and recovery of UXO, 23-lb fragmentation bombs, and 20-lb practice bombs during the TCRA and RI, the southwestern portion of the Tivoli Gardens development may have been used as a bombing target. During the construction of the condominium development, some of the munitions apparently were moved as soil was graded within the development.

5.1.5 Construction of Odyssey Middle School involved leveling of the northern half of the Jeep Track and movement of soil to fill in low lying areas, resulting in the movement of some munitions with the soil. Evaluation of aerial photographs from the time of construction of the various developments at the former Pinecastle Jeep Range site indicates that the general practice was to move soil within a single development unit rather than move soil over large distances. Also, soil was typically excavated to create storm-water retention ponds with the soil being used as fill to raise the general grade before construction of the buildings. The aerial photograph analysis supports the idea that this practice occurred independently at Odyssey Middle School, Tivoli Gardens, and Lee Vista Square.

5.1.6 During the TCRA, it was discovered that munitions (UXO and DMM) were accumulated and disposed of in pits to the east and southeast of the Jeep Track. It is unknown if this occurred as part of regular range maintenance during its period of use or if these pits were created during the range clearance after the closing of the facility. The pits were encountered during the TCRA and extend to depths greater than 13 feet, where additional munitions are anticipated to remain.

5.1.7 Evaluation of environmental media as part of the TCRA and RI identified the MC barium as posing a direct contact human health hazard in soil in a limited area within the wetlands east of Odyssey Middle School. Barium is known to be a component of 2.36" rockets.

5.1.8 The overall CSM for the Demonstration Range (North) MRS consists of a multiuse range – small arms training with a moving target Jeep Track, use of static demonstrations of incendiary and other munitions (due east of the Jeep Track), firing bazookas and ground based weapons toward the edge of the wetland east of the Jeep Track, and a demonstration bombing target at the southwestern corner of what is now the Tivoli Gardens development. Due to the horizontal firing of anti-aircraft artillery, projectiles ranging from 37mm to 90mm are scattered eastward from the Jeep Track. Some of the UXO and MD within the portions of these targets and munitions use areas were moved as soil was graded during the construction of the school and residential developments; some areas were excavated, some areas were covered by fill, and some areas remain relatively undisturbed.

5.1.9 MC was assessed in surface soil and surface water during the RI. Barium was identified as a human health risk in surface soil in a limited area in the wetlands east of Odyssey Middle School. Exposure pathways for MC in the surface soil are presented in the Conceptual Site Exposure Model (CSEM) shown in Figure 2. Additional information supporting the CSM is provided in Sections 5.2 through 5.4 below.

5.2 Site Overview

The Demonstration Range (North) MRS is comprised of 247-acres in the western section of the former Pinecastle Jeep Range FUDS. This area consists of residential neighborhoods, a middle school, several ponds, wetlands, and empty parcels. Wetlands are located between Odyssey Middle School and Tivoli Gardens (23 acres), between Tivoli Gardens and Lee Vista Square (46 acres) and between Lee Vista Square and State Highway 417 (34 acres). There are no areas of archeological or historical importance within this MRS.

5.3 MEC Investigation

5.3.1. In 2008, a TCRA was performed and munitions were removed from Odyssey Middle School and Tivoli Gardens. UXO and DMM found during the TCRA included (as listed in the TCRA report): M6 2.36" High Explosive Anti-Tank (HEAT) rockets, 23-lb fragmentation bombs (99 unused bombs in a pit), M48 20-lb bombs, 37mm projectiles, 4.5" air to ground rockets, 75mm armor-piercing (AP) projectiles, a M9 rifle grenade, and M110 fuzes. Some of the UXO were of a type that contained white phosphorus (WP). During the TCRA, UXO and DMM were located in several pits within the Odyssey Middle School property at depths ranging from near surface to 13 feet. The UXO consisted of M6 2.36-inch HEAT rockets, 37mm projectiles, 4.5-inch air-to-ground rockets, 75mm armor-piercing projectiles, and M110 fuzes. The DMM consisted of 99 23-lb fragmentation bombs. The TCRA report stated that additional UXO or DMM were detected below these depths; however, the remaining UXO and DMM could not be removed due to excavator limitations and the scope of the TCRA. This property was the only location within this MRS where DMM were discovered in burial pits.

5.3.2. One UXO and two DMM M48 20-lb bombs were discovered at depths from 6 inches to three feet in Tivoli Gardens during the TCRA.

5.3.3. Field activities during the RI included digital geophysical mapping and the intrusive investigation of anomalies. Four UXO M6 2.36-inch HEAT rockets, one M7 2.36-inch practice rocket (MD), and one 20-lb fragmentation bomb (UXO) were discovered during the RI within the conservation area between the Odyssey Middle School and Tivoli Gardens at depths not exceeding ten inches.

5.3.4. All of these munitions can be lethal if detonated. Expended .50-caliber small arms ammunition was also found at the site. However, expended small arms ammunition poses no explosive hazard.

5.3.5. The approximate density of MEC found at the Demonstration Range (North) MRS was calculated using the number of UXO and DMM encountered and the acreage of the area investigated during the RI and TCRA (Table 1). The density of UXO and DMM found ranges from 0 to 20 MEC/acre for individual investigation areas. The average MEC density for the overall area investigated is 3.9 MEC/acre. Although a density of zero MEC/acre was computed for some areas, it has not been confirmed that no MEC are present in these areas, only that the density is relatively low.

Table 1
MEC Density for Demonstration Range (North) MRS

Area - Investigation	Number of UXO and DMM Found	Total Acreage[1]	Structure Portion (%)[2]	Investigated/ Acreage	Approx. Density of UXO and DMM Found (MEC/acre)
Tivoli Gardens – TCRA	3	25.8	70%	7.7	0.4
Odyssey MS - TCRA	120	28.2	50%	14.1	8.5
Wetland East of Odyssey MS – RI	5	36.68	0%	0.25	20
Wetlands East and South of Tivoli Gardens - RI	0	40.30	0%	0.1	0
Lee Vista Square - RI	0	69.5	70%	10.5	0
Total	128	200.48	-	32.65	3.9[3]

Source: Final RI Report for the former Pinecastle Jeep Range (Parsons, 2010) and TCRA Report (USA, 2009).
Notes:
[1]Total area bounding the investigation area including structures such as buildings, roads, parking areas, ponds.
[2]Portion of the total acreage estimated to be inaccessible due to structures
[3]Overall average MEC density for all areas investigated in the MRS.
Although a density of zero MEC/acre was computed for some areas, this should not be interpreted to mean that no MEC are present in these areas, only that the density is relatively low.

5.3.6. Based on this estimated MEC density of 3.9 MEC/acre and the acreage of the MRS, approximately 483 MEC might be present in the remaining uninvestigated 123.9 acres of the 247-acre Demonstration Range (North) MRS. This number does not consider that some of these munitions might be inaccessible due to ponds, roads, buildings, and other structures. The area with higher MEC densities in this MRS corresponds to the area recommended in 1953 for being "restricted to surface use only." Also, most of the remaining uninvestigated area is adjacent to areas that had relatively low MEC density compared to the other areas in this MRS. Therefore, the estimated number of MEC remaining is expected to be somewhat conservative.

