Final

Site Specific Work Plan Addendum to the FUDS MMRP Programmatic Work Plan for the Site Inspection of Madison Barracks Target Range, Henderson, New York

FUDS Project # **C02NY020400**

Prepared Under: **Contract No. W912DY-04-D-0017**
Delivery Order # 00170001

Prepared for:

U.S. Army Engineering and Support Center, Huntsville
4280 University Square
Huntsville, AL 35807

U.S. Army Corps of Engineers, Baltimore District
City Crescent Building
10 South Howard Street, 10th Floor
Baltimore, Maryland 21201

U.S. Army Corps of Engineers, New York District
Jacob K. Javits Federal Building
New York, New York 10278-0090

Prepared by:

Alion Science and Technology
1000 Park Forty Plaza
Suite 200
Durham, North Carolina 27713

December 2009

Final

Site Specific Work Plan Addendum to the FUDS MMRP Programmatic Work Plan for the Site Inspection of Madison Barracks Target Range, Henderson, New York

FUDS Project # **C02NY020400**

Prepared Under: **Contract No. W912DY-04-D-0017**
Delivery Order # 00170001

Prepared for:

U.S. Army Engineering and Support Center, Huntsville
4280 University Square
Huntsville, AL 35807

U.S. Army Corps of Engineers, Baltimore District
City Crescent Building
10 South Howard Street, 10th Floor
Baltimore, Maryland 21201

U.S. Army Corps of Engineers, New York District
Jacob K. Javits Federal Building
New York, New York 10278-0090

03 December 2009
Roger Azar — Date
Alion Program Manager

03 December 2009
Curtis Mitchell — Date
Alion Corporate Quality Management Reviewer

December 2009

LIST OF TABLES

LIST OF FIGURES (See Appendix A)

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

ADR	Automated Data Review
Alion	Alion Science and Technology Corporation
APP	Accident Prevention Plan
ASR	Archive Search Report
BG	Background
bgs	Below ground surface
°C	Degrees Celsius
CENAB	Corps of Engineers North Atlantic Division Baltimore District
CENAN	Corps of Engineers North Atlantic Division New York District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CONUS	Continental United States
CSM	Conceptual Site Model
CTT	Closed Transferring or Transferred
CWM	Chemical Warfare Materiel
CX	Center of Expertise
DA	Department of the Army
DC	Design Center
DERP	Defense Environmental Restoration Program
DMM	Discarded Military Munitions
DNT	Dinitrotoluene
DoD	Department of Defense

DQO	Data Quality Objective
EDD	Electronic Data Deliverable
EDMS	Electronic Data Management System
EDS	Environmental Data Services, Inc.
EHE	Explosive Hazard Evaluation
EM	Engineering Manual
EOD	Explosive Ordnance Disposal
ER	Engineering Regulation
ESRI	Environmental Systems Research Institute
FD	Field Duplicate
FDE	Findings and Determination of Eligibility
Ft	Foot (or feet)
FTL	Field Team Leader
FUDS	Formerly Used Defense Site(s)
FUDSMIS	Formerly Used Defense Site Management Information System
GIS	Geographic Information Systems
GPS	Global Positioning System
HHE	Health Hazard Evaluation
HHRA	Human Health Risk Assessment
HRS	Hazard Ranking System
HTRW	Hazardous Toxic and Radioactive Waste
ID	Identification
IDW	Investigative-Derived Waste

IGD	Interim Guidance Document
INPR	Inventory Project Report
m	meter
MBTR	Madison Barracks Target Range
MC	Munitions Constituents
MCL	Maximum Contaminant Levels
MD	Munitions Debris
MDL	Method Detection Limits
MEC	Munitions and Explosives of Concern
MFR	Memorandum for Record
mg/kg	milligram per kilogram
Mk	Mark
MPPEH	Material Potentially Presenting an Explosive Hazard
MMRP	Military Munitions Response Program
MQO	Measurement Quality Objective
MR	Munitions Response
MRA	Munitions Response Area
MR/MRS	Munitions Response Site
MRSPP	Munitions Response Site Prioritization Protocol
MS/MSD	Matrix Spike/Matrix Spike Duplicate
msl	Mean Sea Level
NAD	North American Datum
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDAI	No Department of Defense Action Indicated
NELAC	National Environmental Laboratory Accreditation Conference
NG	Nitroglycerin

NTCRA	Non-Time Critical Removal Action
NYSDEC	New York State Department of Environmental Conservation
NYSOPRHP	New York State Office of Parks, Recreation, and Historic Preservation
NYDOS	New York Department of State
NYS	New York State
OPRHP	Office of Parks, Recreation and Historic Preservation
oz	ounce
PAOI	Potential Area of Interest
PE	Professional Engineer
PFSP	Programmatic Field Sampling Plan
PGM	Program Manager
PM	Project Manager
PMMQL	Preferred Maximum Method Quantitation Limits
PPE	Personal Protective Equipment
PQAPP	Programmatic Quality Assurance Project Plan
PSAP	Programmatic Sampling and Analysis Plan
PWP	Programmatic Work Plan
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QSM	Quality Systems Manual
RAC	Risk Assessment Code
RCWM	Recovered Chemical Warfare Materiel
RI/FS	Remedial Investigation and Feasibility Study

RMIS	Restoration Management Information System
ROE	Right of Entry
SI	Site Inspection
SS	Surface Soil
SSHASP	Site-Specific Health and Safety Plan
SSHO	Site Safety and Health Officer
SSL	Soil Screening Level
SS-SAP	Site-Specific Sampling and Analysis Plan
SS-WP	Site-Specific Work Plan Addendum
T&E	Threatened and Endangered
TCRA	Time Critical Removal Action
TNT	Trinitrotoluene
TPP	Technical Project Planning
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering and Support Center, Huntsville
USDA	U.S. Department of Agriculture
USDOI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
UXO	Unexploded Ordnance

GLOSSARY OF TERMS

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) – Congress enacted CERCLA, commonly known as Superfund, on 11 December 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment (USACE 2004a).

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 unexploded ordnance, 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 U.S.C.2710(e)(2)).

Explosive Ordnance Disposal (EOD) – The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded ordnance and of other munitions that have become an imposing danger, for example, by damage or deterioration (USACE 2000).

Explosives Safety – A condition where operational capability and readiness, people, property, and the environment are protected from the unacceptable effects or risks of potential mishaps involving military munitions (DA 2005).

Formerly Used Defense Site (FUDS) – A FUDS is defined as a facility or site (property) that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination by hazardous substances. By the Department of Defense Environmental Restoration Program (DERP) policy, the FUDS program is limited to those real properties that were transferred from DoD control prior to 17 October 1986. FUDS properties can be located within the 50 States, District of Columbia, Territories, Commonwealths, and possessions of the United States (USACE 2004a)

Material Potentially Presenting an Explosive Hazard (MPPEH) – Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or material potentially containing a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within DoD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions (DA 2005).

Military Munitions – All ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the Department of Defense, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including

bulk explosives, and chemical warfare agents; chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges; and devices and components thereof. The term does not include wholly inert items; improvised explosive devices; and nuclear weapons, nuclear devices, and nuclear components, other then non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed (10 U.S.C 101(e)(4)(A) through (C)).

Munitions Response Site Prioritization Protocol (MRSPP) – The MRSPP was published as a rule on October 5, 2005. This rule implements the requirement established in section 311(b) of the National Defense Authorization Act for Fiscal Year 2002 for the Department to assign a relative priority for munitions responses to each location (hereinafter MRS) in the Department's inventory of defense sites known or suspected of containing unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC). The DoD adopted the MRSPP under the authority of 10 USC 2710(b). Provisions of 10 USC 2710(b) require that the DOD assign to each defense site in the inventory a relative priority for response activities based on the overall conditions at each location taking into consideration various factors related to safety and environmental hazards (710 FR 58016).

Munitions and Explosives of Concern (MEC) – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks means: (A) Unexploded ordnance (UXO), as defined in 10 U.S.C. 101(e)(5); (B) Discarded military munitions (DMM), as defined in 10 U.S.C. 2710(e)(2); or (C) Munitions constituents (e.g., TNT, RDX), as defined in 10 U.S.C. 2710(e)(3), present in high enough concentrations to pose an explosive hazard (10 USC 2710(e)(2)).

Munitions Constituents (MC) – Materials originating from unexploded ordnance (UXO), discarded military munitions (DMM), or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (10 U.S.C. 2710(e)(3)).

Munitions Debris (MD) – Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal (10 USC 2710(e)(2)).

Munitions Response Area (MRA) – An area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former range and munitions burial areas. A munitions response area is comprised of one or more munitions response sites (32 CFR 179.3).

Munitions Response Site (MRS) – A discrete location within an MRA that is known to require a munitions response (32 CFR 179.3).

Non-Time Critical Removal Action (NTCRA) – Actions initiated in response to a release or threat of a release that poses a risk to human health or the environment where more than six months planning time is available (USACE 2007).

Range – A designated land or water area that is set aside, managed, and used for range activities of the Department of Defense. The term includes firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access and exclusionary areas. The term also includes airspace areas designated for military use in accordance with regulations and procedures prescribed by the Administrator of the Federal Aviation Administration (10 U.S.C. 101(e)(1)(A) and (B)).

Range Activities – Research, development, testing, and evaluation of military munitions, other ordnance, and weapons systems; and the training of members of the armed forces in the use and handling of military munitions, other ordnance, and weapons systems (10 U.S.C. 101(e)(2)(A) and (B)).

Range-Related Debris – Debris, other than munitions debris, collected from operational ranges or from former ranges (*e.g.* target debris, military munitions packaging and crating material).

Time Critical Removal Action (TCRA) – Removal actions conducted to respond to an imminent danger posed by the release or threat of a release, where cleanup or stabilization actions must be initiated within six months to reduce risk to public health or the environment (USACE 2007).

Unexploded Ordnance (UXO) – Military munitions that (A) have been primed, fuzed, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (C) remain unexploded whether by malfunction, design, or any other cause (10 U.S.C 101(e)(5)(A) through (C)).

1. INTRODUCTION

This Site-Specific Work Plan (SS-WP) Addendum was prepared to document the Site Inspection (SI) activities to be conducted at the site formerly known as Madison Barracks Target Range[1] in accordance with the Military Munitions Response Program (MMRP). The SI at Madison Barracks Target Range falls under the purview of the Defense Environmental Restoration Program (DERP) for Formerly Used Defense Sites (FUDS). The specific FUDS project number for Madison Barracks Target Range is C02NY020400. This SS-WP is an addendum to the Programmatic Work Plan (PWP) for the DERP FUDS MMRP SIs (entitled *Programmatic Work Plan for Formerly Used Defense Sites Military Munitions Response Program Site Inspections at Multiple Sites in the Northeast Region,* referred to throughout this document as the PWP) (Alion 2005). The U.S. Army Corps of Engineers (USACE) approved the final PWP, dated October 2005, for use in conducting SIs at multiple sites located throughout the Northeastern United States. The reader is directed to the PWP (Alion 2005) for additional programmatic detail regarding general SI plans and procedures. This addendum provides site-specific plans, objectives, and procedures for conducting the SI at the FUDS known as Madison Barracks Target Range.

1.1 Project Authorization

The U. S. Army Engineering and Support Center Huntsville (USAESCH) contracted with Alion Science and Technology Corporation (Alion) to perform an SI at Madison Barracks Target Range, Henderson, Jefferson County, New York. This work, which is being performed in the Northeast Region of the Continental United States (CONUS) under contract W912DY-04-D-0017, Task Order 00170001, falls under the purview of DERP FUDS. USAESCH transferred management of the contract to the U.S. Army Corps of Engineers North Atlantic Division Baltimore District (CENAB). CENAB works with USAESCH on this project. As the local USACE Geographic District, the USACE North Atlantic Division, New York District (CENAN) completes the USACE Project Team by providing project management and technical support to work with the regulators and all stakeholders in execution of the SI.

[1] The USACE FUDS Management Information System (FUDSMIS) track this property as "Madison Bks Trgt R." For the purpose of this document, the site name will be used as "Madison Barracks Target Range."

The work under this task order is being completed by Alion, along with Alion's subcontractors: TestAmerica Inc., Integral Consulting, Inc., and Environmental Data Services (EDS) Data Validation Services, Inc.

1.2 Project Scope and Objectives

The goal of this SI is to determine whether the FUDS warrants a further response action or a No Department of Defense Action Indicated (NDAI) designation with respect to MMRP (Alion 2005). To make this determination, investigations for Munitions and Explosives of Concern (MEC) and Munitions Constituents (MC) will be performed in accordance with Engineering Regulation (ER) 200-3-1 (USACE 2004a), the Department of Defense (DoD) Management Guidance for DERP (DoD 2001), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). In accordance with ER 200-3-1 (USACE 2004a), this SI is a screening level assessment to determine presence/absence of MEC and MC, and is not intended as a full-scale study of the nature and extent of MEC or MC hazards. Further project response actions, if required, will be conducted in parallel with the CERCLA response action.

The project objectives of this SI are as follows:

- Determine if the FUDS requires additional investigation through a Remedial Investigation/Feasibility Study (RI/FS) or if the FUDS may be recommended for NDAI designation based on the presence or absence of MEC and MC.

- Determine the potential need for a Time-Critical Removal Action (TCRA) or Non-Time-Critical Removal Action (NTCRA) for MEC and MC by collecting data from previous investigations/reports, conducting site visits, performing qualitative reconnaissance (using visual observations and analog geophysics), and collecting MC samples.

- Collect or develop additional data, as appropriate, in support of potential Hazard Ranking System (HRS) scoring by the U.S. Environmental Protection Agency (USEPA).

- Collect the additional data necessary to complete the Munitions Response Site Prioritization Protocol (MRSPP).

The following describes the site-specific process used to complete the project objectives:

- Conduct a site visit and contact facility personnel at Madison Barracks Target Range, as necessary, to obtain additional site-specific data (associated reports and documents).

- Review available reports/data for Madison Barracks Target Range to identify potential MEC/MC sources, pathways, receptors, and associated data gaps.

- Prepare a read-ahead package for stakeholder review to clarify the MMRP process, discuss historical site operations, and present potential MEC/MC hazards.

- Initiate the Technical Project Planning (TPP) process to involve site owners and regulators (stakeholders) in a meeting to establish/confirm project objectives and data needs required to: (1) screen the property for releases that, if present, would trigger the RI/FS phase of the CERCLA process, or if releases are not found to be present, determine the data required to reach project closeout; (2) define Data Quality Objective (DQO) worksheets; (3) prepare a conceptual site model (CSM); and; (4) obtain stakeholder consensus on the SI approach and planned field activities. The results of the TPP meeting are documented in a TPP Memorandum.

- Prepare a SS-WP (this document) to document site history and field investigation and analysis plans.

- Conduct field work, including a qualitative reconnaissance for MEC and MC sampling activities.

- Complete a comprehensive SI Report to document findings, conclusions, and recommendations.

This MMRP SI does not require MEC intrusive/clearing activities (Alion 2005). Furthermore, initiation or completion of a TCRA/NTCRA or emergency response action is not within the SI scope. Refer to Section 2.6.1 for additional detail on the munitions response approach.

A determination of NDAI or RI/FS designation for an MMRP project will address only MEC/MC issues at a site; *i.e.* this determination does not address potential Hazardous, Toxic, and Radioactive Waste (HTRW) issues at the property. Potential HTRW concerns identified during SI activities will be documented and this information will be provided to USACE for determination of future action under the HTRW program. In addition, if an NDAI designation is made, and MEC/MC contamination is discovered at a later date, USACE may reopen the MMRP project.

1.3 Technical Project Planning Summary

The TPP Meeting for Madison Barracks Target Range was conducted on 13 May 2009 at the Robert G. Wehle State Park, Henderson, New York. The New York State Department of

Environmental Conservation (NYSDEC), Office of Parks, Recreation and Historic Preservation (OPRHP), USACE Baltimore District (CENAB), USACE New York (CENAN), and Alion representatives participated in this meeting. The TPP participants concurred with the technical approach for the planned SI activities discussed as documented in the TPP Memorandum (Alion 2009) and summarized below (see Appendix B):

- **SI Objectives and Approach**. Stakeholders understood limited scope study and supported the general approach presented.

- **Munitions Response Site/Potential Areas of Interest (MRS).** Identified stakeholders agreed to the selection and designation of Munitions Response Site (MRS) 1 (Small Arms Range) as the focus of the SI.

- **CSMs (MEC and MC).** Stakeholders agreed to the CSMs presented for MEC and CSMs for MC, as modified during the TPP:

- **DQOs.** Stakeholders agreed to the DQOs.

TPP actions items (Alion 2009) and their respective status are noted below:

- Mr. Shultz will provide Alion with the existing Archeological and Historical Report for the property. [***Follow-up***: *Alion contacted Mr. Shultz to obtain the Archeological and Historical Report for the property. Mr. Thomas, of the OPRHP, responded that the digital version of the document was corrupted and he requested another scanned version of the report. Any relevant information will be included in the Final SS-WP*].

- Mr. Thomas will provide Alion with the existing Biodiversity Study Report for the property. [***Follow-up***: *Alion contacted Mr. Thomas to obtain the Biodiversity Study Report for the property. Mr. Thomas responded that the biodiversity study contains sensitive information and needs to be cleared for sharing. After it is cleared, he will send it to Alion and any relevant information will be included in the Final SS-WP*].

- Mr. Thomas will provide Alion with the existing GIS database for the property. [***Follow-up***: *Alion contacted Mr. Thomas to obtain the OPRHP GIS database for the property.*].

1.4 Decision Rules

Site-specific DQOs were developed for Madison Barracks Target Range and are presented in Worksheets 1-4 (Appendix C). The DQOs and the decision rules to support decision-making for this SI are presented below:

- DQO 1 - Determine if the FUDS requires additional investigation through an RI/FS or if the FUDS may be recommended for a NDAI designation based on the presence or absence of MEC and MC.

  The basis for an RI/FS recommendation related to the presence/absence of MEC includes:

  - Historic data that indicates the presence of MEC or Munitions Debris (MD)
  - Visual evidence or surface anomalies which are classified as MEC or MD
  - One or more anomalies in a target area near historic or current MEC/MD finds or within an impact crater
  - Physical evidence indicating the presence of MEC (e.g., distressed vegetation, stained soil, ground scarring, bomb craters, burial pits, MD, etc.)

  The basis for an RI/FS recommendation related to the presence/absence of MC includes:

  - Maximum concentrations at the FUDS exceed USEPA Regional Screening Values for human health (USEPA 2009) based on current and future land use
  - Maximum concentrations at the FUDS exceed USEPA interim ecological risk screening values
  - Maximum concentrations at the FUDS exceed site-specific background levels

If none of these aforementioned scenarios occur, then the recommendation for a NDAI designation will be given.

- DQO 2 - Determine the potential need for a TCRA for MEC and MC by collecting data from previous investigations/reports, conducting site visits, performing qualitative reconnaissance, and by collecting MC samples. The basis for a removal recommendation is specified below:

  - A TCRA or an emergency response – If there is a complete pathway between source and receptor and if the MEC presence is viewed as an "imminent danger" posed by the release or threat of a release. Cleanup or stabilization actions must be initiated within six months to reduce risk to public health.

  - A NTCRA – If a release or threat of release that poses a risk where more than six months planning time is available.

- DQO 3 – Collect or develop additional data, as appropriate, in support of a potential HRS scoring by the USEPA.

- DQO 4 – Collect the additional data necessary to complete the MRSPP.

1.5 Work Plan Organization

This SS-WP covers the inspection and all associated preparations necessary for SI activities at Madison Barracks Target Range. Refer to the PWP (Alion 2005) for additional detail regarding general SI plans and procedures.

1.6 Project Organization

Technical, ordnance, and managerial personnel required to support the SI activities are provided from a pool of Alion professionals. Key positions include the Program Manager (PGM), Site-Specific Project Manager (PM), Task Managers, Field Team Leaders (FTLs), Chemical Quality Control (QC) Officer, Certified Industrial Hygienist (CIH), Unexploded Ordnance (UXO) Technician II/III, and Geographic Information Systems (GIS) Manager. The key positions, qualification requirements, and assigned personnel are identified in the PWP (Alion 2005).

Project points of contact for the Madison Barracks Target Range SI are identified in Table 1-1. Project communication and reporting is conducted in accordance with the procedures outlined in the PWP (Alion 2005).

The Alion SI Field Team for the Madison Barracks Target Range will include a three-person team, with each person qualified in his/her area of expertise. The FTL leads the field sampling activities. The FTL will manage the field team and make decisions in coordination with the Alion PM and Task Manager. The FTL will manage the field team and make decisions in coordination with the Alion PM. A Sampling Technician assigned to perform the MC sampling will support the FTL. The Field Team also will include a UXO Technician (II or III)[2] tasked with ensuring all aspects of field safety, including the inspection of any Material Potentially Presenting an Explosive Hazard (MPPEH) encountered and the certification of items as UXO,

[2] The use of one UXO Technician is a deviation from the PWP (Alion 2005), which stated that two UXO Technicians will be used during these visits. Previous field investigations under the MMRP indicate that this revised team structure does not impact data gathering or health and safety.

discarded military munitions (DMM), MC (explosive concentrations), MD, range-related debris, or cultural debris. The UXO Technician will conduct the geophysical reconnaissance and ensure safe pathways to allocated sampling locations.

The Madison Barracks Target Range SI field team will be comprised of the following individuals:

- FTL, Kim Evers
- UXO Technician, TBD
- Sampling Technician, Todd Belanger

Table 1-1. Project Points of Contact

NAME	ORGANIZATION	PHONE	ADDRESS	E-MAIL	PROJECT ROLE
Bradford McCowan	U.S. Army Corps of Engineers (USACE) Directorate of Environmental & Munitions Center of Expertise (EM-CX)	256-426-4214	P. O. Box 1600 4820 University Square Huntsville, AL 35816	Brad.McCowan@usace.army.mil	MMRP SI Program Manager
Julie Kaiser	U.S Army Corps of Engineers North Atlantic Division Baltimore District (CENAB) EM Design Center (DC)	410-962-2227	City Crescent Building 10 S. Howard St. Baltimore, MD 21201	Julie.E.Kaiser@usace.army.mil	MMRP SI Regional Program Manager
Alan Warminski	CENAB	410-962-7677	City Crescent Building 10 S. Howard St. Baltimore, MD 21201	Alan.s.warminski@usace.army.mil	DC Design Team Leader
Constancio Labeste	CENAN	917-790-8330	26 Federal Plaza New York, NY 10278-0090	Constancio.j.labest@usace.army.mil	Project Manager
Chek Beng Ng, P.E.	NYSDEC, Division of Environmental Remediation	518-402-9620	625 Broadway Albany, NY 12233-0715	cbng@gw.dec.state.ny.us	State Regulator
Dan Eaton	NYSDEC	518-402-9620	625 Broadway Albany, NY 12233-0715	djeaton@gw.dec.state.ny.us	State Regulator
Alida Karas	USEPA Region 2, Federal Facilities Section	212-637-4276	290 Broadway New York, NY 10278-0090	Karas.alida@epamail.epa.gov alidamk@comcast.net	Federal Regulator
John Shultz	OPRHP	315-938-5302	5522 Military Road Henderson, NY 13650-2133	NA	Park Superintendent
Brian Thomas	OPRHP	315-482-2593	5522 Military Road Henderson, NY 13650-2133	Brian.Thomas@oprhp.state.ny.us	Capital Facilities Manager
Roger Azar, PE	Alion Science and Technology	301-399-7304	3975 Fair Ridge Drive Suite 125 South Fairfax, VA 22033	razar@alionscience.com	Program Manager
Bonnie Herring	Alion Science and Technology	919-406-2138 919-558-9218 (fax)	1000 Park Forty Plaza Suite 200 Durham, NC 27713	bherring@alionscience.com	Contracts Administration

Table 1-1. Project Points of Contact					
NAME	**ORGANIZATION**	**PHONE**	**ADDRESS**	**E-MAIL**	**PROJECT ROLE**
Scott Hemstreet	Alion Science and Technology	301-705-5044 919-549-0611	1000 Park Forty Plaza Suite 200 Durham, NC 27713	shemstreet@hfactors.com	Operations Manager-Munitions and Explosives of Concern
Curtis Mitchell	Alion Science and Technology	301-399-7152	7730 Harborview Drive, Charlotte Hall, MD 20622	rmitchell@hfactors.com	Quality/Safety Manager and Senior Unexploded Ordnance Technician
Kimberly Evers	Alion Science and Technology	703-259-5132	3975 Fair Ridge Drive Suite 125 South Fairfax, VA 22033	kevers@alionscience.com	Project Manager/Field Team Leader
Robert Scheitlin	Alion Science and Technology	919-406-2101	3975 Fair Ridge Drive Suite 125 South Fairfax, VA 22033	rscheitlin@alionscience.com	GIS Specialist
Bill Beckett, CIH	Alion Science, and Technology	908-852-4887	1750 Tysons Boulevard, McLean, VA 22102	wbeckett@alionscience.com	Certified Industrial Hygienist
Dreas Nielsen	Integral Consulting, Inc.	206-957-0311	7900 SE 28th St. Ste 410 Mercer Island, WA. 98040	dnielsen@integral-corp.com	Contractor -Chemical Quality Control Officer
Douglas Weaver	EDS, Inc.	757-564-0090	1156 Jamestown Road Suite A Williamsburg, VA 23185	dweaver@env-data.com	Data Validation Lead
Deborah Henderer	TestAmerica, Inc.	303-736-0134	4955 Yarrow Street Arvada, CO 80002	Debra.Henderer@testamericainc.com	Customer Service Manager

1.7 Project Schedule

The Madison Barracks Target Range SI project schedule includes proposed submittal dates, review times for stakeholders, expected fieldwork dates, and reporting dates (Appendix A – Figure 1). This revised project schedule supersedes the project schedule originally presented in the Final TPP Memorandum (Alion 2009). The current SI schedule will be updated as necessary to reflect current progress and anticipated activities.

2. PROJECT DESCRIPTION

2.1 Project Location

Madison Barracks Target Range is located in Henderson, Jefferson County, New York (Appendix A – Figure 2). The North American Datum (NAD) 1983 Universal Transverse Mercator (UTM) Zone 19N, easting (X) and northing (Y) coordinates for the approximate center of the FUDS are 397181.00 meters (m) and 4858237.00 m, respectively. This FUDS falls under the geographical jurisdiction of USACE, New York District (USACE 2004b).

2.2 Site Description

The Madison Barracks Target Range FUDS is approximately 866 acres in areal extent. The Army acquired portions of the land for Madison Barracks Target Range in May 1885 and November 1907. A portion of the property was used as a practice target range for small arms including .45 caliber pistol, .50 caliber machine gun, and .30 caliber Springfield and M-1 rifles. Former structures at this FUDS included a water tower, six "pill boxes", numerous concrete footings of old buildings, and numerous inhabited buildings (former offices, sheds, and residential) (Alion 2009 and USACE 2004b).

2.2.1 Topography

The former Madison Barracks Target Range FUDS is located in Henderson, New York, which is located on the shoreline of Lake Ontario. The area as a whole varies in elevation from 270 feet (ft) above sea level to approximately 330 ft. above mean sea level (msl) (USACE 2004b). A topographic map of the area surrounding Madison Barracks Target Range is included as Figure 4 in Appendix A of this report.

2.2.2 Vegetation

The former Madison Barracks Target Range FUDS is located at Wehle State Park. The vegetation at the former Madison Barracks Target Range is predominantly a mixed forest including deciduous (maple, birch and beech trees) and evergreen Needle Leaf trees. The southern portion of the FUDS contains woody wetlands. The site is bordered to the northwest by Lake Ontario and to the east by Wehle State Park which has similar vegetation (USGS 2009a).

2.2.3 Geology and Soils

During the Pleistocene epoch, the Labradorian ice of the Laurentide glacial ice sheets, thousands of feet thick, covered all of what is now northwestern New York. During the Wisconsin stage of

the Pleistocene epoch, ice formed in the mountains of the northeastern part of North America and traveled out in different directions. The advancement of ice was slow and was followed by an equally slow retreat. In the Watertown and Sackets Harbor area, the remains of the previous glacial stages were destroyed by subsequent glaciation and therefore all current surficial deposits are most likely from the Cary and Mankato substages. During the early phase of the Cary substage, the Ontario Ice Lobe, originating in the St. Lawrence Valley, extended south. Upon reaching the Tug Hill escarpment, the Ontario Ice Lobe split in two lobes in order to advance down either side of the plateau. As the glacier advanced south, it acquired past glacial deposits, bedrock, and soil (Stewart 1958 and USGS 2009b).

