Final

Decision Document

Michie Stadium Munitions Response Site
U.S. Army Garrison West Point
West Point, New York

September 2014

Prepared for:

U.S. Army Corps of Engineers
Baltimore District
10 South Howard Street
Baltimore, Maryland 21201-1715

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FINAL
DECISION DOCUMENT

MICHIE STADIUM MUNITIONS RESPONSE SITE
U.S. ARMY GARRISON WEST POINT
WEST POINT, NEW YORK

Contract No.: W912DR-09-D-0006
DELIVERY ORDER NO.: 0001

Prepared For:

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
10 South Howard Street
Baltimore, Maryland 21201-1715

Prepared By:

Weston Solutions, Inc.
1400 Weston Way
West Chester, PA 19380

WESTON SOLUTIONS, INC. PROJECT NO.: 03886.551.001

September 2014

Final

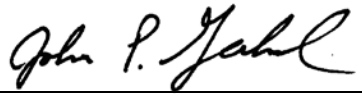
Decision Document

Michie Stadium Munitions Response Site

U.S. Army Garrison West Point

WESTON – Technical Manager
Ryan Steigerwalt, P.G.

9/4/2014
Date



WESTON – Project Manager
John Gerhard

9/4/2014
Date

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LIST OF ACRONYMS AND ABBREVIATIONS

3Rs	Recognize, Retreat, Report
AEDB-R	Army Environmental Database Restoration
amsl	above mean sea level
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CTT	closed, transferred, and transferring
DD	Decision Document
DERP	Defense Environmental Restoration Program
DGM	digital geophysical mapping
DMM	discarded military munitions
DoD	Department of Defense
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
FS	feasibility study
GIS	Geographic Information System
gpm	gallons per minute
HRR	historical records review
LUC	land use control
MC	munitions constituents
MD	munitions debris
MEC HA	munitions and explosives of concern hazard assessment
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
MRS	munitions response site
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NTCRA	non-time-critical removal action
NYSDEC	New York State Department of Environmental Conservation
PA	preliminary assessment
PP	Proposed Plan
RAO	remedial action objective
RI	remedial investigation
SARA	Superfund Amendments and Reauthorization Act

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

SI	site inspection
TBC	to-be-considered information
TMV	toxicity, mobility, or volume
U.S.	United States
USACE	U.S. Army Corps of Engineers
U.S.C.	U. S. Code
UXO	unexploded ordnance
West Point	U.S. Army Garrison West Point, West Point, New York
WESTON®	Weston Solutions, Inc.
WPMR	West Point Military Reservation

Note: Definitions of bold-faced terms in the text are provided in the "Glossary of Specialized Terms" located at the end of the document.

September 2014

DECLARATION

SITE NAME AND LOCATION

Site Name: Michie Stadium Munitions Response Site

Address: 700 Mills Road, West Point, New York

Army Environmental Database Restoration (AEDB-R): WSTPT-022-R-01

STATEMENT OF BASIS AND PURPOSE

The Michie Stadium **Munitions Response Site (MRS) Decision Document (DD)** presents the Selected Remedy for the Michie Stadium MRS (WSTPT-022-R-01) located in Orange County, West Point, New York, at 700 Mills Road at the United States (U.S.) Army Garrison West Point (West Point). The Michie Stadium MRS is one of the sites included in the **Defense Environmental Restoration Program (DERP) – Military Munitions Response Program (MMRP)** and is one of several MRSs being addressed at West Point. The remedy presented in the Michie Stadium MRS DD was selected following an opportunity for public participation in the process and in accordance with the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA**) (42 United States Code [U.S.C.] 960 et seq.) of 1980 and its amendments and to the extent practicable, the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)** (40 Code of Federal Regulations [CFR] 300). The selected remedy decision is based on the site investigation documents, which are available in the **Administrative Record file** for the Michie Stadium MRS. The DD is being issued by the U.S. Army (the Army), the lead agency managing remediation of **munitions and explosives of concern (MEC)** and **munitions constituents (MC)** at the Michie Stadium MRS, in accordance with CERCLA as required by DERP.

The Michie Stadium MRS is not included on the National Priorities List promulgated under CERCLA and the NCP and maintained by the United States Environmental Protection Agency (EPA). Under DERP-MMRP, the Army is the lead agency establishing the remedy for the MRS

with regulatory support provided by the New York State Department of Environmental Conservation (NYSDEC) and EPA Region 2. The Army is seeking agreement on the Selected Remedy from NYSDEC and EPA Region 2 and anticipates that the decision will be the final one related to MEC and MC for the Michie Stadium MRS. After agreement is reached, remedy concurrence letters will be included in the Michie Stadium MRS DD, which will be added to the Administrative Record file.

ASSESSMENT OF SITE

During construction activities, MEC and **munitions debris (MD)** was transported to the Michie Stadium MRS in fill material used for earthwork and may remain on the surface and in subsurface soil at the MRS.

Fourteen **3-inch Stokes mortars** were discovered during two past construction events conducted at Michie Stadium. As a result of the findings, Michie Stadium was included in the Army's inventory of closed, transferred, and transferring (CTT) military ranges and defense sites completed for West Point in August 2004 and was determined to be eligible for action under the MMRP. During the **site inspection (SI)** phase of the CERCLA process, a historical records review (HRR) and field site inspection were conducted between 2006 and 2007 to determine whether MEC and MC were present at the MRS (TLI, 2006 and 2007). Based on the results of the SI, the recommendation was made to proceed to a **remedial investigation (RI)** to further evaluate MEC at the Michie Stadium MRS. Based on the findings of the screening-level MC assessment performed as part of the SI, further evaluation of MC was not recommended unless concentrations of MEC and MD were identified.

The nature and extent of MEC at the Michie Stadium MRS was determined during the RI (Weston Solutions, Inc. [WESTON®], 2012). **Unexploded ordnance (UXO)** and MD were identified at the MRS during geophysical survey and intrusive investigation activities. Further MC evaluation was not warranted based on intrusive investigation results. As part of a historical photographs and records review, the boundary of the Michie Stadium MRS was established to include 14.1 acres around Michie Stadium to capture the full extent of earthwork disturbances observed in the historical records.

The RI results were used to prepare the **feasibility study (FS)** that identified **remedial action objectives (RAOs)** and goals for the Michie Stadium MRS to protect human health and the environment and evaluate remedial alternatives (i.e., cleanup plans) to address the type and extent of MEC potentially remaining in the MRS (WESTON, 2013). The recommendations of the FS were used to select a preferred alternative, which was documented in a **Proposed Plan (PP)** finalized in February 2014 and submitted with an opportunity for public comment (17 February 2014 through 20 March 2014) (WESTON, 2014). All public comments were considered prior to selection of the final remedy.

The Army has determined that the selected **remedial action** presented in the DD for MEC at the Michie Stadium MRS is necessary to protect public health, welfare, and/or the environment from the hazards associated with MEC based on the current and intended future use of the MRS. The Army is seeking agreement from NYSDEC and EPA with this determination.

DESCRIPTION OF THE SELECTED REMEDY

The Selected Remedy for the Michie Stadium MRS is Alternative 2 – Risk Management. Under Alternative 2, exposure hazards to the public and West Point personnel will be managed through access controls and public awareness activities. Specific components of the Selected Remedy (Alternative 2) for the Michie Stadium MRS are as follows:

- Terminating the interim **land use controls (LUCs)** established in the existing *Final Non-Time Critical Removal Action Land Use Control Plan* (URS Group, Inc. and ARCADIS/Malcolm Pirnie, 2012) in accordance with the selected **non-time-critical removal action (NTCRA)** interim action.
- Developing a LUC Plan specific to the Michie Stadium MRS that modifies the interim LUC components based on RI/FS findings to establish the following response complete LUC components for the final remedy:
  - Continuing restrictions on land use in accordance with the interim LUCs that prohibit or otherwise manage (e.g., office review, approval, and permitting through West Point) excavation and development of new residential, daycare, hospital or school use facilities.
  - Updating the Real Property Master Plan with the MRS boundary and the RI MEC findings, and continuing the requirement for all emergency calls regarding munitions response activities to be recorded in a Geographic Information System (GIS) database to facilitate installation-wide risk delineation.

  - Providing notification to contractors through the dig permit process, currently required for all ground-breaking activities at West Point, to use **UXO construction support** based on the RI explosive hazard assessment.

  - Providing public advisory information (e.g., the 3Rs [Recognize, Retreat, Report] policy) based on the data collected to date related to the known presence of MEC and the safety hazard identified for the Michie Stadium MRS.

- Providing long-term management through recurring reviews (every 5 years) and maintenance of LUC components.

The Selected Remedy neither impacts nor is impacted by response actions at other MRSs within West Pont.

STATUTORY DETERMINATION

The Selected Remedy for the Michie Stadium MRS 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.

The Selected Remedy represents the maximum extent to which a permanent solution can be achieved in a practicable manner at the MRS, given the identified **explosive safety hazard** and the limited exposure risk. The Selected Remedy only moderately supports the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume (TMV) of hazardous substances, pollutants, or contaminants as a principal element through treatment), because treatment will occur only on an on-call basis in response to future munitions discoveries or during construction activities. However, the Selected Remedy provides the best balance of trade-offs in terms of balancing criteria while also considering regulatory and community acceptance.

Because the remedy may result in hazardous substances, pollutants, or contaminants remaining at the Michie Stadium MRS above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment. **Recurring reviews** will continue to be conducted every 5 years until risk management is no longer required.

Alternative 2 – Risk Management is consistent with the recommendations of the FS. NYSDEC and EPA are in agreement with the Selected Remedy and recommendations.

DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of the Michie Stadium MRS DD. Additional information can be found in the project **information repository** and the Administrative Record file for the MRS.

- Nature and extent of MEC contamination: Subsection 5.2 – Nature and Extent of MEC.
- Baseline risk represented by MEC: Section 7 – Summary of Site Risks.
- Remediation objectives: Section 8 – Remedial Action Objectives.
- Addressing source materials constituting principal threats: Section 11 – Principal Threat Wastes.
- Current and reasonably anticipated future land use assumptions used in the baseline risk assessment and DD: Section 6 – Current and Potential Future Land Use.
- Potential land use that will be available at the Michie Stadium MRS as a result of the Selected Remedy: Subsection 12.4 – Expected Outcome of Selected Remedy.
- Estimated capital, annual operation and maintenance, and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected: Section 9 – Description of Alternatives.
- Key factor(s) that led to selection of the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision): Section 10 – Comparative Analysis of Alternatives, Section 12 – Selected Remedy, and Section 13 – Statutory Determinations.

AUTHORIZING SIGNATURE

Date: 18 Mar 15

Landy D. Dunham
Colonel, U.S. Army
Commanding

Note: Definitions of bold-faced terms in the text are provided in the "Glossary of Specialized Terms" located at the end of the document.

September 2014

DECISION SUMMARY

1. SITE NAME, LOCATION, AND DESCRIPTION

1.1 SITE NAME AND LOCATION

The Michie Stadium **Munitions Response Site (MRS)** (WSTPT-022-R-01) is located in Orange County, West Point, New York at 700 Mills Road at the U.S. Army Garrison West Point (West Point). The Michie Stadium MRS includes 14.1 acres around the stadium (see Figure 1-1).

West Point encompasses 15,974 acres that are divided into two areas, the Main Post or campus (2,530 acres) and the Military Reservation (13,444 acres). The Military Reservation is largely undeveloped and contains operational training facilities such as firing ranges and **bivouac** areas, which are used during the summer to house and train cadets.