5.4 MC Investigation

5.4.1. The RI/FS Work Plan prescribed that samples would be collected where previous contamination was identified during the 2007 SI, where MEC or selected MD were discovered during the 2009 TCRA or RI fieldwork, and where demolition activities occurred during the RI. Samples were analyzed for metals and explosives compounds consistent with the munitions recorded as being used at the range. Sample analyses were compared to background concentrations collected within the FUDS and FDEP criteria. Additional samples were collected at locations where previous samples exceeded these criteria to determine the extent of contamination.

5.4.2. Thirty soil samples (and three duplicates) were collected on June 24, 2008 from areas within Tivoli Gardens and Odyssey Middle School where UXO and DMM were discovered during the TCRA (both south of Lee Vista Blvd.). From these 30 samples, 21 samples were collected from 16 locations where UXO was discovered within the Tivoli Gardens development. At five of these locations, UXO was discovered in the subsurface, so samples were collected in the surface (top 12-inches) and at the depth of the UXO (UXO was removed prior to sampling). At four locations at Odyssey Middle School, samples were collected at the surface (10-12 inches below ground surface [bgs]) and subsurface (42-48 inches bgs) where DMM were discovered in several "pits" in the area. On the same date, a drum was discovered buried at a location near the temporary classrooms at Odyssey Middle School. A sample was collected near the drum (48 inches bgs). This site was revisited again on July 8, 2008, when the drum was removed, and more UXO were discovered at that location. One soil sample from the Pit #1 at Odyssey Middle School contained concentrations of arsenic, antimony, and selenium slightly higher than FDEP-Leachability to Ground Water screening levels. Another sample was collected at this location (Pit #1) in June 2009 to reassess the soil for these analytes. The second sample collected at this location contained a concentration of antimony below FDEP screening levels and no detectable concentrations of arsenic and selenium.

5.4.3. In July 2008, three M6 2.36-inch HEAT rockets and one M7 2.36-inch practice rocket were discovered along transect TA003in the wetland between Tivoli Gardens and Odyssey Middle School. Samples were collected at all four locations. Three samples were collected at the sites of demolition (three sites on TA003). Barium was detected in two pre-demolition samples (PJR-AREAA-TCA-006-001 and PJR-AREAA-TCA-006-003) and copper in one post-demolition sample (PJR-AREAA-TCA-006-006) at concentrations higher than FDEP Direct Contact soil screening levels. Because of this, in May and June 2009, a team sampled soil at six points around this occurrence to determine the extent of contamination due to the detonation. These samples returned with concentrations of copper lower than FDEP screening levels (6.0-36 mg/kg). Barium was still present in one sample (PJR-AREAA-TCA-006-012) at a concentration above FDEP Direct Contact criteria, so sample teams collected five additional samples (including one subsurface sample) to determine the extent of contamination. These five samples demonstrated that the contamination is surficial and localized.

5.4.4. UXO was also discovered when intrusive teams investigated the wetland between the Odyssey Middle School and Tivoli Gardens in March 2009. One M6 2.36-inch HEAT rocket and one M41 20-lb fragmentation bomb were discovered on TA001. One soil sample was collected under the 2.36-inch HEAT rocket . Pre- and post-demolition samples were collected under the 2.36-inch HEAT rocket and the M41 20-lb fragmentation bomb A soil sample (PJR-AREAA-TA001-6) collected at the M41 20-lb fragmentation bomb contained concentrations of 2,4,6-trinitrotoluene above FDEP Leachability to Groundwater criteria. One post-demolition soil sample collected at TA001 (PJR-AREAA-TA001-7B) contained chromium above FDEP Leachability to Groundwater criteria. A sample crew returned to the area in May 2010 to install groundwater monitoring wells in an effort to determine whether MC was leaching to the groundwater. The previous sample locations were both underwater (located in a swamp), so no monitoring wells were installed. Instead, a pair of surface water samples (filtered and unfiltered) were collected at the location of sample PJR-AREAA-TA001-7B and analyzed for chromium, which was not present above surface water criteria or groundwater criteria in these samples. The location of sample PJR-AREAA-TA001-6 was also underwater and inaccessible, so no samples were collected there.

5.4.5. Two constituents—barium and 2,4,6-trinitrotoluene—were detected in soil samples collected in the Demonstration Range (North) MRS, as mentioned in the previous paragraphs. Subsequent sampling events demonstrated that barium was limited to surface soil (0-2 inches) contained within a one-square meter location within the conservation area between Odyssey Middle School and Tivoli Gardens. Barium was detected at this location at a maximum concentration of 170 mg/kg, slightly higher than the FDEP Direct Contact criteria of 120 mg/kg. Barium is a metal which binds readily to organic matter (soil) and thus tends to be immobile in the environment. It is not listed as a known carcinogen. A soil sample collected near where a 20-pound fragmentation bomb was discovered in the southern portion of the wetland contained concentrations of 2,4,6-trinitrotoluene (3.2 mg/kg) above FDEP Leachability to Groundwater criteria (0.006 mg/kg). This location was inaccessible to a field team who revisited the site at a later date. This explosives compound tends to be water soluble in the environment, readily traveling through the soil into surface and ground waters. In surface waters, it is quickly broken down by sunlight. Microorganisms have the ability to metabolize this compound; however, this process is rather slow. This compound is listed as a known carcinogen. If this compound is still present in the environment, it is likely to have been taken up in the surface water and broken down through photolysis or to have entered into a shallow aquifer. Although human populations in this area are unlikely to encounter the compound due to the lack of groundwater wells in the area, human and ecological receptors may come into contact with surface water.

6.0 Current and Potential Future Land and Water Uses

6.1 Land Uses

The Demonstration Range (North) MRS is currently used for educational and residential purposes and also contains three large wetlands and several empty lots. The future land uses within this MRS are likely to remain the same.

6.2 Groundwater and Surface Water Uses

There are currently no known groundwater wells used for drinking sources or irrigation within the Demonstration Range (North) MRS; future groundwater use is likely to remain the same as current residents are supplied water through the City of Orlando's municipal water system. Two types of surface water exist within this MRS—neighborhood ponds and surface water within swamps. The neighborhood ponds throughout the MRS are used for visual and irrigation purposes. The surface waters within the swamps are not utilized.

7.0 Summary of Project Site Risks

7.1 Human Health Risks

7.1.1. The presence of UXO found during the RI and TCRA shows that an explosive safety hazard exists within the Demonstration Range (North) MRS. The Demonstration Range (North) MRS has both the highest UXO density and the highest human population of the four MRSs at the former Pinecastle Jeep Range. The exposure route for MEC receptors is primarily direct contact as a result of some human activity. The risk pathway for the Demonstration Range (North) MRS has been evaluated in terms of the depths of UXO and DMM within the MRS coupled with the potential interaction depths of human receptors.

- Of the investigation areas in this MRS, the Odyssey Middle School contains UXO and DMM at the greatest depth (>13 feet). UXO found within Tivoli Gardens were encountered from 6 to 36 inches deep. UXO discovered in the wetland between Odyssey Middle School and Tivoli Gardens were located at depths ranging from 3 to 10 inches. The depths at the Odyssey Middle School can be attributed to the burial pits and movement of soil during construction of the school; the depths of UXO and MD within Tivoli Gardents are attributable to the soil being moved around during development. The shallower depths noted in the wetlands are consistent with the understanding of the range use described in the CSM (Section 5.1). Intrusive investigation during the RI and TCRA show that the UXO are concentrated near the surface and diminish in frequency with depth.