Bedrock escarpments are the cause of the irregular surface expression in the lake plain area of Henderson, NY. The bedrock escarpments are the result of glacial erosion of the underlying Trenton bedrock. The bedrock of the Trenton Group is typically fossiliferous and consist of limestone layers containing alternating beds of calcareous shale (Stewart 1958 and USGS 2009b).

Typical soil within the FUDS is the very rocky Bebson-Galoo complex and the Galoo-Rock outcrop complex. There are also smaller areas consisting of very rocky Benson-Galoo channery silt loam, Farmington loam, and Galway silt loam (USDA 2009) (Appendix A, Figure 5).

2.2.4 Hydrology and Hydrogeology

Madison Barracks Target Range is located on the shoreline of Lake Ontario. The area is drained by streams that flow west and southwest across the lake plain to Lake Ontario. The courses of the streams, usually parallel to the movement of the previous ice glacier, are generally straight but do contain some sharp angular changes. The directions of these streams are mostly due to the erosive work of the Pleistocene glaciers (Stewart 1958 and USGS 2009b).

The groundwater at Madison Barracks Target Range is contained within the bedrock and in unconsolidated glacial meltwater deposits. There are several principle aquifers located to the east and southeast of the FUDS (USGS 2009c).

Several wells are located in the southern and southwestern portion of the former Madison Barracks Training Range. The well in the southwest portion of the FUDS is screened at 180 feet deep and is not considered to be a potential pathway to receptors given the absence of route of exposure (Alion 2009).

2.2.5 Threatened and Endangered (T&E) Species

Madison Barracks Target Range is located at Wehle State park in Henderson, NY. The State of New York has multiple animal species that are on the federal endangered, threatened, recovered, or species of concern list, some of which could be located in the vicinity of the Madison Barracks Target Range FUDS (NYSDEC 2009a). State or federally-listed species may be present seasonally in the vicinity of the Madison Barracks Target Range FUDS; therefore, a complete list of the Threatened and Endangered (T&E) species for the State of New York is presented in Appendix G (NYSDEC 2009a).

USACE and Alion is in the process of contacting the New York Natural Heritage Program and the U.S. Fish and Wildlife Service (USFWS) to determine if any T&E species are present and likely to be adversely effected by the sampling activities. The proposed work tasks presented in this SS-WP are not anticipated to cause adverse impact to any of the listed species or habitats; however, if additional T&E species are identified, disturbances to T&E species and their sensitive habitats will be avoided during the SI field activities.

2.2.6 Wetlands

Wetlands, specifically freshwater forested/shrub wetlands, are present within the Madison Barracks Target Range FUDS boundary but not the MRS (USFWS 2009). The field sampling activities proposed for the Madison Barracks Target Range FUDS are not expected to negatively impact wetlands present at the project site. A wetlands map is provided in Appendix A, Figure 6.

2.2.7 Cultural, Archaeological, and Water Resources

USACE will consult with the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP) to ensure cultural, archeological, and water resources are not present at the Madison Barracks Target Range FUDS and/or will not be disturbed during field activities. In the event that cultural, archeological, and/or water resources are identified in these areas, any disturbances will be avoided or mitigated in accordance with the State's requirements. Any adjustments required to the sampling design, to avoid impact on cultural resources, will be documented in the Final SS-WP, prior to commencement of field activities. An Archeological and Historical Report for the site was requested by Alion and any pertinent information will be included in the Final SSWP report (Alion 2009).

2.2.8 Coastal Zone

The Madison Barracks Target Range FUDS is within the New York Coastal Zone. This area is managed under the New York Coastal Management Program, which is administered by the

Department of State through the Division of Coastal Resources (NYS DOS 2004) Alion will notify the New York Division of Coastal Resources of the proposed field sampling activities planned for this SI. Sampling activities will be completed without disturbance to the coastal areas and in accordance with coastal regulations. The field crew will stay on pre-existing paths during sampling activities wherever possible.

2.3 Site History

The Madison Barracks Target Range FUDS is approximately 866 acres in areal extent and is located at the western most side of Stony Point in Henderson, NY. Between 1885 and 1947, the site was used as a troop staging and training area. Approximately 200 acres of the Madison Barracks Target Range property was used for small arms training (.30, .45, and .50 calibers). The range was known as the Madison Barracks Training Range and was closed in 1947 when the property was transferred to the War Assets Administration from the War Department. Later, in 1947, the entire 866 acres was conveyed to a private owner with no restoration, recapture, or restrictive clauses (USACE 1991 and USACE 2004b).

2.4 Current Use and Projected Land Use

The former Madison Barracks Target Range FUDS is located at Wehle State Park. Former structures at this FUDS included a water tower, six “pill boxes”, numerous concrete footings of old buildings, and numerous inhabited buildings (former offices, sheds, and residential) (Alion 2009 and USACE 2004b).

Wehle State Park currently is used for fishing, hiking, bird watching, biking, cross-country skiing, limited hunting and other recreational activities. The New York State (NYS) Office of Parks, Recreation and Historic Preservation (OPRHP) managed the land subsequent to its opening to the public in 2004. Future land use is expected to be similar (NYSDEC 2009b).

2.5 Previous Investigations of the Site

This section describes the results, conclusions, and recommendations associated with historic reports on this FUDS.

2.5.1 Inventory Project Report

USACE issued the Inventory Project Report (INPR) for the Madison Barracks Target Range FUDS in 1991 (USACE 1991). The 1991 INPR determined that the present condition of the project site is the result of prior DoD ownership, utilization, or activity. In addition, the INPR

determined that an environmental restoration project was an appropriate undertaking within the purview of the DERP for FUDS.

The INPR included a property description, physical characteristics of the site, the historical property ownership summary, site eligibility as a FUDS, a visual site inspection, an evaluation of ordnance present at the site, and recommendations. Chemical warfare materiel (CWM) was not used, stored, or disposed of at Madison Barracks Target Range. The INPR also included maps, and a preliminary assessment form. A site visit was conducted by the USACE on 16 August 1991 and no MEC or munitions related debris was observed during the site visit.

2.5.2 INPR Supplement

The INPR Supplement was prepared for the FUDS in 2004 (USACE 2004b). This report documented the range boundaries of the FUDS based on historical documents, munitions used, and other information related to the property. The INPR Supplement also assigned a Risk Assessment Code (RAC) score. The score indicates the level of MEC risk associated with the area. RAC scores range from 1, being the highest category of risk, to 5, being the lowest. The INPR Supplement designated one MRS, Madison Barracks Training Range, which included a small arms range used for training purposes. MRS 1 has an overall RAC score of 5. Only small arms were used at MRS 1 at the Madison Barracks Target Range FUDS (USACE 2004b). Table 2-1 lists the areas of evaluation, the acreage associated with each area, the RAC score given to each area, and munitions type.

Table 2-1. Potential Risk from Munitions and Explosives of Concern (USACE 2004b)

FUDS Name	Range Name	Sub-Range Name	RMIS ID	Acreage	RAC Score	Type Of Munitions	Munitions ID
Madison Barracks Target Range	Madison Barracks Training Range	N/A	C02NY020400R01	200[1]	5	Small Arms, General	Small Arms (CTT01)

[1] An acreage discrepancy for the MRS range exists in the Inventory Project Report (INPR) and INPR Supplement. The INPR and INPR Supplement identified the acreage of this FUDS as 866 acres and the acreage of the Madison Barracks Target Range (MRS 1) as 200 acres. A range boundary was not provided in the INPR Supplement or the current USACE GIS data for MRS 1. Using current and historical aerial imagery, an approximate range boundary for MRS 1 was created in this SI. The acreage is approximately 22 acres of land (Appendix A, Figure 2). USACE will be notified of this discrepancy in the SI report.

CTT = Closed, Transferring, Transferred
FUDS = Formerly Used Defense Site
ID = Identification
N/A= Not Applicable
RAC = Risk Assessment Code
RMIS = Range Management Information System

2.6 Site Inspection Approach and Rationale

In this section, the overall SI approach and rationale are presented. The overall approach to munitions response activities is presented in the PWP (Alion 2005).

2.6.1 Approach to Munitions Response Activities

The overall approach to munitions response activities is presented in the PWP (Alion 2005). As discussed in Section 2.5 of this SS-WP, there are no confirmed reports of munitions finds at Madison Barracks Target Range. The technical approach, as defined during the TPP Meeting (Alion 2009), will focus on biased screening for the presence of MEC/MC in the Madison Barracks Target Range FUDS in areas that are most likely to be impacted from former munitions-related activities.

The Madison Barracks Target Range FUDS, as defined in the INPR Supplement, includes one MRS. MRS 1 is the focus of this SI as identified below:

- **MRS 1 (Madison Barracks Training Range)**. This range is identified as Restoration Management Information System (RMIS) Number C02NY020400R01 and includes

approximately 200 acres[3] of land. MRS 1 was used as a small arms (.30, .45, and .50 caliber) firing range for pistols, rifles, and machine guns.

2.6.2 Munitions and Explosives of Concern Exposure Analysis

2.6.2.1 Munitions Type and Composition

The types of munitions historically used at the FUDS are presented in Table 2-2. The associated MC analyses were developed based on the munitions used at the MRS at the former Madison Barracks Target Range FUDS (Table 2-2). These data were gathered from munitions data sheets, historical documents, and other munitions reference documents. Appendix D (Munitions Data Sheet) was prepared and included in this SS-WP to serve as a visual guide for the SI field team to ensure accurate identification should suspect MEC be located on the FUDS.

[3] An acreage discrepancy for the MRS range exists in the INPR and INPR Supplement. The INPR and INPR Supplement identified the acreage of this FUDS as 866 acres and the acreage of the Madison Barracks Target Range (MRS 1) as 200 acres. A range boundary was not provided in the INPR Supplement or the current USACE GIS data for MRS 1. Using current and historical aerial imagery, an approximate range boundary for MRS 1 was created in this SI. The acreage is approximately 22 acres of land (Appendix A, Figure 2). USACE will be notified of this discrepancy in the SI report.

Table 2-2. Military Munitions Type and Composition (USACE 1991, USACE 2004b, and other sources)

Range ID (MRS)	Munitions ID	Munitions Type	Composition (explosives and metallic components)	Associated MC Analysis
Madison Barracks Training Range (MRS 1)	Small Arms (CTT01)	Small Arms (.30 caliber, .45 caliber, .50 caliber)	**Projectile:** Lead, antimony [f], cupro-nickel and soft steel (iron [e] and carbon). **Shell casing [d]:** Brass (copper-zinc alloy) or Steel (iron and carbon) **Propellant [a]:** Single or double – base smokeless powder (nitrocellulose [c], NG], DNT [b], potassium sulfate, graphite) **Primer [a]:** Barium nitrate, lead styphanate	**Explosives (at firing point) [a]:** NG DNT [b] **Metals (at impact areas) [a]:** Copper Iron [e] Lead Nickel

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act	MC = Munitions Constituents
CTT = Closed Transferring or Transferred	MK = Mark
DNT = Dinitrotoluene	MRS = Munitions Response Site
FUDS = Formerly Used Defense Site	NG = Nitroglycerin
ID = Identification	PWP = Programmatic Work Plan
	SI = Site Investigation

[a] Based on available technical manuals, MCs identified for the Madison Barracks Target Range FUDS munitions include primer and propellant. Primer materials typically represent a very small percentage (~5%) of the total munitions weight. The primer material, along with the propellant, typically burns as the projectile is fired, although due to the large quantity of propellant explosive residues may be deposited during firing. Therefore, the MC sampling/analysis typically focuses on primary constituents present in propellants at the firing point.

[b] DNT and DNT break-down products currently on the approved PWP (Alion 2005) explosives analysis using method 8330A list (2,4-Dinitrotoluene; 2,6-Dinitrotoluene; 2-Amino-4,6-dinitrotoluene; 2-Nitrotoluene; 3-Nitrotoluene; 4-Nitrotoluene 4-Amino-2,6-dinitrotoluene) will be analyzed.

[c] Simple single-based nitrocellulose readily breaks down in the environment and is not expected to persist while more complex nitrocellulose may persist longer in the environment (Duran et al. 1994). Nitrocellulose is not considered toxic, and consequently no risk-based screening values were developed for the compound. Furthermore, there are no chemical analysis techniques that quantify nitrocellulose separately from the natural common essential nutrient nitrate. Based on this rationale, no sampling for nitrocellulose is proposed.

[d] Shell casings would have been removed and recycled and are not likely to be present at the firing point. Therefore, no MC associated with the shell casings will be analyzed.

[e] Chemicals that are not CERCLA hazardous substances (e.g., aluminum, barium, iron) can be reported in the SI Report; however, the SI risk evaluation and conclusions will include a discussion of the limitations of the FUDS program to respond to such chemicals. Non-CERCLA chemical concentrations will not provide the basis for a RI/FS recommendation for MC in the SI report.

[f] Antimony is added in small quantities to the predominantly lead inner core of a bullet in order to increase the hardness of the bullet as well as to increase the melting temperature of the lead. The antimony content in a small arms inner core is typically 2-3 % of the total bullet weight with the remaining percentage being lead. Given the small quantities of antimony used, no analysis for this metal is planned. For the largest caliber gun used at Madison Barracks Target Range (.50 caliber), this represents approximately 1.3 grams of antimony. Lead and metals found in the outer jacket (copper and nickel) are the predominant environmental contaminants associated with small arms use and will serve as marker analytes for potential contamination at the impact area. If these analytes are found to exceed environmental screening levels, future studies, if implemented, should include analysis for antimony.

Available historical information indicates that munitions were used/fired at the former Madison Barracks Target Range FUDS. Explosives associated with the propellant will be analyzed for at the firing points of MRS 1. Metals within the projectile may be present in detectable quantities at impact areas; therefore, metals will be sampled at the impact areas of MRS 1 (Alion 2009).

2.6.2.2 Munitions and Explosives of Concern and Munitions Constituents Exposure Routes

MRS 1 (Madison Barracks Training Range)

As shown in the CSM for MRS 1 (Appendix A, Figure 7), there are potentially complete exposure pathways for receptors including trespassers, visitor (recreation), employee and biota in surface soil. There are no freshwater sources within the FUDS; therefore, surface water and sediment are not media of concern. As discussed during the TPP meeting, there are a few wells on the southern end of the property and one well near the southwestern end of the former Madison Barracks Training Range. This well was screened at 180 feet deep and is not considered to be a potential pathway to receptors given munitions used (small arms), fate and transport of MC (MC associated with small arms is confined to surface soil) and location and depth of the groundwater wells [see Section 2.2.4] (Alion 2009). The potential presence of MEC/MD to all receptors is presented as a potentially complete pathway for surface soil. However, the explosive hazard associated with small arms is minimal due to the type and quantity of explosives present in the small arms propellant

The proposed MEC reconnaissance and MC sampling areas at Madison Barracks Target Range are selected by assessing the potential pathways and receptors and then choosing biased sample locations based on historical and other site-specific information. Biasing MEC screening/sampling to these areas will achieve the MEC DQOs and permit completion of the MRSPP. MC sampling is further discussed in Section 3 of this SS-WP. Sampling locations were also refined based on input from stakeholders during the TPP meeting (Alion 2009).

Site-specific DQOs were defined to complete a MEC/MC exposure analysis. The programmatic DQOs outlined in Section 3.1.2 of the PWP (Alion 2005) were reviewed and modified to address the site-specific needs of the SI at Madison Barracks Target Range. The DQOs were discussed and agreed to during the TPP meeting, and included in the Final TPP Memorandum. The DQO worksheets are provided in Appendix C of this SS-WP.

USACE and Alion obtained agreement to collect surface soil samples to assess the potential presence of MC, associated with the munitions used/fired at the FUDS (see Table 2-2). The MC associated with known munitions used at the Madison Barracks Target Range and the MC analysis list was further refined and reduced using the MC screening process shown in Table 2-2.

The sampling approach presented below is based on the MRS-specific CSM and current understanding of the sources and pathways for MEC/MC through the environment to the potential receptors (see Section 2.6.3). See Figure 8 in Appendix A for the proposed sampling locations discussed below.

2.6.3 Conceptual Site Model

Based on the discussion in Section 2.6.2.2, the current version of the CSM is provided in Appendix A of this SS-WP (Figure 7). The CSM is limited to those areas potentially impacted by MEC and/or MC based on the site use and history. The CSM is a dynamic model that will be updated throughout the SI process as additional site information is collected.

2.6.3.1 Sampling Plan

According to historical documents only small arms munitions were used at Madison Barracks Target Range FUDS. Table 2-1 lists the areas of evaluation, the acreage associated with each area and the RAC score. Explosives and metals associated with the munitions historically used at MRS 1 will be analyzed at firing points, impact areas, and formerly used range areas, where accessible. The sampling approach presented below is based on the MRS-specific CSM and current understanding of the sources and pathways for MEC/MC through the environment to the potential receptors (see Section 2.6.2.2 and 2.6.2.3).

Below is a brief description of MRS 1 and the MC sample analysis scheme.

MRS 1 (Madison Barracks Training Range). As stated during the TPP, a historic aerial photograph was used to identify the location of the former Madison Barracks Training Range (MRS 1) (Appendix A, Figure 3). Per discussion at the TPP meeting, samples will be collected at former firing points and impact areas. Explosive MC (NG, DNT, and DNT breakdown products) related to small arms propellant will be analyzed at the firing points (Alion 2009) (Table 2-2 and Appendix A, Figure 8). Additionally, samples collected from the former firing points and impact areas will be analyzed for a reduced list of metals (copper, iron, lead, and nickel) associated with the bullet (Appendix A, Figure 8). Samples collected at the firing point are typically not analyzed for metal MC related to the bullet; however, the firing points were located at several different distances from the impact area. During firing operations at the range, bullets may have landed short of the impact berm; therefore, as requested in the TPP meeting, the samples collected at the firing points will also be analyzed for metal MC (Alion 2009). As discussed during the TPP, the wells located in the southern portion of the FUDS are not considered to be a potential pathway to receptors. There are no freshwater sources within the FUDS; therefore surface water and sediment are not media of concern.

Background Samples. Five surface soil background samples will be collected from areas that are within or adjacent to the FUDS boundary and exhibit a similar geological or soil composition to the samples collected in MRS 1 (Appendix A, Figure 8). All background surface soil samples will be analyzed for a reduced metals list (copper, iron, lead, and nickel). Explosive MCs are not naturally occurring substances and are not expected to be found in the environment; therefore, background soil samples will not be analyzed for explosives.

In addition to the MC sampling activities described above, a qualitative reconnaissance will be performed at various locations within the Madison Barracks Target Range FUDS. This reconnaissance will include the use of visual observations and analog geophysics in order to identify potential surface presence of MEC/MD and support anomaly avoidance activities. The DQO for the determination of MEC risk will be achieved by completing the reconnaissance within and around the MRS especially focused in the vicinity of the former firing points and impact areas. The former firing points and impact areas are the most likely areas to verify the presence of MEC/MD and/or MC.

3. FIELD INVESTIGATION PLAN

3.1 Pre-Field Activities

USACE New York District (CENAN) will complete the Right-Of-Entry (ROE) with the State of New York prior to Alion conducting the field sampling activities at Madison Barracks Target Range. USACE will notify site owners of actual fieldwork dates in advance of site entry to ensure no access problems are encountered.

Dig-Safe will not be contacted for this site visit as Dig-Safe does not require mark-out and clearance when using hand tools such as plastic trowels. Alion will notify USACE, who will in turn notify the property owners, of actual fieldwork dates in advance of property entry to ensure no access problems are encountered. NYSDEC will be informed by CENAN of the planned field mobilization date prior to the commencement of field work.

3.2 Environmental Protection Program

Potential environmental resources associated with the FUDS (including T&E species, wetlands, Cultural, Archaeological, and Water Resources) are presented in Section 2 along with avoidance procedures for minimizing potential adverse effects to the environment occurring as result of the planned SI activities at Madison Barracks Target Range. Furthermore, in accordance with the PWP (Alion 2005), each sampling location will be evaluated individually to avoid tree and shrub removal during SI activities. As a result of these procedures, tree and shrub removals are not anticipated during the field sampling activities. Due to the nature of activities performed during the SI (no MEC intrusive investigations and MC sample depths not exceeding one foot), environmental impacts are considered insignificant, if present at all.

3.3 Munitions and Explosives of Concern Avoidance Design and Rationale

A UXO Technician II/III will be present to perform avoidance of anomalies during all SI on-site activities.

Prior to conducting site reconnaissance or field sampling operations, the field personnel will have reviewed applicable health and safety documents and become familiar with the types of military munitions used at the FUDS. The field personnel also will receive a daily safety briefing from the site UXO Technician to highlight the munitions and the potential hazards associated with MEC at the FUDS.

3.3.1 Site Reconnaissance Field Procedures

Field procedures are described below for areas where the field team will be conducting SI related activities.

3.3.1.1 Land Areas

The qualitative site reconnaissance[4] and field sampling activities require the use of analog geophysical equipment to identify access routes to environmental sampling locations that are free of anomalies. Figure 8, Appendix A includes representative qualitative reconnaissance paths planned for the FUDS. The UXO Technician II/III will ensure an anomaly-free location at or in the vicinity of sample locations. The UXO Technician II/III will document surface or subsurface anomalies at or in the vicinity of the sample collection location, if encountered. Surface and subsurface anomaly locations will be surveyed using a Global Positioning System (GPS) unit, and a description of the surface anomalies (to include type, details, etc.) will be documented in the daily field notes for later inclusion into the SI Report.

In the event that MPPEH is observed and Alion is unable to identify and certify that the MPPEH is (1) MD remaining after munitions use, demilitarization, or disposal; (2) range-related debris, or (3) cultural debris, Alion will consult with USACE for guidance on whether the site or area where the item was found should be considered for a potential emergency response. An emergency response action may be initiated by USACE if there is a complete pathway between receptor and the source and the situation is viewed as an "immediate and unacceptable hazard" to the local populace or site personnel. Alion will adhere to the requirements of Engineer Pamphlet 1110-1-18 (USACE 2000) and the USACE Interim Guidance Document (IGD), *Procedure for Preliminary Assessment and Site Inspection Teams That Encounter UXO While Gathering Non-UXO Field Data* (USACE 2006) for initiating an emergency response (Appendix D).

[4] Meandering path refers to the route the field team will follow to navigate through, in, or around a range or area of concern. It is not a pre-designed transect at a preset interval, but rather refers to wandering in a zigzag fashion through an area to identify additional locations of interest, observe site conditions, and present visual observations related to MEC in potentially impacted areas. Qualitative reconnaissance describes the process whereby the field team completes a reconnaissance of certain areas around the site using analog geophysics and visual surveys in a meandering path to avoid MEC, evaluate/confirm proposed sampling locations and collect additional data on anomalies and site conditions to be used in completion of the data quality objectives. The results of the qualitative reconnaissance including surface observations and surface/subsurface anomaly counts related to past DoD operations involving military munitions will be documented in the field books and the SI Report.

If the UXO Technician determines that an item may present an explosives hazard that poses an imminent threat to human health, the following steps of the USACE IGD will be implemented:

- The area will be flagged and GPS coordinates will be obtained.
- The property owner will be notified of the hazard and advised to call the local emergency response authority. The USACE Geographic District PM and CENAB will be notified.
- The property owner will be informed that if they do not call the local response authority within one hour, the UXO Technician will notify the local emergency response authority.
- The local response authority will decide on how to respond to the reported incident, including a decision not to respond. Neither USACE personnel nor Alion personnel have the authority to call EOD to respond to an explosives hazard.
- If local response authority decides to respond, the UXO Technician or his designee will mark the location of the item, wait for the arrival of local response personnel, and provide accurate location information to the emergency response authority.

Once the UXO Technician II/III identifies an area as anomaly-free, the MC sampling team will collect the samples for analysis. Samples will be collected from areas identified by the CSM or the MEC survey to be suspected of containing high concentrations of MEC and/or MC. USACE, in consultation with Alion, may consider implementing a TCRA if the three conditions below are present:

- MPPEH is visually inspected and cannot be certified as MD or scrap,
- There is a complete pathway between receptor and the source,
- The situation presents an imminent danger posed by the release or threat of a release.

A TCRA is implemented where cleanup or stabilization actions must be initiated within six months to reduce risk to public health or the environment. Alternatively, an NTCRA may be initiated by USACE if more than six months is available for planning. Alion will immediately notify the Geographic District PM at CENAN and the Military Munitions Design Center (DC) Technical Manager at CENAB and provide the necessary detail for USACE to discuss and plan any future actions (TCRA, NTCRA, or other). Alion will follow similar procedures of using a GPS unit to document the location for USACE and providing documentation (including photographs of the scene) as part of the field records.

3.3.1.2 Aquatic Areas

There are no permanent surface water features located within the Madison Barracks Target Range FUDS or MRS. Per stakeholder agreement no aquatic reconnaissance will be conducted in Lake Ontario, adjacent to the FUDS (Alion 2009).

3.3.2 Equipment Calibration and Method Testing

The UXO Technician will utilize hand-held analog metal detection instruments to aid in the identification of potential surface and subsurface MEC locations. The Schonstedt 52CX and Whites All-Metal detector will be used for the purpose of anomaly avoidance during sampling activities at the Madison Barracks Target Range FUDS. The Schonstedt will detect ferrous metals while the Whites detector will detect ferrous and non-ferrous metals and will be used to detect small arms materials from MRS 1. The instruments provide ample detection considering the munitions, geology, and potential interferences expected at the FUDS.

The UXO Technician II/III is trained in the use of the analog instruments and will check these instruments daily, prior to the start of field work. Schonstedt and Whites metal detectors do not require calibration; they have a simple "Go/No Go" field operational check. This function test requires the instruments be used on objects that are representative of the smallest munitions item known or suspected on the FUDS. The UXO Technician II/III will determine the depth of detection for the test items and test the instrument (and spare) close to that limit for everyday testing. If the depth of a soil sample to be taken is deeper than the determined detection depth of the equipment being used (*e.g.*, subsurface samples), then the sample depth screening for UXO will be achieved in steps so that any anomalies deeper than the established detection depth can be detected. If the instrument does not detect the test object being used to ensure the equipment is in proper functioning condition, the UXO Technician II/III will replace the batteries and retest the instrument. If the instrument fails twice, the instrument will be replaced with a spare that has undergone the daily testing described above. The UXO Technician II/III will check his instruments periodically throughout the day on objects known to contain ferrous metals such as boot eyelets, belt buckles, or other readily available items.

Handheld GPS equipment will be used to log the locations of MPPEH items encountered, adjusted sampling locations, and other items of interest. A Trimble ProXRS, specified in the PWP (Alion 2005), and/or a Trimble GeoXH will be used as a primary GPS unit. A handheld GPS unit will be used as a secondary GPS unit and, if used, will be documented in the SI Report as a variance to the PWP. Operator(s) will receive appropriate training on use of the GPS prior to their arrival at the FUDS. GPS locations will be transferred from the data logger at the end of each field day for inclusion in the FUDS GIS. GPS waypoints will be logged and the Alion Team

member will take measurements at known locations. In the event the GPS does not function because of interference, the field team will use both the data provided in Table 3-1 (coordinates and site descriptions) and sampling maps to visually identify sample locations. The sample locations will be marked and the Alion Team will measure off from available known locations to obtain coordinates. If MPPEH is encountered, the field team will photograph (digital) the item and mark its location using GPS.

Continued acceptable GPS performance will be documented through the use of a control point. During the mobilization of the field sampling efforts, a surveyed point with a known location (third order or better) will be identified. This point will be occupied by the GPS unit each field day. The GPS location will be recorded and compared to the known value, validating the unit's accuracy. The surveyed test point will be in similar vegetation (if possible) to most of the area where the GPS will be used (e.g., if the area is wooded, test point should be in woods). The pass/fail GPS performance test will require that the GPS unit register within 1m of the established surveyed/control point.

3.4 Munitions Constituents Field Sampling Activities

Field activities will follow the procedures outlined in the PWP (Alion 2005), Programmatic Sampling and Analysis Plan (PSAP) and Addendum (Appendix E.1 and E.2 of the PWP [Alion 2005]) except that the soil samples will be homogenized in a one-gallon plastic bag rather than in a stainless steel mixing bowl. Information pertaining to the specific samples that will be collected at Madison Barracks Target Range is detailed below.