The Main Post includes the majority of the academic, residential, and support facilities for West Point. Michie Stadium has been part of the Main Post area of West Point since the installation was established in 1802, and used for recreational and athletic activities throughout its history. The Michie Stadium MRS is owned, and managed by the U.S. Army. To effectively manage the overall cleanup of former munitions sites at West Point under the **Military Munitions Response Program (MMRP)**, the Army identified 11 MRSs within the installation boundary. The Michie Stadium MRS is one of these 11 sites.

The MRS is bordered by Howze Field to the south, Holleder Center to the southwest, and Lusk Reservoir to the east (see Figure 1-2). The Michie Stadium MRS intersects a capped landfill at Service Lot A to the west and extends about 200 feet north of Stony Lonesome Road to the north. Several athletic complexes, including the Holleder Center, Howze Field, Kimsey Center, and Randall Hall, are located at or immediately adjacent to the MRS.

1.2 SITE DESCRIPTION

Based on historical document reviews and on-site investigations conducted to date, it is believed that items of **munitions and explosives of concern (MEC)** are present in the Michie Stadium MRS as a result of importing fill material during construction activities. All MEC recovered at the MRS to date have been classified as **unexploded ordnance (UXO)** and includes **3-inch Stokes mortars**. All **munitions debris (MD)** recovered during the **remedial investigation (RI)** was identified as fragments or components associated with 3-inch Stokes mortars (Weston Solutions, Inc. [WESTON®], 2012).

Funding for the implementation of the Michie Stadium MRS Selected Remedy will be provided by the Defense Environment Restoration Account, a source of funding approved by the U.S. Congress to clean up contaminated sites on Department of Defense (DoD) installations under the **Defense Environmental Restoration Program (DERP)**. The U.S Army is the lead agency for investigating, reporting, making remedial decisions, and implementing **remedial actions** regarding MEC at the MRS with technical support provided by the U.S. Army Corps of Engineers (USACE), Baltimore District. The New York State Department of Environmental Conservation (NYSDEC) is the lead regulatory agency for the Michie Stadium MRS with support provided by the U.S. Environmental Protection Agency (EPA), Region 2. The Army is issuing the Michie Stadium MRS **Decision Document (DD)** in consultation with NYSDEC and EPA.

In 2002, the U.S. Congress established the MMRP under the DERP to address MEC and **munitions constituents (MC)** located on current and former defense sites. The Michie Stadium MRS was determined to be eligible for action under the DERP – MMRP (10 United States Code [U.S.C.] 2710). Management of MEC and MC at the Michie Stadium MRS under DERP-MMRP is being conducted by the Army in accordance with the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** (42 U.S.C. 960 et seq.) of 1980, as amended by the **Superfund Amendment and Reauthorization Act (SARA),** and the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)** (40 Code of Federal Regulations [CFR] 300)**.** The ultimate objective under the MMRP is to protect human health, welfare, and the environment from hazards associated with both MEC and MC.

Current land use in the Michie Stadium MRS includes recreational activities and non-recreational activities (e.g., public attendance at athletic events, property maintenance). Potential **receptors** include the general public and athletes using Michie Stadium for recreational purposes, and West Point personnel and their contractors performing maintenance or construction activities within the MRS boundary. Although future plans for the MRS include the construction of an additional athletic building (Lacrosse Center), no change to the current land use (recreational and athletic activities) is anticipated.

SECTION 1

FIGURES

Figure 1-1
Regional Location Map
U.S. Army Garrison West Point

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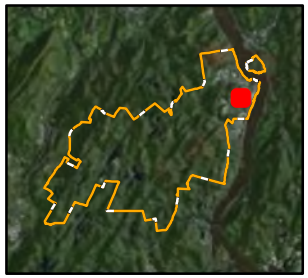
Legend

Michie Stadium -14.1 Acres



Imagery Source: ESRI, Imagery Mapping Service. 2013

N W E S

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Figure 1-2
Michie Stadium MRS
(WSTPT-022-R-01)
U.S. Army Garrison West Point

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2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 SITE HISTORY

Since the establishment of West Point in 1802, the land in the Michie Stadium vicinity has always been part of the Main Post and has been used for recreational and athletic activities. The land on which Michie Stadium is located was acquired by West Point in the mid-1800s. The area was low-lying and undeveloped as of the late 1800s. When the site was selected for construction of the stadium, the site was described as a wet, marshy area (Bedford, 2000; TLI, 2006).

In 1909, there was a restoration project at Fort Putnam, which is located north of the Michie Stadium MRS. In addition, there was a major earth and rock excavation and reworking of material for the construction of the new stadium. Earthmoving activities for the new stadium began in August 1923 with massive amounts of bedrock being removed from the southern edge of the Fort Putnam ridge because extensive filling was necessary to stabilize what had once been a low lying, seasonally inundated area (Bedford, 2000; TLI, 2006).

Historical photographs and records were reviewed during the RI to identify the extent of historical earthwork in the vicinity of the stadium. Topographic maps dated 1892 and 1941 capture the maximum extent to which excavation was performed during construction of Michie Stadium in 1923 and suggest that there was significant reworking of the landscape in the area between Michie Stadium and Fort Putnam. Additional removal of bedrock and reworking of fill material occurred at the north end of the Michie Stadium MRS during a 2001 and 2002 extension of Stony Lonesome Road.

Stokes mortars were identified and disposed by an Explosive Ordnance Disposal (EOD) unit during two separate construction projects completed near the stadium in 2001 and 2003. In 2001, five 3-inch MKI Stokes mortars were found during construction of pilings to increase the stability of the west stands. In September 2003, nine 3-inch Stokes mortars were found during the construction of Randall Hall. As a result of these findings, the Michie Stadium MRS area was included in the inventory of closed, transferred, and transferring (CTT) military ranges and defense sites completed in August 2004 by the Army for West Point (also known as the Phase 3

CTT). The Phase 3 CTT meets the requirements of a CERCLA Preliminary Assessment (PA) and identified the Michie Stadium MRS as eligible for action under the MMRP.

2.2 SITE INSPECTION

The next phase of the CERCLA process for West Point was the **site inspection (SI)**. The SI was completed using a two-phase approach. A Historical Records Review (HRR) (TLI, 2006) was the initial step of the MMRP SI. During the HRR, records searches were performed to supplement the information gathered during the Phase 3 CTT and to help facilitate decision-making processes to determine the next step for the SI (TLI, 2006).

Based on the HRR results, one MRS at West Point was determined to require no further action. All other MRSs in the Phase 3 CTT, including the Michie Stadium MRS, were found to require a field inspection. The field inspection phase of the SI was performed in April, May, and September 2006. The combination of the HRR and field inspection results performed during the SI indicated that 11 MRSs, including the Michie Stadium MRS, required further investigation and should proceed to the RI phase of CERCLA (TLI, 2007). Although no MEC was identified during the field inspection at the Michie Stadium MRS, the recommendation to proceed with an RI was made because of the MEC recovered during the previous construction activities. Based on the screening-level MC assessment performed as part of the SI, further evaluation of MC was not recommended unless concentrations of MEC and MD were identified.

2.3 REMEDIAL INVESTIGATION/FEASIBILITY STUDY

An RI/**feasibility study (FS**), completed in accordance with the NCP (40 CFR 300.430(d) and (e)), was initiated in 2010 and concluded in 2012. The sources of data evaluated as part of the RI to characterize contamination at the Michie Stadium MRS included historical information and archival searches, results of the RI field effort, site layouts based on historical maps and photos, and the visual inspection of terrain and structures. The data collected during the field investigation and the conclusions drawn in the RI regarding hazards and risks to human health and the environment were used to develop the FS, finalized in February 2013 (WESTON, 2013).

The RI findings support the conclusion that the MEC and MD recovered from the Michie Stadium MRS were likely transported to the MRS in fill material deposited during various

construction projects. A review of historical topographic maps and current site conditions was used to delineate the extent of the fill material potentially containing MEC and MD at the MRS and establish the 14.1-acre MRS boundary. The results of the RI are fully documented in the *Final Remedial Investigation Report for the Michie Stadium Munitions Response Site, U.S. Army Garrison West Point, West Point, New York* (WESTON, 2012).

Primary components of the FS that were important in determining a Selected Remedy for the Michie Stadium MRS included development of **remedial action objectives (RAOs)** to protect human health and the environment, followed by the development and evaluation of remedial alternatives to address the potential residual MEC in the MRS. Four remedial alternatives were developed for the MRS, including no action, risk management, surface removal of MEC with risk management, and subsurface removal of MEC to instrument **detection depth** (includes surface and subsurface soil) with risk management. These alternatives provided a range of options for comparison in their ability to meet the nine criteria prescribed by the NCP (40 CFR. 300.430(e)(9)(iii)(A)-(I)) that are considered for remedy selection.

The results of the FS were presented in the *Final Feasibility Study, Michie Stadium Munitions Response Site, U.S. Army Garrison West Point, West Point, New York* (WESTON, 2013), and summarized in the *Final Proposed Plan, Michie Stadium Munitions Response Site, U.S. Army Garrison West Point, West Point, New York* (WESTON, 2014). As required by the NCP (40 CFR 300.800(a)), both technical documents are available as part of the **Administrative Record file**.

3. COMMUNITY PARTICIPATION

Pursuant to CERCLA Section 113(k)(2)(B) and Section 117 and Section 300.430(f)(2) and (3) of the NCP, the **Proposed Plan (PP)** for the Michie Stadium MRS was released for public comment on 7 February 2014. The PP and the RI/FS reports are available to the public in the project **information repository**, located near the MRS at the West Point Post Library in Building 622. The project information repository provides copies of documentation included in the Administrative Record file for the Michie Stadium MRS. The official Administrative Record file for the MRS is located in Building 667 in the Engineering and Environmental Division area and is maintained by the Army.

A public comment period was held from 17 February 2014 through 20 March 2014. No comments were received by the Army during this time. The notification for the PP 30-day public comment period and meeting was published in the following periodicals:

- The *Times Herald-Record* on 14 February, 15 February, and 16 February 2014.
- The *News of the Highlands* on 14 February 2014.
- The *Putnam County News and Reporter* on 12 February 2014.

A Responsiveness Summary to present comments received during the public comment period and agency responses is provided in Appendix A.

4. SCOPE AND ROLE OF RESPONSE ACTION

The Michie Stadium MRS DD addresses the remedial action the Army determined as a Selected Remedy to address MEC at the MRS. To effectively manage the overall cleanup of former munitions sites at West Point under the MMRP, the Army identified 11 MRSs within the installation boundary. The Michie Stadium MRS is one of the 11 sites. The Michie Stadium MRS DD addresses only the remedy selected by the Army to manage the risks that have been identified specifically at the MRS and does not affect the results of investigations or the outcome of decisions being made for other MRSs at West Point.

Based on the information and data collected for the MRS, the Army anticipates that the Selected Remedy will be the final remedial action needed at the Michie Stadium MRS to protect the public and environment from the risks related to MEC that have been identified to date. The role of the remedial action selected for the MRS is to reduce the risk associated with MEC to human health and the environment based on the current and intended future land use by the public for recreation and by West Point personnel and/or contractors performing property management activities.

5. PROJECT MUNITIONS RESPONSE SITE CHARACTERISTICS

The following information is presented to document the site characteristics of the Michie Stadium MRS. Detailed information about the MRS characteristics, the site conceptual model, and the nature and extent of contamination is presented in the *Final Remedial Investigation Report for the Michie Stadium Munitions Response Site, U.S. Army Garrison West Point, West Point, New York* (WESTON, 2012).