- Receptors and exposure pathways within this MRS range from residents (including visitors) whose activities may include shallow excavations (e.g., gardening,

fencepost installation) in the upper two feet, to workers whose activities include a wider range of excavations (e.g., landscaping, sidewalk and fence installation, lawn irrigation) – localized excavations from surface to 4 feet, to construction workers whose activities include major excavations (e.g., deep utilities, building foundations) – excavations potentially over large areas from surface to 8 feet.

- Consideration of the depth ranges of UXO at the MRS and potential interactions with receptors indicates that all categories of human receptors (residents, workers, construction workers) described above would most frequently interact with UXO in the shallow depth range (upper two feet). Workers and construction workers would typically encounter UXO at greater depths.

7.1.2. Evaluation of the analytical results for the Demonstration Range (North) MRS indicated that a localized human health risk may be present due to concentrations of barium greater than the direct contact screening values and 2,4,6-trinitrotoluene at a concentration greater than leachability to groundwater screening values. While groundwater protection screening values were also exceeded, the lack of groundwater users indicates that this pathway likely poses no risk.

7.2 Ecological Risks

7.2.1 To evaluate ecological risk at the site, the exposure-point maximum detected concentration of each analyte was evaluated against Ecological Soil Screening Levels (EcoSSLs). This comparison results in the calculation of hazard quotients (HQs) for each analyte. An HQ is calculated by determining the ratio of the exposure-point concentration to the screening value. If the HQ is equal to or less than one, the potential for ecological risk is considered to be negligible. If the HQ is greater than one, then unacceptable ecological risk should not be ruled out based on the screening comparison alone. HQs greater than one should be reviewed to evaluate the significance of the exceedance.

7.2.2 A screening level ecological risk assessment for the Demonstration Range (North) MRS indicated that six metals and two explosives exceeded their initial screening values in soil, with hazard quotients ranging from 29 for antimony to 1.2 for 2-amino-4,6-dinitrotoluene. Antimony exceeded the ecological screening values in 18% of the soil samples, which was the highest margin of exceedance for any compound. The average concentration of 0.59 mg/kg was approximately two times the EcoSSLs based on exposure to mammals. No other screening levels were exceeded.

7.2.3 HQs greater than one were reviewed and were determined not to pose a significant hazard to ecological receptors for the following reasons:

- The exceedances identified at the site are highly localized, and represent only a de minimus area that is not expected to affect ecological receptor populations at the

MRS. In the absence of threatened and endangered species, the goal of the ecological risk assessment would be to evaluate ecological risk to receptor populations, rather than individuals.

- The average concentrations at the site do not exceed the ecological screening values (with the exception of antimony).

- Average antimony concentrations do not exceed the USEPA Region 4 Ecological Screening Values (ESV), and the maximum detected concentration results in a HQ of 2.2 when using the Region 4 ESV. The high HQ for antimony (29) reflects the comparison of a single data point to the Eco-SSL for mammals. The EcoSSLs are based on conservative assumptions regarding toxicity (i.e., they are based on No Observed Adverse Effects Levels (NOAEL) rather than Lowest Observed Adverse Effects Levels(LOAEL)) and exposure (conservative contact assumptions through ingestion, dermal contact, exposure durations, and ranges) and likely overestimate the risk associated with exposure to the analyte. The EcoSSLs are not intended to be used as cleanup values. Comparison of this site concentration (7.8 mg/kg) to the Region 4 ESV (3.5 mg/kg) results in a HQ of 2.2. Additionally, the average concentration of antimony at the Demolition Area (North) (0.59 mg/kg) was less than the Region 4 ESV.

- The highest concentrations of the analytes which exceeded the screening criteria are co-located with exceedances of the human health screening values by barium, and will be addressed by the barium removal.

7.3 Basis for Response Action

The response action selected in this Decision Document is necessary to protect the public's health and welfare—and the environment—from MEC or actual releases of hazardous substances (i.e., MC) into the environment within the Demonstration Range (North) MRS.

8.0 Remedial Action Objectives

8.1. The overall Remedial Action Objective (RAO) is to minimize the health risk to the public, including residents and workers, from MEC and MC remaining within the Demonstration Range (North) MRS. The RAO defines the measures for the success of the adopted remedial actions. The means for how the actions are implemented will be established during the future remedial design phase.

8.2. The RAOs for the Demonstration Range (North) MRS will be achieved when the following are met:

- MEC has been removed from the surface and subsurface of the MRS in areas not already cleared during the TCRA and RI, with the following limitations:
    - The removal of MEC will be limited to accessible areas where right-of-entry can be obtained. MEC removal will not occur under structures or pavement, or within water.
    - Depth of MEC removal will depend on the depths of UXO, DMM, and MD found during the TCRA and RI coupled with the maximum depth of anticipated intrusive activities based on future land use. UXO and DMM will be removed at depths exceeding 13 feet within areas of the Odyssey Middle School where disposal pits have been identified and to 4 feet within all other areas. Depth of removal will be limited by physical barriers such as encountering groundwater.
- Additional measures will be established to protect the public and workers from UXO or DMM that may remain in the areas cleared and under structures or pavement, and within water. Such measures may include establishing an educational awareness program, as appropriate.
- MC contamination has been removed from areas identified as having exceedances of the Florida Direct Contact criteria for soil. Surface soil will be removed to achieve concentrations to the following target levels:
    - Barium - 120 mg/kg

9.0 Description of Alternatives

Six remedial alternatives were evaluated during the Feasibility Study for the Demonstration Range (North) MRS. A description of each of the six alternatives developed for consideration is presented below.

9.1 Remedy Components

- **Alternative 1: No Department of Defense Action Indicated (NDAI)** - The NDAI alternative means that a remedy is not necessary to reduce the potential safety risk posed by MEC and MC. Declaration of NDAI on a property or project is a programmatic decision that indicates USACE has determined that no further action is required to address unsafe conditions or hazardous contaminants related to MEC or MC. This alternative, if implemented, will involve continued use of the MRS in its current condition.

- **Alternative 2: Fencing and Signage with Five-year Reviews** - For this alternative, a six-strand barbed-wire fence, approximately 6 feet high would be installed in areas of the MRS to prevent the public from coming in contact with MEC. Bilingual warning signs would be placed along the entire perimeter of the fence and at all access points. Annual maintenance would be conducted to replace and repair damaged portions of the fence and signs. Five-year reviews would be conducted, if required, to determine if the response action continues to minimize explosives safety risks and continues to be protective of human health, safety, and the environment.

- **Alternative 3: Educational Awareness with Five-year Reviews** - This alternative is comprised of an educational awareness program coupled with five-year reviews, and was considered for initial screening at all of the MRSs. An educational awareness program would focus on providing information on the areas containing the MEC and MC hazards and the appropriate response if MEC is encountered. These preventive measures could include educational fact sheets that have the goal of modifying behavior to reduce the risk of exposure and reduce the impact if exposure occurs. In addition, letters and fact sheets would be sent to landowners and residents in areas identified as having MEC hazards as a result of the RI, and a website containing educational information would be maintained. Five-year reviews would be conducted, if required, to determine if the response action continues to minimize explosives safety risks and continues to be protective of human health, safety, and the environment.