Field sampling identification designations, GPS location coordinates, and the sampling rationale for each sample location are presented in Table 3-1. The actual coordinates (listed below) established for the sample locations were taken from a review of aerial photographs and historical information. These sample locations may require adjustments in the field due to site-specific conditions (e.g., access issues, MEC avoidance). During the SI, a total of 12 surface soil samples (including background) will be collected. The proposed sampling locations, shown in Appendix A - Figure 8, are areas where MEC/MC were historically used/expended and, if present, are most likely to be detected. Analytical methods for each media are described in Table 3-3.

Table 3-1. Madison Barracks Target Range Proposed Sample Locations and Descriptions				
Location	**Sampling ID**	**Coordinate System: UTM Zone: 18N Datum: NAD 1983 CONUS**		**Area of Interest / Rationale of Sampling Locations**
		Easting(m)	**Northing(m)**	
MRS 1 (Madison Barracks Target Range)	MBTR-MR1-SS-01-01	398663.46	4859425.03	Surface soil sample located near berm impact area (select metals)
	MBTR-MR1-SS-01-02	398680.85	4859415.78	Surface soil sample located near berm impact area (select metals)
	MBTR-MR1-SS-01-03	398696.94	4859405.47	Surface soil sample located near berm impact area (select metals)
	MBTR-MR1-SS-01-04	398713.89	4859394.10	Surface soil sample located near berm impact area (select metals)
	MBTR-MR1-SS-01-05	398732.52	4859382.52	Surface soil sample located near berm impact area (select metals)
	MBTR-MR1-SS-01-06	398539.87	4859135.97	Surface soil sample located near firing point (select metals and select explosives)
	MBTR-MR1-SS-01-07	398420.55	4858955.63	Surface soil sample located near firing point (select metals and select explosives)
Background Soil	MBTR-BG-SS-01-01	396769.30	4857048.28	Background for metals comparison
	MBTR-BG-SS-01-02	397068.53	4857053.51	Background for metals comparison
	MBTR-BG-SS-01-03	397321.05	4857045.09	Background for metals comparison
	MBTR-BG-SS-01-04	396671.34	4856604.26	Background for metals comparison
	MBTR-BG-SS-01-05	396438.76	4856422.26	Background for metals comparison
Note: See Table 2-2 for specific MC related analyses associated with each area.				
BG = Background CONUS = Continental United States ID = Identification MR/ MRS = Munitions Response Site MBTR = Madison Barracks Target Range		MC = Munitions Constituents NAD = North American Datum SS = Surface Soil Sample UTM = Universal Transverse Mercator		

3.4.1 Background Samples

As stated in Section 2.6.3.1, five background surface soil samples will be analyzed for copper, iron, lead, and nickel. The samples will be collected from areas that are within or adjacent to the southwestern corner of the FUDS boundary.

3.4.2 Surface Soil

Surface soil samples will be collected from 0 – 6 inches below ground surface (bgs). Soil samples will be collected utilizing dedicated, disposable plastic trowels. At each surface soil sample location, a seven-wheel sampling approach will be applied. A rope will be place on the ground forming a circle three feet in diameter. Six soil samples will be collected around the

inside perimeter of the string and one soil sample will be collected in the center of the circle. The seven grab samples of approximately equal weight will be combined and homogenized in a dedicated one-gallon plastic bag. Below are the proposed analyses to be performed at each MRS.

MRS 1 (Madison Barracks Training Range). Based on the current knowledge of the MC known or suspected to have been used at MRS 1, Madison Barracks Target Range FUDS, two surface soil samples will be collected in proximity to the training range firing point and four surface soil samples will be collected in the vicinity of the impact areas (Table 2-2 and Appendix A, Figure 8). Explosive MC of concern expected to be found at the firing point at MRS 1 includes nitroglycerin (NG) and DNT and DNT breakdown products (2,4-Dinitrotoluene; 2,6-Dinitrotoluene; 2-Amino-4,6-dinitrotoluene; 2-Nitrotoluene; 3-Nitrotoluene; 4-Amino-2,6-dinitrotoluene, 4- Nitrotoluene). Metallic MC of concern at MRS 1 are copper, iron, lead and nickel. The two surface soil samples associated with the MRS 1 firing point will be analyzed for select metals (copper, iron, lead, nickel – methods 6010B and 6020) and for explosives (NG and DNT – methods 8330A and 8330A-mod). The four surface soil samples associated with the target/impact areas will be analyzed for select metals (copper, iron, lead, and nickel) using Methods 6010B and 6020 (Table 2-2).

3.4.3 Surface Water/Sediment

As noted in Sections 2.6.2.2 and 3.3.1.2, there are no freshwater sources within the FUDS; therefore, neither surface water nor sediment is a medium of concern and will not be sampled.

3.4.4 Groundwater

No groundwater samples are proposed for this SI since the medium represents an incomplete exposure pathway. Based on the fate and transport of MC at small arms ranges, MC, if present, is confined to surface soil. As discussed during the TPP there are a few wells on the southern end of the property and one well near the southwestern end of the former Madison Barracks Training Range. This well was screened at 180 feet deep and is not considered to be a potential pathway to receptors; therefore, groundwater samples will not be collected (Alion 2009).

3.4.5 Quality Control/Quality Assurance Samples

Quality control (QC) samples will be collected as specified and described in the PWP and as indicated on Table 3-2, Table 3-3 and Table 3-4. QC samples will include field duplicates, matrix spike (MS), and matrix spike duplicates (MSD). No equipment (rinsate) blanks are anticipated since only dedicated disposable equipment will be used during sample collection. Per

direction from the CENAN chemist, no quality assurance (QA) samples will be collected at Madison Barracks Target Range.

Table 3-2. Sample Identification Table

Location	Sample ID	Media	MC Sampled				Quality Control Samples[1]	
		Soil	Explosives - DNT (reduced 8330A)[4]	Nitroglycerin (8330A mod)	Metals - Cu, Pb, Ni (3050B/ 6020)	Metals - Fe (3050B/ 6010B)	Field Duplicate[2]	MS and MSD[3]
MRS 1 (Madison Barracks Training Range)	MBTR-MR1-SS-01-01	X			X	X		
	MBTR-MR1-SS-01-02	X			X	X		
	MBTR-MR1-SS-01-03	X			X	X	X	
	MBTR-MR1-SS-01-04	X			X	X		
	MBTR-MR1-SS-01-05	X			X	X		
	MBTR-MR1-SS-01-06	X	X	X	X	X	X	2
	MBTR-MR1-SS-01-07	X	X	X	X	X		
Background Soil Samples	MBTR-BG-SS-01-01	X			X	X		
	MBTR-BG-SS-01-02	X			X	X		
	MBTR-BG-SS-01-03	X			X	X		
	MBTR-BG-SS-01-04	X			X	X		
	MBTR-BG-SS-01-05	X			X	X		
Totals		11	2	2	12	12	2	2

1. For each QC sample, the marked sample type will be gathered for every MC category that is being sampled. Use of dedicated equipment is anticipated. Proposed QC sample locations may change depending on sampling conditions and sampling media available.

2. FD# will replace sample ID (the sample ID and its corresponding FD# will be indicated in the field notebook); 1 per 10 samples (10%).

3. MS/MSD samples will be analyzed at a frequency of 5%. The Field Team will add the following note on the field Chain of Custody: Additional volume collected for MS/MSD analysis.

4. DNT and DNT breakdown products (2,4-Dinitrotoluene; 2,6-Dinitrotoluene; 2-Amino-4,6-dinitrotoluene; 2-Nitrotoluene; 3-Nitrotoluene; 4-Amino-2,6-dinitrotoluene, 4-Nitrotoluene).

BG: Background	MS/MSD: Matrix Spike/Matrix Spike Duplicate
Cu : Copper	MBTR: Madison Barracks Target Range
DNT: Dinitrotoluene	Ni : Nickle
FD#: Field Duplicate Number	Pb: Lead
Fe: Iron	QA: Quality Assurance
ID: Identification	QC: Quality Control
MC: Munition Constituent	SS: Surface Soil
MR/MRS: Munitions Response Site	

Table 3-3. Analytical Parameters, Methods, Standards, and Total Number of Soil Analyses

Compound	Analytical/ Preparation Method	Preservative	Sample Container Type[1]	Holding Times[2]	Number of Soil Samples	Field Duplicates[3]	QA Splits[4]	MS[5]	MSD[5]	Equipment Blanks	Total Analyses
Explosives											
DNT and breakdown products (2,4-Dinitrotoluene; 2,6-Dinitrotoluene; 2-Amino-4,6-dinitrotoluene; 2-Nitrotoluene; 3-Nitrotoluene; 4-Amino-2,6-dinitrotoluene, 4-Nitrotoluene)	SW8330A	Cool to 4°C	1- 8 oz wide-mouth glass jar w/ Teflon-lined cap (250 grams)	14/40 days	2	1	0	1	1	N/A	5
Nitroglycerin	SW8330A (mod)	Cool to 4°C	Same as above	14/40 days	2	1	0	1	1	N/A	5
Metals											
Copper, lead, nickel	6020/3050B	Cool to 4°C	Same as above	180 days	12	2	0	1	1	N/A	16
Iron	6010B/3050B	Cool to 4°C	Same as above	180 days	12	2	0	1	1	N/A	16

1 Indicates number of bottles

2 Number of days between sample collection and extraction/number of days between extraction and analysis

3 Field Duplicates, 1 per 10 (10%)

4 QA Splits, none per CENAB direction

5 MS/MSD, 1 per 20 (5%) – To be selected at the laboratory by TestAmerica, Inc.

6 Temperature Blank, 1/cooler; Equipment Blank, 1/ FUDS (if necessary); No reusable equipment anticipated

7 Samples will be collected for a reduced list of explosives and metals analysis based on the munitions used at MRS 1 as agreed at the TPP meeting.

CENAN = Corps of Engineers New York
FUDS = Formerly Used Defense Site
MRS = Munitions Response Site
MS/MSD = Matrix Spike/ Matrix Spike Duplicate
N/A = Not applicable
QA = Quality Assurance
TPP = Technical Project Planning

3.5 Sample Handling

Samples collected during the SI activities at Madison Barracks Target Range will be handled as outlined in the Programmatic Field Sampling Plan (PFSP) located in Appendix E of the PWP, with the exception that soil samples will be homogenized in a one-gallon plastic bag rather than in a stainless steel mixing bowl. Disposable scoops will be used to collect the surface soil samples. Table 3-2 details the location, matrix sampled, sample identification (ID), types of analyses, and number of samples to be collected, including those for QC purposes. Table 3-3 provides additional information regarding preservatives, sample container types, and allowable sample holding times. Adjustments to these plans may be necessary in the field due to unforeseen site conditions. Deviations from the PFSP during field work will be documented in the field notebook along with an explanation for each modification. Examples of the logs and forms used to document field activities are provided in Appendix F.

3.6 Data Collection, Assessment and Analytical Procedures

Both field and non-measurement data will be used to support this SI. Non-direct measurement refers to data and other information that were previously collected or generated under some effort outside the specific project being addressed by the QA Project Plan. Potential non-direct measurement sources to be used during the SIs include, but are not limited to:

- Site-specific USACE information (e.g., ASR, INPR, ASR Supplement).
- Site-specific information from stakeholders or knowledgeable individuals associated with the FUDS collected during the TPP or SS-WP development process.
- Site-specific demographic and climatic data from the U.S. Census Bureau.
- Site-specific geology, hydrology, topography and soil information from the U.S. Geological Survey (USGS) and U.S. Department of Agriculture (USDA).
- Site-specific wetlands information from the U.S. Department of the Interior (USDOI) Fish and Wildlife Service.
- Site-specific information on T&E Species from the NYSDEC and the USFWS.
- Site-specific information pertaining to cultural and archeological resources associated with the site collected from the New York State Office of Parks, Recreation and Historic Preservation.

Field data collected will be analyzed in accordance with the procedures and protocol defined in the PWP and this SS-WP. In particular, the following organizations have responsibilities for sample analysis, data validation, QA Requirements, data management, and risk screening:

- Sample Analysis – TestAmerica is responsible for the data analysis and for following applicable protocols for pertaining to analytical methods (outlined in the Programmatic Quality Assurance Project Plan [PQAPP] located in Appendix E of the PWP). Analytical results will be used by all stakeholders during the SI process.
- Review/validation of SI Analytical Results – EDS Inc. is responsible for reviewing and validating the data acquired during the SI.
- QA Requirements - QA split samples will not be collected per CENAB direction since laboratory QA samples have been tested for two years and the results have verified that the laboratory quality assurance is satisfactory.
- Analytical Data Management and Risk Screening – Integral, Inc. is responsible for creating ADR (Automated Data Review) libraries prior to the commencement of field work, running the laboratory EDD (Electronic Data Deliverable) file through ADR, inputting the reviewed EDD file to Electronic Data Management System (EDMS), and completing the risk screening portion of the SI report.

Table 3-3 identifies the analytical methods for each media for which samples are planned. The table also provides details on preserving samples, sample containers, hold times, and numbers of quality control samples that will be collected.

The DQO worksheets were developed using the TPP process (USACE 1998) and the Guidance on Systematic Planning using the Data Quality Objectives Process (USEPA 2006). The DQO worksheets define the performance criteria that limit the probabilities of making decision errors by considering the intended data uses, defining the appropriate type of data needed, and specifying the appropriate sampling and analysis methods. The site-specific DQOs will be evaluated throughout the SI Process to determine if the DQOs are achieved during the SI. A DQO attainment verification worksheet will be included in the SI Report.

3.7 Investigative Derived Waste

The only Investigative Derived Waste (IDW) anticipated will be from dedicated sampling equipment and sampling materials (gloves, paper towels etc.). This material will be disposed of as general refuse off-site. Excess soil will be placed back in the sampling locations in accordance with the approved PWP.

4. QUALITY ASSURANCE

The PQAPP, prepared by USACE and included in Appendix E.1 of the PWP along with the programmatic addendum to the PQAPP (Appendix E.2 to the PWP), provides guidance for QA procedures (Alion 2005). The PQAPP addresses the following topics:

- Project organization and responsibilities (related to project QA and QC)
- Data assessment organization and responsibilities. Alion reviews the EDDs of TestAmerica's ADR data to ensure the EDDs are free of the ADR conformance errors.
- DQOs
- Sample receipt, handling, custody, and holding time requirements
- Analytical procedures (related to operations of laboratory and field equipment)
- Data reduction/calculation of data quality indicators. Alion reviews and confirms the final data qualifiers of chemical data validated by Alion's third party team member, EDS, are in compliance with the DoD Quality Systems Manual (QSM) Version 4.1 (DoD 2009) and the USEPA Regional Criteria and Standards.
- Laboratory operations documentation
- Data assessment procedures

Based on the history of munitions used at Madison Barracks Target Range (Table 2-2) and the sampling rationale, the chemical-specific Measurement Quality Objectives (MQOs) include selected explosives and metals (Appendix C). These analytes are presented in Tables 3-3. Federal human health and ecological screening values will be used for comparison of sampling results in the human health and ecological risk screening. In addition, the Preferred Maximum Method Quantitation Limits (PMMQL) (half of the most stringent criteria) were identified to verify laboratory reporting limits to achieve the project goals. In summary, all lines of evidence including secondary lines of evidence, such as historic data, field data, and comparison to regional background concentration ranges for metals, will be used to make a final decision for an NDAI designation or RI/FS recommendation.

This site-specific Quality Assurance Project Plan (QAPP) (Alion 2005) (e.g., see Sections 1 and 3) provides project specific information and operating procedures applicable to sampling and analytical activities to be performed as part of the SI at Madison Barracks Target Range.

Specifically this QAPP provides site-specific DQOs developed for Madison Barracks Target Range and provides insight into the DQO process. The reader is referred to the PWP (Alion 2005) for discussions relating to the other PQAPP topics.

5. REFERENCES

Alion. 2005. *Programmatic Work Plan for Formerly Used Defense Sites (FUDS) Military Munitions Response Program (MMRP) Site Inspections at Multiple Sites in the Northeast Region.*

Alion. 2009. *Final Technical Project Planning Memorandum for the Formerly Used Defense Site (FUDS) Madison Barracks Target Range, May 2009 Meeting.* Final June 2009.

Department of the Army (DA). 2005. *Office of the Assistant Secretary, Installations and Environment, Memorandum for the Assistant Chief of Staff for Installation Management, Munitions Response Terminology.*

Department of Defense (DoD). 2001. *Management Guidance for the Defense Environmental Restoration Program.*

DoD. 2005. *32 Code of Federal Regulations (CFR) Part 179.*

DoD. 2009. Quality Systems Manual for Environmental Laboratories .Final Version 4.1. April 22.

Duran, M., Kim, B.J., and Speece, R.E. 1994. Anaerobic biotransformation of nitrocellulose. Waste Management. Vol. 14, No. 6. p. 481-487.

Environmental Systems Research Institute (ESRI) NGS. 2009. *Online 13 Imager 2-Dimensional Topographic database of the US*. Available at: http://services.arcgisonline.com/v93. Accessed in October 2009.

New York State Department of Environmental Conservation (NYSDEC). 2009a. *List of Endangered, Threatened and Special Concern Fish & Wildlife Species of New York State*. Available from http://www.dec.ny.gov/animals/7494.html#Endangered. Accessed 1 October 2009.

NYSDEC 2009b. *New State Park Opens on Lake Ontario*. Available from http://www.dec.ny.gov/environmentdec/18677.html. Accessed 5 October 2009.

New York State (NYS) Department of State (DOS). 2004. New York State Coastal Atlas, Central Great Lakes Region, GL54: Stony Point. Available from http://www.nyswaterfronts.com/downloads/greatlakes/gl54.pdf. Accessed 5 October 2009.

New York Geographic Information System. 2006. Available at: http://www1.nysgis.state.ny.us/MainMap.cfm. Accessed in October 2009.

Talmage, S.S., D.M Opresco, C.J. Maxwell, C.J.E. Welsh, F.M Cretella, P.H. Reno, and F.B. Daniel. 1999. Nitroaromatic munition compounds: Environmental effects and screening values. Rev. Environ. Contam. Toxicol. 161:1-156.

Stewart, D.P., 1958. The surface geology of the Watertown and Sackets Harbor (15') Quadrangles: New York State Museum, Bulletin 369.

USACE. 1991. *DERP-FUDS INPR for Site No. C02NY020400, Madison Barracks Target Range, Henderson, New York.*

USACE. 1998. *Technical Project Planning (TPP) Process, Engineering Manual (EM) 200-1-2.*

USACE. 2000. *Ordnance and Explosive Response. EP 1110-1-18. 24 April 2000*

USACE. 2003. *Explosives Safety Submission, EP 385-1-95b.*

USACE. 2004a. Defense Environmental Restoration Program (DERP) Formerly Used Defense Sites (FUDS) Program Policy, ER 200-3-1.

USACE. 2004b. *INPR Supplement for Madison Barracks Target Range, Henderson, New York, Project No. C02NY020400. 2004.*

USACE. 2006 *Procedure for Preliminary Assessment and Site Inspection Teams That Encounter UXO While Gathering Non-UXO Field Data, Military Munitions Center of Expertise, Interim Guidance Document 0605. March 16.*

USACE. 2007. *Ordnance and Explosives Response. EP 1110-1-18. 04 Dec 07.*

USACE. 2008. Engineer Pamphlet 1110-1-18 and the USACE Interim Guidance Document, *Procedure for Preliminary Assessment and Site Inspection Teams That Encounter UXO While Gathering Non-UXO Field Data* (USACE 2006a).

United States Department of Agriculture (USDA). 2009. U.S. Department of Agriculture Natural Resources Conservation Services. 2009. *Soils map.* *http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx*

United States Environmental Protection Agency (USEPA). 2001. *National Priorities List Characteristics Data Collection Form, Version 3.0.* Available from http://www.epa.gov/superfund/sites/npl/hrsres/tools/nplform.pdf.

USEPA. 2005. Ecological Soil Screening Level for Lead. Available from http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_lead.pdf. Accessed 01 July 2008.

USEPA. 2006. Guidance on systematic planning using the DQO process.

USEPA. 2007a. Ecological Soil Screening Level for Copper. Available from http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_copper.pdf. Accessed 01 July 2008.

USEPA. 2007b. Ecological Soil Screening Level for Nickel. Available from http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_nickel.pdf. Accessed 01 July 2008.

USEPA. 2009. *Regional Screening Levels.* Available from http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm. Accessed May 2009.

USFWS. 2009. Wetlands Map. http://www.fws.gov/wetlands/Data/Mapper.html. Accessed October 2009.

USGS. 2009a The National Map Seamless Server. Available from http://seamless.usgs.gov/website/seamless/viewer.htm. Accessed September 2009.

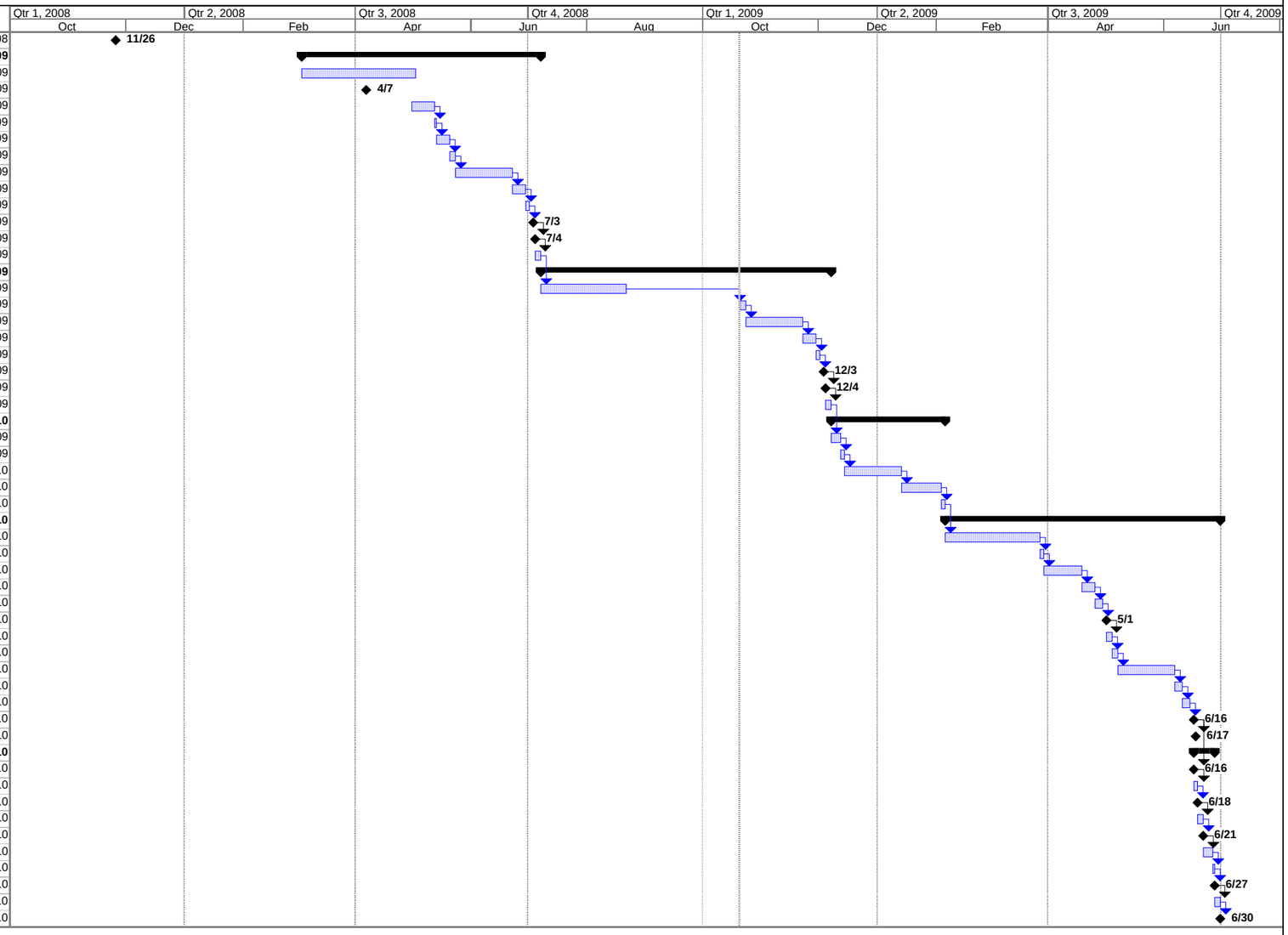
USGS. 2009b New York Geology. Available from http://mrdata.usgs.gov/sgmc/ny.html. Accessed October 2009.

USGS. 2009c. Primary & Principal Aquifers. http://www.dec.ny.gov/lands/36119.html. Accessed October 2009.