5.1 ENVIRONMENTAL SETTING

5.1.1 Current Topography

The general topography of West Point is best described as having moderately steep hills and numerous **escarpments;** however, as the Michie Stadium MRS is extensively developed with athletic facilities and impervious surfaces within the Main Post area of the facility, the topography is relatively flat. There is a small area along the northern edge of the MRS that includes wooded, hilly terrain. The Michie Stadium MRS lies at an elevation of approximately 320 feet (97 meters) above mean sea level (amsl) (WESTON, 2012).

5.1.2 Soil Conditions

The soil types present within the Michie Stadium MRS are excessively to moderately well drained soils that are characteristic of man-made cut-and-fill areas. The two soil types observed during the SI and RI were the Swartswood-Mardin and Hollis Complex soils, which range in available water capacity from low to moderate, and excessively low to low, respectively, and are not likely to be susceptible to **frost heave**. Shallow depths to underlying bedrock are evident by numerous outcroppings visible in undeveloped portions of the Michie Stadium MRS (WESTON, 2012).

5.1.3 Geology

West Point lies in the Hudson Highlands, a low, rugged mountain range that forms a zone of folded and faulted metamorphic and igneous rocks subjected to extensive weathering and erosion. Precambrian-age granite, diorite, gneiss, and schist compose the majority of the crystalline bedrock underlying West Point. The metamorphic rocks of West Point exist in

sequences. These sequences are composed of a hard, layered, banded rock, gneiss, which is sometimes intruded by igneous rocks. The cantonment area, which is bounded by the Hudson River, is underlain by exposed bedrock and glacial alluvium (Tetra Tech, Inc., 2011). Site-specific geologic investigations were not conducted for the Michie Stadium MRS. Regional geologic maps (Cadwell, 1989; Fisher et al., 1970) indicate that the bedrock geology of the Michie Stadium MRS is gneiss underlain by biotite granitic gneiss. Bedrock is very shallow with many outcroppings.

Surficial geologic formations on the installation are outcroppings, talus, and glacial deposits. A thin veneer layer of Pleistocene-age glacial deposits, both stratified and unstratified, overlies the igneous and metamorphic bedrock sequence. The stratified drift consists primarily of sand and gravel deposited in glacial lakes and streams. The unstratified drift consists of glacial till material, which is mainly large boulders and clay, sand, and gravel deposited directly from glacial ice as it progressed or regressed across the area (Tetra Tech, Inc., 2011).

5.1.4 Hydrology

5.1.4.1 Surface Water

Although no surface water resources exist within the Michie Stadium MRS, the Lusk Reservoir is immediately adjacent to the MRS and several water bodies are located within a 3-mile radius, including the Hudson River, Dassori Pond, Delafield Pond, Crow's Nest Brook, Sinclair Pond Brook, and Kinsley Farm Brook. Sheet flow within the MRS is directed to Kinsley Farm Brook (WESTON, 2012).

5.1.4.2 Groundwater

Groundwater on West Point occurs in an **unconsolidated aquifer** consisting of **alluvial deposits** and a consolidated **bedrock aquifer**. Water within the unconsolidated aquifer occurs primarily in the sands and gravels of the **stratified drift deposits**. These deposits represent the most prolific sources of groundwater on the installation, but the deposits are thin and generally have low well yields that average about 40 gallons per minute (gpm). Recharge to the aquifer is primarily from local precipitation, but hydrologic communication occurs between the alluvial and the bedrock aquifers, and some upward seepage from the bedrock aquifer occurs in

low-lying areas (Tetra Tech, Inc., 2011; TLI, 2007). However, an unconsolidated aquifer does not exist within the Michie Stadium MRS based on the geology (WESTON, 2012).

5.1.5 Sensitive Environments

5.1.5.1 Ecological Resources

West Point has identified 12 sites that are to be specially managed because of ecological or geological significance, unique geological structure, and/or aesthetic and educational value to the installation; however, the Michie Stadium MRS is not located within or adjacent to any of the 12 identified sites. Additionally, approximately 1,010 acres of wetlands are located throughout West Point in association with streams, ponds, depressions, and seeps; however, the Michie Stadium MRS does not contain wetlands.

Adjacent to the developed portions of the MRS, vegetation is limited to mowed lawn and trees that are characteristic of developed, landscaped areas with pockets of mature hardwood forest and or dense vegetation consisting of small saplings, mountain laurel, blueberry, briers, and vines. Although 48 species of mammals have been documented at West Point, in addition to many species of fish and **invertebrate** species, the extensive development within the Michie Stadium MRS makes it unlikely that these species are present in the MRS (WESTON, 2012).

5.1.5.2 Cultural Resources

West Point is one of the older training grounds in the United States that is still intact, and it contains numerous cultural, archaeological, and historical sites. Michie Stadium itself is a cultural resource. The Michie Stadium MRS is located in a Cadet Support area and is used for recreational and athletic activities. Michie Stadium is used for football and lacrosse events.

5.2 NATURE AND EXTENT OF MUNITIONS AND EXPLOSIVES OF CONCERN

A total of 0.43 acre of the Michie Stadium MRS was investigated via electromagnetic **digital geophysical mapping** (DGM) survey to delineate the nature and extent of MEC in the portions of the MRS that are accessible and where the highest use of the area occurs. The remainder of the MRS was not accessible for characterization via geophysical mapping and intrusive investigation as nearly 70% of the MRS has been developed and includes buildings and

structures; impermeable surfaces, such as concrete and asphalt roads, parking areas, and walkways; and the playing field inside Michie Stadium.

A total of 242 **anomalies** were detected as a result of the DGM surveys. Each anomaly was reacquired and investigated. One MEC item (UXO, mortar, 3-inch Stokes, MKI, unfuzed) and seven MD items were recovered during intrusive investigations. The MD items included one tail boom and one end cap from 3-inch Stokes mortars and five fragments from unknown munitions. The UXO item was recovered at 6 inches below ground surface (bgs), and MD was recovered between 0 inches and 3 inches bgs. The remaining 234 anomalies were documented as cultural debris, including non-munitions related scrap metal such as nails, and were discovered between 0 inches and 6 inches bgs.

The RI report findings support the conclusion that MEC and MD recovered from the Michie Stadium MRS were most likely initially brought to the area in construction fill transported to the MRS during various construction projects. Stokes mortars were designed in 1915 and used primarily during World War I (1914-1918) and until World War II (1939). It is unlikely that Stokes mortars were used for training at the Michie Stadium MRS considering that Fort Putnam was restored in 1909, and Michie Stadium was constructed between 1923 and 1924 and used for athletic events and recreation thereafter.

A review of the historical topographic maps was used to delineate the limits of the disturbance resulting from past earthwork and the areas where MEC and MD were likely brought to the MRS in construction fill. The evaluation was used to establish the 14.1-acre MRS boundary to capture the extent of the historically disturbed area (cut or fill) in the vicinity of Michie Stadium.

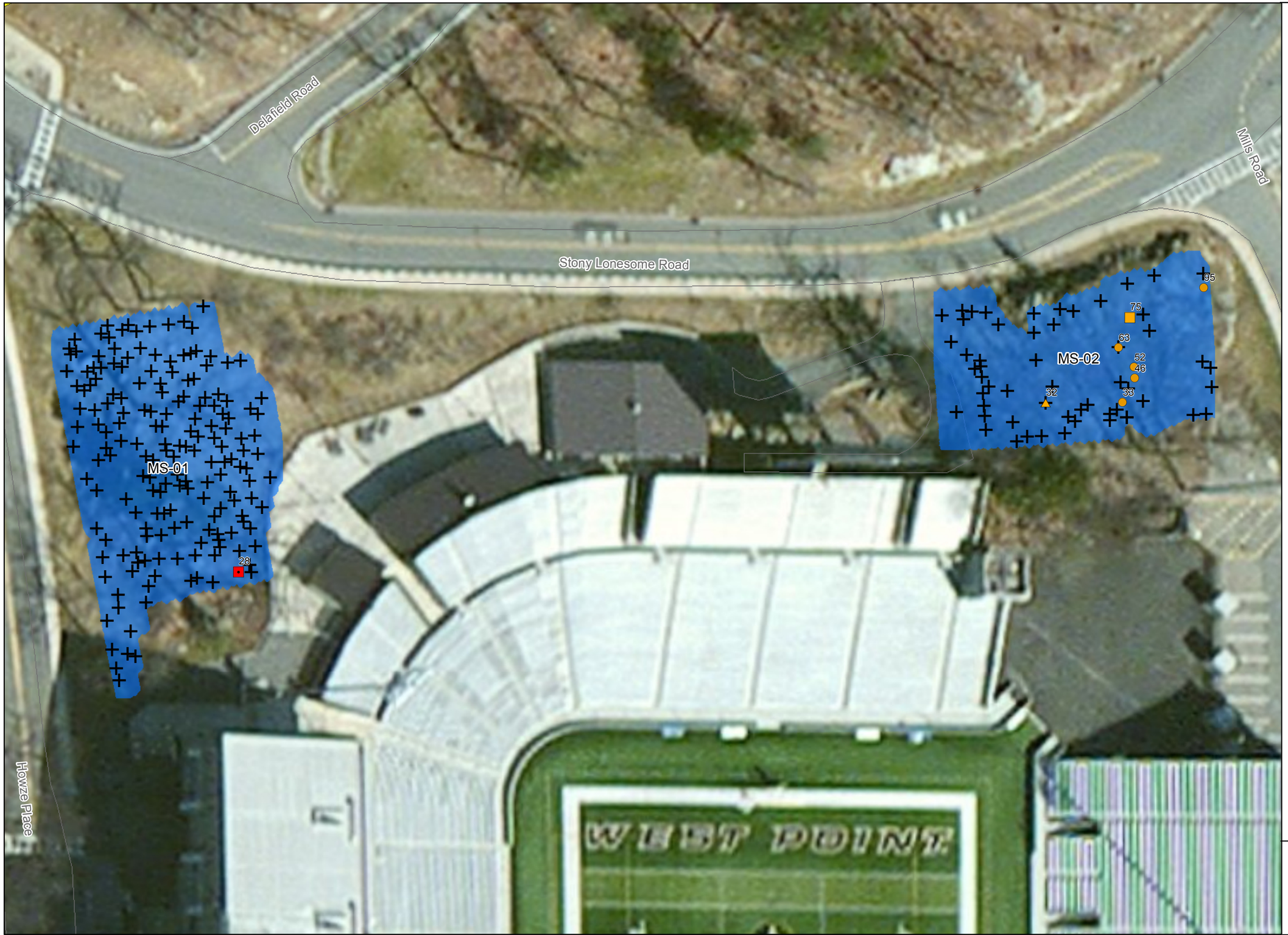
5.3 NATURE AND EXTENT OF MUNITIONS CONSTITUENTS

MC sampling conducted during the SI detected select metals and explosives compounds that were below the conservative screening levels selected to assess potential risk to human health and ecological receptors. Based on the lack of identified risk to potential receptors for MC, a recommendation was made following the SI that further evaluation of MC was not warranted unless additional MEC concerns were identified (TLI, 2007). During the RI, it was determined by the project team that MC sampling was not required based on the low concentration of MEC

and MD discovered during the geophysical surveys and intrusive work. This determination is consistent with the RI objectives developed during the RI field work planning phase (WESTON, 2012).