- **Alternative 4: Removal of MEC and MC-Contaminated Soil, Explosives Safety Support, Educational Awareness, and Five-year Reviews** - A remedial action to remove MEC would be conducted over accessible areas that have not already had MEC removed during the TCRA or RI. MEC will not be removed from under existing roads, parking areas, structures, or within ponds. Metal detector surveys would be conducted over the entire accessible area and metallic anomalies would be identified for intrusive excavation. During this action, MEC would be removed from the disposal pits at Odyssey Middle School below 8 to 13 feet and to 4 feet in all other areas. In undeveloped areas (including wetlands), brush and understory vegetation would be cleared to allow access for the metal detector instruments. Metallic anomalies will be investigated, and if UXO or DMM is found, it will be destroyed on site through blow-in-place or consolidate and blow operations. Completion of the MEC removal will greatly reduce the MEC risk for residents and workers at this MRS by reducing the UXO and DMM at the depth ranges most likely to be encountered. During the MEC removal, soil samples will be collected at demolition sites and near MEC finds. If the cleanup criteria identified in Section 8.2 are exceeded, the soil will be removed from the immediate vicinity of the detonation of munition for offsite disposal. Removal of

MC-contaminated soil will reduce the risk of direct contact by residents and workers. Both Orange County and the City of Orlando currently maintain building permit restrictions which require certification (through qualified contractors) that the building site has been thoroughly inspected and examined and is free or cleared of munitions (City of Orlando Temporary Halt; Orange County Commission Resolution No. 2008-M-11). These entities may continue to impose these restrictions at their discretion or impose additional restrictions. For those areas where construction activities requiring major excavation work will be conducted under existing structures or below the depth of the remedial action, the city or county is encouraged to require that contractors procure explosives safety support in order to identify potential UXO or DMM hazards during excavation. Educational awareness, similar to that described under Alternative 3, would provide additional protection to the public by providing information concerning MEC hazards remaining at the site. This would provide reduction in risk from MEC through behavior modification for residents and workers excavating beyond the depth of the removal. In addition, notices would be published and meetings held to inform residents of MEC removal activities and to help plan for evacuations where needed. Five-year reviews, if required, would be conducted to determine if the response action continues to minimize explosives safety risks and continues to be protective of human health, safety, and the environment.

- **Alternative 5: Removal of MEC and MC-Contaminated Soil in Upland Areas, Fencing and Signage around Wetlands, Explosives Safety Support, and Educational Awareness with Five-year Reviews** - A remedial action to remove MEC would be conducted over accessible areas that have not already had MEC removed during the TCRA or RI. MEC will not be removed from under existing roads, parking areas, structures, or within ponds. Metal detector surveys would be conducted over the entire accessible area and metallic anomalies would be identified for intrusive excavation. During this action, MEC would be removed to 13+ feet at Odyssey Middle School pits and to 4 feet in all other areas. This remedial action would only take place in upland areas, i.e., no wetlands. If the MC cleanup criteria identified in Section 8.2 are exceeded in soil, it will be removed from the immediate vicinity for offsite disposal. A six-strand barbed-wire fence, approximately 6 feet high would be installed around the wetlands. Bilingual warning signs would be placed along the perimeter of the fence. Annual maintenance would be conducted to replace and repair damaged portions of the fence and signs. The City of Orlando and Orange County may continue to impose permit restrictions in the affected areas at their discretion. For those areas where construction activities requiring major excavation work will be conducted under existing structures or below the depth of the remedial action, the city or county is encouraged to require that contractors procure explosives safety support in order to identify potential UXO or DMM hazards during excavation.

Educational awareness programs and five-year reviews would be conducted in the same manner as described under Alternative 4 and would apply to both upland and wetland areas within the MRSs.

- **Alternative 6: Explosives Safety Support, Educational Awareness, and Five-year Reviews** - For areas where a MEC hazard exists but at a lower risk level, explosives safety support procured by developers or other contractors is appropriate in lieu of a remedial action. Explosives safety support would be implemented in the form of one or more UXO-qualified technicians hired by the contractor conducting the excavation activities. The UXO-qualified technician(s) would be available to brief the contractor, management, or construction team on the probable site hazards, procedures when UXO are encountered, responsibilities and lines of authority for MEC response, and emergency response procedures. This technician could either be present onsite at the point of excavation for the duration of the ground-breaking activities or could also serve on a "on call" basis. Examples of ground-breaking activities would include surveying, installation or maintenance of underground utilities, and installation of fence posts. Educational awareness programs and five-year reviews would be conducted in the same manner as described in the previous alternatives.

9.2 Common Elements and Distinguishing Features of Each Alternative

- **NDAI (Alternative 1)** does not provide protection of human health or the environment as MEC and MC contamination would remain in the impacted areas. While the MC may naturally attenuate in time, the explosive risk associated with MEC will remain.

- **Fencing and signage with five-year reviews (Alternative 2)**, like the NDAI alternative, does not remove the MEC or MC contamination although it does reduce the likelihood of receptor interaction. This alternative is not effective in terms of reducing toxicity, mobility, and volume through treatment. Because of the current and anticipated future land uses within the MRS, fencing around the entire MRS is not feasible. However, implementation is technically and administratively feasible, and the services and materials necessary to implement such are readily available. Long term effectiveness will be maintained through fence and sign maintenance along with five-year reviews. This alternative could be implemented in a timely manner (approximately six weeks) with low associated costs for materials. Maintenance of the fence would be conducted annually.

- **Educational awareness with five-year reviews (Alternative 3)** will provide a temporary measure to mitigate potential risks to human health and environment,

although MEC and MC contamination would remain in the impacted areas. Implementation of this alternative will provide long-term effectiveness through the process of five-year reviews. However, there would not be a reduction of the toxicity, mobility, or volume of potential MEC through treatment.

- **Removal of MEC and MC-Contaminated Soil, Explosives Safety Support, Educational Awareness, and Five-year Reviews (Alternative 4)** would effectively remove MEC and MC contamination within this MRS, however at a higher cost than the previous alternatives. MEC and MC removal duration in this MRS would last approximately 34-weeks. Demolition of UXO by detonation may introduce additional MC soil contamination which would need to be removed and disposed of properly. Once complete, cleanup levels will be achieved. Using the current MEC density estimate presented above, approximately 483 UXO or DMM would be removed and destroyed and approximately 49 cubic yards of soil removed for off-site disposal.

- **Removal of MEC and MC-Contaminated Soil in Upland Areas, Fencing and Signage around Wetlands, Explosives Safety Support, and Educational Awareness with Five-year Reviews (Alternative 5)** – similar to Alternative 4, this alternative would effectively remove MEC and MC contamination within the neighborhoods and school; however the wetlands would be untouched. The highest likelihood for MEC would remain in the wetlands of this MRS. MEC would be removed to a depth of 13 feet or greater within the pits at the Odyssey Middle School and to four feet within the remaining school grounds and other developed areas of the MRS. This alternative would occur over approximately 11-weeks, where MEC would be removed from the upland areas, and the wetlands will be fenced (including signage). Five-year reviews of the site would determine the long-term effectiveness of the fenced wetlands. Demolition of MEC may introduce additional soil contamination which would need to be removed and disposed of properly. Using the current MEC density estimate presented above, approximately 200 UXO or DMM would be removed and destroyed, and approximately 3 cubic yards of soil removed for off-site disposal. However, there would not be a reduction of the toxicity, mobility, or volume of potential MEC and MC within the wetlands.