APPENDIX A – FIGURES

MADISON BARRACKS TARGET RANGE

ID	Task Name	Duration	Start	Finish
1	SITE AWARD	0 days	Wed 11/26/08	Wed 11/26/08
2	**TPP # 1**	**126 days**	**Wed 3/4/09**	**Tue 7/7/09**
3	ADDITIONAL HISTORICAL DATA RESEARCH	60 days	Wed 3/4/09	Sat 5/2/09
4	ANNOUNCE MEETINGTO STAKEHOLDERS (READAHEAD PROVIDED)	0 days	Tue 4/7/09	Tue 4/7/09
5	PREPARE TPP MEETING MATERIALS	12 days	Fri 5/1/09	Tue 5/12/09
6	CONDUCT TPP MEETING	1 day	Wed 5/13/09	Wed 5/13/09
7	PREPARE DRAFT TPP MEMO	7 days	Thu 5/14/09	Wed 5/20/09
8	DISTRIBUTE DRAFT TPP MEMO TO STAKEHOLDERS	3 days	Thu 5/21/09	Sat 5/23/09
9	REVIEW AND COMMENT BY STAKEHOLDERS	30 days	Sun 5/24/09	Mon 6/22/09
10	PREPARE RESPONSE TO COMMENTS	7 days	Tue 6/23/09	Mon 6/29/09
11	BACKCHECK OF RTCS	2 days	Tue 6/30/09	Wed 7/1/09
12	TELECONFERENCE CALL TO RESOLVE RTCS (IF NECESSARY)	0 days	Fri 7/3/09	Fri 7/3/09
13	ACCEPTANCE OF RTCS AND TPP MEMO	0 days	Sat 7/4/09	Sat 7/4/09
14	DISTRIBUTE FINAL TPP MEMO	3 days	Sun 7/5/09	Tue 7/7/09
15	**SITE SPECIFIC WORK PLAN (SS-WP)**	**153 days**	**Wed 7/8/09**	**Mon 12/7/09**
16	DEVELOP DRAFT SS-WP	45 days	Wed 7/8/09	Fri 8/21/09
17	DISTRIBUTE DRAFT SS-WP TO STAKEHOLDERS	3 days	Wed 10/21/09	Fri 10/23/09
18	REVIEW AND COMMENT BY STAKEHOLDERS	30 days	Sat 10/24/09	Sun 11/22/09
19	PREPARE RESPONSE TO COMMENTS	7 days	Mon 11/23/09	Sun 11/29/09
20	BACKCHECK OF RTCS	2 days	Mon 11/30/09	Tue 12/1/09
21	TELECONFERENCE CALL TO RESOLVE RTCS (IF NECESSARY)	0 days	Thu 12/3/09	Thu 12/3/09
22	ACCEPTANCE OF RTCS AND SS-WP	0 days	Fri 12/4/09	Fri 12/4/09
23	DISTRIBUTE FINAL SS-WP	3 days	Sat 12/5/09	Mon 12/7/09
24	**FIELD WORK**	**60 days**	**Tue 12/8/09**	**Fri 2/5/10**
25	FIELDWORK PREPARATION AND MOBILIZATION TO SITE	5 days	Tue 12/8/09	Sat 12/12/09
26	FIELD WORK - MEC SURVEY, GEOPHYSICS, AND MC SAMPLING	2 days	Sun 12/13/09	Mon 12/14/09
27	DATA TO LABORATORY	30 days	Tue 12/15/09	Wed 1/13/10
28	DATA TO VALIDATOR	21 days	Thu 1/14/10	Wed 2/3/10
29	DATA TO ALION TEAM	2 days	Thu 2/4/10	Fri 2/5/10
30	**SI REPORT**	**145 days**	**Sat 2/6/10**	**Wed 6/30/10**
31	DEVELOP DRAFT SI REPORT	50 days	Sat 2/6/10	Sat 3/27/10
32	DISTRIBUTE DRAFT SI REPORT TO USACE	2 days	Sun 3/28/10	Mon 3/29/10
33	REVIEW AND COMMENT BY USACE	20 days	Tue 3/30/10	Sun 4/18/10
34	PREPARE RESPONSE TO COMMENTS	7 days	Mon 4/19/10	Sun 4/25/10
35	BACKCHECK OF RTCS	4 days	Mon 4/26/10	Thu 4/29/10
36	TELECONFERENCE CALL TO RESOLVE RTCS (IF NECESSARY)	0 days	Sat 5/1/10	Sat 5/1/10
37	DEVELOP/PRODUCE DF SI REPORT	3 days	Sun 5/2/10	Tue 5/4/10
38	DISTRIBUTE DF SI REPORT TO STAKEHOLDERS	3 days	Wed 5/5/10	Fri 5/7/10
39	REVIEW AND COMMENT BY STAKEHOLDERS	30 days	Sat 5/8/10	Sun 6/6/10
40	PREPARE RESPONSE TO COMMENTS	4 days	Mon 6/7/10	Thu 6/10/10
41	BACKCHECK OF RTCS	4 days	Fri 6/11/10	Mon 6/14/10
42	TELECONFERENCE CALL TO RESOLVE RTCS (IF NECESSARY)	0 days	Wed 6/16/10	Wed 6/16/10
43	ACCEPTANCE OF RTCS AND SS-WP	0 days	Thu 6/17/10	Thu 6/17/10
44	**TPP #2 MEETING (VIA TELECONFERENCE)**	**11 days**	**Wed 6/16/10**	**Sun 6/27/10**
45	ANNOUNCE TPP #2 MEETING	0 days	Wed 6/16/10	Wed 6/16/10
46	DEVELOP TPP #2 MEEETING BRIEFING MATERIAL	2 days	Thu 6/17/10	Fri 6/18/10
47	CONDUCT TPP #2 MEETING	0 days	Fri 6/18/10	Fri 6/18/10
48	DEVELOP TPP#2 MEMORANDUM	3 days	Sat 6/19/10	Mon 6/21/10
49	DISTRIBUTE TPP#2 MEMORANDUM (EMAIL)	0 days	Mon 6/21/10	Mon 6/21/10
50	REVIEW AND COMMENT BY STAKEHOLDERS	5 days	Tue 6/22/10	Sat 6/26/10
51	FINALIZE TPP#2 MEMORANDUM	1 day	Sun 6/27/10	Sun 6/27/10
52	DISTRIBUTE FINAL TPP #2 MEMO (EMAIL)	0 days	Sun 6/27/10	Sun 6/27/10
53	PRODUCE/DISTRIBUTE FINAL SI REPORT	3 days	Mon 6/28/10	Wed 6/30/10
54	USACE ACCEPTANCE OF FINAL SI REPORT	0 days	Wed 6/30/10	Wed 6/30/10

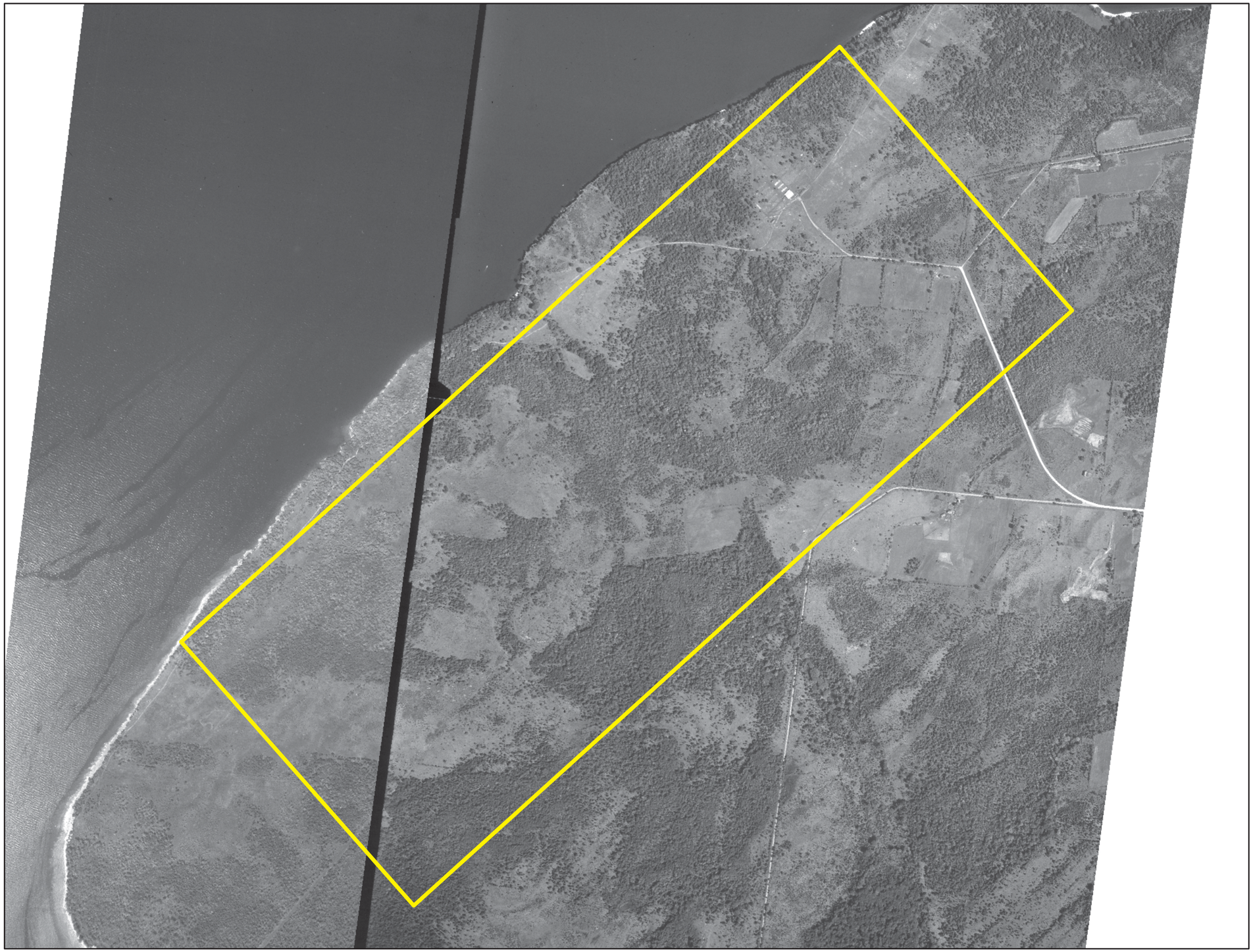


Project: Madison Barracks Target Range
Date: Tue 10/20/09

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External MileTask | Split

FIGURE 1

SCHEDULE FOR SITE INSPECTION OF FORMER MADISON BARRACKS TARGET RANGE NO. C02NY020400



Madison Barracks Target Range

Henderson, New York
Jefferson County

Legend

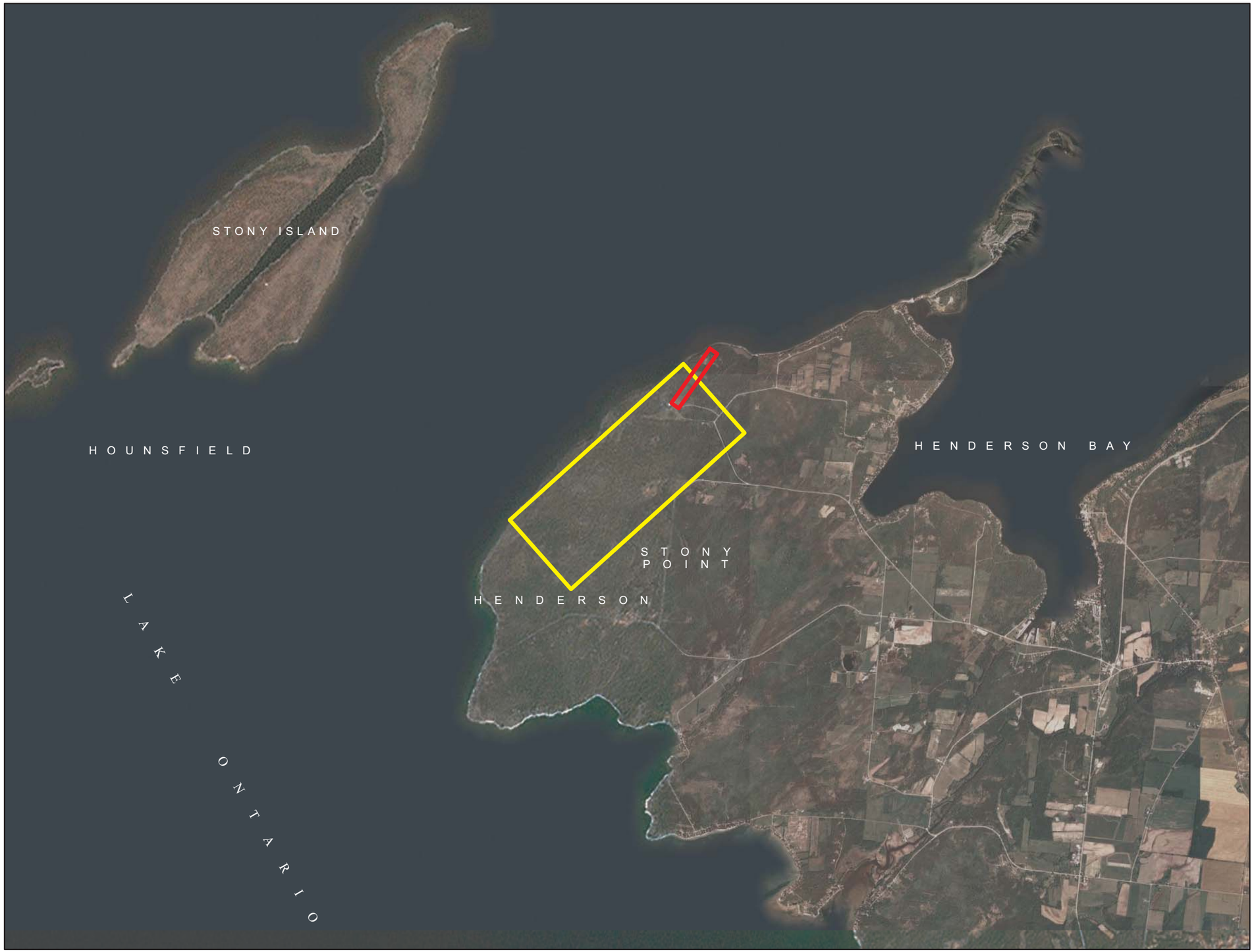
FUDS Boundary

Imagery Source: Aerial Archives
August 11, 1958 and May 31, 1959

N
W E
S

Feet
0 600 1,200 2,400

Figure 2. Historical Aerial Layout



Madison Barracks Target Range

Henderson, New York
Jefferson County

Legend

- MRS 1 - Madison Barracks Training Range
  Note: MRS Location is approximate based on historical aerial images
- FUDS Boundary

Imagery Source:
ESRI iCubed
Prime World 2D Web Service

N
W E
S

Feet
0 2,500 5,000 10,000

Figure 3. Site Location

Madison Barracks Target Range

Henderson, New York
Jefferson County

Legend

- MRS 1 - Madison Barracks Training Range
  Note: MRS Location is approximate based on historical aerial images
- FUDS Boundary

Imagery Source: ESRI NGS Topo US 2D Web Service

Note: Elevation Values are in Feet
Refer to standard USGS Topo Map for Map Legend.

N
W E
S

Feet
0 600 1,200 2,400

Figure 4. Topographic Map

Figure 5. Soils Map

Madison Barracks Target Range

Henderson, New York
Jefferson County

Legend

- MRS 1 - Madison Barracks Training Range
  Note: MRS Location is approximate based on historical aerial images
- FUDS Boundary
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

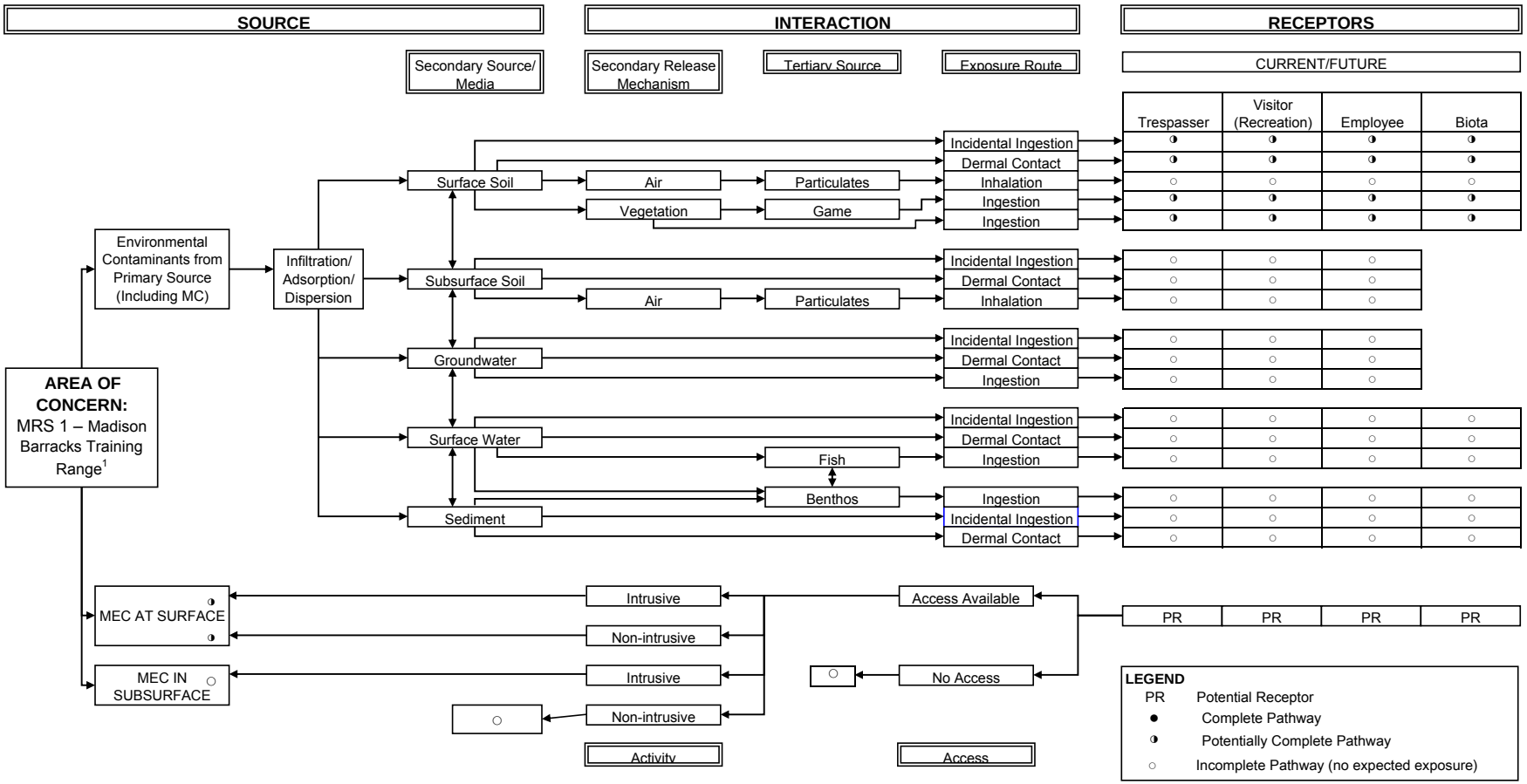
Imagery Source: New York Geographic Information System (2006)

Wetland Information: United States Department of Interior - Fish and Wildlife Service (1998)

N
W E
S

0 600 1,200 2,400 Feet

Figure 6. Wetlands Map



NOTES:

1. For the MMRP SI at Madison Barracks Target Range, this CSM summarizes the potential risk exposure scenarios for MRS 1 –Madison Barracks Training Range . For a pathway to be complete, it must include a source, an exposure medium, an exposure route, and a receptor. A complete pathway may also include a release mechanism and a transport medium. Interaction between a potential receptor and MEC has two components: access and activity.

2. Primary sources will vary but will include the MRS 1 area where historical activities occurred. At the firing points and impact areas, a potential MC source may be present in surface soil. Typically MC associated with smalls arms are present in the surface soil; therefore, subsurface soil is not a medium of concern. There are no freshwater sources within the MRS, therefore, surface water and sediment are not media of concern. Groundwater is not is not a medium of concern since MC associated with small arms is confined to surface. In addition, groundwater is not used within the MRS and existing wells are located several miles south of this MRS, a location not considered to be a potential pathway for receptors given the range use, type of munitions used, and well depth (one well is approximately 180 ft deep).

3. CSM will be refined as more data is obtained and finalized in the Site Inspection Report.

DIAGRAM OF THE INTEGRATED CONCEPTUAL SITE MODEL FOR MMRP FUDS

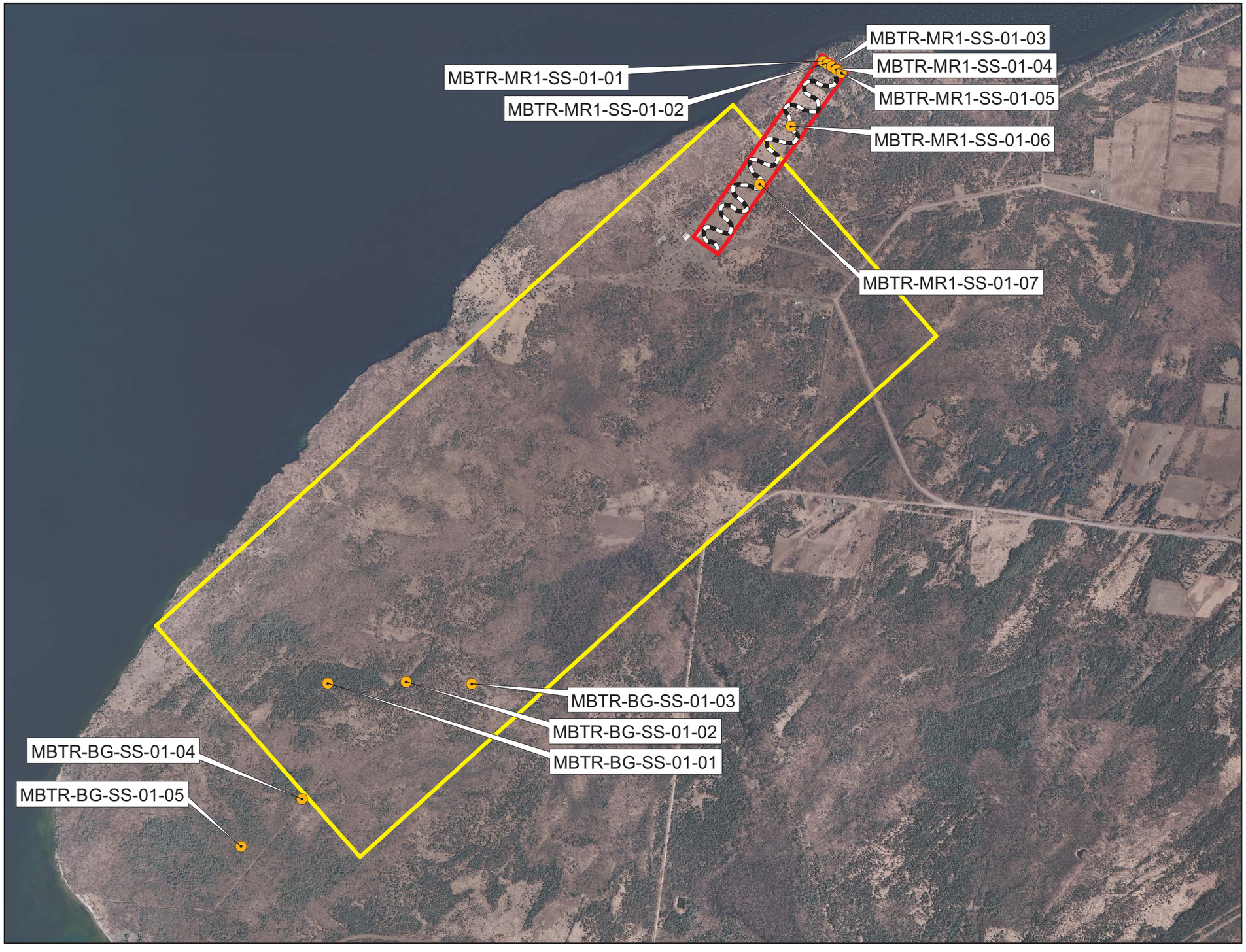
MADISION BARRACKS TARGET RANGE[1,2,3]

MRS 1 - Madison Barracks Training Range

(WORKING DRAFT)

Revised October 2009 Figure 7

Source: U.S. Army Corps of Engineers (USACE). 2003. *Conceptual Site Models for Ordnance and Explosives (OE) and Hazardous, Toxic, and Radioactive Wastes (HTRW) Projects.* EM 1110-1-1200.



Madison Barracks Target Range

Henderson, New York
Jefferson County

Legend

- Proposed Surface Soil Samples
- Proposed Analog Geophysics
  Note: Geophysical paths may change based on site terrain, physical impediments and brush density.
- MRS 1 - Madison Barracks Training Range
  Note: MRS Location is approximate based on historical aerial images
- FUDS Boundary

Imagery Source: New York Geographic Information System (2006)

N
W E
S

0 650 1,300 2,600 Feet

Figure 8. Proposed Geophysical Reconnaissance and Sampling Locations

APPENDIX B – DRAFT PHASE 1 MFR SHEET

Technical Project Planning

Draft Phase I MFR Worksheet

Author(s): Alion Team
Latest Revision Date: 12 October 2009
Reviewer: Corinne Shia
Review Date: 16 October 2009

Location: Robert G. Wehle State Park, Henderson, New York
Site(s): Madison Barracks Target Range
Project: MMRP Project Number C02NY020400

(Attach Phase I MFR to PMP)

TPP Team	**EM 200-1-2, Paragraph 1.1.1**
Decision Maker	
Customer	U.S. Army Corps of Engineers (USACE)
Project Manager	Tany Labeste, USACE New York District (CENAN)
Design Team Leader	Alan Warminski, Design Team Lead (CENAB)
Team Leaders	Roger Azar - Program Manager, Kimberly Evers - Project Manager, Todd Belanger - Task Lead — (Alion Science & Technology)
Regulators	New York State Department of Environmental Conservation (NYSDEC), U.S. Environmental Protection Agency (USEPA), Region II
Stakeholders	Government agencies/regulators (USACE, USEPA, NYSDEC, etc.) Property owners • State of New York Other potential stakeholders • Public interest groups • User groups & community interests • Local, state & federal elected officials • External technical resources (technical experts)

Data Types	**Data User**	**Data Gatherer**
Compliance / Regulatory (CR)	RISK (Risk Assessors) – CENAB/CENAN/USACE Huntsville Districts; NYSDEC; USEPA Region II	Alion Science & Technology
	COMPLIANCE (Regulatory Specialists, Chemists) - NYSDEC; USEPA Region II	
	REMEDY (Engineers, Chemists) – CENAB/CENAN/USACE Huntsville Districts	
	SAFETY (UXO Technician) – CENAB/CENAN/USACE Huntsville Districts	

Demographics/Land Use (LU)	RISK (Risk Assessors) – CENAB/CENAN/USACE Huntsville Districts; NYSDEC; USEPA Region II	Alion Science & Technology
	COMPLIANCE (Regulatory Specialists, Chemists) - NYSDEC; USEPA Region II	
	REMEDY (Engineers, Chemists) – CENAB/CENAN/USACE Huntsville Districts	
	SAFETY (UXO Technician) – CENAB/CENAN/USACE Huntsville Districts	
Site Conditions (SC)	RISK (Risk Assessors) – CENAB/CENAN/USACE Huntsville Districts; NYSDEC; USEPA Region II	Alion Science & Technology
	COMPLIANCE (Regulatory Specialists, Chemists) – NYSDEC; USEPA Region II	
	REMEDY (Engineers, Chemists) – CENAB/CENAN/USACE Huntsville Districts	
	SAFETY (UXO Technician) – CENAB/CENAN/USACE Huntsville Districts	
Munitions and Explosives of Concern (MEC)	RISK (Risk Assessors) – CENAB/CENAN/USACE Huntsville Districts; NYSDEC; USEPA Region II	Alion Science & Technology
	COMPLIANCE (Regulatory Specialists, Chemists) – NYSDEC; USEPA Region II	
	REMEDY (Engineers, Chemists) – CENAB/CENAN/USACE Huntsville Districts	
	SAFETY (UXO Technician) – CENAB/CENAN/USACE Huntsville Districts	

CUSTOMER'S GOALS		**EM 200-1-1, Paragraph 1.1.2**
Future Land Use(s) @ Site	**Issues and Regulatory Compliance Status**	**Site-specific Closeout Goal (if applicable)**
Continued recreational use.	Potential for select munitions constituents [MC] in certain media as well as munitions and explosives of concern (MEC)	See Site Specific Closeout Goal
Site Closeout Statement		
Achieving the walk-away goal, or final condition of the site, as envisioned by the customer. The final condition of the site includes reasonably safe use following any remediation, maintenance, and monitoring for activities that are consistent with the current/future use of the site.		
Customer's Schedule Requirements		
See schedule.		
Customer's Site Budget		
N/A		

IDENTIFY SITE APPROACH		
EXISTING SITE INFORMATION & DATA		**EM 200-1-2, Paragraph 1.1.3 and 1.2.1**
Attachment(s) to Phase I MFR	**Located at Repository**	**Preliminary Conceptual Site Model**
1991 INPR	CENAN	Yes
No ASR	CENAN	No
2004 Supplemental INPR	CENAN	Yes
POTENTIAL POINTS OF COMPLIANCE		**EM 200-1-2, Paragraph 1.2.1.3**
NYSDEC (within boundaries of areas of concern)		
USEPA (within boundaries of areas of concern)		
MEDIA OF POTENTIAL CONCERN		**EM 200-1-2, Paragraph 1.2.1.4**
Surface soil		
SITE OBJECTIVES		**EM 200-1-2, Paragraph 1.2.2**
See attached Project Objectives worksheets.		
REGULATOR AND STAKEHOLDER PERSPECTIVES		**EM 200-1-1, Paragraph 1.2.3**
Regulators	Community Interests	Others
NYSDEC – TBD	TBD	Continued Recreational use.
USEPA – TBD		
PROBABLE REMEDIES		**EM 200-1-2, Paragraph 1.2.4**
Detonation or removal of suspect MEC if found during the site investigation.		
Removal of residual MEC from the site, treatment of MC via removal, onsite treatment, and engineering/institutional controls as appropriate to reduce the risk to future site users.		
EXECUTABLE STAGES TO SITE CLOSEOUT		**EM 200-1-2, Paragraph 1.2.5**
Site Inspection (SI)		
Remedial Investigation/Feasibility Study (RI/FS)		
Proposed Plan		
Record of Decision (ROD)/Decision Document		
Remedial Design		
Remedial Action		
Removal Action (if necessary)		
Long-Term Monitoring (if necessary)		

IDENTIFY CURRENT PROJECT		
SITE CONSTRAINTS AND DEPENDENCIES		**EM 200-1-2, Paragraph 1.3.1**
Administrative Constraints and Dependencies		
SI needs to be completed by May 2011 to meet program needs.		
Acceptance of Programmatic Work Plan and Site Specific Work Plan Addendum prior to field sampling.		
Access agreements need to be in place prior to sampling.		
Technical Constraints and Dependencies		
Complete MEC avoidance for sampling.		
Adhere to Health and Safety Plan.		
Legal and Regulatory Milestones and Requirements		
Need Right of Entry agreement.		
Regulatory evaluation of SI work plan and reporting of SI results and recommendations.		
Section 106 Consultation		
Threatened and Endangered (T&E) species determination		
CURRENT EXECUTABLE STAGE		**EM 200-1-2, Paragraph 1.3.3**
Site Inspection		
Basic (For Current Projects)	**Optimum** (For Future Projects)	**Excessive** (Objectives that do not lead to site closeout)
SI (MC Sample collection and qualitative reconnaissance for MEC)	NDAI or RI/FS	

Acronyms
ASR – Archive Search Report
EM – Engineer Manual (see www.usace.army.mil/inet/usace-docs/)
INPR – Inventory Project Report
MC – Munitions Constituents
MEC – Munitions and Explosives of Concern
NDAI – No Department of Defense Action Indicated
PA – Preliminary Assessment
RA – Removal Action
RAC – Risk Assessment Code type impact analysis conducted during INPR, ASR, and Supplemental ASR
SI – Site Inspection
TPP – Technical Project Planning
USEPA – U.S Environmental Protection Agency

PROJECT OBJECTIVES WORKSHEET

SITE: **Madison Barracks Target Range, Henderson, New York**

PROJECT: Project Number C02NY020400

Site Objective [a]					Data Needs [d]	Data Collection Methods	Project Objective Classification [e]
Number	Executable Stage [b]		Description [c]	Source			
	Current	Future					
1	Yes		Determine if the site requires additional investigation through an RI/FS or if the site may be recommended for No Department of Defense Action Indicated (NDAI) based on the presence or absence of MEC and MC.	ASR, Public	CR, LU, SC, UXO	MEC visual inspection, analog geophysics, MC sampling	Basic
2	Yes		Determine the potential need for a Time-Critical Removal Action (TCRA) for MEC and MC by collecting data from previous investigations/reports, conducting site visits, performing analog geophysical activities, and by collecting MC samples.	ASR, Public	CR, LU, SC, UXO	MEC visual inspection, analog geophysics, MC sampling	Basic
3	Yes		Collect, or develop, additional data, as appropriate, in support of potential Hazard Ranking System (HRS) scoring by Environmental Protection Agency (EPA).	ASR, Public	LU, SC, UXO	MEC visual inspection, analog geophysics, MC sampling	Basic
4	Yes		Collect the additional data necessary to the complete the Munitions Response Site Prioritization Protocol (MRSPP).	ASR, Public	CR, LU, SC, UXO	MEC visual inspection, analog geophysics, MC sampling	Basic

a. Refer to EM 200-1-2, Paragraph 1.2.2
b. Refer to EM 200-1-2, Paragraph 1.2.5
c. For example, Meeting with Customer/stakeholder/Regulator, State Regulations
d. Data Needs: **CR**-Compliance/Regulatory, **LU**-Land Use/Demographics, **SC**-Site Conditions, and **UXO**-OE UXO
e. Classification of project objectives can only occur after the current project has been identified. Refer to EM 200-1-2, Paragraph 1.3.3.