SECTION 5

FIGURE



Legend

- DGM Survey Area
- 3" Stokes Mortar (UXO)
- Cultural Debris
- Frag
- 3" Stokes Mortar Endcap
- 3" Stokes Mortar Tailboom

Imagery Source: ESRI, Bing Mapping Service. 2012

N W E S

0 40

Feet

Figure 5-1
Michie Stadium MRS
Remedial Investigation Findings
U.S. Army Garrison West Point

Path: Y:\West_Point\mxd\FS\MS_Dig_Results.mxd Author: ricksc 6/12/2013 3:51:59 PM

6. CURRENT AND POTENTIAL FUTURE LAND USE

Current land use by the public includes recreational use by athletes and spectators related to the stadium. No exposure to potential residual subsurface MEC is anticipated to occur as a result of using the property for this purpose. Non-recreational activities at the Michie Stadium MRS include property maintenance and management in the improved portions of the MRS around the stadium by West Point personnel and/or contractors. Maintenance activities are expected to include primarily surface activities (e.g., mowing, landscaping activities) but may also include intrusive activities related to improving drainage or utility and roadway and/or parking lot repair. Although future plans for the Michie Stadium MRS include the construction of an additional athletic building (Lacrosse Center), no change to the current land use (recreational and athletic activities) is anticipated.

To facilitate evaluating exposure risks (see Summary of Site Risks provided in Section 7 for more details), a cumulative total number of 80,000 contact hours was estimated for recreational users at the MRS. The estimate assumes that up to 10,000 individuals use the property at a frequency of 8 hours annually. Potential future use of the property includes construction activities related to the existing stadium and infrastructure and new construction within the Michie Stadium MRS boundary.

7. SUMMARY OF SITE RISKS

The results of the RI were used to evaluate potential hazards associated with the identified MEC. Based on the screening-level risk assessment completed in the SI, MC chemicals, including metals and explosive compounds, were not detected at concentrations that pose an unacceptable risk to human health or the environment. Therefore, the only risk considered at the Michie Stadium MRS is an **explosive safety hazard** associated with MEC.

An explosive hazard is the probability for a MEC item to detonate and potentially cause harm because of human activities. An explosive hazard exists if a person can come into contact with a MEC item and act upon it to cause detonation. The potential for an explosive safety hazard depends on the presence of three critical elements: a source (presence of MEC), a receptor (person), and interaction between the source and receptor (such as picking up the item or disturbing the item). There is no explosive safety hazard if any one element is missing.

The **exposure pathway** for a MEC item to a receptor is primarily through direct contact because of some human activity. Agricultural or construction activities involving subsurface intrusion are examples of human activities that will increase the likelihood for direct contact with buried MEC. MEC will tend to remain in place unless disturbed by human or natural forces such as erosion or frost heave. Movement of MEC by natural forces may increase the probability for direct human contact but may not necessarily result in a direct contact or exposure.

Explosive hazards for the Michie Stadium MRS were evaluated in accordance with the 2008 *Interim Munitions and Explosives of Concern Hazard Assessment Methodology* (MEC HA) (EPA, 2008), designed to be used as the CERCLA hazard assessment methodology for MRSs where there is an explosive hazard from the known or suspected presence of MEC. The MEC HA was used to evaluate the baseline hazard associated with the MRS based on the nature and extent of MEC and exposure risks related to the current use identified during the RI. Subsequently, the MEC HA methodology was used to facilitate the evaluation of remedial alternatives by adjusting the input parameters to account for the potential effects of remedial alternative implementation.

The MEC HA is structured around three components of a potential explosive hazard incident:

- **Severity** — The potential consequences (e.g., death, severe injury, property damage) of MEC detonating.
- **Accessibility** — The likelihood that a receptor will be able to come in contact with MEC.
- **Sensitivity** — The likelihood that a receptor will be able to interact with MEC such that it will detonate.

Each of these components is assessed in the MEC HA by input factors that consider a set of site conditions, including the types and uses of munitions and the relationship of the munitions types and uses to the current and proposed activities at a site. Each input factor has two or more categories. Each input factor category is associated with a numeric score that reflects the relative contributions of the different input factors to the MEC HA. The sum of the input factor scores falls within one of four defined ranges, called hazard levels. The attributes of each of the four hazard levels describe groups of MRSs with site condition score ranges from highest to lowest. The MEC HA hazard levels and maximum and minimum score ranges are as follows:

- **Hazard Level 1** — Sites with the highest hazard potential. Instances of an imminent threat to human health from MEC may exist. The hazard level score ranges from a maximum score of 1,000 to a minimum score of 840.
- **Hazard Level 2** — Sites with a high hazard potential. Surface MEC may exist at the site or intrusive activities being conducted may increase the risk of encountering MEC in the subsurface. The site has moderate or greater accessibility by the public. The hazard level score ranges from a maximum score of 835 to a minimum score of 725.
- **Hazard Level 3** — Sites with a moderate hazard potential. A site that would be considered safe for the current land use without further munitions responses, although not necessarily suitable for reasonable anticipated future use. Level 3 areas generally have restricted access and few contact hours. Typically, MEC is present only in the subsurface. The hazard level score ranges from a maximum score of 720 to a minimum score of 530.
- **Hazard Level 4** — Sites with a low hazard potential. The site is compatible with current and reasonably anticipated future use. Typically, a MEC cleanup has been performed at Level 4 sites. The hazard level score ranges from a maximum score of 525 to a minimum score of 125.

Based on the current use scenario, the Michie Stadium MRS has been assigned a baseline Hazard Level Category of 4, with a corresponding score of 525. This assessment indicates that the MRS has a low hazard potential based on a confirmed subsurface source for MEC, coupled with limited exposure risk for potential receptors as activities at the MRS are typically conducted on the surface.

8. REMEDIAL ACTION OBJECTIVES

The Michie Stadium MRS current and future land use is primarily recreational activities by athletes and spectators at the stadium. West Point personnel and/or contractors also access the MRS routinely for maintenance and construction activities.

The ultimate goal of a cleanup alternative is to ensure the protection of human health, public safety, and the environment. To achieve this goal, the RAO established for the Michie Stadium MRS is to prevent construction workers, West Point personnel, athletes, and site visitors from contacting MEC on the ground or below the ground.

9. DESCRIPTION OF ALTERNATIVES

CERCLA, Section 121, requires that each selected remedial alternative be: (1) protective of human health and the environment; (2) cost-effective; (3) comply with all applicable or relevant and appropriate federal and state requirements; and (4) use permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment (i.e., removal and disposal) as a principal element for the reduction of toxicity, mobility, or volume (TMV) of the hazardous substances. The four remedial alternatives evaluated for the Michie Stadium MRS are as follows:

- Alternative 1 – No Action.
- Alternative 2 – Risk Management.
- Alternative 3 – Surface Removal of MEC with Risk Management.
- Alternative 4 – Subsurface Removal of MEC to Instrument Detection Depth with Risk Management.

CERCLA, Section 121(c) and Section 300.430(f)(4)(ii) of the NCP require the review of remedial actions no less than every 5 years if the selected remedy does not allow for unlimited use and unrestricted exposure. The reviews are conducted to ensure that human health and the environment are being protected. **Recurring reviews** for MEC remedial actions determine whether a remedial action continues to minimize explosive safety hazards and continues to be protective of human health and the environment. Because none of the alternatives evaluated for the Michie Stadium MRS allow for unlimited use and unrestricted exposure, recurring reviews will be completed by the government at least every 5 years. Detailed documentation describing the development of each of the four alternatives with the results of the detailed and comparative analyses conducted as part of the FS are available for review in the Administrative Record file (see technical document *Final Feasibility Study, Michie Stadium Munitions Response Site, U.S. Army Garrison West Point, West Point, New York* [WESTON, 2013]). In the FS, the alternatives were evaluated and compared in relation to the nine NCP criteria prescribed for remedy selection in accordance with CERCLA.

These alternatives are summarized as follows:

- **Alternative 1 – No Action** — The no action alternative, required to be evaluated in accordance with Section 300.403(e)(6) under the NCP, is provided as a baseline for comparison to the other proposed alternatives. This alternative means no action will be taken to locate, remove, and dispose of munitions. This alternative assumes land use in the future will remain consistent with current conditions. Cost - $0.

- **Alternative 2 – Risk Management (*Army Selected Remedy*)** — Alternative 2 consists of various access control and/or public awareness components to manage risk exposure to human health from potential MEC remaining at the Michie Stadium MRS. Alternative 2 includes modifying the existing interim LUC components for the Michie Stadium MRS based on the RI/FS findings and establishing the LUC components as a final remedy. Examples of access controls and awareness components considered LUC components include continuing land use restrictions, updating the Real Property Master Plan database, providing notifications with permits and contracts requiring **UXO construction support** for intrusive activities, and providing public advisory information to notify the public of explosive safety hazards when encountering MEC. Cost - $181,998.

- **Alternative 3 – Surface Removal of MEC with Risk Management** — Alternative 3 includes removal of MEC detected using geophysical survey instrumentation on the surface across the 4.3 acres of the Michie Stadium MRS that are not developed and are accessible to the public. This alternative also includes risk management components similar to those presented in Alternative 2. Cost - $581,139.

- **Alternative 4 – Subsurface Removal of MEC to Instrument Detection Depth with Risk Management** — Alternative 4 includes removal of MEC from the surface and the subsurface to the detection depth of geophysical instrumentation across the 4.3 acres of the Michie Stadium MRS that are not developed and are accessible to the public. Because of the nature of the removal and terrain, this alternative includes a combination of both analog and digital geophysical survey instrumentation to achieve the RAO. This alternative also includes risk management components. Cost - $737,574.

The MEC HA methodology (described in Section 7) was used to assess the potential effects (if any) on the explosive hazards posed to human health and the environment that might result from the cleanup contemplated under each remedial alternative. The input parameters are adjusted in the MEC HA worksheet to account for the potential impact of remedial alternative implementation. The results of the evaluation are summarized in Table 9-1.

Table 9-1 Remedial Alternative Munitions and Explosives of Concern Hazard Assessment Scoring Summary

Site ID: Michie Stadium MRS (WSTPT-022-R-01)	MEC HA Hazard Level Category[1]	MEC HA Score[1]
Alternative 1 – No Action[2]	4	525
Alternative 2 – Risk Management – ***Army Selected Remedy***	4	425
Alternative 3 – Surface Removal of MEC with Risk Management[3]	4	335
Alternative 4 – Subsurface Removal of MEC to Instrument Detection Depth with Risk Management	4	345

Notes:

[1] The MEC HA hazard level categories and scores were developed using EPA guidance and are presented in the Final FS Report for the Michie Stadium MRS (WESTON, 2013) to evaluate the explosive hazard associated with alternative implementation.
[2] Represents current use conditions and provides the baseline for alternative comparison.
[3] The MEC HA does not account for Minimum MEC Depth Relative to Maximum Intrusive Depth when evaluating Alternative 3 because MEC is located only in the subsurface and the intrusive depth does not overlap with the minimum MEC depth.

10. COMPARATIVE ANALYSIS OF ALTERNATIVES

Nine NCP criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy (40 CFR 300.430(e)(9)(iii)(A)-(I)). This section presents the relative performance of each alternative in relation to the nine criteria, noting how each compares with the other options under consideration. The nine evaluation criteria are described as follows:

Threshold Criteria:

1. **Overall Protection of Human Health and the Environment** – Evaluates whether a cleanup alternative achieves adequate protection by eliminating, reducing, or controlling hazards through treatment, engineering controls, or local government controls.

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** – Evaluates whether a cleanup option meets federal and state environmental laws, regulations, and other requirements or whether a waiver is justified.