- **Explosives Safety Support, Educational Awareness with Five-year Reviews (Alternative 6)** will be effective in reducing the hazards from MEC by educating the residents and workers of MEC hazards in the area. Developers and residents of the area would also be informed of the building restrictions imposed by the local authorities (if maintained) in areas suspected of containing UXO or DMM. Information will also be provided for those entities planning major excavations and wishing to obtain information regarding explosives safety support during

excavation activities. Although the level of risk may be reduced, the level of protection provided by implementing this alternative may not be adequate because the actions presented are educational in nature only. Reliability of this alternative is related to its proper implementation and willingness of residents and developers to adhere to local ordinances, feedback of which would be included during the five-year reviews.

9.3 Expected Outcomes of Each Alternative

- **NDAI (Alternative 1)** does not provide long-term protection of human health and environment, as it does not reduce potential risk or afford long-term protection. Impacts to the area will remain the same.

- **Fencing and signage with five-year reviews (Alternative 2)** will reduce access and possible receptor interaction, however does not change the status of land use within this MRS. Due to the residential and educational use of this area, fencing is not feasible as it would limit access to two residential neighborhoods and a school.

- **Educational awareness with five-year reviews (Alternative 3)** would benefit the local residents by informing them of what contamination could be present; however it does not provide a permanent reduction of risk to MEC or MC. Land use would potentially remain the same.

- **Removal of MEC and MC-Contaminated Soil, Explosives Safety Support, Educational Awareness, and Five-year Reviews (Alternative 4)**—Assuming that UXO, DMM, and MC-contaminated soil are discovered and disposed of during the remedial action, there will be a reduction in toxicity, mobility, and volume of UXO, DMM, and MC through their removal. Residents of the MRS would benefit knowing that their yards, common areas, and middle school would have a reduced risk of UXO, DMM, and MC hazards. Wetlands in the MRS would be temporarily impacted as they would be cleared of all underbrush in preparation for the removal action. This action, however, could result in a benefit to the wetland and ecology as the clearance would result in thinning underbrush that has been artificially protected from naturally-occurring fires.

- **Removal of MEC and MC-Contaminated Soil in Upland Areas, Fencing and Signage around Wetlands, Explosives Safety Support, and Educational Awareness with Five-year Reviews (Alternative 5).** Assuming that UXO, DMM, and MC-contaminated soil are discovered and disposed of during the remedial action, there will be a reduction in toxicity, mobility, and volume of UXO, DMM, and MC in the upland areas through their removal. Residents of the

upland areas of the MRS would benefit knowing that their yards, common areas, and middle school would have a reduced risk of UXO, DMM, and MC hazards. Fencing and signage around wetland areas will reduce access and possible receptor interaction, thus reducing the potential for exposure pathway completion and minimizing risk. However, this alternative is not effective in terms of reducing toxicity, mobility, and volume in the wetland areas. Land use would potentially remain the same, as the wetlands would remain undeveloped unless cleared. Fencing of the wetlands (with signage) could potentially affect the value of the nearby homes and condominiums.

- **Explosives Safety Support, Educational Awareness, and Five-year Reviews (Alternative 6)** would benefit the local residents and developers by informing them of what contamination could be present; however it does not provide a permanent reduction of risk to MEC or MC. Land use within this MRS would be affected only if further construction is allowed to proceed.

10.0 Comparative Analysis of Alternatives

The rationale for selecting the preferred alternatives was based on nine criteria used to evaluate and compare the alternatives (USEPA, 1999). The nine criteria, summarized in Table 2, fall into three groups: threshold criteria, primary balancing criteria, and modifying criteria. A description and purpose of the three groups follows:

- Threshold criteria are requirements that each alternative must meet in order to be eligible for selection.

- Primary balancing criteria are used to weigh major trade-offs among alternatives.

- Modifying criteria may be considered to the extent that information is available during the Feasibility Study, but can only be fully considered after public comment is received on the Proposed Plan. In the final balancing of trade-offs among alternatives upon which the final remedy selection is based, modifying criteria are of equal importance to the balancing criteria.

Table 2
EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES

Criteria	Threshold	**Overall Protectiveness of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
		Compliance with applicable or relevant and appropriate requirements (ARARs) and issues to be considered evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
	Primary Balancing	**Long-term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time.
		Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
		Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
		Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
		Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
	Modifying	**State/Support Agency Acceptance** considers whether the State agrees with the analyses and recommendations, as described in the RI/FS and Proposed Plan.
		Community Acceptance considers whether the local community agrees with analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Table 3 presents an evaluation of the alternatives based upon the nine criteria presented above.

Table 3: Evaluation of Remedial Alternatives, Pinecastle Jeep Range, Orange County, Florida

Criteria	No Department of Defense Action Indicated (NDAI)	Fencing and Signage with Five-Year Reviews	Educational Awareness with Five-Year Reviews	Removal of MEC and MC-Contaminated Soil, Explosives Safety Support, Educational Awareness, and Five-Year Reviews	Removal of MEC and MC-Contaminated Soil in Upland Areas, Fencing and Signage around Wetlands, Explosives Safety Support, and Educational Awareness with Five-Year Reviews	Explosives Safety Support and Educational Awareness with Five-Year Reviews
	Alternative 1	Alternative 2 - Only Applicable to the Demonstration Range (South) MRS	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Protectiveness	Least protective alternative. No source reduction. No reduction of future risk.	No source reduction. Fencing and signs can reduce interaction with UXO, thus reducing risk. Possible to bypass restrictions.	No source reduction. Hazard recognition to reduce chances of exposure. Public outreach may not reach all persons. Exposure possible.	Remediation of MEC (significant source reduction). Provides protectiveness through educational awareness.	Remediation of MEC (significant source reduction) in upland areas only. Fencing and signage to reduce interaction in wetland areas. Provides protectiveness through educational awareness.	Provides protectiveness through educational awareness.
ARAR/TBC Compliance	No ARARs associated with the alternative.	Need to avoid gopher tortoises and American alligators. May result in destruction or adverse modification of critical habitat.	No ARARs associated with the alternative.	Need to avoid gopher tortoises and American alligators. May result in destruction or adverse modification of critical habitat.	Need to avoid gopher tortoises and American alligators. May result in destruction or adverse modification of critical habitat.	Need to avoid gopher tortoises and American alligators. May result in destruction or adverse modification of critical habitat.
Effectiveness and Permanence	No MEC-related risk reduction and no long-term effectiveness.	No reduction of MEC hazards, but can be effective at reducing possible receptor interaction. Access controls must be reviewed and updated/revised over time.	No reduction of MEC hazards but can be effective at behavior modification and appropriate response.	Can be effective because of hazard reduction and reduced receptor interaction due to education of hazards.	Reduction of MEC in upland areas. Reduced receptor interacation in wetland areas. Results permanent in select areas only.	Effective at reducing receptor interaction with MEC. Limited MEC reduction. Results permanent in select areas only.
Reduction of Toxicity, Mobility, or Volume	No reduction of source.	No reduction of source.	No reduction of source.	Significant reduction in source. MEC hazards are removed from the site.	Reduction in source only in upland areas. Does not affect entire site.	Reduction in source only at work area. Does not affect entire site.
Short-term Effectiveness	No short-term impacts on workers or community.	Possible short-term impacts associated with fence installation.	No short-term impacts associated with distribution of information.	Education reduces receptor interaction.	Possible short-term impacts associated with fence installation.	Education reduces receptor interaction.
Implementability	Readily implemented. No action required.	Signs and fences can be installed for specific areas. Local opposition to conspicuous signs and fences.	Outreach programs already in place. Updates and maintenance are implementable.	Similar operations were conducted during the TCRA and RI. Implementable.	Similar operations were conducted during the TCRA and RI. Implementable.	Requires qualified technicians with specialized (but readily available) equipment.
Cost	$0	$1,334,791 for Demonstration Range (South) MRS	$1,375,248 (Same for all 3 Demonstration Range MRSs)	Demonstration Range (North) MRS = $4,237,012 Demonstration Range (South) MRS = $15,092,065 Demonstration Range (East) MRS = $22,468,716	Demonstration Range (North) MRS = $2,475,229 Demonstration Range (South) MRS = $9,419,071 Demonstration Range (East) MRS = $7,464,060	$1,375,248 (Same for all 3 Demonstration Range MRSs)
	No cost	Comparatively little cost associated with the amount of fencing needed (7250 ft), annual maintenance, and replacement every seven years, up to 30 years	Comparatively little cost associated with development and dissemination of education materials for 30 years.	Costs high but justifiable for locations with significant MEC hazards. Costs developed for 30 years.	Costs high but justifiable for locations with significant MEC hazards. Costs developed for 30 years.	Comparably moderate cost but justifiable for locations with low-risk MEC hazards. Costs developed for 30 years.