Acronyms

ASR–Archive Search Report

EM–Engineer Manual (see www.usace.army.mil/inet/usace-docs/)

APPENDIX C – DATA QUALITY OBJECTIVES (DQO) WORKSHEETS AND MEASUREMENT QUALITY OBJECTIVES (MQO) TABLES

Data Quality Objective Worksheet

Site: **Madison Barracks Target Range, Henderson, New York**
Project: FUDS MMRP SI Project Number: **C02NY020400**
DQO Statement Number: **1 of 4**

DQO Element Description	Site-Specific DQO Statement
Intended Data Use(s):	
Project Objective(s) Satisfied	Determine if the site requires additional investigation through a remedial investigation/feasibility study (RI/FS) or if the site may be recommended for No Department of Defense Action Indicated (NDAI) designation based on the presence or absence of munitions and explosives of concern (MEC) and munitions constituents (MC).
Data Needs Requirements:	
Data User Perspective(s)	Risk-MEC and MC, Compliance
Contaminant or Characteristic of Interest	MEC or Material Potentially Presenting an Explosive Hazard (MPPEH) and MC.
Media of Interest	MEC – Surface soil MC – Surface soil
Required Sampling Locations or Areas	MEC and MC: Areas where military munitions-related operations occurred and/or where MEC or MPPEH has been identified historically based on existing documentation and interviews.
Number of Samples Required	**MEC** - Analog geophysical and visual reconnaissance data will be collected to accomplish this objective. These data will be collected using "meandering path" to and from the sampling points. The UXO Technician will collect data on an approximate 6-ft wide path using the geophysical equipment. The visual reach of observations is approximately 12 ft, and may be limited by the presence of vegetation. Once at the individual sampling point, the geophysical equipment will be used to assess an approximately 25-ft diameter circle for anomalies around the sampling point as site conditions permit. In some areas, there may be limitations to the ability to complete geophysical and visual observations. The total estimated area on the paths to/from the sampling locations is approximately 50,086 ft², and the area around the sampling locations is approximately 3430 ft² *(Appendix A – Figure 8).* **MC** – Seven surface soil samples will be collected at former firing points and impact areas within MRS 1 and/or the FUDS. Five background soil samples will be collected outside of the MRS of interest. Additional QA/QC samples will also be collected (Appendix A – Figure 8).
Reference Concentration of Interest or Other Performance Criteria	**MEC:** If historic data indicate the presence of MEC and one anomaly classified as of MPPEH, or confirmed MEC is found with the analog geophysical equipment, or if physical evidence indicating the presence of MEC is found during the visual inspection, then an RI/FS may be recommended. If no anomalies, MPPEH, or confirmed MEC are found, or if

Data Quality Objective Worksheet

Site: **Madison Barracks Target Range, Henderson, New York**
Project: FUDS MMRP SI Project Number: **C02NY020400**
DQO Statement Number: **1 of 4**

DQO Element Description	Site-Specific DQO Statement
	the UXO Technician indicates that there is no potential hazard from past use of munitions or MEC discoveries, then an NDAI designation may be recommended. In each of these instances, all lines of evidence (*e.g.*, historic data, field data, etc.) will be used to make a final decision for an NDAI designation or RI/FS. In both instances (RI/FS or NDAI designation), all lines of evidence (*e.g.*, historic data, field data, background concentration of metals, etc. for both MEC and MC) will be used to make a final decision for an NDAI designation or RI/FS. **MC:** If the maximum concentrations measured at the site exceed United States Environmental Protection Agency (USEPA) Regional Screening Levels based on current and future land use, or USEPA interim ecological risk screening values, or site-specific background levels (highest value and mean value), then an RI/FS may be recommended for the site. If the maximum concentrations measured at the site do not exceed the USEPA Regional Screening Levels or ecological risk screening values, then an NDAI designation may be recommended. In summary, all lines of evidence including secondary lines of evidence, such as historic data, field data, comparison to regional background concentration ranges for metals, and comparison to state screening/cleanup criteria, will be used to make a final decision for an NDAI designation or RI/FS. Screening values selected for comparison at this site are specified in the chemical-specific measurement quality objective (MQO) tables.
Appropriate Sampling and Analysis Methods:	
Sampling Method and Depths	**MEC:** Geophysics with handheld analog equipment, which will be used to collect related data, is accurate to an approximate depth of 2 ft. Global Positioning System (GPS) equipment will be used to log locations of MEC items encountered by the magnetometer. Visual observations will provide a continuous source of additional information which will be noted in the field log book with GPS coordinates. Photographs also will be used as an additional documentation method. Geophysical methods/procedures are described in detail in Section 3 of the SS-WP, and the Field Activities section of the programmatic field sampling plan (PFSP). **MC:** Sampling methods for MC are described in detail in Section 4 of the SS-WP and Field Activities section of the PFSP.

Data Quality Objective Worksheet	
Site: **Madison Barracks Target Range, Henderson, New York** Project: FUDS MMRP SI Project Number: **C02NY020400** DQO Statement Number: **1 of 4**	
DQO Element Description	**Site-Specific DQO Statement**
Analytical Method	**MEC:** Analytical methods are not used with analog geophysics. However, trained UXO professionals, engineers, and scientists will review all data to determine whether evidence gathered indicates the presence or absence of MEC. This analysis will be subject to an independent review within the Alion Team, by the USACE North Atlantic New York (CENAN), USACE Baltimore District Design Center (CENAB), and USACE Center of Expertise. **MC:** The methods that can be used for analysis include the following: Explosives Methods–8330A, Explosives Prep Methods - 8330A, Explosives Methods–8330A (mod), Explosives Prep Methods - 8330A (mod), Metals Methods–6010B, Metals Prep Methods – 3050B, Methods–6020, Metals Prep Methods – 3050B.

Data Quality Objective Worksheet	
Site: **Madison Barracks Target Range, Henderson, New York** Project: FUDS MMRP SI Project Number: **C02NY020400** DQO Statement Number: **2 of 4**	
DQO Element Description	**Site-Specific DQO Statement**
Intended Data Use(s):	
Project Objective(s) Satisfied	Determine the potential need for a Time-Critical Removal Action (TCRA) for MEC and MC by collecting data from previous investigations/reports, conducting site visits, performing analog geophysical activities, and by collecting MC samples.
Data Needs Requirements:	
Data User Perspective(s)	Risk-MEC/MC, Compliance
Contaminant or Characteristic of Interest	MEC or Material Potentially Presenting an Explosive Hazard (MPPEH) and MC.
Media of Interest	MEC – Surface soil MC – Surface soil
Required Sampling Locations or Areas	Areas where military munitions-related operations occurred and/or where MEC or MPPEH has been identified historically based on existing documentation and interviews (Figure 8).
Number of Samples Required	Refer to DQO 1 for MC/MEC sampling parameters.
Reference Concentration of Interest or Other Performance Criteria	If MC is reported in samples collected at the FUDS at concentrations exceeding screening criteria and those exceedances result in unacceptable risk and an imminent threat to receptors as identified through human health and ecological risk assessments or if one piece of confirmed MEC is found with the magnetometer or if physical evidence indicating the presence of MEC is found during the visual inspection, and if the item(s) is determined by a qualified UXO Technician, explosive ordnance disposal (EOD) unit, and/or the USACE to be an immediate or imminent threat, then one of two actions may be initiated: ***TCRA*-** If there is a complete pathway between source and receptor and the MEC and the situation is viewed as an "imminent danger threat posed by the release or threat of a release, where cleanup or stabilization actions must be initiated within six months to reduce risk to public health or the environment", the Alion Team will immediately notify the Military Munitions Design Center Project Manager at USACE and the property owner. USACE will determine, with input from the Alion Team and stakeholders, whether or not a TCRA will be implemented. ***Non-TCRA*** **-** A non-TCRA (NTCRA) may be initiated in response to a release or threat of release that poses a risk where more than six months planning time is available.

Data Quality Objective Worksheet	
Site: **Madison Barracks Target Range, Henderson, New York** Project: FUDS MMRP SI Project Number: **C02NY020400** DQO Statement Number: **2 of 4**	
DQO Element Description	**Site-Specific DQO Statement**
Appropriate Sampling and Analysis Methods:	
Sampling Method and Depths	**MEC:** Geophysical methods/procedures are described in detail in Section 3 of the SS-WP and the Field Activities section of the programmatic field sampling plan (PFSP). **MC:** Sampling methods for MC are described in detail in Section 4 of the SS-WP and Field Activities section of the PFSP.
Analytical Method	Refer to DQO 1 for MEC and MC analytical methods to be incorporated.

Data Quality Objective Worksheet	
Site: **Madison Barracks Target Range, Henderson, New York** Project: FUDS MMRP SI Project Number: **C02NY020400** DQO Statement Number: **3 of 4**	
DQO Element Description	**Site-Specific DQO Statement**
Intended Data Use(s):	
Project Objective(s) Satisfied	Collect, or develop, additional data, as appropriate, in support of potential Hazard Ranking System (HRS) scoring by USEPA.
Data Needs Requirements:	
Data User Perspective(s)	Risk-MC, Compliance.
Contaminant or Characteristic of Interest	Data for HRS worksheet parameters will be compiled by gathering basic identifying information, general site description, site type, waste description, demographics, water use, sensitive environments, and response actions.
Media of Interest	Surface Soil
Required Sampling Locations or Areas	Areas where MEC has been historically found, used, or disposed as documented in interviews or existing documentation.
Number of Samples Required	Refer to DQOs 1and 2.
Reference Concentration of Interest or Other Performance Criteria	The HRS levels of contamination are Level I (concentrations that meet the criteria for actual contamination and are at or above media-specific benchmark levels), Level II (concentrations that either meet the criteria for actual contamination but are less than media-specific benchmarks, or meet the criteria for actual contamination based on direct observation), and Potential (no observed release is required but targets must be within the target distance limit). These levels are weighted for each target by USEPA (Level I carries the greatest weight) and scores of 28.5 or above are then eligible for listing on the National Priorities List (NPL).
Appropriate Sampling and Analysis Methods:	
Sampling Method and Depths	Methods associated with historic data field reconnaissance and sampling (see DQOs 1 and 2). Refer to NPL Characteristics Data Collection Form, Version 3.0 (USEPA 2001).
Analytical Method	Refer to DQOs 1and 2 for associated methods.

Data Quality Objective Worksheet

Site: **Madison Barracks Target Range, Henderson, New York**
Project: FUDS MMRP SI Project Number: **C02NY020400**
DQO Statement Number: **4 of 4**

DQO Element Description	Site-Specific DQO Statement
Intended Data Use(s):	
Project Objective(s) Satisfied	Collect the additional data necessary to the complete the Munitions Response Site Prioritization Protocol (MRSPP).
Data Needs Requirements:	
Data User Perspective(s)	Risk-MEC and MC, Compliance
Contaminant or Characteristic of Interest	Explosive Hazard Evaluation (EHE), Chemical Warfare Materiel Hazard Evaluation (CHE), and Health Hazard Evaluation (HHE). For the EHE and CHE modules, factors evaluated include the details of the hazard, accessibility to the Munitions Response Site (MRS), and receptor information. HHE factors include an evaluation of MC and any non-munitions-related incidental contaminants present, receptor information, and details pertaining to environmental migration pathways. Typical information compiled includes details pertaining to historical use, current/future use and ownership, cultural/ecological resources, and structures.
Media of Interest	Surface soil
Required Sampling Locations or Areas	Areas where MEC has been identified historically and where sampling is recommended.
Number of Samples Required	Refer to DQOs 1and 2 for related sampling required.
Reference Concentration of Interest or Other Performance Criteria	An MRS priority is determined by USACE based on integrating the ratings from the EHE, CHE, and HHE modules. Refer to Federal Register/Vol. 70, No. 192/Wednesday, October 5, 2005/Rules and Regulations.
Appropriate Sampling and Analysis Methods:	
Sampling Method and Depths	Data gathering prior to field activities as well as additional data gathered during field reconnaissance and sampling (DoD 2005).
Analytical Method	Refer to DQOs 1and 2 for associated methods.

Table 1. Evaluation of Potential Chemical-Specific Measurement Quality Objectives for Soil

Analyte (Method)	Abbreviation	CAS #	USEPA Regional Screening Levels for Residential Soil (1) (mg/kg)	USEPA Interim Ecological Soil Screening Levels (mg/kg)	Lowest Value (mg/kg)	Preferred Maximum Method Quantitation Limit (PMMQL) (2) (mg/kg)	Lab Method Detection Limit (MDL) (3) (mg/kg)	Lab Reporting Limit (RL) (3) (mg/kg)
Explosives (8330A)								
2,4-Dinitrotoluene	2,4-DNT	121-14-2	1.6	30 [a]	1.6	0.8	0.0498	0.25
2,6-Dinitrotoluene	2,6-DNT	606-20-2	6.1	30 [a]	6.1	3.05	0.0542	0.25
2-Amino-4,6-dinitrotoluene	2-Am-DNT	35572-78-2	15	80 [a]	15	7.5	0.0455	0.25
2-Nitrotoluene	2-NT	88-72-2	29	30 [a]	2.9	1.45	0.0841	0.25
3-Nitrotoluene	3-NT	99-08-1	120	30 [a]	30	15	0.0548	0.50
4-Amino-2,6-dinitrotoluene	4-Am-DNT	19406-51-0	15	80 [a]	15	7.5	0.0391	0.25
4-Nitrotoluene	4-NT	99-99-0	30	30 [a]	30	15	0.109	0.40
Nitroglycerin	***NG***	***55-63-0***	***0.61***	**-**	***0.61***	***0.305***	***0.1928***	***5.1***
Metals (6020)								
Copper	Cu	7440-50-8	310	28 [b]	28	14	0.071	2.5
Lead	Pb	7439-92-1	400	11 [c]	11	5.5	0.018	0.4
Nickel	Ni	7440-02-0	160	38 [d]	38	19	0.025	0.35
Metals (6010B)								
Iron	Fe	7439-89-6	5500	-	5500	2750	3.8	80

Notes:

- = No Standard
CAS# = Chemical Abstracts Service Number
MDL = Method Detection Limit
mg/kg = milligrams per kilogram
PMMQL = Preferred Maximum Method Quantitation Limit
RL = Reporting Limit
SI = Site Inspection
USEPA = United States Environmental Protection Agency

(1) USEPA Regional Screening Levels for Residential Soil. Dated May 2009. With the exception of lead, values of non-cancerous compounds were divided by 10 based on the conservative assumption that up to 10 chemicals could affect the same target organ. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm
(2) Preferred Method Maximum Quantitation Limit is one half of the Lowest Value unless the Method Detection Limit or Laboratory Reporting Limit is higher than the

Lowest Value.
(3) TestAmerica Denver Reference Data Summary (QC Limits) for Methods 8330A Mod, 6010B, 6020, and 7471A. Dated August 2009.

Bolded rows indicate occurrences when the Preferred Maximum Method Quantitation Limit is less than the Method Detection Limit
Bolded italicized rows indicate occurrences when the Preferred Maximum Method Quantitation Limit is less than the Reporting Limit

Note: In the SI Report, Alion will report all analytes to the RL.

Note: Chemicals that are not CERCLA hazardous substances (e.g., iron, aluminum, barium, magnesium) can be reported in the SI; however, the SI risk evaluation and conclusions will include a discussion of the limitations of the FUDS program to respond to such chemicals. Chemical concentrations of substances that are not CERCLA hazardous substances will not provide the basis for a RI/FS recommendation for MCs in the SI Report.

[a] Talmage, S.S., D.M. Opresko, C.J. Maxwell, C.J.E. Welsh, M. Cretella, P.H. Reno, and F.B. Daniel. 1999. Nitroaromatic munition compounds: environmental effects and screening values. Rev. Environ. Contam. Toxicol. 161: 1-156. Values are based on 2,4,6-TNT, except for 2-Amino-4,6-dinitrotoluene and 4-Amino-2,6-dinitrotoluene.
[b] USEPA. 2007a. *Ecological Soil Screening Level for Copper.* Available from http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_copper.pdf. Accessed 06 October 2009.
[c] USEPA. 2005. *Ecological Soil Screening Level for Lead.* Available from http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_lead.pdf. Accessed 06 October 2009
[d] USEPA. 2007b. *Ecological Soil Screening Level for Nickel.* Available from http://www.epa.gov/ecotox/ecossl/pdf/eco-ssl_nickel.pdf. Accessed 06 October 2009.

The primary uncertainty associated with achieving PMMQLs is associated with those analytes where the standard analytical methodology fails to achieve the MDL. The impact of the individual exceedance on the overall data set will have to be evaluated, based on the magnitude of the exceedance, the analyte of concern, the likelihood that that analyte is a constituent of the munitions used at the site, and its value as target or indicator analyte in the SI Report.

MDL and RL Exceedances of the Preferred Maximum Quantitation Limit (PMMQL)
Soil
Nitroglycerin

APPENDIX D – INTERIM GUIDANCE DOCUMENT AND MUNITIONS DATA SHEETS

DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO ATTENTION OF:

MAR 1 6 2006

CEHNC-OE-CX

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Procedure for Preliminary Assessment (PA) and Site Inspection (SI) Teams that Encounter Unexploded Ordnance (UXO) While Gathering Non-UXO Field Data, Military Munitions Center of Expertise (MM CX) Interim Guidance Document (IGD) 06-05

1. PURPOSE: This procedure describes the responsibilities of project teams during the preliminary assessment and site investigation phases should unexploded ordnance (UXO) be discovered.

2. APPLICABILITY: This guidance is applicable to the geographic military Districts, Military Munitions Response Program (MMRP) Design Centers, Major Subordinate Commands (MSCs), and designated Remedial Action Districts performing MMRP response actions.

3. REQUIREMENTS AND PROCEDURES:

a. During site visits to formerly used defense site (FUDS) properties to gather PA or SI information, in the rare instance that a UXO-qualified individual identifies an item that is an explosive hazard, the following actions will occur:

(1) The property owner or individual granting rights of entry to the property will be notified of the hazard and advised to call the local emergency response authority (i.e., police, sheriff, or fire department). The individual will also be informed that if they do not call the local response authority within 1 hour, the individual who identified the UXO item will notify the local emergency response authority.

(2) The local response authority will decide how to respond to the reported incident, including deciding not to respond (e.g., if the local response authority is already aware of the hazards on the property). If the local response authority decides to respond, the individual who identified the item or his designee will mark the location of the item and provide accurate location information to the emergency response authority. The individual who identified the item or his designee will generally remain in the area until the local response authority arrives, unless specifically indicated by the appropriate response authority that the individual may leave the area.

(3) During the SI, the state regulator may also be notified at their request.

MAR 1 6 2006

CEHNC-OE-CX
SUBJECT: Procedure for Preliminary Assessment (PA) and Site Inspection (SI) Teams that Encounter Unexploded Ordnance (UXO) While Gathering Non-UXO Field Data, Military Munitions Center of Expertise (MM CX) Interim Guidance Document (IGD) 06-05

b. During site visits to active installations or Base Realignment and Closure (BRAC) sites to gather PA or SI information, in the rare instance that a UXO-qualified individual identifies an item that is an explosive hazard, the following actions will occur:

(1) The installation point of contact (POC) or the BRAC coordinator will be notified of the hazard and requested to notify explosive ordnance disposal (EOD) through their channels.

(2) The installation/EOD will make the determination if they are going to respond to the incident. The installation/EOD may be aware of the hazards at the site and make the decision not to respond. If the installation/EOD decides to respond, the individual who identified the item or his designee will mark the location and provide accurate location information to the installation/EOD unit and will remain in the area unless the installation/EOD unit requests otherwise.

c. Neither the US Army Corps of Engineers personnel, nor their contractors have the authority to call EOD to respond to an explosive hazard. This call is the responsibility of the local emergency response authority for FUDS properties and it must come through the proper chain of command on installations.

d. AR 75-14 and AR 75-15 contain the information on how EOD responds to explosives hazards.

4. EFFECTIVE DATES: The requirements and procedures set forth in this interim guidance are effective immediately. They will remain in effect indefinitely, unless superseded by other policy or regulation.

5. POINT OF CONTACT: If you need additional information, please contact Mr. Brad McCowan at 256-895-1174.

Carol A. Youkey

CAROL A. YOUKEY, P.E.
Chief, Center of Expertise for Ordnance
and Explosives Directorate

MUNITIONS LIST:

ID	NAME	DATA SHEET
CTT01	SMALL ARMS, GENERAL	YES

CTT01

SMALL ARMS

SMALL-ARMS AMMUNITION

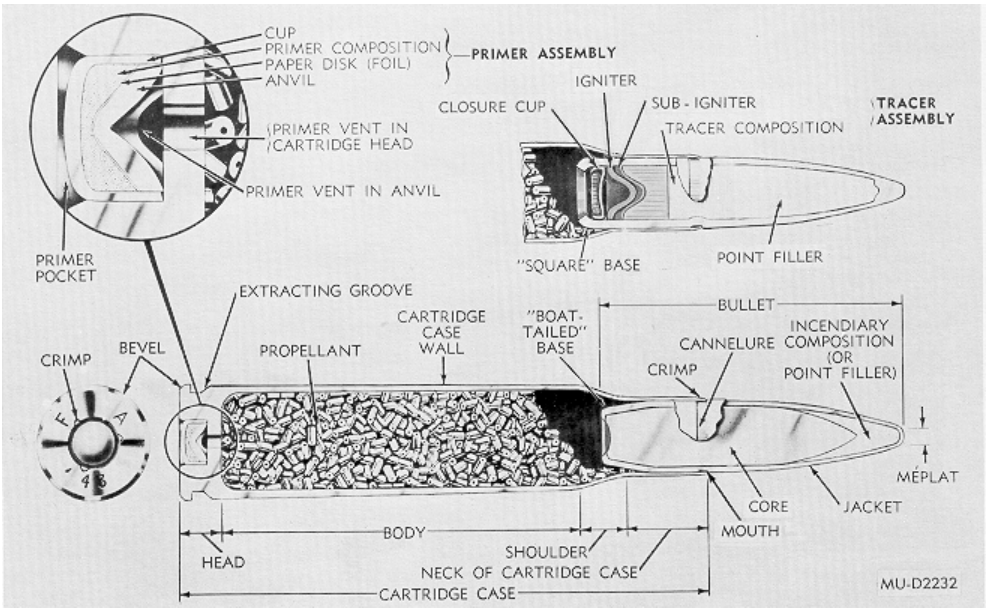


Figure 1. Typical cartridge (sectional)

General. Small-arms ammunition, as used herein, describes a cartridge or families of cartridges intended for use in various types of hand-held or mounted weapons through 30 millimeter. Within a caliber designation, these weapons may include one or more of the following: rifles (except recoilless), carbines, pistols, revolvers, machineguns and shotguns. For purposes of this publication, small-arms ammunition may be grouped as cartridges intended primarily for combat or training purposes (API, HEI, tracer or ball); for training purposes only (blank or dummy); or for special purposes (rifle grenade or spotter-tracer). Refer to TM 9-1306-200 for more detailed information on small-arms ammunition.

Cartridges. In general, a small-arms cartridge is identified as an assembly of a cartridge case, primer, a quantity of propellant within the cartridge case, and a bullet or projectile. Blank and rifle grenade cartridges are sealed with paper closure disks in lieu of bullets. Dummy cartridges are composed of a cartridge case and a bullet. Some dummy cartridges contain inert granular materials to simulate the weight and balance of live cartridges. A typical cartridge and the terminology of its components are shown in figure 1.

Case. Although steel, aluminum, zinc and plastic materials have been used experimentally, brass, a composition of 70 percent copper and 30 percent zinc, is the most commonly used material for cartridge cases. Steel, as well as brass, is an approved material for caliber .45 cartridge cases. Brass, paper and plastic are used for 12 gage shotshell bodies. Aluminum is used for military-type .410 gage shotshell bodies. Configurations of cartridges and bullets are illustrated in figures 2 through 9.