Balancing Criteria:

3. **Long-Term Effectiveness and Permanence** – Considers whether a cleanup alternative will maintain reliable protection of human health and the environment over time after cleanup goals are met. The evaluation of the criteria also takes into account the amount of hazard remaining after the cleanup is complete.

4. **Reduction of TMV through Treatment** – Evaluates whether a cleanup alternative's use of treatment reduces the harmful effects of the contaminants, their ability to move in the environment, and the amount of contamination present.

5. **Short-Term Effectiveness** – Considers the time needed to complete a cleanup alternative and the risks a cleanup alternative may pose to workers, the community, and the environment until the cleanup goals are met.

6. **Implementability** – Considers whether implementation of a cleanup alternative is technically and administratively feasible, including factors such as the relative availability of goods and resources.

7. **Cost** – Includes the estimated capital and annual operations and maintenance costs as well as the present worth cost of a cleanup alternative (Present worth cost is the total cost of an alternative over time in terms of today's dollar value.).

Modifying Criteria:

8. **Regulatory Acceptance** – Considers whether the state (NYSDEC) and EPA Region 2 agree with the Army's analyses and recommendations for a cleanup alternative as described in the PP.

9. **Community Acceptance** – Considers whether the local community agrees with the Army's analyses and proposed remedial plan. The comments the Army receives on its preferred alternative are important indicators of community acceptance.

10.1 OVERALL PROTECTIVENESS OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative 1 is not protective because no action would be taken to prevent human exposure to MEC. Alternative 2 is more protective than Alternative 1 because risk management would reduce unacceptable exposure. Alternative 3 does not provide any additional protectiveness over Alternative 2 because the potential remaining MEC is in the subsurface. Alternative 4 is more protective because it would remove subsurface MEC; however, the probability of encountering additional MEC at the Michie Stadium MRS is low, and Alternative 2 and Alternative 3 include risk management to reduce exposure to the potential remaining hazards over the long term.

Alternatives 2, 3, and 4 fall in the same MEC HA Hazard Level Category (Category 4) as the baseline conditions represented by Alternative 1, meaning that all the alternatives contemplated have a low risk of explosive hazard. Therefore, differentiation between the alternatives was evaluated using the corresponding scores that were calculated for implementing Alternatives 2, 3, or 4 using the MEC HA.

The MEC HA analysis indicates that Alternative 2 will result in lowering the score from the baseline condition of 525 to 425. The lower score indicates that a greater protectiveness will be achieved by implementing Risk Management versus No Action at the Michie Stadium MRS. However, both Alternative 3 and Alternative 4, which address potential residual MEC, may provide better protectiveness than Alternative 2 to varying degrees as both scores were calculated below 400.

Because Alternative 3 would address the immediate exposure risks for surface MEC only and because no MEC was confirmed at the ground surface during the RI, Alternative 3 would be less

protective than Alternative 4. Only Alternative 4 addresses the subsurface MEC that was confirmed by the RI and discovered during past construction events, and only implementation of Alternative 4 would reduce immediate hazards associated with intrusive activities in accessible portions of the Michie Stadium MRS.

10.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Pursuant to Section 300.5 of the NCP, ARARs are defined as follows:

- *Applicable* requirements are those cleanup standards; standards of control; and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.

- *Relevant and Appropriate* requirements are those cleanup standards; standards of control; and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not ‘‘applicable’’ to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

Non-promulgated (and not enforceable) **to-be-considered (TBC)** advisories, guidance, and policies that may facilitate development of protective remedies were also considered during remedy selection under the ARAR criterion in accordance with Section 300.400(g)(3) of the NCP. TBC information may be identified, as appropriate, to supplement ARARs where they do not exist or where it has been determined that the ARARs are insufficient to ensure protection of human health and the environment at a particular release.

As required in accordance with Section 300.400(g) of the NCP, the Army, with support from NYSDEC and EPA, identified requirements applicable to the MEC characterized during the RI. The requirements were further defined with regard to the remedial alternatives considered during

the FS, based on an objective determination of whether the requirements specifically address the hazard, remedial action, location, or other circumstance found at the Michie Stadium MRS.

There are no regulations or criteria associated with Alternative 1, and Alternatives 2 through 4 would be implemented and performed to comply with all ARARs and TBCs. Alternative 4 would be more intrusive in nature and would require further attention to impacts on cultural and natural resources. A summary of the ARARs and TBCs identified during the RI/FS for the Michie Stadium MRS is appended to the DD (see Appendix B).

10.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative 1 is not effective or permanent. Alternative 2 is more effective and permanent than Alternative 1, assuming the cooperation and active participation of the existing powers and authorities of the government agencies. The risk management measures recommended as Alternative 2 have been designed to provide effectiveness in the long term. Alternatives 3 and 4 would achieve greater effectiveness and permanence over a shorter time period than Alternative 2 because MEC would be removed permanently from the MRS. In this regard, Alternative 4 is more effective and permanent than Alternative 3 because it addresses potential residual MEC in the subsurface where MEC has been confirmed.

However, over the long term, both removal alternatives would ultimately achieve effectiveness and permanence similar to Alternative 2, given that the same risk management measures contemplated for Alternative 2 would be included as part of the remedy under Alternative 3 or 4. These measures would entail future UXO construction support during construction activities. Any MEC recovered in the future under Alternatives 2, 3, and 4 would be permanently removed from the Michie Stadium MRS.

10.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME OF CONTAMINANTS THROUGH TREATMENT

Alternative 1 would not reduce the TMV of MEC at the Michie Stadium MRS. Alternative 2 would be effective in the reduction of TMV but only to the extent that MEC is detected, recovered, and disposed of during future construction activities. Alternative 3 would be somewhat effective in the reduction of TMV but only to the extent that surface MEC is present,

detected, recovered, and destroyed. Subsurface MEC remaining after implementation of Alternative 3 would maintain its ability to move because of natural processes. Alternative 4 would be effective in reducing the TMV of MEC because all detectable surface and subsurface MEC would be removed. Alternatives 3 and 4 satisfy the statutory preference for treatment as a principal element of the remedy because MEC would be removed and destroyed. Alternative 3 and Alternative 4 would also reduce the toxicity and volume of MEC in those instances in which MEC is removed and destroyed during future construction projects.

10.5 SHORT-TERM EFFECTIVENESS

Given that no construction activities are associated with either Alternative 1 or Alternative 2, neither alternative would present significant additional risk to the public or to workers at the Michie Stadium MRS. Alternatives 3 and 4 would increase risk to the public and to workers during MEC removal activities. Increased risk to the public during the removal of MEC would be reduced by the use of engineering controls and/or evacuations to maintain exclusion zones. Alternatives 1 and 2 would not cause damage to the environment because no clearing, grubbing, or excavation would be required. Alternatives 3 and 4 would cause damage to the environment because of these support activities. Alternative 4 would cause greater damage to the environment than Alternative 3 as subsurface MEC would be removed by excavation in addition to the removal of surface MEC.

10.6 IMPLEMENTABILITY

Alternative 1 would be easily implemented because it requires no action. The risk management activities recommended as Alternative 2 could also be readily implemented because these activities pose no technical difficulties and the materials and services needed are available. Removals of MEC to various depths, similar to those proposed in Alternatives 3 and 4, were implemented effectively at the Michie Stadium MRS during the RI; however, these alternatives are more difficult to implement than Alternative 2. Alternative 4 would take longer to implement because it would require intrusive work. Specific activities, including awareness training and mitigation activities, would be required to protect cultural resources. Alternative 4 would be slightly more difficult to implement because of the additional administrative work required as a result of the length of the **removal action** compared to Alternative 3.

10.7 COST

The total present-worth cost to perform each alternative is as follows:

- Alternative 1 = $0
- Alternative 2 = $181,998
- Alternative 3 = $581,139
- Alternative 4 = $737,574

10.8 REGULATORY ACCEPTANCE

Regulatory agency agreement on the recommendation made in the PP to select Alternative 2 for the Michie Stadium MRS has been received and is documented in emails submitted by NYSDEC and EPA, which are provided as Appendix C to the DD. Final agreement letters from NYSDEC and EPA demonstrating concurrence with the remedy as selected will be included in the Michie Stadium DD, which will be added to the Administrative Record file.

10.9 COMMUNITY ACCEPTANCE

A Responsiveness Summary is appended to the DD (Appendix A).

10.10 COMPARATIVE ANALYSIS RECOMMENDATION

During the comparative analysis, Alternative 2 was determined to be more favorable than Alternatives 1, 3, or 4 with respect to the evaluation criteria. Alternative 1 is not favorable because it does not meet the threshold criteria, which are overall protectiveness and compliance with ARARs. These two criteria are the minimum criteria that must generally be met for remedy selection. Implementing Alternative 2 would meet ARARs and would achieve a high level of protectiveness over the long term. Alternative 2 includes managing exposure risks through continuing LUCs, distributing public awareness/education information, and requiring UXO construction support during intrusive activities. It is believed that Alternative 2 will provide the most cost-effective solution to addressing the identified explosive safety hazards at the Michie Stadium MRS for the public and athletes using Michie Stadium and for West Point personnel and/or contractors performing maintenance or construction activities at the Michie Stadium MRS.

Alternatives 3 and 4 are ARAR-compliant but are less desirable. They are more difficult to implement and would incur a much greater cost for only a slightly higher level of protectiveness over the long term compared to Alternative 2, based on the limited MEC and MD findings during the RI in subsurface soil, and no MEC identified at the surface.

11. PRINCIPAL THREAT WASTES

Principal threat wastes are "source materials" considered highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. A source material is a material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contaminants to groundwater, surface water, or air, or act as a source for direct exposure. MEC is not considered a principal threat waste; therefore, it was not necessary to rate the alternatives on how effectively they would mitigate a principal threat waste.

12. SELECTED REMEDY

12.1 SUMMARY OF THE RATIONALE FOR THE SELECTED REMEDY

Based on the requirements of CERCLA and the NCP and on a detailed analysis of the remedial alternatives using the nine criteria (which include public and state comments), the Army has selected Alternative 2 – Risk Management as the remedy for the Michie Stadium MRS. NYSDEC and EPA concurrence with the Selected Remedy is provided in Appendix C.

Managing risks by implementing Alternative 2 will include continuing restrictions on land use, updating the Master Plan electronic files, requiring UXO construction support during future intrusive activities, developing and distributing information materials during permitting/contracting for construction activities, and providing brochures/fact sheets to the public and information packages to public officials and emergency management agencies.

Alternative 2 meets the RAO to prevent direct contact of construction and maintenance workers, West Point personnel and residents, athletes, and site visitors with the explosive hazards posed by MEC in surface and subsurface soil at the Michie Stadium MRS.

The Selected Remedy is believed to provide the best balance of trade-offs among the alternatives with respect to the CERCLA and NCP criteria. The Army believes that the Selected Remedy can be easily implemented based on similar experiences at West Point and other DoD facilities and is the most cost-effective alternative relative to the MEC removal alternatives (Alternatives 3 and 4), while still being protective of human health in the long term, based on the limited exposure risk to confirmed subsurface MEC within the MRS boundary. The Army will implement and perform Alternative 2 to comply with all ARARs and TBCs.

The Selected Remedy is endorsed by NYSDEC, EPA, and the community.

12.2 DETAILED DESCRIPTION OF THE SELECTED REMEDY

Risks related to potential MEC will be managed through a risk management alternative consisting of various access control and/or public awareness components. The implementation of the risk management alternative would provide a means for West Point and its representatives to coordinate an effort to reduce MEC exposure through behavior modification. Implementation of

risk management requires the cooperation and active participation of the existing land users and the authorities of the U.S. Army at West Point to protect the public from explosives hazards.