Note: Shaded box indicates the most practicable solutions for each criteria.

11.0 Principal MEC/MC Issues

11.1. With a large residential population, there is a risk that people could encounter MEC in the Demonstration Range (North) MRS where the overall MEC density is estimated at 3.9 MEC per acre. During the RI, four 2.36-inch M6 HEAT rockets were found in the wetland east of Odyssey Middle School at depths ranging from 3 to 6 inches bgs. Also within the same wetland, one M41 20-lb fragmentation bomb was recovered from a depth of 10 inches bgs. The portions of the wetland adjacent to these finds remain uninvestigated, so there is a potential for more UXO to exist within the wetlands. In addition, UXO and DMM were encountered during the TCRA at both Odyssey Middle School (at depths exceeding 13 feet in several pits) and in the Tivoli Gardens development (at depths of 3 feet), so there is a potential that additional munitions remain in the uninvestigated areas of this MRS.

11.2. Aside from containing an explosive hazard, buried MEC acts as a contamination source by presenting the potential for MC to leach from the MEC into the surrounding soil and groundwater. To remove this potential for leaching, only those alternatives which remove the MEC from the site would reduce the toxicity, mobility, and volume of MC. Of the six alternatives presented above, the following alternatives would provide for the removal of MEC, thereby reducing the source of MC:

- Alternative 4—Removal of MEC and MC-Contaminated Soil, Explosives Safety Support, Educational Awareness, and Five-year Reviews; or

- Alternative 5— Removal of MEC and MC-Contaminated Soil in Upland Areas, Fencing and Signage around Wetlands, Explosives Safety Support, and Educational Awareness with Five-year Reviews.

12.0 Selected Remedy

12.1 Summary of the Rationale for the Selected Remedy

12.1.1 Alternative 4 has been selected for this MRS because of the volume of MEC coupled with the risk associated with a large residential population. Implementing Alternative 4 would not only reduce the toxicity, mobility, and volume of UXO/DMM or MC within the residential areas, but also within the wetlands. Although Alternative 4 was the costlier solution, this alternative was selected as it was the only alternative that addressed UXO and DMM within the wetlands. Signs and fencing suggested by Alternative 5 are unpopular with the local residents as there was a concern over the unsightliness of the warning signs and fencing, and potential devaluation of the homes.

12.1.2 In implementing Alternative 4, removal of MEC and MC-contaminated soil will be conducted in the MRS at all locations that had not been cleared of MEC during the RI and TCRA. Parcels that were not cleared in Tivoli Gardens and Lee Vista Square would be included

in the removal response provided that rights-of-entry can be obtained. MEC would be removed to depths exceeding 13 feet at the Odyssey Middle School disposal pits and to depths of 4 feet in all other areas. As part of the remedial action, soil samples will be collected at UXO demolition locations. Where cleanup criteria (presented in Section 8.2) are exceeded, contaminated soil will be removed from the immediate vicinity for offsite disposal. This alternative includes an educational awareness program that provides to residents and local workers information on the MEC and MC hazards and the appropriate response if MEC is encountered. These preventive measures could include educational fact sheets that have the goal of modifying behavior to reduce the risk of exposure and reduce the impact if exposure occurs. In addition, letters and fact sheets would be sent to landowners and residents in areas identified as having MEC hazards and a website containing educational information would be maintained. Five-year reviews, if required, will be conducted to determine if the response action continues to minimize explosives safety risks and continues to be protective of human health, safety, and the environment.

12.2 Detailed Description of the Selected Remedy

12.2.1. Alternative 4 uses a combination of activities to achieve a reduction in the MEC and MC hazard and also minimizes receptor interaction. The activities consist of removing MEC and MC contaminated soil, explosives safety support, educational awareness, and five-year reviews.

12.2.2. This alternative addresses undeveloped areas (including wetlands), parcels not cleared previously, and TCRA areas where the immediate danger was addressed but may still have munitions present. Brush and understory vegetation will be removed to accommodate the instruments necessary to collect the geophysical data. Once the data are analyzed and anomalies consistent with munitions are identified, MEC removal will begin. This removal will occur at 13 feet or greater within the six pits at Odyssey Middle School identified during the TCRA. At other portions throughout the school grounds and at other areas, such as Tivoli Gardens, Lee Vista Square, and wetland areas, removal will be achieved to a depth of four feet. Excavation depth will be limited by groundwater. To assess the presence of MC, soil samples will be collected where UXO and DMM is found and before and after demolitions. If the cleanup criteria identified in Section 8.2 are exceeded, the contaminated soil will be removed and disposed of off-site. Verification of removal of the MC-contaminated soil will be demonstrated by the collection of post-removal soil samples which must not exceed the criteria or be demonstrated through a risk evaluation as not posing a risk.

12.2.3. Geophysical anomalies will be selected based on characteristics that are consistent with the munitions known to occur at the site. All anomalies consistent with munitions will be removed or the source will be documented. Completeness of the MEC removal may be demonstrated by follow-on geophysical surveys. Any remaining anomalies consistent with munitions will be removed or explained as non-munition related through documentation.

12.2.4. Educational awareness will provide information to the residents and the local public concerning MEC hazards at the site. As part of this effort, notices will be published and meetings held to inform residents of MEC removal activities status and to help plan for evacuations where needed. Five-year reviews, if required, will also be conducted to determine if the response action continues to minimize explosives safety risks and continues to be protective of human health, safety, and the environment.