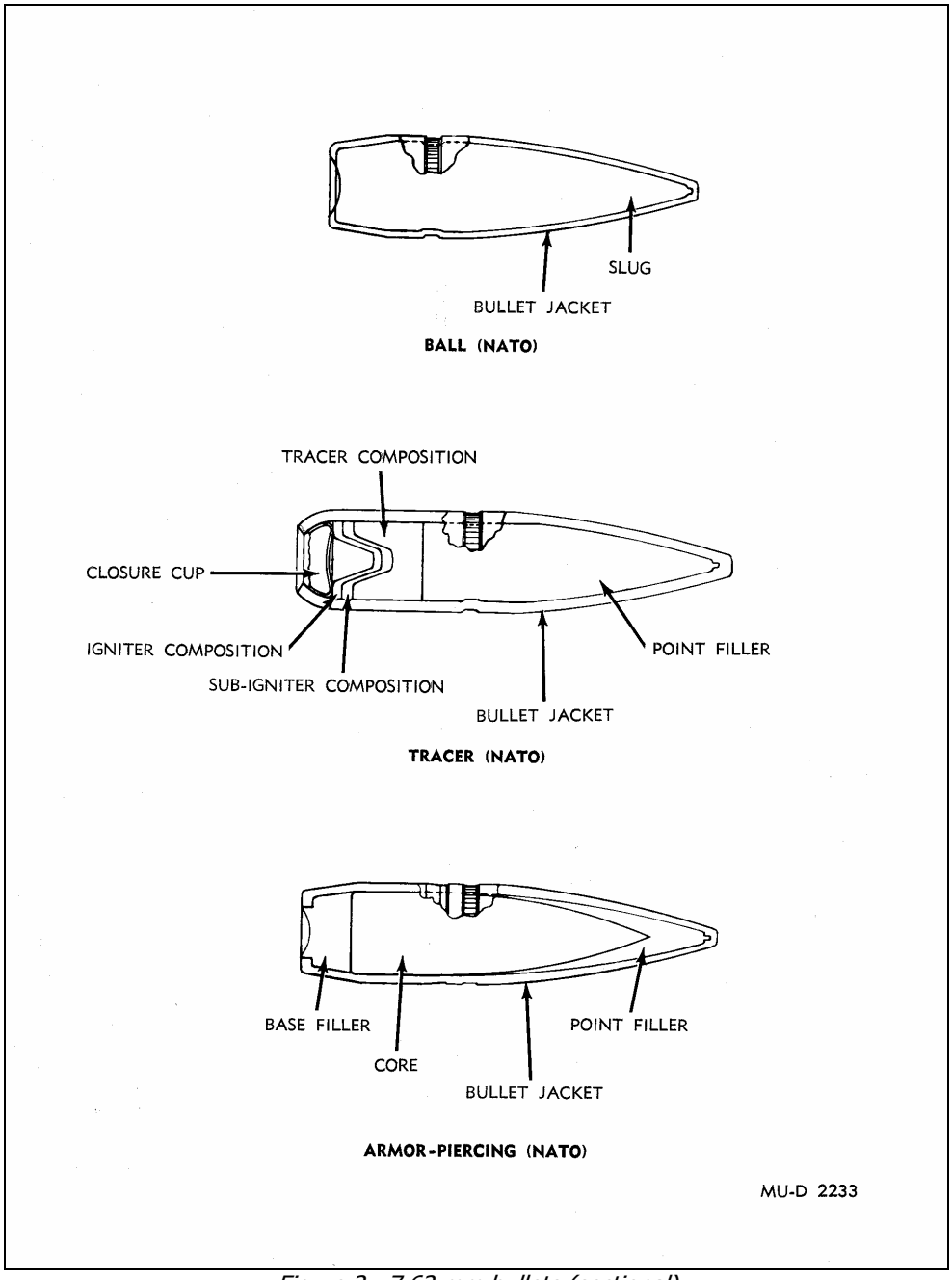


Figure 2. 7.62 mm bullets (sectional)

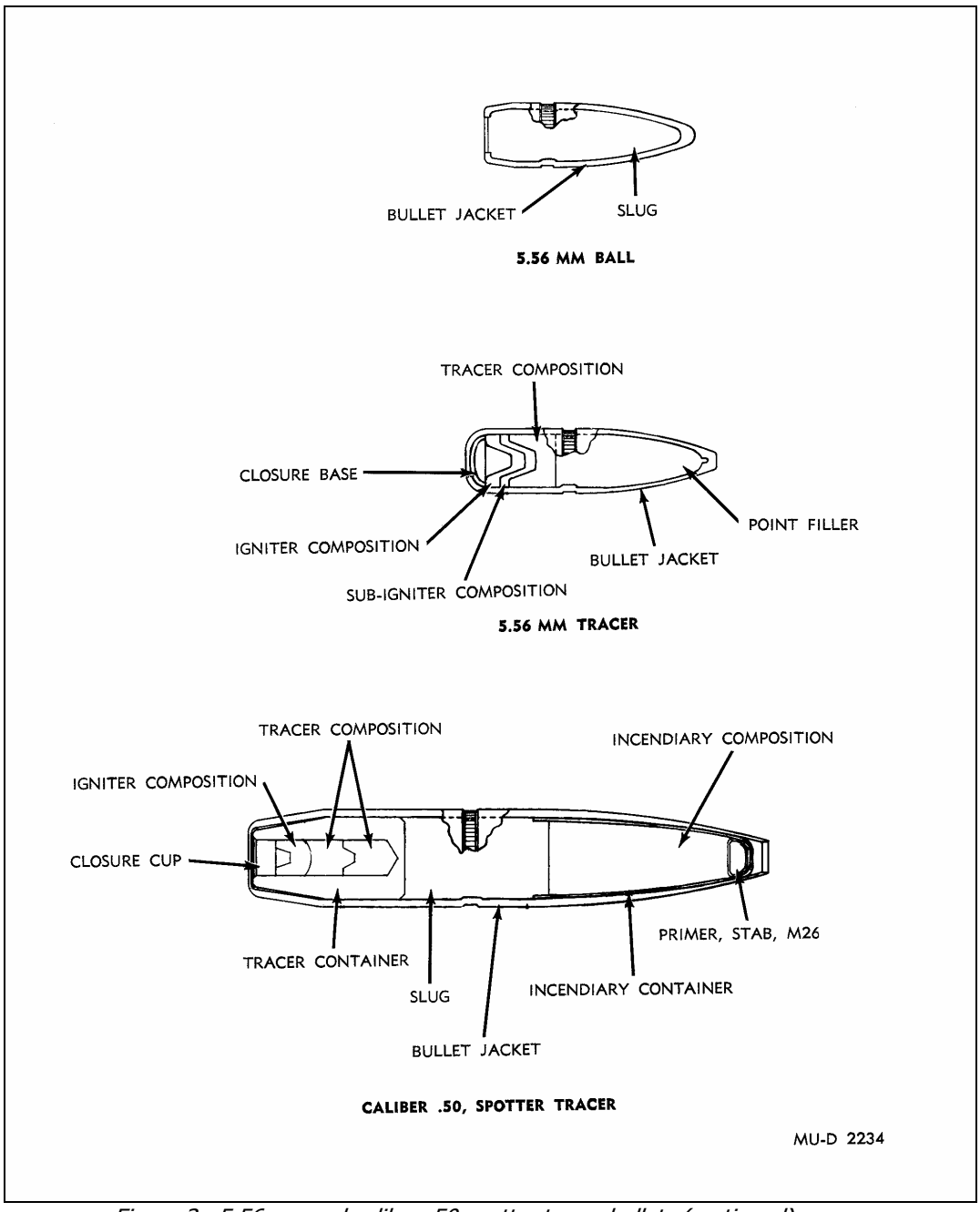


Figure 3. 5.56mm and caliber .50 spotter tracer bullets (sectioned)

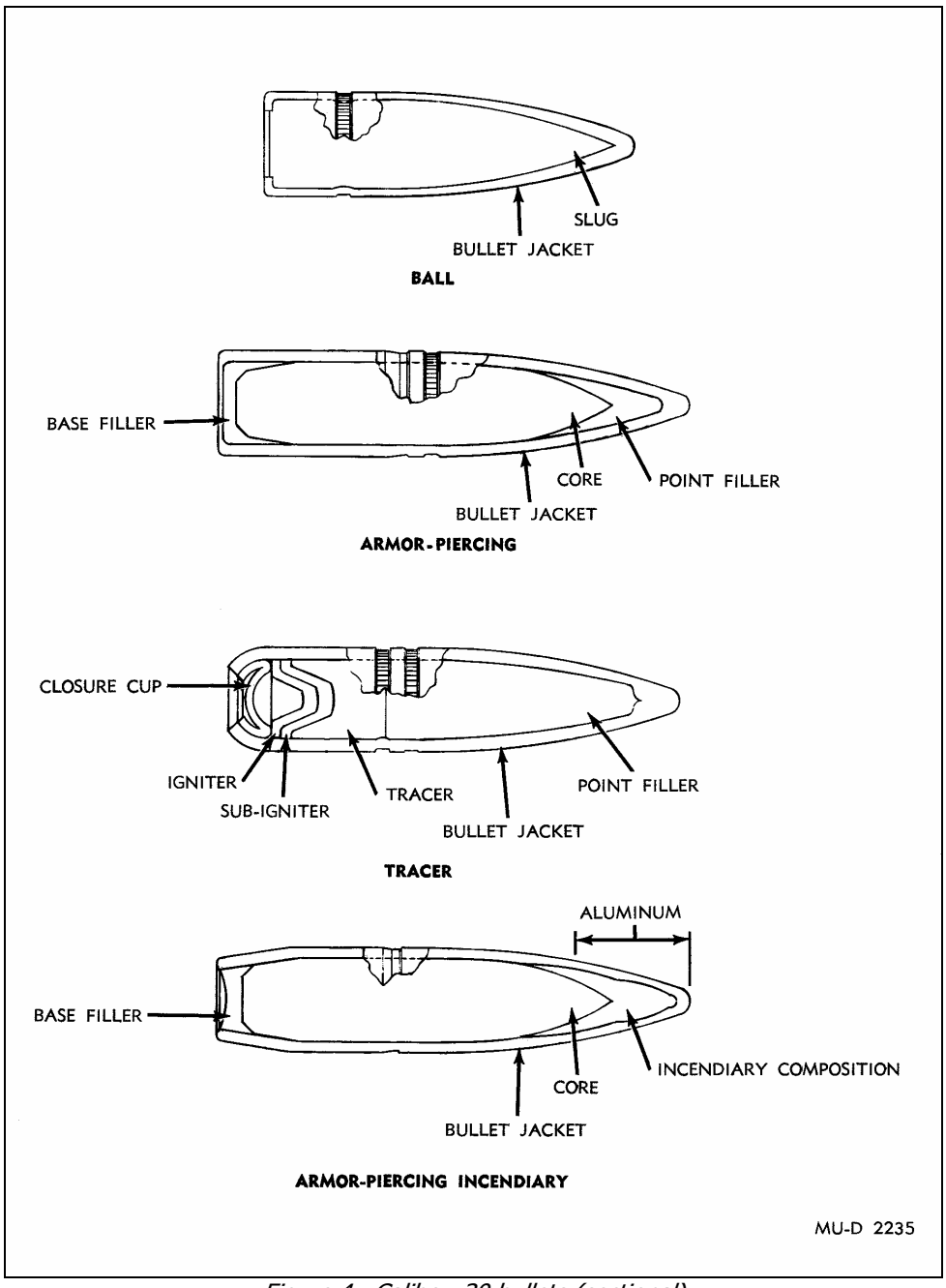


Figure 4. Caliber .30 bullets (sectional)

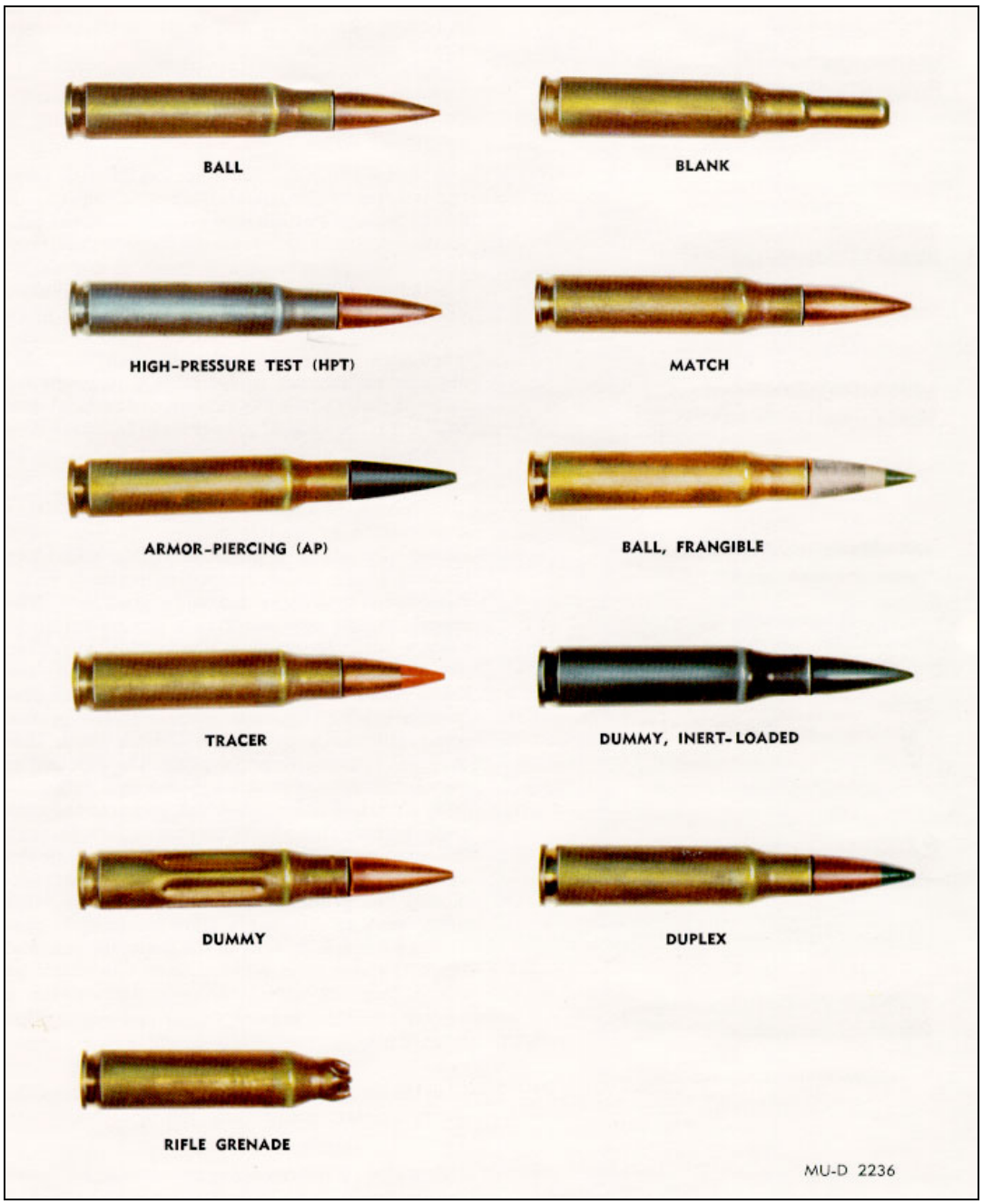


Figure 5. 7.62mm cartridges

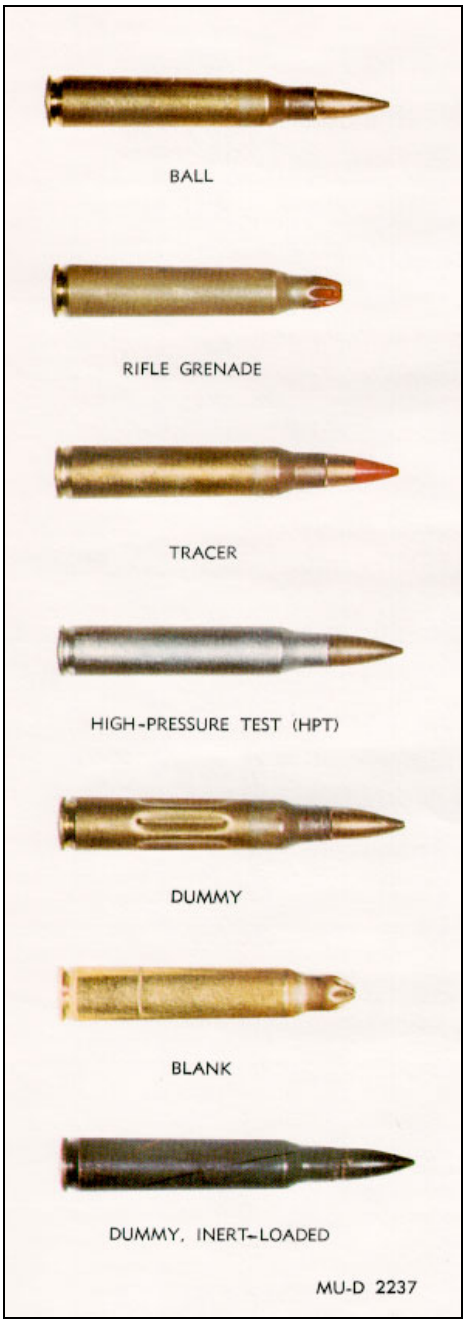


Figure 6. 5.56mm cartridges

Propellant. Cartridges are loaded with varying weights of propellant. This is to impart sufficient velocity (within safe pressures) to the projectile to obtain the required ballistic performance. These propellants are either of the single-base (nitrocellulose) or double-base (nitrocellulose and nitroglycerine) type. The propellant grain configuration may be cylindrical with a single, lengthwise perforation, spheroid (ball) or flake. Most propellants are coated with a deterrent (to assist in controlling the rate of combustion) and with a final coating of graphite (to facilitate flow of propellant and eliminate static electricity in loading cartridges).

Primer. Small-arms cartridges contain either a percussion or electric primer. The percussion primer consists of a brass or gilding metal cup that contains a pellet of sensitive explosive material secured by a paper disk and a brass anvil. The electric primer consists of an electrode button in contact with the priming composition, a primer cup assembly and insulator. A blow from the firing pin of the weapon on the center of the percussion primer cup base compresses the primer composition between the cup and the anvil. This causes the composition to explode. The function of the electric primer is accomplished by a firing pin with electrical potential, which contacts the electrode button. This allows current to flow through the energy-sensitive priming composition to the grounded primer cup and cartridge case, exploding the priming composition. Holes or vents in the anvil or closure cup allow the flame to pass through the primer vent in the cartridge case and ignite the propellant. Rimfire ammunition, such as the caliber .22 cartridge, does not contain a primer assembly. Instead, the primer composition is spun into the rim of the cartridge case and the propellant is in intimate contact with the composition. On firing, the firing pin strikes the rim of the cartridge case, compressing the primer composition and initiating its explosion.

Bullet. With few exceptions, bullets through caliber .50 are assemblies of a jacket and a lead or steel core. They may contain other components or chemicals which provide the terminal ballistic characteristics of the bullet type. The bullet jacket may be either gliding metal, gliding-metal clad steel, or copper plated steel. Caliber .30 and 7.62mm frangible bullets are molded of powdered lead and a friable plastic which pulverizes into dust upon impact with the target. The pellets used in the shotgun shells are spheres of lead alloys varying from 0.08 inch to 0.33 inch in diameter.

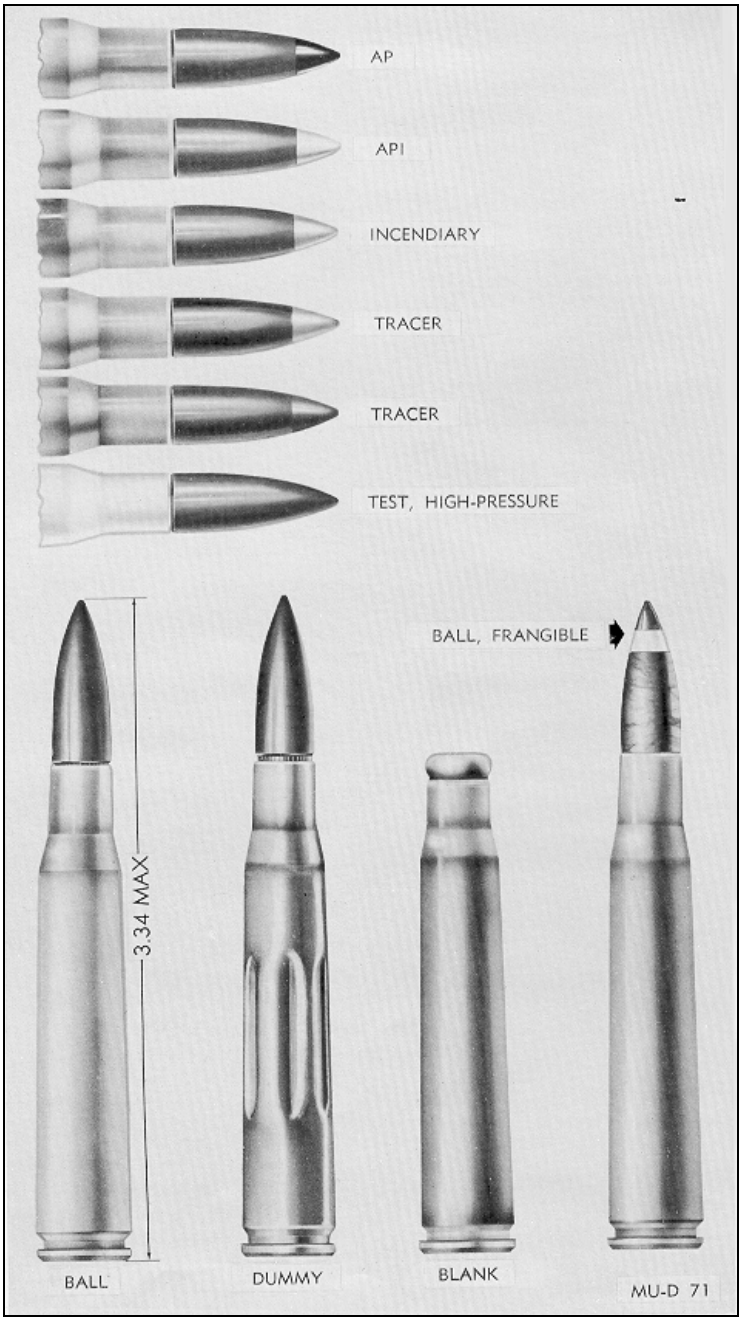


Figure 7. Caliber .30 cartridges

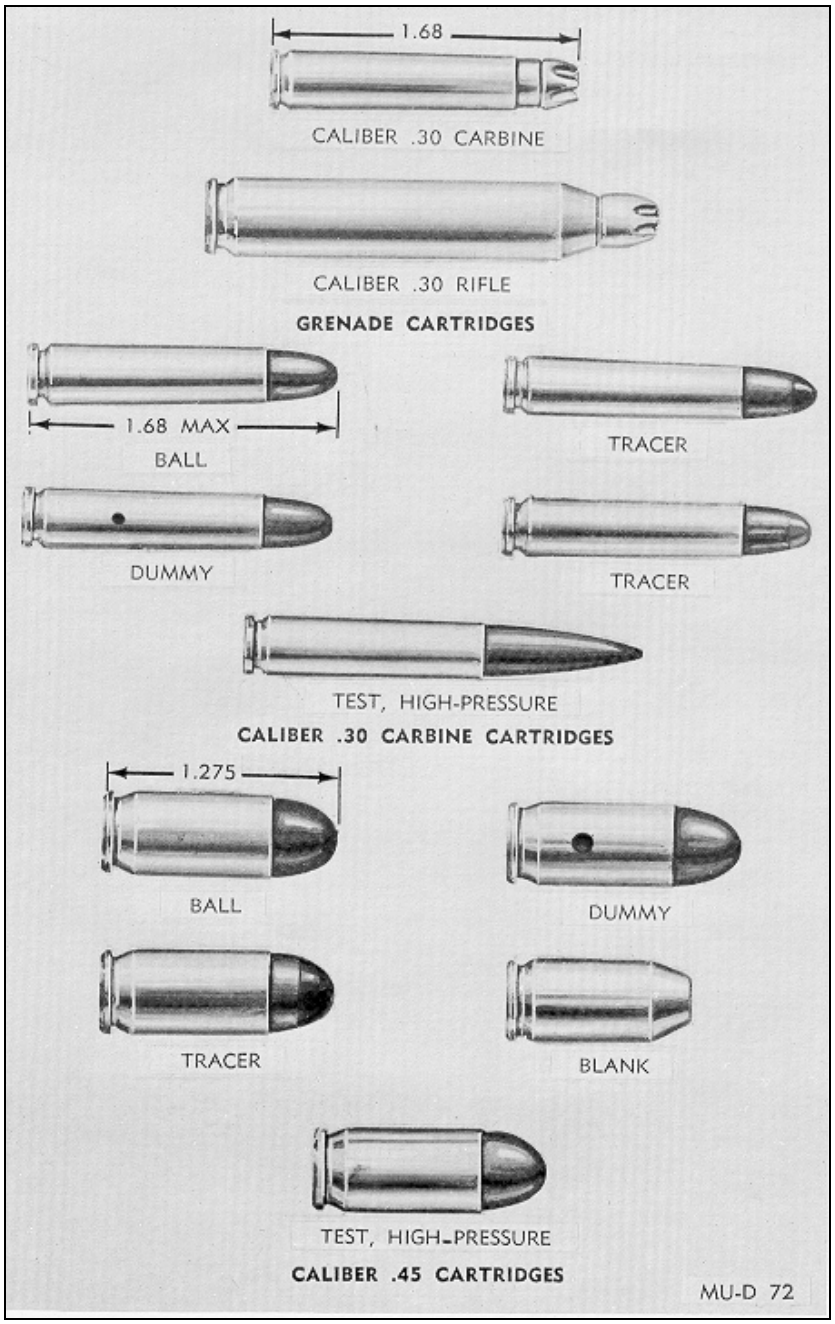


Figure 8. Caliber .30 carbine and caliber .45 cartridges

Figure 9. Caliber .50 cartridges

Ball Cartridge. The ball cartridge is intended for use in rifles, carbines, pistols, revolvers and/or machineguns against personnel and unarmored targets. The bullet, as designed for general purpose combat and training requirements, normally consists of a metal jacket and a lead slug. Caliber .50 ball bullet and 7.62-mm, Ball M59 bullet contain soft steel cores.

Tracer Cartridge. By means of a trail of flame and smoke, the tracer cartridge is intended to permit visible observation of the bullet's in-flight path or trajectory and the point of impact. It is used primarily to observe the line of fire. It may also be used to pinpoint enemy targets to ignite flammable materials and for signaling purposes. The tracer element consists of a compressed, flammable, pyrotechnic composition in the base of the bullet. This composition is ignited by the propellant when the cartridge is fired. In flight, the bullet emits a bright flame which is visible to the gunner. Trace burnout occurs at a range between 400 and 1,600 yards, depending upon the caliber of ammunition.

Match Cartridge. The match cartridge is used in National and International Match Shooting competitions. The bullet consists of a gliding-metal jacket over a lead slug. The cartridges are identified on the head face with the designation NM (National Match) or Match.

Armor-Piercing Cartridges. The armor-piercing cartridge is intended for use in machine-guns or rifles against personnel and light armored and unarmored targets, concrete shelters, and similar bullet-resisting targets. The bullet consists of a metal jacket and a hardened steel-alloy core. In addition, it may have a base filler and/or a point filler of lead.

Armor-Piercing-Incendiary Cartridge. The armor-piercing-incendiary cartridge is used in rifles or machineguns as a single combination cartridge in lieu of separate armor-piercing and incendiary cartridges. The bullet is similar to the armor-piercing bullet, except that the point filler is incendiary mixture instead of lead. Upon impact with the target, the incendiary mixture burst into flame and ignites flammable material.

Armor-Piercing-Incendiary Tracer Cartridge. The bullet of the armor-piercing- incendiary-tracer cartridge combines the features of the armor-piercing, incendiary, and tracer bullets and may be used to replace those cartridges. The bullet consists of a hard steel core with compressed pyrotechnic mixture in the cavity in the base of the core. The core is covered by a gilding-metal jacket with incendiary mixture between the core point and jacket. This cartridge is for use in caliber .50 weapons only.

Duplex Cartridge. The duplex cartridge contains two special ball type bullets in tandem. The front bullet is positioned partially in the case neck, similarly to a standard ball bullet. The rear bullet, positioned completely within the case, is held in position by a compressed propellant charge. The base of the rear bullet is angled so that in flight, it follows a path slightly dispersed from that of the front bullet.

Spotter-Tracer Cartridge. The spotter-tracer cartridge is intended for use in coaxially mounted caliber .50 spotting rifles. The bullet trajectory closely approximates that of

106mm projectiles. Thus, this cartridge serves as a fire control device to verify weapon sight settings before firing 106mm weapons. The bullet contains an impact detonator and incendiary composition which identify the point of impact by flash and smoke.

Blank Cartridge. The blank cartridge is distinguished by absence of a bullet. It is used for simulated fire, in training maneuvers, and for saluting purposes. It is fired in rifles and machineguns equipped with blank firing attachments.

Grenade Cartridge. The grenade cartridge is used to propel rifle grenades and ground signals from launchers attached to rifles or carbines. All rifle grenade cartridges are distinguished by the rose petal (rosette crimp) closure of the case mouth.

Frangible Cartridge. The caliber .30 frangible cartridge, designed for aerial target training purposes, is also used in rifles and machineguns for target shooting. Caliber .30 and 7.62mm frangible cartridges are used in tank machineguns, firing single shot, for training in tank gunnery. At its normal velocity, the bullet, which is composed of powdered lead and friable plastic, will completely disintegrate upon striking a 3/16-inch aluminum alloy plate at 100 yards from the muzzle of the gun. These cartridges are not to be used on any but well ventilated indoor ranges to preclude buildup of toxic bullet dust. Inhalation of bullet dust may be injurious to health.

Incendiary Cartridge. The incendiary cartridge was designed for aircraft and ground weapon use to ignite combustible targets (e.g., vehicular and aircraft fuel tanks). The bullet contains a compressed incendiary mixture which ignites upon impact with the target. The incendiary cartridge has been superseded by the API and APIT cartridges because of their improved terminal ballistic effects.