West Point is required and able to participate in risk management. The U.S. Army Corps of Engineers, Baltimore District is currently assisting West Point in ongoing risk management efforts to educate the installation population and visitors about potential MEC. A *Final Non-Time Critical Removal Action Land Use Control Plan*, which includes the Michie Stadium MRS, was prepared in October 2012 (URS Group, Inc. and ARCADIS/Malcolm Pirnie, 2012). The *Final Non-Time-Critical Removal Action Land Use Control Plan* was based on the data available for the MRS through the SI and an Interim Probability Assessment for Encountering MEC. The plan defines the safety precautions required in the Michie Stadium MRS. The risk management controls that will be implemented for the Michie Stadium MRS as part of a final remedy are consistent with and expand on the interim **land use control (LUC)** components with respect to the RI/FS findings and updated explosive hazard assessment performed.

After terminating the interim LUC components in accordance with the *Final Non-Time Critical Removal Action Land Use Control Plan* (URS Group, Inc. and ARCADIS/Malcolm Pirnie, 2012), a LUC Plan specific to the Michie Stadium MRS will be developed. The LUC Plan will modify the interim LUC components based on the RI/FS findings to establish the following response complete LUC components for the final remedy:

- Continuing the restrictions on land use in accordance with the interim LUCs that prohibit or otherwise manage (e.g., office review, approval, and permitting through West Point) excavation and development of new residential, daycare, hospital, or school use facilities.
- Providing updates of the Real Property Master Plan with the MRS boundary and the RI MEC findings and continuing to meet the requirement that all emergency calls regarding munitions response activities be recorded in a GIS database to facilitate installation-wide risk delineation.
- Providing notification to contractors through the dig permit process, currently required for all ground-breaking activities at West Point, to use UXO construction support based on the RI explosive hazard assessment.
- Providing public advisory information (e.g., the 3Rs [Recognize, Retreat, Report] policy) based on the data collected to date related to the known presence of MEC and the safety hazard identified for the Michie Stadium MRS.

- Performing long-term management of the remedy by means of recurring 5-year reviews and maintenance of LUCs.

12.2.1 Unexploded Ordnance Construction Support

The objective of the UXO construction support component of the Selected Remedy will be to ensure the safety of workers and the public in the event that suspected MEC items are encountered during future construction activities at the Michie Stadium MRS. Based on the RI findings, there is a low probability for encountering MEC, and therefore, a low potential explosive hazard present. Based on the assessment and the probability of encountering MEC, UXO construction support provided by EOD personnel or UXO-qualified personnel will be required. An existing dig permit requirement (i.e., administrative LUC mechanism) applies to the Michie Stadium MRS as part of the installation-wide standing policy for ground-breaking activities. Dig permitting is currently managed by the Department of Public of Works.

12.2.2 Public Advisories

A variety of advisories, notifications, and/or educational materials will be used to alert the public about the potential risks at the Michie Stadium MRS. The advisories will focus on the groups affected by risk management controls. For instance, advisory pamphlets could be provided to the residents who live in buildings and houses adjacent to or at the MRS, or to crews and individuals when they apply for dig permits or building permits for work adjacent to or at the MRS. Periodic advisories would also be broadcast to all on-post people to ensure that military and civilian personnel, including families, are reminded of the potential presence of MEC and/or MC. The advisories will include:

- Providing information about the potential dangers of MEC and/or MC on post, and notification that any digging on West Point without a permit is a serious offense. Communications may include informational materials such as the 3Rs available through various DoD and Army agencies; e.g., see Web site http://www.denix.osd.mil/uxo/.

- Providing information to on-base residents when they move in, and on an annual basis thereafter.

- Posting articles in the on-post newspaper and/or website on a quarterly or event-specific basis.

The presentation format for public advisory information and the level of detail and the specific content may vary to be specific to the viewing audience. For example, a video may be determined to be the most effective means of communicating information during the remedial design.

12.2.3 Reviews

CERCLA requires the review of remedial actions no less than every 5 years to ensure that human health and the environment are being protected. Recurring reviews for MEC remedial actions determine whether a remedial action continues to minimize explosive safety hazards and continues to be protective of human health, safety, and the environment, and provides an opportunity to assess the applicability of new technology for addressing previous technical impracticability determinations. Recurring reviews will be completed by the Army and will include the following general steps:

- Prepare Recurring Review Plan.
- Establish project delivery team and begin community involvement activities.
- Review existing documentation.
- Identify and review new information and current site conditions.
- Prepare preliminary Site Analysis and Work Plan.
- Conduct site visit.
- Prepare Recurring Review Report.

12.3 SUMMARY OF ESTIMATED COSTS

The total present-worth cost estimated to perform Alternative 2 at the Michie Stadium MRS is $181,998 over a 30-year period. The estimated costs, which include initial capital costs to develop the educational materials; 30-year annual costs for operations and maintenance (O&M); and a variable annual discount rate, which decreases from 1%, are as follows:

- Estimated Capital Cost: $154,596
- Estimated Annual O&M Costs: $1,265 (excludes 5-Year Reviews)
- Estimated Total Present-Worth Cost: $181,998 (includes 5-Year Reviews)

Detailed cost estimates for Alternative 2 were developed as part of the FS (WESTON, 2013) and have been adopted for the Michie Stadium MRS DD and provided as Table 12-1.

The information in the cost estimate is based on the best available information regarding the anticipated scope of the remedy. Changes in the cost elements may occur as a result of new information and data collected during the engineering design of the remedy. Major changes, if they occur, may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Differences, or a DD amendment.

12.4 EXPECTED OUTCOME OF SELECTED REMEDY

Based on the information available, Alternative 2 – Risk Management is the remedial alternative selected by the Army for the Michie Stadium MRS. Alternative 2 provides the best balance of tradeoffs with respect to the evaluation criteria considered for remedy selection. Alternative 2 can be readily implemented to achieve the remedial action objective in a cost-effective manner while providing a high level of overall protectiveness relative to the current and future use of the MRS, which is intended to remain recreational (i.e., Michie Stadium). The Army expects the preferred alternative to meet regulatory requirements and to satisfy the statutory requirements under CERCLA §121(b).

Risk management measures will be maintained until the hazard associated with the potential residual MEC at the Michie Stadium MRS is at levels that allow for unlimited use and unrestricted exposure. The Army is responsible for implementing, maintaining, reporting on, and enforcing risk management measures. Although the Army may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Army shall retain ultimate responsibility for the remedy integrity.

Table 12-1 Michie Stadium Munitions Response Site Alternative 2 Cost Estimate

CAPITAL COST:

Bid Item No.	Description	QTY	Unit	Team Production (Units/Day)	# Teams	Duration (Weeks)	Weekly Cost Per Team	Total
0100	Work Plans	0.50	LS	N/A	N/A	N/A	99,000	$49,500
0110	Explosives Safety Submission	0.50	LS	N/A	N/A	N/A	38,500	$19,250
0200	Mobilization	0.00	LS	N/A	N/A	N/A	57,865	$0
0300	Site Management	0.00	WEEKS	0.0	0.0	0.0	20,985	$0
0310	Survey/Positioning	0.00	AC	0.0	0.0	0.0	15,522	$0
0320	Brush Clearing	0.00	AC	0.0	0.0	0.0	11,090	$0
0400	MEC Surface Removal	0.00	AC	0.0	0.0	0.0	42,304	$0
0410	MEC Removal to Detection Depth (M&D)	0.00	AC	0.0	0.0	0.0	42,689	$0
0420	Digital Geophysical Mapping	0.00	AC	0.0	0.0	0.0	20,932	$0
0430	Geophysical Data Analysis	0.00	AC	0.0	0.0	0.0	18,714	$0
0440	Anomaly Reacquisition	0.00	AC	0.0	0.0	0.0	4,965	$0
0450	MEC Subsurface Removal (DGM)	0.00	AC	0.0	0.0	0.0	42,689	$0
0500	MEC Disposal	0.00	WEEKS	0.0	0.0	0.0	38,266	$0
0510	Scrap Disposal	0.00	WEEKS	0.0	0.0	0.0	19,568	$0
0600	Site Restoration	0.00	AC	0.0	0.0	0.0	40,819	$0
0610	Demobilization	0.00	LS	N/A	N/A	N/A	12,925	$0
0700	Final Report	0.00	LS	N/A	N/A	N/A	77,000	$0
0800	Risk Management	1.00	LS	N/A	N/A	N/A	42,350	$42,350
	Sub-Total							$111,100
	Contingency	15%						$16,665
	Sub-Total							$127,765
	Infrastructure Improvements	2%						$2,555
	Project Management	5%						$6,388
	Remedial Design	8%						$10,221
	Construction Management	6%						$7,666
	Total Capital Cost							**$154,596**

Table 12-1 Michie Stadium Munitions Response Site Alternative 2 Cost Estimate (Continued)

PERIODIC COST:

	Description	Year	QTY	Unit	Unit Cost	Total
0900	Risk Management - Annual Cost	5 - 30	1	LS	1,265	$1,265
1000	Five Year Review - First Review	5	1	EA	8,800	$8,800
1010	Five Year Review - Years 10,15,20,25 & 30	10 - 30	1	EA	5,500	$5,500
1100	Four to Five Year UXO Construction Support	5 - 30	0	EA	26,769	$0

PRESENT VALUE ANALYSIS:

Cost Type	Year	Total Cost	Total Cost Per Year	Discount Factor (%)	Present Value
Capital Cost	0	$154,596	$154,596	1	$154,596
Periodic Cost	5	$10,065	$10,065	0.854	$8,596
Periodic Cost	10	$6,765	$6,765	0.737	$4,986
Periodic Cost	15	$6,765	$6,765	0.633	$4,282
Periodic Cost	20	$6,765	$6,765	0.543	$3,673
Periodic Cost	25	$6,765	$6,765	0.467	$3,159
Periodic Cost	30	$6,765	$6,765	0.400	$2,706
		$198,486			$181,998
Total Present Value of Alternative					**$181,998**

Notes:
AC = acre, EA = each, LS = lump sum, N/A = not applicable

Table adopted from capital and present worth cost estimate developed for Alternative 2 and presented in Appendix A of the *Final Feasibility Study for the Michie Stadium Munitions Response Site, U.S. Army Garrison West Point, West Point, New York* (WESTON, 2013).

13. STATUTORY DETERMINATIONS

Under CERCLA Section 121, the Army must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the TMV of hazardous substances as their principal element. The following sections present a discussion of the remedy in light of these statutory requirements.

13.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The Selected Remedy, Alternative 2, will protect public health through mitigation of the hazards to public health from exposure to potential residual MEC. The protection is accomplished by targeting the most likely Michie Stadium MRS users that may be exposed to residual MEC and providing the following elements of the remedy:

- A review and modification, as needed, to property and LUC documentation for West Point.
- Information materials to contractors, public officials, and emergency agencies.
- Routine education and outreach to current users of the Michie Stadium MRS area regarding the potential existence of MEC and its recognition and avoidance.
- A requirement to employ EOD personnel or UXO-qualified personnel to provide UXO construction support during construction activities.

Threats to the environment are not anticipated while the suspected MEC remains in place.

13.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Risk management will be implemented to comply with all ARARs and TBCs, including DoD and Army safety policies for the clearance and control of property containing MEC or potential MEC. An identification of ARARs and TBCs for the Selected Remedy is provided in Appendix B.