12.3 Cost Estimate for the Selected Remedy

12.3.1 The information in the cost estimate summary table below is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost element are likely to accrue as a result of new information. Major changes may be documented in the form of a memorandum in the Administrative Record file, or a Decision Document amendment. This is an order-of-magnitude cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

12.3.2 Table 3 presents the costs associated with each phase of the alternative. The brush clearing task will involve the removal of approximately 40 acres of brush (including brush in wetlands outside of permanently flooded areas) which would take approximately nine weeks to complete. After the brush has been removed, four geophysical survey teams will be mobilized to collect data over approximately 42 acres—including the areas where brush is removed and in additional residential parcels. The geophysical surveys are estimated to take approximately 16 weeks. Once the geophysical data have been processed and approved, anomalies will be marked and investigated by three teams of UXO-certified technicians and support personnel. The intrusive investigation is estimated to take 9-weeks. Contaminated soil removal, MC sampling and analysis, and UXO and DMM destruction activities will be performed concurrent to the intrusive phase. To support this work, a Work Plan will be prepared prescribing the actions the field teams must take to complete the remedial action, and a final report will be written to document the remedial action activities and results. Four public meetings will be conducted over the course of the remedial activities in an effort to educate the public to project schedule and success.

Table 3
Cost Estimate for Demonstration Range (North) MRS

Alternative 4 – Demonstration Range (North)	
MEC and MC Removal	***$2,897,369***
• Brush Clearing (~40 acres)	$478,946
• Geophysical Survey (~42 acres)	$779,160
• Intrusive MEC Investigation (~40 acres and 135 residential parcels)	$1,149,755
• Contaminated Soil Removal and additional sampling	$271,932
• Work Plan	$35,000
• Final Report	$25,000
• Public Meetings (four)	$157,577
Five-Year Reviews (over 30 years)	***$307,098***
Education (over 30 years)	***$1,032,545***
Total Cost Alternative 4 – Demonstration Range (North)	**$4,237,012**

12.4 Estimated Outcomes of Selected Remedy

The land comprising the Demonstration Range (North) MRS, as it currently stands, is developed to its fullest potential. According to representatives from the City of Orlando, the land use is not expected to change. Groundwater is currently not used by the residents within this MRS and this is not expected to change in the future. At one location where barium was detected in elevated concentrations, cleanup is expected to be minimal as the contamination is localized to surface soil within a one square-meter area. Socioeconomic impacts are not expected at this location due to cleanup as the contaminated areas mostly lie within unused portions of the MRS. Environmental impacts are expected to be significant; as prescribed, clearing of underbrush is expected to occur which may temporarily affect the habitats of the wetlands. The outcome, however, is that the wetlands will ultimately be restored to a better condition due to the reduction of invasive species.

13.0 Statutory Determinations

13.1. It is expected that the chosen alternative contains the best remedy for the protection of human health and the environment from MEC and MC contamination. The chosen alternative complies with ARARs and currently is not expected to require a waiver. The cost associated with this alternative is reasonable in relation to providing the best outcome for the given amount of money. The solution is permanent as the sources of contamination are removed from the site.

13.2. A high level of overall protectiveness of human health and the environment will be achieved with Alternative 4 through source removal of MEC and MC. Alternative 4 will significantly reduce the MEC and MC risk, but it will not completely eliminate risk since there is no way to know if all MEC has been removed. This alternative will afford the greatest protection to the potential receptors in the Demonstration Range (North) MRS which contains two neighborhoods, a middle school, and three wetlands, as well as onsite workers and visitors.

13.3. The location-specific ARARs and to-be-considered (TBC) items identified for the site are presented below in Table 4. No waivers to ARARs are expected to be required to implement the selected remedy within this MRS.

Table 4

Description of ARARs for Selected Remedy

Authority	Requirement	Status	Synopsis of Requirement	Action to be Taken to Attain Requirement
Federal Regulatory Requirement	40 CFR 264 RCRA subparts I, L, X 40 CFR 262.11	Relevant and Appropriate	Provides requirements for treatment of explosive constituents via an open burning/open detonation unit. This would apply to blow-in-place effort during MEC removal work.	Pre- and post-demolition samples will be collected to ensure MC are not introduced to the environment, or to gauge the amount of MC that is.
Federal Regulatory Requirement	Protection of Wetlands 33 CFR 320 et, seq Executive Order 11988	Applicable	Requires action to minimize loss or degradation of wetlands. Remedial activities must: take steps to avoid or minimize wetland and flood plain impacts.	Brush clearing activities conducted during this removal action will be conducted in a manner which will ultimately benefit the wetlands.
Federal Regulatory Requirement	Endangered Species Act USC Title 16 chapter 35§1536 (a)(2)	Applicable	Establishes rules for the protection of federal or state-listed species.	Fieldwork conducted in the habitats of state or protected species (e.g. gopher tortoise or American alligator) will be done so in a manner which minimizes impact to their habitat.
State Regulatory	Florida Administrative Code (Chapter 68A-27, Rule 68A-27.004)			
FDEP Code	Florida Administrative Code 62-777 Contaminant Cleanup Target Levels	TBC	Establishes guidelines for determining cleanup target levels	Cleanup target levels for future actions will be established using this guidance.

13.4. Five-year reviews, as outlined in Section 121(c) of CERCLA, as amended by SARA, and Section 300.430 (f) (ii) of the NCP, will be conducted at the Demonstration Range (North) MRS. Five-year reviews will be conducted to 1) ensure that the remedial action remains protective of human health, safety, and the environment; and 2) evaluate the implementation and performance of the selected remedy. Data gathered during the review process will be used to determine if further action needs to be taken to protect public safety and the environment. If no changes have taken place, the site will continue to be monitored at the specified intervals. At the completion of the review, a Five-year Review Report will be prepared, and a public notice will be placed in the local newspaper concerning the continued effectiveness of the remedy.

14.0 Documentation of Significant Changes from Preferred Alternative of Proposed Plan

Alternative 4 was selected for the Demonstration Range (North) MRS as presented in the final Feasibility Study and Proposed Plan. One change for this alternative is the removal of the requirement for construction support to be provided by the USACE, and instead recommending that contractors undertaking major excavation work procure their own explosives safety support to identify potential UXO or DMM hazards. Providing construction support for remedial actions is contrary to USACE FUDS policy. Even with the removal of construction support Alternative 4 is still protective and is the best overall remedy.

PART 3: THE RESPONSIVENESS SUMMARY

1.0 Stakeholder Issues and Lead Agency Responses

Part II Section 3.0 of this Decision Document described the activities used to solicit community input. A public meeting was held on July 22, 2010, to present the Proposed Plan and obtain comments from the community. The meeting also initiated a 30-day public review period. Members of the public made comments during the meeting, and written comments were received during the review period. Letters, along with a Proposed Plan fact sheet, were sent to all of the property owners within the former Range to invite them to the meeting, to explain the recommended alternatives and to encourage them to submit comments. A summary of the concerns raised by the public and stakeholders along with responses are provided below.

Concern: A resident expressed concern over the omission of the discussion regarding munitions debris found in the portion of the Warwick development which is within the Remaining Area MRS. There was concern that the presence of munitions debris in that area constitutes a hazard to the public, and for this reason, the area should be included in one of the Demonstration Range MRSs.

Response: The Warwick development was intrusively investigated to the fullest extent possible to 100% of the exposed ground surface (the eastern half by the USACE and the western half by the developer), and no hazardous munitions were found. The munitions debris consisted of two non-explosively configured bombs and brass casings from .50 caliber bullets. The bombs were likely from educational displays that were shown to military personnel participating in the training exercises conducted during World War II. The brass casings can be attributed to waste from the machine gun range farther east. The munitions debris does not constitute an explosive hazard. Warwick is outside of the property controlled by the military during World War II and behind the observation areas. Given the extensive investigation and the historical use of the site, it is unlikely that munitions would be found in Warwick. The recommendation for Warwick to be included in the Remaining Area MRS, as presented in the Proposed Plan, is based on this consistency of data.