Special Purpose Cartridge

Cartridges of various calibers. (figures. 10 through 12), which consist of different types of projectiles and bullets, are used for training and special purposes. They include the following:

(1) Caliber .22 long rifle and caliber .38 and .45 wad-cutter cartridge for target shooting.

(2) Caliber .45 blank cartridges fired in exercises to condition dogs to gun fire.

(3) Caliber .22 hornet and .410 shotgun cartridges for firing in Air Force combination (survival) weapons for hunting purposes.

(4) Caliber.45 line-throwing cartridges for firing in caliber .45 line-throwing rifles. The Navy uses these for throwing lines from ship-to-ship. The Army Signal Corps uses these for projecting signal wires over elevated terrain.

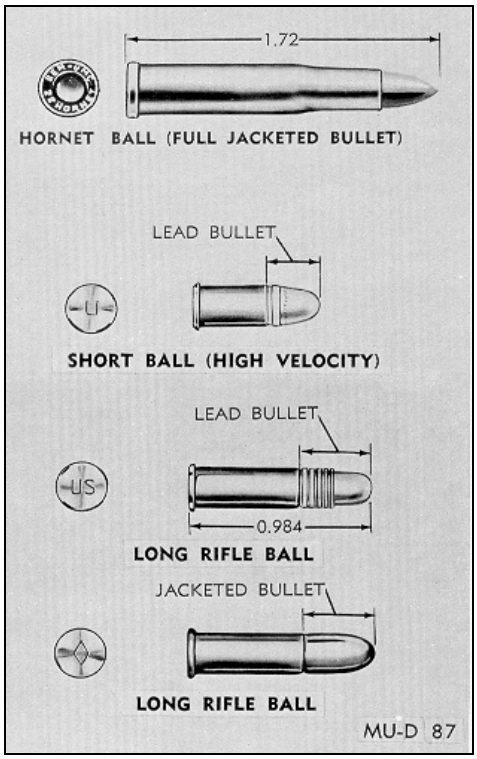


Figure 10. Caliber .22 cartridges

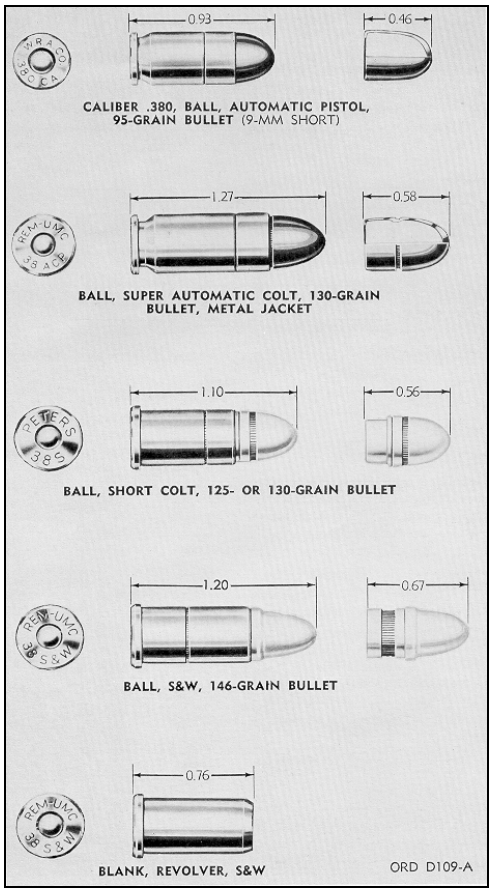


Figure 11. Caliber .38 cartridges

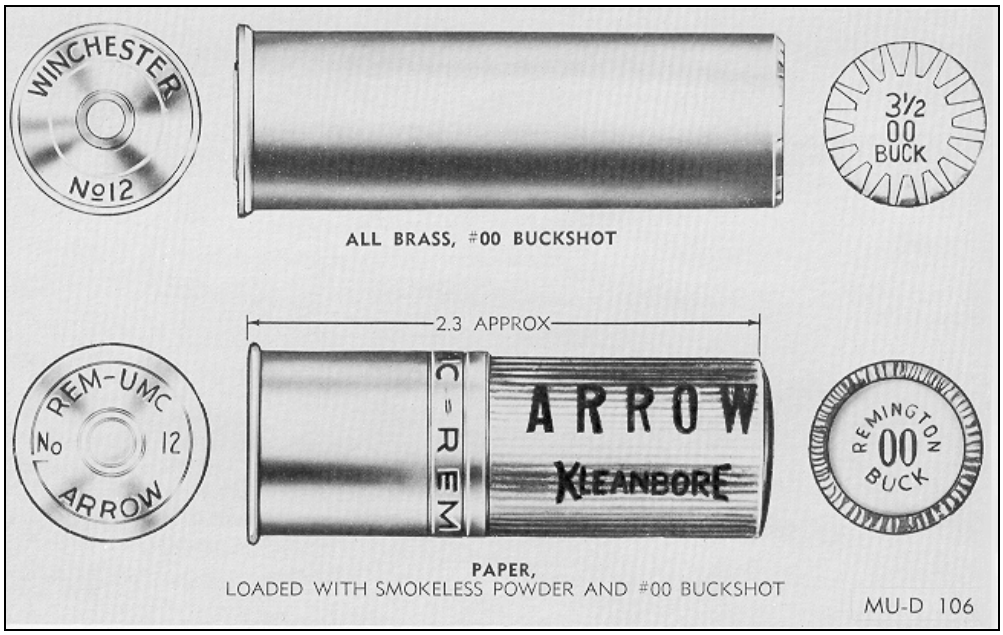


Figure 12. 12 gage shotgun shells

(5) Shotshells containing the designated shot sizes as required for the following:

12 gage #00 Buck for guard duty
12 gage #4 Buck for guerrilla purposes.
12 gage #6, 7½ and 8 shot for clay target shooting for training purposes.
.410 gage #7 shot for caliber .22/.410 survival weapons maintained by aircraft

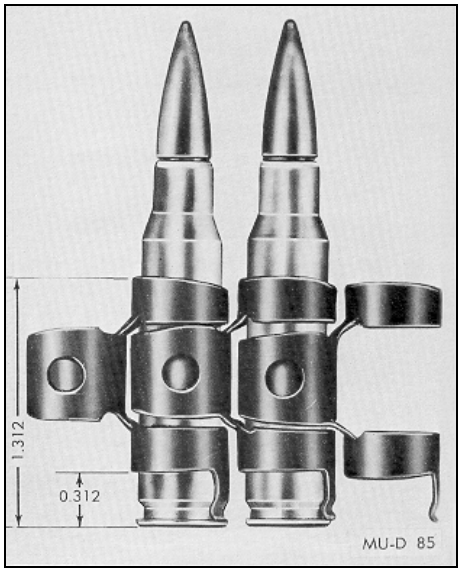


Figure 13. Linked 7.62-mm cartridges

Special purpose cartridges also include the following types of military cartridges:

(1) Dummy. The dummy cartridge is used for practice in loading weapons and simulated firing to detect flinching of personnel when firing weapons. It consists of a cartridge case and a ball bullet. Cartridge identification is by means of holes through the side of the case or longitudinal corrugations in the case and by the empty primer pocket.

(2) Dummy inert-loaded. This cartridge consists of a cartridge case, a ball bullet and inert granular material in the case simulating the weight and balance of a live cartridge. The exterior of the cartridge is identified by a black chemical finish and by the absence of a primer. This cartridge is used by installations for testing weapon function, linkage and feed chutes.

(3) High-pressure test. High-pressure test ammunition is specially loaded to produce pressures substantially in excess of the maximum average or individual pressures of the corresponding service cartridge. This cartridge is not for field issue. It is used only by armorers and weapons mechanics for proof firing of weapons (rifles, pistols, machine guns) at place of manufacture, test and repair. Because of excessive pressures developed by this type of ammunition, and the potential danger involved in firing, proofing of weapons is conducted only by authorized personnel from fixed and shielded rests by means of a lanyard or other remote control methods.

Metallic Links and Clip

Metallic links. (figures. 13 and 14) are used with caliber .30, caliber .50, 5.56mm, 7.62mm and 20mm cartridges in machine guns. The links are made of steel, surface treated for rust prevention. They are used to assemble cartridges into linked belts of 100 to 750 cartridges per belt. The links must meet specific test and dimension requirements to assure satisfactory ammunition feed and functioning in the machine gun under all training and combat service conditions.

Different configurations of cartridge clips. These permit unitized packages of ammunition. This facilitates transfer of cartridges to appropriate magazines for caliber .30, 7.62mm and 5.56mm rifles. The caliber .30 eight-round clip feeds eight cartridges as a unit into the receiver of the rifle. The caliber .45 clip feeds three cartridges as a unit into the revolver cylinder. Five-round and eight-round clips are used with caliber .30 cartridges; five-round clips with 7.62mm cartridges; ten- round clips with caliber .30 carbine and 5.56-mm cartridges; and three-round clips with caliber .45 cartridges.

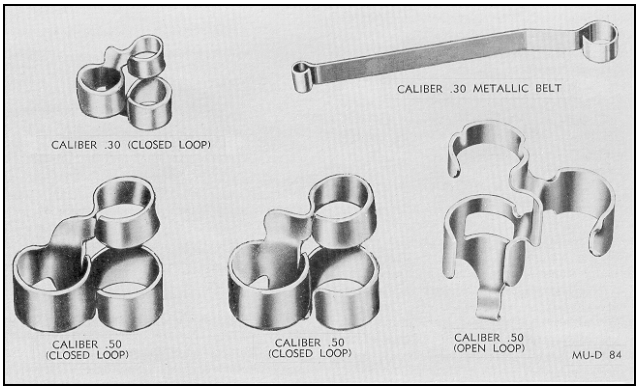


Figure 14. Links for caliber .30 and caliber .50 ammunition

Identification Markings. Each outer shipping container and all inner containers are fully marked to identify the ammunition. Wire- bound boxes are marked in black and ammunition boxes are painted olive drab, with markings in yellow. When linked ammunition is functionally packed, component lot numbers are replaced by a functional lot number. Typical packing and identification markings are illustrated in figures 15 through 17.

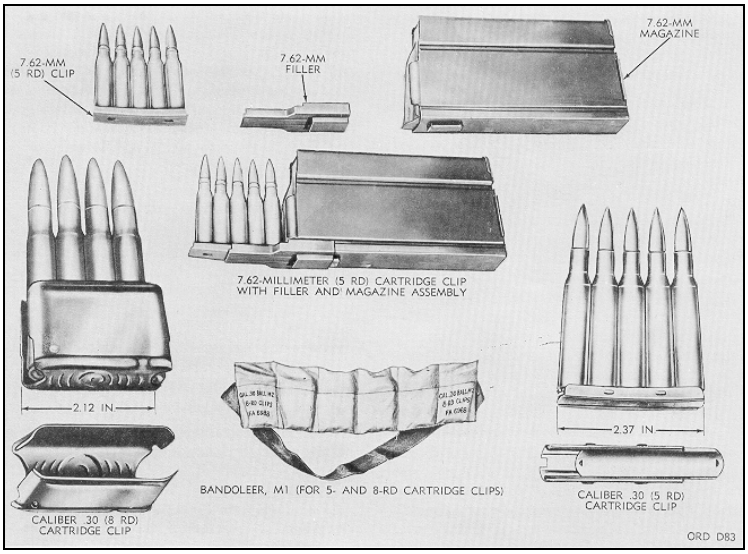


Figure 15. Cartridges, links, belt, cartons, bandoleers and ammunition box

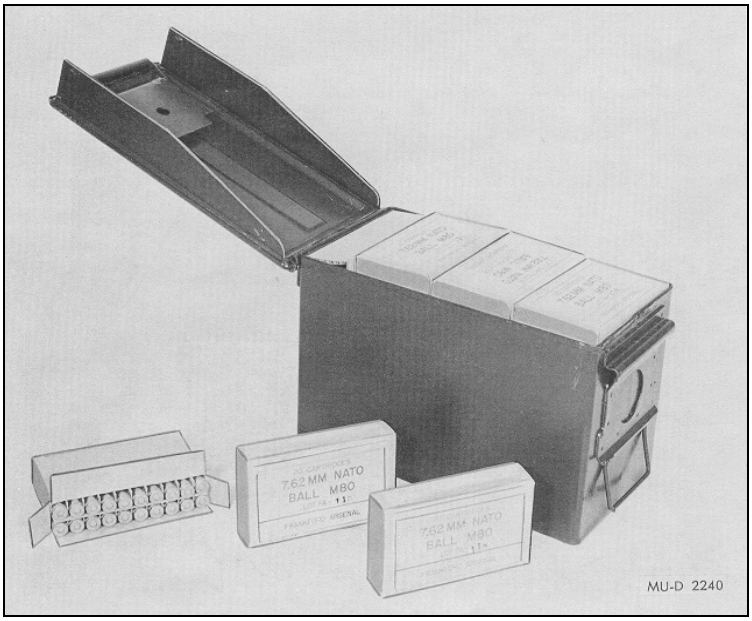


Figure 16. Cartridges, link belt, cartons, bandoleers and ammunition box

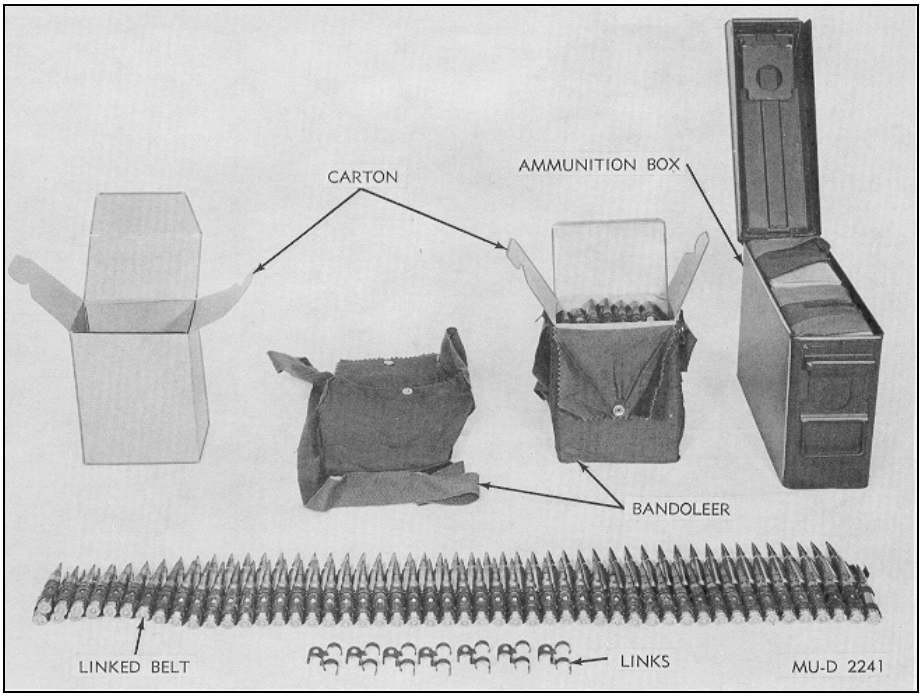


Figure 17. Cartridges, link belt, cartons, bandoleers and ammunition box

Care, Handling and Preservation

Small-arms ammunition is comparatively safe to handle. It is packed to withstand transportation, handling and storage conditions normally encountered in the field. However, consideration should be given to general handling precautions pertaining to ammunition and explosives.

Reference: This data is a reprint of Chapter 3, TM 9-1300-200, *Ammunition General,* October 1969

APPENDIX E – SITE-SPECIFIC ACCIDENT PREVENTION PLAN

Site Specific Accident Prevention Plan

The purpose of this appendix is to augment the programmatic Accident Prevention Plan (APP), Appendix D of the PWP (Alion 2005) by presenting site-specific information and any procedural deviations. The Programmatic APP will accompany this SS-WP during field activity.

SITE-SPECIFIC Accident Prevention Plan

Client: U.S. Army Corps of Engineers Baltimore

Project Name/Number: Site Inspection of Madison Barracks Target Range

Site Location/Address: Henderson, Jefferson County, New York (See Figure 2 – Aerial Map, Appendix A)

Work Description: Site Inspection of this Formerly Used Defense Site (FUDS) will include site reconnaissance, limited geophysical survey, and soil sampling within or adjacent to the FUDS.

APPROVALS:

This Addendum to the project Work Plan and APP has been prepared under the supervision and review of a CIH certified by the American Board of Industrial Hygienists (ABIH).

Program Safety and Health Officer: _____ 11/25/09

Bill Beckett, CIH (ABIH No. 5246CP) Date

Hospital Route Map

MEDICAL EMERGENCY:

Distance to Nearest Hospital: 20 miles, about 30 minutes

Hospital Name: Samaritan Medical Center
Hospital Phone: (315)785-4000
Hospital Address: 830 Washington Street Watertown, NY 13601

In Case of Emergency Contact: Call 911 for first responder. Arrangements will be made for faster transport to the hospital if necessary (i.e., helicopter).

Route to Hospital (from the FUDS):

20 miles, approximately 30 minutes

1. Starting in Wehle State Park
2. Drive north on County Route 72 (CR-72) toward Harbor View Dr
3. Take third right onto NY-3 (RT-3) – go 17.9 mi
5. Turn right on Washington St – go 0.7 mi
6. Arrive 830 Washington St, Watertown, on the right

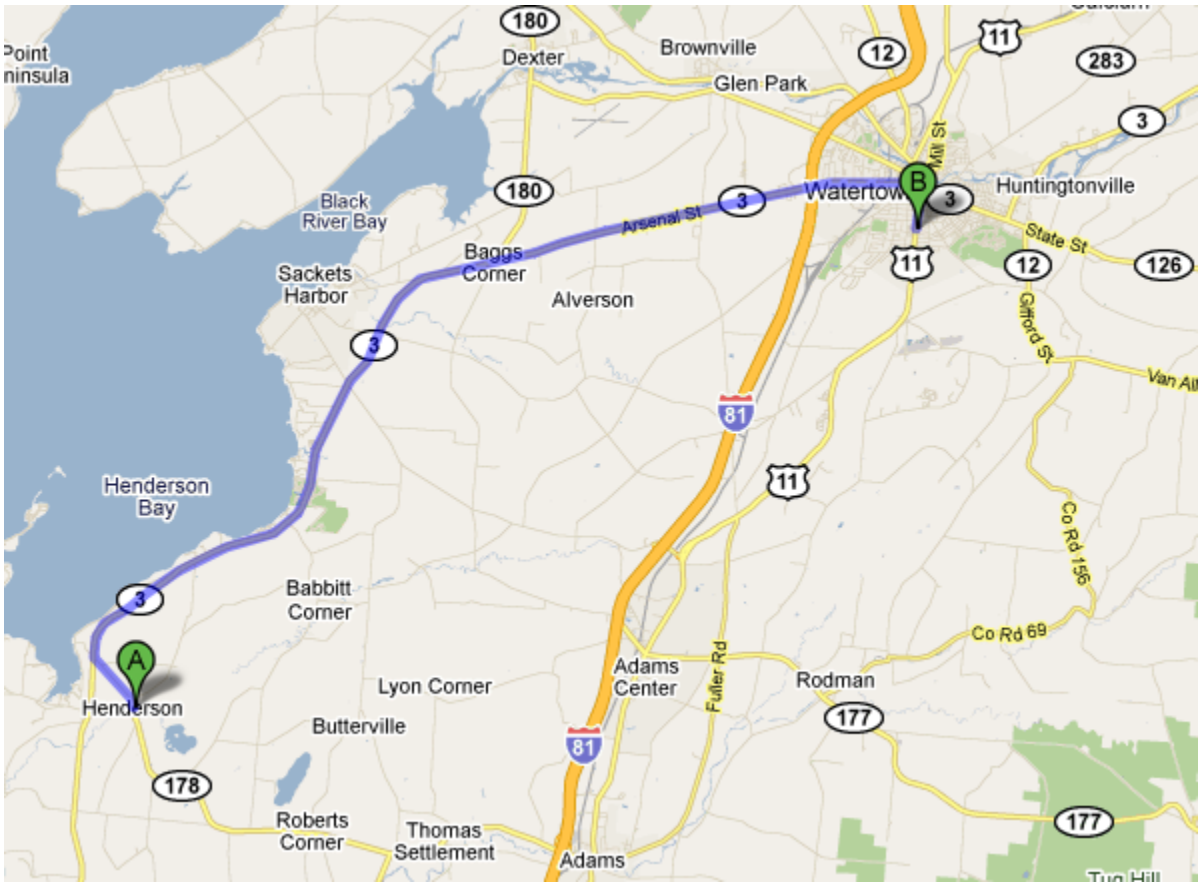


TABLE E-1. EMERGENCY CONTACT INFORMATION

Contacts	Name	Phone Number(s) work/cell
Program Manager	Roger Azar	Cell: 301-399-7304
Program Safety and Health Officer	Curtis Mitchell	Cell: 301-399-7152
Project Manager	Kimberly Evers	703-259-5132
Site Safety and Health Officer (SSHO)	Curtis Mitchell	Cell: 301-399-7152
Client Contact	Tany Labeste – CENAN	917-790-8330
	Julie Kaiser – Baltimore District	410-962-2227
	Alan Warminski	410-962-7677
Regulatory Contact	Chek Beng Ng, P.E.- NYSDEC Dan Eaton - NYSDEC	518-402-9620 518-402-9620
Property Owner/Manager	Kevin Kieff (OPRHP - Regional Director)	315-482-2593
Hospital	Samaritan Medical Center	(315)785-4000
Poison Control	-	800-222-1222
National Response Center	-	800-424-8802
Alion Medical Services	Bill Beckett	908-852-4887

HAZARDS OF CONCERN: Check as many as are applicable. See Section 6 of Programmatic APP (Alion 2005) for Chemical, Physical and Biological Hazards.

( ) Heat Stress	( ) Reactive	( ) Oxygen Deficient	**(X) Insect Bite**
(X) Cold Stress	( ) Noise	( ) Corrosive	( ) Snake Bite
( ) Explosion/Flammable	( ) Inorganic	**(X) Toxic**	( ) Excavations
(X) Biological	( ) Organic	( ) Inert	**(X) Vegetation**
( ) Radiological	( ) Confined Space (see Section 9 of Programmatic APP)		
(**X**) **Slip, Trip, Fall**	( ) Lift, Push, Pull	( ) Volatile	

(X) Other, specify: Potential MEC. Site workers will practice MEC avoidance. Any suspected MEC will be left alone. A MEC avoidance team (provided by Alion/HFA) will identify routes free of anomalies to a sampling area. The MEC team will also ascertain that sample locations are free of anomalies. Once the MEC team has identified that a sampling area is free of anomalies, the MC sampling team will then collect samples for analysis. Soil and sediment samples will be collected from areas identified by CSM or the MEC survey to be suspect or contain high concentrations of MEC and/or MC. Activity Hazard Analysis tables have been completed for the proposed field work (to include Site Inspection and Reconnaissance and general sample collection) and are included at the end of this chapter. Other potential hazards include slips, trips, or falls (as discussed in Table E-2, E-3, and E-4).

PATHWAYS:

( ) Air **(X) Dust/Soil** ( ) Surface Water ( ) Sediment ( ) Groundwater ( ) Other

OVERALL HAZARD EVALUATION: ( ) High ( ) Medium **(X) Low** ( ) Unknown

JUSTIFICATION (brief narrative of how work activities may encounter hazards and their controls, include known or anticipated contaminant concentrations):
Airborne dust will not be created because soil samples will be collected by manual digging with hand trowels to 1 foot or less. Site workers may be exposed to chemicals of concern (explosives and metals) present in site soil during sampling activities. Nitrile gloves will be worn when collecting samples to prevent skin contact. Detonation of UXO is highly unlikely because small arms ammunition was used on the firing range and no MEC has been found on site. Even so, a UXO specialist using a metal detector will clear pathways to sampling areas as well as the sampling locations. Procedures to follow when suspected MEC are detected are described in the SS-WP. Site sampling will occur in wooded/overgrown areas that may contain biting insects and/or poisonous plants. Plant and insect identification and precautionary information will be

available to site personnel. Slip, trip and fall hazard is similar to that found on field sites that are not maintained and overgrown with vegetation.

FIRE/EXPLOSION POTENTIAL: ( ) High ( ) Medium **(X) Low** ( ) Unknown

SURROUNDING POPULATION: (X) Residential (X) Industrial (X) Rural ( ) Urban

ANTICIPATED LEVEL OF CHEMICAL EXPOSURE:

Low levels.

CONTINGENCY PLANS: Summarize below (Evacuation, assembly point, contingency leader)

During an emergency, site workers will gather at an assembly point (to be established during daily health and safety meeting). The SSHO will take the role of contingency leader.

DEVIATION/VARIATIONS FROM APP:

No deviation or variation from the Health and Safety Plan APP is permitted without specific written approval from the Program SSHO and PM. Deviation from the plan for an unforeseen hazard that demands an immediate decision can me made by SSHO and confirmed with the PS as soon as possible.

Do Hazardous Waste Site Workers and Supervisor (s) have Documentation of Required Training and Medical Exams? **(X) Yes** ( ) No, Explain

Do at least two people in the field have current Cardiopulmonary Resuscitation (CPR) and First Aid qualifications? **(X) Yes** ( ) No, Explain

Kim Evers, Sarah Moore and HFA UXO Technician.

PROTECTIVE EQUIPMENT: Protective equipment should be specified by the type of task and site (e.g., soil or groundwater sampling). Indicate type and/or material, as necessary. Use additional pages as necessary.

Primary
TASKS: **Site Sampling, Site Reconnaissance, and Geophysical Survey**
INITIAL LEVEL: A - B - C - **(D)** - Modified (Circle applicable)
UPGRADE CRITERIA: **None – No air monitoring equipment will be used**

Respiratory: **(X) Not needed**
( ) SCBA, Airline: _____
( ) APR: _____
( ) Cartridge: _____
( ) Escape Mask: _____
( ) Other: _____

Head and Eye: ( ) Not needed
(X) Safety Glasses: _____
( ) Face Shield: _____
( ) Goggles: _____
( ) Hard Hat**:** _____

( ) Hearing Protection: _____
Boots: ( ) Not Needed
Boots: **Work Boots/Shoes with slip resistant soles recommended; steel toe boots not required during Geophysical Surveying and sampling**
Overboots: _____

Protective Clothing: **(X) Not Needed**
( ) Encapsulating Suit: _____
( ) Splash Suit: _____
( ) Apron: _____
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Coverall: _____
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves: _____
(X) Gloves: **Nitrile, during sampling**
( ) Overgloves: _____
( )**Other:**

Contingency
TASKS: **NONE**
LEVEL: A - B – C – D - Modified (Circle applicable)
UPGRADE CRITERIA: **Personal Protective Equipment (PPE) Upgrade not expected under this /APP**

Respiratory: **(X) Not needed**
( ) SCBA, Airline: _____
( ) APR: _____
( ) Cartridge: _____
( ) Escape Mask: _____
( ) Other: _____

Head and Eye: **(X) Not needed**
( ) Safety Glasses: _____
( ) Face Shield: _____
( ) Goggles: _____
( ) Hard Hat: _____
_____

Protective Clothing: **(X) Not Needed**
( ) Encapsulating Suit: _____
( ) Splash Suit: _____
( ) Apron: _____
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Coverall: _____
( ) Other: _____

Gloves: **(X) Not needed**
( ) Undergloves: _____
( ) Gloves: _____
( ) Overgloves: _____

( ) Hearing Protection: _____

( ) Other: Specify below

_____

Boots: ( ) Not Needed
Boots:_____

Overboots:_____

MONITORING EQUIPMENT: Monitoring equipment should be specified by task and type of site. Indicate type, as necessary. Attach additional sheets, as necessary.

TASKS: **NONE**

See APP for Calibration Procedures or attach if different. See 8-1 from the Programmatic APP (Alion 2005) for specific monitoring requirements and action levels.

INSTRUMENT	ACTION GUIDELINES
Combustible Gas Indicator **(X) Not needed**	0-10% Lower Explosive Limit (LEL) Continue. 10-20% LEL Potential explosion hazard, continuous monitoring. >20% LEL Explosion hazard; interrupt task/evacuate.
Oxygen (O_2) Percentage:	20.8% - O_2 normal. <20.8% - O_2 deficient, investigate cause. <19.5% O_2 Interrupt task/evacuate.