13.3 COST-EFFECTIVENESS

In the Army's judgment, the Selected Remedy is cost-effective because it represents a reasonable value for the money to be spent. In making the determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness" (NCP §300.430(f)(l)(ii)(D)). The determination was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence, reduction in TMV through treatment, and short-term effectiveness). Overall effectiveness was subsequently compared to the estimated costs to determine cost-effectiveness. The overall effectiveness of the Selected Remedy was determined to be proportional to its costs; hence, this remedy represents a reasonable value for the money to be spent.

As indicated by the comparative analysis conducted for all remedial alternatives considered during the FS, the Selected Remedy, Alternative 2 (present worth cost estimate of $181,998), is the most cost-effective alternative evaluated that is ARAR-compliant and that provides acceptable levels of achievement of the other evaluation criteria.

13.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT POSSIBLE

The Army has determined that the Selected Remedy, Risk Management, represents the maximum extent to which a permanent solution can be implemented in a practicable manner for the Michie Stadium MRS. Alternative treatment technologies and/or resource recovery technologies were found not to be appropriate for the MRS conditions. Of the alternatives that are protective of human health and the environment and comply with ARARs and TBCs, the Army has determined, with agreement from NYSDEC and EPA, that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria.

13.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

Treatment of MEC consists of removal and disposal. The Selected Remedy, Risk Management, will satisfy the statutory preference for treatment as a principal element of the remedy by requiring UXO construction support to handle future suspected MEC discoveries during construction activities. The treatment will ensure that any MEC identified on the surface or in subsurface soil is removed and disposed of appropriately on an on-call basis when a suspected MEC item is encountered.

13.6 FIVE-YEAR REVIEW REQUIREMENTS

Because the Selected Remedy may result in hazardous substances, pollutants, or contaminants remaining at the Michie Stadium MRS above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after the initiation of the alternative. Recurring reviews will continue on a periodic basis of every 5 years to ensure that the remedy is, or will be, and remains protective of human health and the environment.

14. DOCUMENTATION OF SIGNIFICANT CHANGES

The PP for the Michie Stadium MRS was released for public comment from 17 February 2014 to 20 March 2014. The PP identified Alternative 2, Risk Management, as the proposed remedy for the MRS. No comments were received during the public comment period or public meeting that resulted in changes to the proposed final remedy. The Michie Stadium MRS DD does not document any significant changes to the proposed remedy identified in the PP.

15. REFERENCES

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SEPTEMBER 2014

GLOSSARY OF SPECIALIZED TERMS

3-inch Stokes Mortar	The 3-inch Stokes mortar is also called a trench mortar. Depending on the type of mortar, the filler will be trinitrotoluene (TNT), black powder, or sand. The mortar was fired from a barrel at steep angles so it would fall straight down on the target. The 3-inch Stokes mortar was mostly used during World War I (1914-1918) and until World War II (1939).
Administrative Record File	A collection of documents containing the information and reports generated during the entire phase of investigation and cleanup at a site, which are used to make a decision on the selection of a response action under CERCLA. This file is to be available for public review and a copy maintained near the site. The official Administrative Record file for the Michie Stadium MRS is located in Building 667, within the Environmental Engineering Branch, and is maintained by the Army. The point of contact for the file is Jeff Sanborn (667A Ruger Road, West Point, New York, 10996).
Alluvial Deposits	A general geological term for sediment accumulations deposited by rivers or streams in layers over time. It includes sediment deposited in river beds and floodplains.
Anomaly	An anomaly is an irregularity within a particular set of data. During the RI, an anomaly was recognized as a metallic object (or cluster of objects) that was detected with specialized equipment at or below ground surface.
Applicable or Relevant and Appropriate Requirements (ARARs)	Federal (or state, if more stringent) environmental statutes, regulations, and other requirements that pertain to the protection of human health and the environment and have been determined to be either directly applicable or relevant and appropriate to the particular cleanup site's hazardous substances, location, or expected cleanup actions. May include to be considered (TBC) information found pertinent to a response action during the CERCLA process.
Bedrock Aquifer	A water-bearing underground layer of rock. Bedrock aquifers are usually found in rock types such as limestone, dolomite, sandstone, siltstone, shale, or fractured crystalline rock.
Bivouac	A temporary encampment.
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980, and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA), to investigate and clean up hazardous substances.
Decision Document (DD)	The Department of Defense has adopted the term Decision Document (DD) to refer to a legal public document, similar to a Record of Decision completed for National Priorities List sites, that: certifies that the cleanup plan selection process was carried out in accordance with CERCLA, and to the extent practical, the NCP; provides a substantive summary of the technical rationale and background information in the Administrative Record file; provides information necessary in determining the conceptual engineering components to achieve the remedial action objective (RAO) established for a site; and serves as a key communication tool for the public that explains the identified hazards that the selected cleanup will address and the rationale for cleanup plan selection. The DD will be maintained in the Administrative Record file.

GLOSSARY OF SPECIALIZED TERMS (Continued)

Defense Environmental Restoration Program (DERP)	The DERP, established under subpart 2710 of Title 10 United States Code [10 U.S.C. § 2701], requires conducting all response actions in accordance with CERCLA with respect to releases of hazardous substances at facilities, sites, or vessels, as defined under 10 U.S.C. § 2701(c).
Detection Depth	The depth below ground surface at which munitions items can be reliably detected using the best available and most appropriate remote sensing equipment for a given environment. Detection depth is dependent on the equipment, the size/mass of item, the item's depth and orientation, and geological/soil conditions.
Digital Geophysical Mapping (DGM)	A survey technique that uses electromagnetic induction sensor technology to detect and measure surface and subsurface metallic objects to investigate the presence of munitions. Electromagnetic induction sensors induce electrical currents in surface and subsurface conductive objects. The electrical currents in both ferrous (e.g., steel) and nonferrous (e.g., brass, aluminum) objects generate a secondary magnetic field measured by the sensor to detect the object.
Discarded Military Munitions (DMM)	Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include UXO, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations [10 USC 2710(e)(2)].
Escarpment	A steep ridge, or cliff-like slope of land, rock or the like that is often a result of Earth's crust fracturing or faulting.
Explosive Safety Hazard	The probability for a MEC item to detonate (explode) and potentially cause harm to people, property, or the environment as a result of human activities. An explosive safety hazard exists if a person can come into contact with a MEC item and act upon it to cause it to detonate or explode. The potential for an explosive safety hazard depends on the presence of three critical elements: a source (presence of MEC), a receptor or person, and an interaction between the source and the receptor (such as picking up the item or disturbing the item by plowing). There is no explosive safety hazard if any one element is missing.
Exposure Pathway	Describes the course a chemical or physical agent takes from the source to the exposed individual. Elements of the exposure pathway are: (1) the source of the released chemical or physical agent; (2) the contaminated medium (e.g., soil); (3) a point of contact with the contaminated medium; and (4) an exposure route (e.g., ingestion, inhalation) at a contact point.
Feasibility Study (FS)	An evaluation of viable technologies and treatment options that can be used to clean up a site. These technologies and treatment options are assembled into a number of different cleanup alternatives that are evaluated using the nine CERCLA/NCP criteria. The overall purpose of the FS is to provide the analysis in order to identify a preferred cleanup alternative in the Proposed Plan.
Frost Heave	The upthrust of ground caused by the freezing of moist soil.

GLOSSARY OF SPECIALIZED TERMS (Continued)

Information Repository	A file containing current information, technical reports, and reference documents duplicated from the Administrative Record file maintained for a site. The information repository is usually located in a public building that is convenient for local residents, such as a public school, city hall, or library. The project information repository is located at the West Point Post Library [622 Swift Road #2, West Point, New York, 10996 (Building 622)].
Invertebrate	Any animal that lacks a backbone or spine. Examples are insects, spiders, snails, and millipedes.
Land Use Controls (LUCs)	Any type of physical, legal, or administrative mechanism that restricts the use of or limits access to real property to prevent or reduce risks to human health and the environment. Physical mechanisms encompass a variety of engineered remedies to contain or reduce contamination and physical barriers to limit access to property, such as fences or signs. The legal mechanisms used for land use controls are generally the same as those used for institutional controls as discussed in NCP. Legal mechanisms include restrictive covenants, negative easements, equitable servitudes, and deed notices. Administrative mechanisms include notices, adopted local land use plans and ordinances, construction permitting, or other land use management systems to ensure compliance with use restrictions (as defined in the DoD Instruction 4715.7 for implementing the DERP; DoD, 2013).
Military Munitions Response Program (MMRP)	This category was established to meet the DERP goals in sections 2710 and 2701(b)(2) of Reference (i) and includes munitions response areas and munitions response sites that are known or suspected to contain UXO, **discarded military munitions (DMM)**, or munitions constituents. The MMRP does not include UXO, DMM, or munitions constituents at operational ranges, operating storage or manufacturing facilities, or facilities that are used for or were permitted for the treatment or disposal of military munitions. The DoD Component may also include in the MMRP category sites where addressing the release of hazardous substances or pollutants or contaminants is incidental to the munitions response. The MMRP category is one of three DERP program category restrictions (as defined in the DoD Instruction 4715.7 for implementing the DERP; DoD, 2013).
Munitions Constituents (MC)	Any chemicals contained in UXO, DMM, or other military munitions. These chemicals include explosives, metals, and chemical breakdown products.
Munitions Debris (MD)	Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization or disposal (Army, 2005).
Munitions and Explosives of Concern (MEC)	This term includes specific types of military munitions that may pose unique explosive safety risks, including unexploded ordnance (UXO) as defined in 10 USC 101(e)(5)(A) through (C) and 40 CFR 266.201, discarded military munitions (DMM) as defined in 10 USC 2710(e)(2), and munitions constituents (MC) (e.g., explosives like trinitrotoluene (TNT) present in high enough concentrations to pose an explosive hazard as defined in 10 USC 2710(e)(3)).
Munitions Response Site (MRS)	A specific area on a defense site that is known or expected to contain munitions and that requires investigation to determine whether munitions or munitions constituents are present.

GLOSSARY OF SPECIALIZED TERMS (Continued)

National Oil and Hazardous Substances Pollution Contingency Plan (NCP)	The Federal regulation that implements CERCLA. The NCP was revised in February 1990. The purpose of the NCP is to provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, or contaminants.
Non-Time-Critical Removal Action (NTCRA)	Action(s) initiated in response to a release or threat of a release that poses a risk to human health, its welfare, or the environment. Initiation of removal cleanup actions may be delayed for 6 months or more.
Proposed Plan (PP)	A document that presents a proposed cleanup alternative, including rationale for selection, and requests public comments regarding the proposed alternative.
Receptor	Receptors include both humans and biota (plants or animals) that may come into contact with a hazardous substance, including munitions and munitions constituents, either directly (e.g., picking an item up) or indirectly (e.g., through ingestion).
Recurring Reviews	Review required by CERCLA no less than every 5 years to assure that human health and the environment are being protected by the selected remedial action, where the remedial action does not allow for unlimited use and unrestricted exposure.
Remedial Action	An action taken to clean up munitions or chemicals in the environment that may pose a risk to humans, animals, or other potential receptors or to prevent these munitions or chemicals from entering the environment and causing risk. The term includes, but is not limited to, actions such as covering or capping, excavation and disposal, chemical treatment, incineration, transportation, storage, or any other actions necessary to protect the public health or welfare and the environment, such as land use and institutional controls.
Remedial Action Objective (RAO)	Objectives established for remedial actions to guide the development of cleanup alternatives and focus the comparison of acceptable alternatives, if warranted. RAOs also assist in clarifying the goal of minimizing risk and achieving an acceptable level of protection for human health and the environment.
Remedial Investigation (RI)	A study of a site that provides information regarding the location and concentration of chemicals and munitions in soil, surface water, groundwater, and/or sediment and whether these chemicals and munitions pose a risk to human health and the environment.
Removal Action	Short-term immediate actions taken to address releases of hazardous substances that may require expedited response.
Site Inspection (SI)	In an SI, investigators typically collect historical information and environmental (e.g., soil, surface water) and/or waste samples to determine what chemicals are present at a site. Investigators determine if these chemicals are being released to the environment and may pose a risk to human health or the environment.
Stratified Drift Deposit	Layered/bedded sand, gravel, or rock deposited by meltwater.