Concern: The residential areas within the FUDS boundary (namely Avon, Tivoli Woods, Central Park, and parts of Newport) were partly within a former .50 caliber machine gun range. Also, samples collected during the Site Inspection within a wetland in this area contained mercury above background levels (as stated in the Site Inspection Report). For these reasons, the residential areas should be included in the portion of the site requiring further action.

Response: The extensive investigation of the residential areas as part of the Remedial Investigation did not find any hazardous munitions in the areas north of Lee Vista Blvd. The limited number of expended .50 caliber bullets does not constitute a hazard. The screening level risk assessment in the Site Inspection Report found that the mercury detection (0.2

mg/kg) did not exceed the Florida Department of Environmental Protection (FDEP) Direct Contact criteria (3 mg/kg) nor the FDEP leachability criteria (2.1 mg/kg). Soil samples were also collected during the Remedial Investigation but again did not exceed the FDEP screening levels. A review of the list of munitions used at Pinecastle Jeep Range shows that mercury is only a very minor component of some of the munitions used at the site, indicating that the small quantities of mercury identified in the soil is likely naturally occurring or due to a source other than military munitions. Based on this information, which has also been included in the Remedial Investigation Report, there is no strong basis for including the residential areas north of Lee Vista Boulevard with the areas requiring further action.

Concern: An explanation for the time frame of two to six years for the removal operation under Alternative 4 should be provided and alternatives explored for shortening the time frame for this action.

Response: The USACE considers these actions to be high priority (based on prioritization scoring) and will seek to expedite the schedule appropriately. The two to six year estimates for conducting removal responses in the Proposed Plan are based on past experience with such operations at other sites.

Concern: Special attention and assistance is being provided to developers and builders in the area.

Response: The USACE's priority in scheduling additional work at Pinecastle will be in the Demonstration Range (North) MRS where there are residential homes and a middle school. The concern about special assistance to developers could be based on a misunderstanding of "construction support" and how and when it will be provided. The USACE may provide educational materials to developers and other entities conducting excavation projects within the Demonstration Ranges, but developers will need to fund their own UXO technicians to monitor activities that penetrate the ground surface.

Concern: Groundwater and soil testing was only conducted where munitions were encountered, and the final RI/FS Report did not recommend any additional groundwater or soil testing.

Response: The Remedial Investigation used a standard approach to environmental investigations that determines if contamination is moving from sources of contamination (in this case munitions and munitions debris) into underlying soils and groundwater. Our sampling was focused on locations where munitions were found. Results indicated concentrations that exceeded the FDEP criteria at only limited locations. Additional samples were collected surrounding the locations with FDEP exceedances to bound the areas of contamination. At the request of FDEP, monitoring wells were installed and sampled but no further exceedances were found. Overall, elevated concentrations were found at very limited locations, and were mostly attributed to munitions demolitions that occurred during the

investigation. The remedial investigation did not find widespread contamination in the soil and did not find contamination in the groundwater. For this reason, no widespread groundwater and soil sampling was recommended.

Concern: The Orange County Solid Waste Division recommended that the Demonstration Range (East) MRS be extended south to the Beachline Expressway so that all of the future landfill expansion in that area would be within the area being recommended for Construction Support. It was also requested that the USACE plan sufficient funding to provide Construction Support for the future landfill projects in that area.

Response: The boundary of the Demonstration Range (East) MRS should not be moved without supporting information that munitions hazards exist outside the current boundary. The RI field data do not support moving the boundary.

Concern: Orange County also recommended Permit Restrictions (which at a minimum could consist of a notice and disclaimer) stating that the area was part of the former Pinecastle Jeep Range. The county also indicated that it is evaluating the issue of requiring additional geotechnical analysis for parcels within the Remaining Area MRS, notwithstanding the findings and recommendations of the RI/FS.

Response: The recommended alternatives outlined in the Proposed Plan as finalized by the Decision Document constitute the USACE recommendations for this site. The county is free to impose any additional requirements at its discretion.

Concern: During the public meeting, a few residents inquired as to whether the Pinecastle Jeep Range would ever be 100% clear of munitions. Residents were also curious as to USACE's stance in the event that, years from now, munitions are discovered within the areas which were cleared, or those that were cleared as a result of the recommended future removal actions.

Response: Due to technological limitations, it is impossible to guarantee that all munitions are removed—or could be removed—from the former Pinecastle Jeep Range. If, in the future, munitions are discovered within areas which were already cleared, the public should practice the "Three R's" of UXO safety (Recognize the item may be a munition, Retreat from the location, and Report the location to the proper authorities). The local authorities may report the incident to the USACE, who will then determine whether follow-on actions are needed.

Concern: The FDEP review of the draft final Remedial Investigation/Feasibility Study Report expressed concerns about munitions constituents (mainly copper, barium, and some explosives compounds) concentrations in soil exceeding either the FDEP Direct Contact criteria or Leachability to Groundwater criteria at several isolated locations within the Demonstration Range MRSs where demolition activities destroyed munitions during the RI.

Response: Additional soil samples were collected to help determine the extent of the exceedances, and groundwater wells were installed at four of the six recommended locations where leachability criteria were exceeded (one location was inaccessible and another was flooded). Subsequent soil sampling demonstrated that munitions constituents were limited to small footprints (~1 square meter) on the surface, and that munitions constituents were not leaching into the shallow groundwater. Results from this additional sampling were incorporated into the final Remedial Investigation report.

2.0 Technical and Legal Issues

Current policy within the USACE does not allow for the provision of funding for construction support as part of the remedial alternatives for the former Pinecastle Jeep Range. Instead, onsite monitoring and technical support by UXO technicians may still be provided and funded by landowners and contractors performing activities within affected areas which may increase the probability of contact with UXO or DMM, but the USACE does not have the authority to impose this as a requirement.

Figure 1

Demonstartion Range (North) MRS
Pinecastle Jeep Range

Orange County
Orlando, Florida

Legend

- MRS Boundary
- FUDS Boundary
- Parcel Boundary

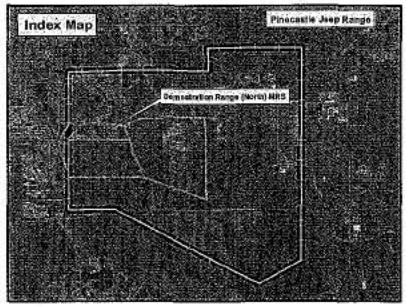

Image Source: 2007 Orthophotos
Projection: UTM Zone 17 NAD83, Units in Meters

200 100 0 200 Meters

N

PARSONS	U.S. ARMY CORPS OF ENGINEERS HUNTSVILLE CENTER

DESIGNED BY: BT	Pinecastle Jeep Range	
DRAWN BY: BT		
CHECKED BY: GH	SCALE: As Shown	PROJECT NUMBER: 746163.03004
SUBMITTED BY: MS	DATE: October 2010	PAGE NUMBER:
	FILE: X:\GIS\Site_Inspections_mrl\Maps\Pinecastle_FLS\Fig1.mxd	

Figure 2 - CONCEPTUAL SITE EXPOSURE MODEL

Site/MRS Name: FORMER PINECASTLE JEEP RANGE – Demonstration Range (North) MRS

Completed By: Steve Rembish, PARSONS ***Date Completed:*** Sept. 14, 2009