GLOSSARY OF SPECIALIZED TERMS (Continued)

Superfund Amendments and Reauthorization Act (SARA)	In 1986, this legislation established standards for cleanup activities, required federal facility compliance with CERCLA, and clarified public involvement requirements.
To-Be-Considered (TBC) Information	Information used to evaluate cleanup alternatives when there are no ARARs, or when ARARs alone may not adequately protect human health and the environment.
Unexploded Ordnance	Unexploded ordnance (UXO) includes military munitions that have been primed, fuzed, armed, or otherwise prepared for action; have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material; and remain unexploded either by malfunction, design, or any other cause. (10 USC 101(e)(5)(A) through (C) and 40 CFR 266.201).
Unconsolidated Aquifer	An underground, water-bearing layer of loosely arranged materials, such as sands and gravels, whose particles are not cemented together.
UXO Construction Support	Support provided by DoD explosive ordnance disposal or UXO-qualified personnel and/or by personnel trained and qualified for operations during digging or excavating on a property known or suspected to contain UXO, DMM, or other munitions that may pose an explosive hazard. This support is provided to ensure the safety of personnel or resources from any potential explosive or chemical agent hazards.

APPENDIX A

RESPONSIVENESS SUMMARY

APPENDIX A
RESPONSIVENESS SUMMARY

SECTION 1 – OVERVIEW

Based on an assessment of the site conditions, the Army, the lead agency for site activities, selected a remedy for the Michie Stadium Munitions Response Site located at the U.S. Army Garrison West Point in West Point, New York. The New York State Department of Environmental Conservation (NYSDEC) and the U.S. Environmental Protection Agency (EPA) concur with the selected remedy.

The selected remedy is Alternative 2 – Risk Management. The Army determined that this response action is necessary to protect human health and the environment based on the current and intended future recreational use and maintenance of the property.

SECTION 2 – SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

A responsiveness summary presents responses to the questions and comments raised during the public comment period. The public comment period on the final Proposed Plan for the Michie Stadium Munitions Response Site was from 17 February 2014 to 20 March 2014. No comments were received during this timeframe.

APPENDIX B

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO-BE-CONSIDERED CRITERIA

APPENDIX B

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO-BE-CONSIDERED CRITERIA

Three categories of applicable or relevant and appropriate requirements (ARARs) were evaluated for the Michie Stadium Munitions Response Site (MRS), along with to-be-considered (TBCs) information. The ARAR categories are chemical-specific, location-specific, and action-specific.

Chemical-specific ARARs are health-based or risk-based numerical values that establish the acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Because the results of the risk evaluation performed as part of the site inspection (SI) indicated no adverse risks from munitions constituents (MC) were present, and no additional information was collected during the remedial investigation (RI) to modify this conclusion, chemical-specific ARARs are not identified for the Michie Stadium MRS.

Location-specific ARARs generally are restrictions placed on the concentration of hazardous substances or the conduct of activities to prevent damage to unique or sensitive areas, such as floodplains, wetlands, historic places, and sensitive ecosystems or habitats. No location-specific ARARs have been identified for the Michie Stadium MRS pertaining to implementation of risk management measures.

Action-specific ARARs are usually technology- or activity-based requirements or limitations placed on actions taken with respect to removal actions or requirements to conduct certain actions to address particular circumstances at a site.

TBC information can be used when there are no ARARs, or when ARARs alone may not adequately protect human health and the environment.

The action-specific ARARs and the TBC information identified for the Michie Stadium MRS are summarized in **Table B-1.**

Table B-1 Applicable or Relevant and Appropriate Requirements and To-Be-Considered Information

ARAR/TBC	Citation/Description	Applicability or Relevance
Chemical-Specific ARARs		
Not applicable		
Location-Specific ARARs		
None identified		
Action-Specific ARARs		
40 Code of Federal Regulations (CFR) 264 Subpart X – Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities; miscellaneous units	264.601- A miscellaneous unit must be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment.	It is anticipated that munitions and explosives of concern (MEC) disposal (by detonation) will be required as part of unexploded ordnance (UXO) construction support activities provided for risk management. Should the need for disposal/treatment arise, it could require the use of technologies defined as "miscellaneous units" in Subpart X, including open burning/open detonation (OB/OD) units, shredders, or crushers. Subpart X outlines procedures for issuing permits to miscellaneous units that treat, store, or dispose of hazardous waste. Miscellaneous units include OB/OD units, enclosed combustion devices, carbon and catalyst regeneration units, thermal desorption units, shredders, crushers, filter presses, and geologic repositories. Subpart X does not specify minimum technology requirements or monitoring requirements for miscellaneous units. Subpart X specifies an environmental performance standard that must be met through conformance with appropriate design, operating, and monitoring requirements.

Table B-1 Applicable or Relevant and Appropriate Requirements and To Be Considered Information (Continued)

ARAR/TBC	Citation/Description	Applicability or Relevance
Military Munitions Rule – 40 CFR Part 266, Subpart M	Regulates unused munitions, munitions used for intended purposes, and used or fired munitions.	During UXO construction support activities, identify when military munitions become a solid waste; and, if these wastes are also hazardous under this subpart or 40 CFR Part 261, identify the management standards that apply to these wastes.
TBCs		
Memorandum, Department of Defense (DoD) and U.S. Department of Environmental Protection (EPA), Interim Final, 7 March 2000, *DoD and EPA Interim Final Management Principles for Implementing Response Actions at Closed, Transferring, and Transferred (CTT) Ranges*	A permanent record of the data gathered to characterize a site and a clear audit trail of pertinent data analysis and resulting decisions and actions are required. To the maximum extent practicable, the permanent record shall include sensor data that are digitally-recorded and geo-referenced.	This document provides interim guidance for ongoing response actions addressing MEC at the Michie Stadium MRS.
Final Non-Time Critical Removal Action Land Use Control Plan, United States Army Garrison West Point, Military Munitions Response Program	URS, Group, Inc. and ARCADIS/Malcolm Pirnie. 2012. *Final Non-Time Critical Removal Action Land Use Control Plan, United States Army Garrison West Point, Military Munitions Response Program.* Prepared for U.S. Army Corps of Engineers. October 2012.	Includes interim Military Munitions Response Program-specific land use control and management procedures for West Point munitions response sites, including the Michie Stadium MRS.

APPENDIX C

LETTERS OF AGREEMENT

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau C, 11th Floor
625 Broadway, Albany, New York 12233-7014
Phone: (518) 402-9662 • **Fax:** (518) 402-9679
Website: www.dec.ny.gov

Joe Martens
Commissioner

(via email and US mail)

November 25, 2014

Mr. Jeff Sanborn
United States Army Garrison West Point
ATTN: IMNE-MIL-PWE-M
667A Ruger Road
West Point, NY 10996-1592

Dear Mr. Sanborn:

Re: Michie Stadium MRS - Decision Document May 2014
West Point Military Reservation, Site No. 336041
West Point, Orange County

The New York State Department of Environmental Conservation (Department) in conjunction with the New York State Department of Health, has reviewed the Decision Document prepared for the USACE by Weston Solutions and dated May 2014 for Michie Stadium. The recommendations of the Feasibility Study were used to select a preferred alternative, which was documented in a Proposed Plan finalized in February 2014 and was submitted with an opportunity for public comment from February 17, 2014 through March 20, 2014. All public comments were considered prior to selection of the final remedy.

We understand that this site will be managed under a Land Use Control (LUC) plan that will describe restrictions for land use and procedures for contractors or other parties that may need to work on the site. There will be long-term management though 5 year reviews and maintenance of LUC components.

The Department concurs with the Decision Document conclusion that no further action is needed for soil at Michie Stadium.

If you have any questions on the above, please feel free to contact Paul Patel at (518) 402-9662.

Sincerely,

George W. Heitzman, P. E.
Director
Remedial Bureau C
Division of Environmental Remediation

ec: W. Roach, EPA Reg. 2
D. Crosby
G. Heitzman
S. Karpinski, NYSDOH

Gerhard, John P.

From: Sanborn, Jeff CIV USA IMCOM <Jeff.Sanborn@usma.edu>
Sent: Friday, May 30, 2014 8:25 AM
To: Gerhard, John P.; Kirgan, Robert CIV (US); 'Meyer, Thomas P (Tom) NAB'
Subject: FW: West Point - Michie Stadium MRS (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

FYI

-----Original Message-----
From: Roach, Bill [mailto:Roach.Bill@epa.gov]
Sent: Thursday, May 29, 2014 3:36 PM
To: Sanborn, Jeff CIV USA IMCOM
Cc: appatel@gw.dec.state.ny.us
Subject: West Point - Michie Stadium MRS

Jeff,

I have reviewed the Decision Document for the Michie Stadium MRS and do not have any comments other than the title sheet in the document was for a different project (Camp Dawson, W. Virginia).

Regards, Bill

Classification: UNCLASSIFIED
Caveats: NONE

Gerhard, John P.

From: Roach, Bill <Roach.Bill@epa.gov>
Sent: Wednesday, December 18, 2013 10:15 AM
To: Gerhard, John P.; appatel@gw.dec.state.ny.us
Cc: 'Sanborn, Jeff CIV USA IMCOM'; Meyer, Thomas P (Tom) NAB; Kirgan, Robert CIV (US) (robert.kirgan.civ@mail.mil); Steigerwalt, Ryan; Stahl, Eric D.; Swiech-Laflamme, Marie
Subject: RE: WESTON - West Point, NY - MMRP - Michie Stadium MRS - Proposed Plan

Jeff/John,

EPA has reviewed the track-changed Proposed Plan for the Michie Stadium MRS and has no further comments.

Bill

From: Gerhard, John P. [mailto:J.Gerhard@WestonSolutions.com]
Sent: Monday, December 09, 2013 3:03 PM
To: Roach, Bill
Cc: Gerhard, John P.; 'Sanborn, Jeff CIV USA IMCOM'; Meyer, Thomas P (Tom) NAB; Kirgan, Robert CIV (US) (robert.kirgan.civ@mail.mil); Steigerwalt, Ryan; Stahl, Eric D.; Swiech-Laflamme, Marie
Subject: WESTON - West Point, NY - MMRP - Michie Stadium MRS - Proposed Plan

Bill,

Jeff Sanborn from US Army Garrison West Point also advised that you did not have a copy of the redline strikeout (RLSO) version of the proposed changes to the Proposed Plan for the Michie Stadium MRS. Attached is the actual document and response to comments from NYSDEC and NYDOH.

Please confirm receipt of this email. I was not sure if a 7MB file will go through.

Please call with questions.

Thanks,

John Gerhard
Senior Project Manager
Federal Business Team
East Division
Weston Solutions, Inc.
www.westonsolutions.com
J.Gerhard@westonsolutions.com
Office: (610) 701-3793
Cell: (610) 513-6897
Fax: (610) 701-3187

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