Type _____

Photoionization Detector Specify
( ) 11.7 ev ( ) 10.2 ev ( ) 09.8 ev ( ) __ ev
Type: Photovac or MiniRAE (circle applicable or list other): _____
(X) Not needed

Flame Ionization Detector Specify:
Type Photovac or Organic Vapor Analyzer (OVA) (circle applicable or list other): _____
(X) Not needed

Detector Tubes Monitor Specify: (Chemical, Range) COMMENTS (Interferences)
Type _____
(X) Not needed

Dust Monitor Specify:
Type _____
(X) Not needed

Radiation Survey Meter

> Background	Contact Radiation Safety Officer (RSO)/SSHO and PM
3 x Background	Notify CIH and stop work
2.5mrem/hr	Interrupt task/evacuate

(X) Not needed Note: Annual Exposure not to exceed 100 mrem/yr or 50 urem/hr average

Other Specify:

DECONTAMINATION PROCEDURES:

Summarize personnel decontamination/containment and disposal method
( ) Not needed

Nitrile Gloves will be disposed of after sampling as general refuse. Wash hands before eating, drinking, and smoking.

Summarize equipment decontamination/containment and disposal method
( ) Not needed

Sampling equipment will be dedicated and disposed of following sample collection as general refuse following sample collection.

Summarize heavy equipment decontamination/containment and disposal method
(X) Not needed

TABLE E-2 SITE INSPECTION SAMPLING (ALL MEDIA) ACTIVITY HAZARD ANALYSIS		
PRINCIPLE STEP	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**
All Activities Related to soil sampling	Slips, Trips, Falls	Keep work area free of excess material and debris.
		Remove all trip hazards by keeping materials/objects organized and out of walkways.
		Be aware of uneven surfaces while walking around sampling locations.
		Keep work surfaces dry when possible.
		Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces.
		Wear sturdy shoes with slip resistant soles.
		Stay aware of footing and do not run.
	Heat/Cold Stress	Take breaks as needed.
		Be aware of weather conditions and dress appropriately.
		Consume adequate food/beverages.
		If possible, adjust work schedule to avoid heat/cold stresses.
	Biological Hazards: Insects, Snakes, Wildlife, Vegetation	Inspect work areas when arriving at a sampling site to identify hazard(s).
		Use insect repellant as necessary.
		Stay alert and safe distance away from biological hazards.
		Wear appropriate PPE including work gloves, long sleeves and pants, and snake chaps if probability of encountering snakes, ticks, poison ivy or oak. Wear bug netting, long sleeves and gloves if working in Black Fly season.
		Workers with allergies should carry antidote kits, if necessary.
	Traffic (including pedestrian)	Notify attendant and/or site owner/manager of work activities and location.
		Set up exclusion zone surrounding work area.
		Wear appropriate PPE including high visibility clothing such as reflective vest if in high traffic areas.
		Inspect area behind vehicle prior to backing and use spotter.
	Fire/Explosion	Ensure type ABC, fully charged fire extinguisher on-site.
		Stop work if hazardous conditions are identified.
	Physical Hazard	Identify electrical utility hazards prior to sampling.

	(Electrical)	Inspect work areas for spark sources, maintain safe distances, properly illuminate work areas, and provide barriers to prevent inadvertent contact.
		Maintain minimum clearance distances for overhead energized electrical lines.
	Physical Hazards (Weather)	Monitor radio for up-to-date severe weather forecasts.
		Discontinue work during thunderstorms and severe weather events.
	MEC Hazards	Follow established MEC avoidance protocols when performing intrusive sampling activities. If MEC is discovered or suspected, use existing access roads to retract from the MEC after completion of sample collection activities.
	Chemical Hazards (including MEC)	Perform environmental monitoring as required in Site Specific Health and Safety Plan (SSHASP). Where appropriate PPE (including nitrile gloves) as indicated in the SSHASP.
	Biological Hazards	Wear proper PPE (including nitrile gloves) and a face shield or goggles when sampling sludge or sediments (if appropriate).
		Wash with soap and water as soon as PPE is removed or when contact or exposure has occurred.

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Vehicle • hand tools	• Inspect PPE prior to each use • Inspect vehicle daily • Use appropriate PPE • Underground hazards require clearance prior to execution • Work area upon arrival on site • Inspect emergency equipment/supplies daily (first aid kit)	• Use and limitations of PPE • Activity Hazard Analysis AHA review • SSHP-review • Valid driver's license • Use and limitations of PPE • Operator will be trained in equipment used • Lifting • AHA-review • SSHP-review • First aid/CPR—at least 2 people on site • Hazardous waste sites require 8-hour annual refresher and supervisor training

TABLE E-3 SITE INSPECTION AND RECONNAISSANCE ACTIVITY HAZARD ANALYSIS		
PRINCIPLE STEP	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**
Driving to site and between site sampling / reconnaissance locations.	Automobile accidents/ personal injury	Follow posted speed limits and obey traffic/roadway signs.
		Always wear your seat belt when driving. In some states it may be the law.
		Follow the "Rules of the Road" including: use your turn signals, use the 2-second rule[1] when following behind a vehicle, and allow vehicles the right of way when they are turning or entering intersections in front of you.
		Review/make yourself familiar with maps and driving directions before beginning the drive to the Site. Do not attempt to drive and review maps/directions at the same time. Pull over and stop your vehicle before looking at maps/directions.
		Do not perform reconnaissance or inspections while driving. Your vehicle should be parked in a safe location when viewing or surveying the Site and vicinity.
		Avoid sudden turns and stops, don't drive recklessly.
		In inclement weather, drive as road conditions allow but at least 5-10 mph below the posted speed limit.
		If feeling drowsy or sleepy do not drive. Below[2] are warning signs of drowsiness or fatigue. Pull over in a safe place if you experience any of these signs to rest.
		Never operate a vehicle under the influence of alcohol or illegal substances
		Keep your eyes on the road.
		Check mirrors on a regular basis during driving so that you aware of other vehicles behind you.
All Activities Related to Site Inspection and reconnaissance	Slips, Trips, Falls	Keep work area free of excess material and debris.
		Remove all trip hazards by keeping materials/objects organized and out of walkways.
		Be aware of uneven surfaces while walking or getting in and out of the vehicle.

TABLE E-3 SITE INSPECTION AND RECONNAISSANCE ACTIVITY HAZARD ANALYSIS		
PRINCIPLE STEP	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**
		Keep work surfaces dry when possible.
		Wear appropriate PPE including slip resistant sturdy shoes or non-slip rubber boots if working on wet or slick surfaces.
		Install rough work surface covers where possible.
		Stay aware of footing and do not run.
	Heat/Cold Stress	Take breaks as needed.
		Be aware of weather conditions and dress appropriately.
		Consume adequate food/beverages.
		If possible, adjust work schedule to avoid heat/cold stresses.
	Biological Hazards: Insects, Snakes, Wildlife, Vegetation	Inspect work areas when arrive at site to identify hazard(s).
		Use insect repellant as necessary.
		Stay alert and safe distance away from biological hazards.
		Wear appropriate PPE including work gloves, long sleeves and pants, and snake chaps if probability of encountering snakes, ticks, poison ivy or oak.
		Workers with allergies should carry antidote kits, if necessary.
	Traffic (including pedestrian)	Notify attendant and/or site owner/manager of work activities and location.
		Utilize cones, signs, flags and/or other traffic control devices as outlined in the Traffic Control Plan.
		Set up exclusion zone surrounding work area.
		Wear appropriate PPE including high visibility clothing such as reflective vest.
		Inspect area behind vehicle prior to backing and use spotter.
	Fire/Explosion	Ensure type ABC, fully charged fire extinguisher on-site.
		Stop work if hazardous conditions are identified.
	Physical Hazard (Electrical)	Identify electrical utility hazards prior to reconnaissance if possible.
		Inspect work areas for spark sources, maintain safe distances, properly illuminate work areas, and provide barriers to prevent inadvertent contact.
		Maintain minimum clearance distances for overhead energized electrical lines as specified in the GHASP.

TABLE E-3 SITE INSPECTION AND RECONNAISSANCE ACTIVITY HAZARD ANALYSIS			
PRINCIPLE STEP	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**	
	Physical Hazards (Weather)	Monitor radio for up-to-date severe weather forecasts.	
		Discontinue work during thunderstorms and severe weather events.	
	MEC Hazards	Follow established MEC avoidance protocols when performing site reconnaissance activities. If MEC is discovered or suspected, use existing access roads to retract from the area containing MEC after documenting coordinates and collecting samples (if appropriate).	
EQUIPMENT TO BE USED		**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
• Vehicle		• Inspect PPE prior to each use • Inspect vehicle daily	• AHA-review • SSHP-review • Valid driver's license • Use and limitations of PPE • First aid/CPR—at least 2 people on site • Hazardous waste sites require 8-hour annual refresher and supervisor training

1. "Two second rule" works by the driver choosing an object along the road in front of them. As the vehicle in front of them passes it, count aloud, slowly, "one thousand one, one thousand two." If you reach the object before you finish counting, you are following too closely. Allow the other vehicle to get further ahead. In bad weather, increase the count to three or four seconds for extra space.

2. Warning signs of drowsiness
or fatigue:
- can't remember the last few miles driven
- have wandering or disconnected thoughts
- experience difficulty focusing or keeping your eyes open
- have trouble keeping your head up
- drift from lanes or hit a rumble strip
- yawn repeatedly
- tailgate or miss traffic signs

TABLE E-3 SITE INSPECTION AND RECONNAISSANCE ACTIVITY HAZARD ANALYSIS		
PRINCIPLE STEP	**POTENTIAL SAFETY/HEALTH HAZARDS**	**RECOMMENDED CONTROLS**

- find yourself jerking your vehicle back into lane

If you find yourself experiencing the above, you may be suffering from drowsiness or fatigue. Continuing to drive in this condition puts you at serious risk of being involved in a fatigue-related crash. You should pull over in a safe place and get some rest before resuming your trip.

TABLE E-4 SOIL SAMPLING ACTIVITY HAZARD ANALYSIS		
Task	**Potential Hazards**	**Hazard Control Measures**
MOBILIZATION / DEMOBILIZATION	Physical Hazards (slips, trips, fall, cuts, etc.)	□ Clear walkways, work areas of equipment, tools, debris. □ Watch for accumulation of water work surfaces. □ Mark, identify, or barricade obstructions. □ Wear cut-resistant work gloves when the possibility of lacerations or other injury caused by sharp or protruding objects occurs. □ Wear sturdy shoes with slip resistant soles.
	Physical Hazards (Material Handling, Moving, Lifting)	□ Observe proper lifting techniques. □ Obey sensible lifting limits (60 lb maximum per person manual lifting). □ Use mechanical lifting equipment (hand carts, trucks, etc.) to move large awkward loads. □ Use two or more persons for heavy bulk lifting.
	Physical Hazards (Vehicle and Pedestrian Traffic)	□ Use orange traffic cones where necessary. □ Use reflective warning vests if exposed to vehicular traffic. □ Locate staging areas in locations with minimal traffic.
	Physical Hazards (Cold Stress /Heat Stress)	□ Monitor of cold/heat stress as recommended.
	MEC Hazard	□ Practice site reconnaissance with a trained, experienced MEC specialist capable of recognizing MEC hazards. If MEC is discovered, use existing access roads to retract from the MEC.
	Biological Hazards (insects, poisonous plants, ticks)	□ Wear protective outer clothing and insect repellant to avoid insect bites and ticks. □ Wear long sleeve shirts when working in areas with poison ivy or oak. □ Workers with allergies should carry antidote kits, if necessary.
SAMPLING ACTIVITIES	Physical Hazards (slips, trips, fall, cuts, etc.)	□ Clear walkways, work areas of equipment, tools, debris. □ Watch for accumulation of water work surfaces. □ Mark, identify, or barricade obstructions. □ Wear cut-resistant work gloves when the possibility of lacerations or other injury caused by sharp or protruding objects occurs. □ Wear sturdy shoes with slip resistant soles.

TABLE E-4 SOIL SAMPLING ACTIVITY HAZARD ANALYSIS		
Task	**Potential Hazards**	**Hazard Control Measures**
	Physical Hazard (Electrical)	□ Identify electrical utility hazards prior to sampling. □ Inspect work areas for spark sources, maintain safe distances, properly illuminate work areas, and provide barriers to prevent inadvertent contact. □ Maintain minimum clearance distances for overhead energized electrical lines as specified in the General Health and Safety Plan (GHASP).
	Physical Hazards (Weather)	□ Monitor radio for up-to-date severe weather forecasts. □ Discontinue work during thunderstorms and severe weather events.
	Physical Hazards (Cold Stress /Heat Stress)	□ Monitor of cold/heat stress as recommended in Section 6 of the GHASP.
	MEC Hazards	□ Follow established MEC avoidance protocols when performing intrusive sampling activities. If MEC is discovered or suspected, use existing access roads to retract from the MEC.
	Chemical Hazards (including MEC)	□ Perform environmental monitoring as required in SSHASP. Where appropriate PPE as indicated in the SSHASP.
	Biological Hazards (Bloodborne pathogens)	□ Wear proper PPE including nitrile gloves and a face shield or goggles when sampling sludge. □ Wash with soap and water as soon as PPE is removed or when contact or exposure has occurred.
	Biological Hazards (insects, poisonous plants, ticks)	□ Wear protective outer clothing and insect repellant to avoid insect bites and ticks. □ Wear long sleeve shirts when working in areas with poison ivy or oak. □ Workers with allergies should carry antidote kits, if necessary.

APPENDIX F – LOGS AND FORMS USED DURING THE SITE INSPECTION

HEALTH AND SAFETY PLAN REVIEW RECORD

SITE: _____

ALION Project No._____

I have read the Health and Safety Plan (s) and have been briefed on the nature, level, and degree of exposure likely as a result of participation of field activities. I agree to conform to all the requirements of this Plan.

Name	Signature	Affiliation	Date

SITE ENTRY AND EXIT LOG

Project/Site : _____

Project No.: _____

Date	Name	Representing	Time In	Time Out

DAILY SITE SAFETY JOURNAL
Page 1 of 2

DATE:	**PROJECT:**
Field UXO Technician:	

AREA / ITEMS INSPECTED	**SAT**	**UNSAT**
Proper work attire (PPE)		
Vehicle condition		
Emergency equipment		
Safe demolition procedures		
Field office, inside		
Field office grounds		

[ ] Last Work Days Events
[ ] Site Description
[ ] Work Area Description
[ ] Work Area Hazards
[ ] On-Site Emergency
[ ] Site Evacuation Procedures
[ ] Emergency Response Personnel
[ ] Emergency Telephone Numbers
[ ] Directions to Hospital
[ ] First Aid
[ ] Heat / Cold Stress
[ ] Asbestos Awareness & ID
[ ] Ticks
[ ] Safety Concerns
[ ] Personnel Protective Equipment
[ ] Safe Work Practices
[ ] Emergency Response Plan
[ ] Chemical Hazards
[ ] Emergency Equipment, Location
[ ] Emergency Equipment, by Type
[ ] Emergency Decontamination
[ ] Safe Work Practices - General
[ ] Site specific OE Safety Precautions
[ ] Site specific OE Identification Features
[ ] Liquid Contaminates / Landfill Material
[ ] Other _____

Comments:

UXO Technician in Field SIGNATURE:

DAILY SITE SAFETY JOURNAL
MEETING ATTENDEES
DATE: _____
Page 2 of 2

	Name	Affiliation
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

Alion Science and Technology, Inc.

DAILY QUALITY CONTROL REPORT

Report Number:		Date:
Project Name:		Contract Number:
Location of Work:		
Description of Work:		
Weather:	Rainfall:	Temperature: Min. Max.
1. Work performed today by Alion.		
2. Work performed today by Subcontractors.		
3. Type and results of Control Phases and Inspection. (Indicate whether Preparatory – P, Initial – I, or Follow-Up – F and include satisfactory work completed or deficiencies with actions to be taken)		
4. List type and location of tests performed and results of these tests.		
5. List material and equipment received.		

Alion Science and Technology, Inc.

DAILY QUALITY CONTROL REPORT

6. Submittals reviewed. (Include Transmittal No., Item No., Spec/Plan Reference, by whom, and any action.
7. Off-site surveillance activities, including action taken.
8. Job Safety. (Report safety violations observed and actions taken)
9. Remarks. (Instructions received or given. Conflicts in Plans or Specifications)

Alion Science and Technology, Inc's Verification: On behalf of Alion, I certify this report is complete and correct, and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications, to the best of my knowledge, except as noted above.

_____

Quality Control System Manager (or site UXO representative)

APPENDIX G –THREATENED AND ENDANGERED SPECIES CONSULTATION RESPONSE LETTERS FOR THE STATE OF NEW YORK

New York State Department of Environmental Conservation
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, Albany, New York 12233-4757
Phone: (518) 402-8935 • **FAX:** (518) 402-8925
www.dec.state.ny.us

Alexander B. Grannis
Commissioner

November 3, 2009

Corinne Shia
Alion Science & Technology
3975 Fair Ridge Drive, Suite 125
Fairfax, VA 22033

Dear Ms. Shia:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to an Environmental Assessment for the former Madison Barracks Target Range, site as indicated on the map you provided, located in the Town of Henderson, Jefferson County, New York State.

Enclosed is a report of rare or state-listed animals and plants, significant natural communities, and other significant habitats, which our databases indicate occur, or may occur, on your site or in the immediate vicinity of your site. The information contained in this report is considered sensitive and should not be released to the public without permission from the New York Natural Heritage Program.
PLEASE NOTE: This Project is within Robert Wehle State Park.

The presence of the plants and animals identified in the enclosed report may result in this project requiring additional review or permit conditions. For further guidance, and for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the appropriate NYS DEC Regional Office, Division of Environmental Permits, at the enclosed address.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our databases. We cannot provide a definitive statement on the presence or absence of all rare or state-listed species or significant natural communities. This information should not be substituted for on-site surveys that may be required for environment impact assessment.

Our databases are continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

Sincerely,
Tara Salerno
Tara Salerno, Information Services
New York Natural Heritage Program

Enc.
cc: Reg. 6, Wildlife Mgr.
Reg. 6, Fisheries Mgr.
Tom Lyons, NYS OPRHP, Empire State Pl, Bldg. 1, Albany, 12238 17th floor

Natural Heritage Report on Rare Species and Ecological Communities

NY Natural Heritage Program, NYS DEC, 625 Broadway, 5th Floor, Albany, NY
12233-4757
(518) 402-8935

~This report contains **SENSITIVE** information that should not be released to the public without permission from the NY Natural Heritage Program.
~Refer to the User's Guide for explanations of codes, ranks and fields.
~Location maps for certain species and communities may not be provided 1) if the species is vulnerable to disturbance, 2) if the location and/or extent is not precisely known, 3) if the location and/or extent is too large to display, and/or 4) if the animal is listed as Endangered or Threatened by New York State.

Natural Heritage Report on Rare Species and Ecological Communities

COMMUNITIES

Calcareous shoreline outcrop

This occurrence of Calcareous Shoreline Outcrop is considered significant from a statewide perspective by the NY Natural Heritage Program. It is either an occurrence of a community type that is rare in the state or a high quality example of a more common community type. By meeting specific, documented significance criteria, the NY Natural Heritage Program considers this occurrence to have high ecological and conservation value.

Office Use

NY Legal Status:	Unlisted	**NYS Rank:**	S2	5110
Federal Listing:		**Global Rank:**	G3G4	
Last Report:	2008-06-25	**EO Rank:**		
County:	Jefferson			
Town:	Henderson			
Location:	Stony Point Shore			

Directions: The limestone ledges occur along the east shore of Lake Ontario, along the southwest, west, and northwest shores of Stony Point. The outcrops extend from northwest of the junction of Boyce Road and Military Road, southwest about 2.5 mi to Gravely Bay; and in smaller patches between sections of cobble shore north of the lighthouse, southeast of the lighthouse, and east of Boomer Cove in Ray Bay. From Route 3 in Henderson, go west about 4 miles on Route 178 (Military Road) towards Lake Ontario.

General Quality and Habitat: This moderately sized shoreline outcrop is in fair to good condition. The best quality areas of the community are along the 2.5 mile section of northwest shore where ledges are narrow, sparsely vegetated but little disturbed, and bordered by woodland. South and southwest shores are somewhat broader, but much more disturbed and weedy, and with more development upslope. This community is comprised of extensive, sparsely vegetated limestone ledges along the east shore of Lake Ontario, on the northwest, west, and southwest shores of Stony Point. At the northwest end, the ledges are below high limestone cliffs, with limestone woodland above the cliffs. Moving southwest, the shoreline is bordered above by low bluffs, limestone woodland, and calcarous pavement barrens. There are cobble shores along Gravely Bay and many residential properties on adjacent uplands. Broader, but more disturbed shore ledges occur near the lighthouse and in patches along Ray Bay, especially east of Boomer Cove. The uplands along this south shore of Stony Point are more disturbed, with several residential properties.

Calcareous pavement barrens

This occurrence of Calcareous Pavement Barrens is considered significant from a statewide perspective by the NY Natural Heritage Program. It is either an occurrence of a community type that is rare in the state or a high quality example of a more common community type. By meeting specific, documented significance criteria, the NY Natural Heritage Program considers this occurrence to have high ecological and conservation value.

Office Use 6493

NY Legal Status: Unlisted
NYS Rank: S1S2
Federal Listing:
Global Rank: G3
Last Report: 2008-06-25
EO Rank:
County: Jefferson
Town: Henderson
Location: Stony Point Barrens
Directions: The barrens are on the western half of Stony Point. From the junction of Ray Bay Road and Lighthouse Road, go west on Lighthouse Road. The barrens are on the north and south sides of Lighthouse Road starting approximately 0.2 miles west of Ray Bay Road,and extending in large patches west nearly to the Lake Ontario shore. To access the western side of the barrens, take Military Road west to Robert G. Wehle State Park. Park in lot and walk south along trails and old roads to the barrens.

General Quality and Habitat: This is a large barrens in a moderately small landscape that is somewhat fragmented. It has been very disturbed and degraded by past grazing and the presence of many exotics. The viability of this barrens is highly threatened. This open pavement barrens occurs in a mosaic of limestone woodlands, small wet meadows, and hardwood swamps on the western half of Stony Point. The pavement barrens and limestone woodlands extend west and south towards the edge of limestone ledges and cliffs along the Lake Ontario shore, but are fragmented by four stretches of road. Residential development lies to the southwest along the lake. The barrens and woodlands are from about 1 to 18 m above the elevation of lakeshore ledges.

VASCULAR PLANTS

Ulmus thomasii

Cork Elm

Office Use 12871

NY Legal Status: Threatened
NYS Rank: S2S3 - Imperiled
Federal Listing:
Global Rank: G5 - Secure
Last Report: 2008-06-25
EO Rank: Good or Fair
County: Jefferson
Town: Henderson
Location: Stony Point
Directions: From Route 3 in Henderson, go west on Route 178 (Military Road) towards Lake Ontario, following signs to Robert G. Wehle State Park. Continue on Route 178 about 3 miles until the road becomes North Schoolhouse Road. Turn into the entrance for Robert G. Wehle State Park. Group 1: From the parking area, follow the Yellow Trail southwest about 0.6 miles. The plants are at the intersection of the Yellow Trail and the Midge Trail. GPS coordinates in meters (UTM Zone 18 NAD83 Datum) are 397606 E, 4857868 N.

General Quality and Habitat: The population is of moderate size and there is evidence of reproduction. The landscape is protected but heavily impacted by invasive species. The trees are growing in openings within limestone woodland and calcareous pavement barrens communities. The land is flat and was formerly cleared for pasture and military use. The canopy is dominated by Juniperus virginiana and Carya spp. There is a dense understory of Cynanchum rossicum.

---

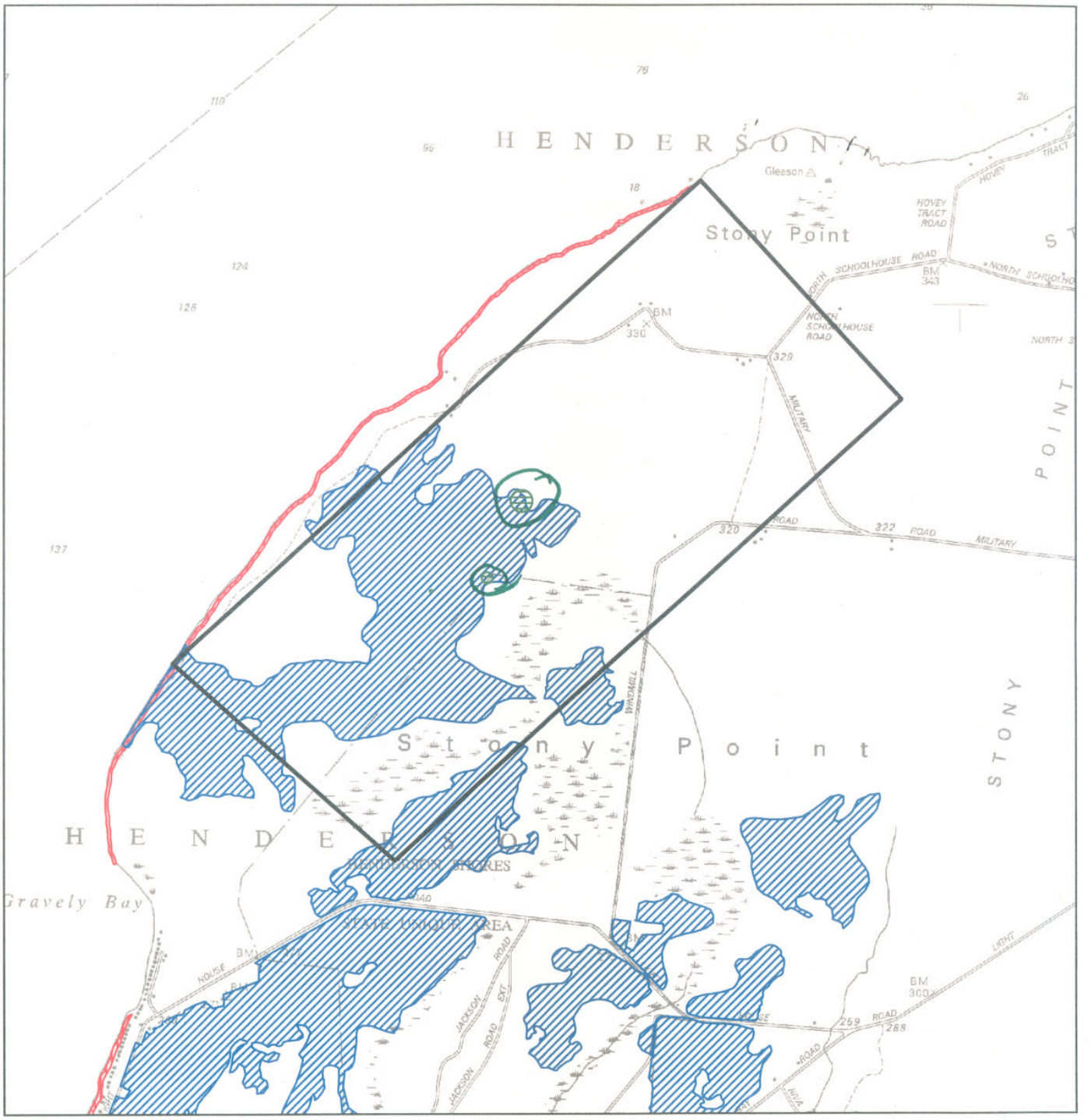
3 Records Processed

More detailed information about many of the rare and listed animals and plants in New York, including biology, identification, habitat, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.acris.nynhp.org, from NatureServe Explorer at http://www.natureserve.org/explorer, from NYSDEC at http://www.dec.ny.gov/animals/7494.html (for animals), and from USDA's Plants Database at http://plants.usda.gov/index.html (for plants).

More detailed information about many of the natural community types in New York, including identification, dominant and characteristic vegetation, distribution, conservation, and management, is available online in Natural Heritage's Conservation Guides at www.acris.nynhp.org. For descriptions of all community types, go to http://www.dec.ny.gov/animals/29384.html and click on Draft Ecological Communities of New York State.

Natural Heritage Map of Rare Species and Ecological Communities

Prepared October 22, 2009 by the NY Natural Heritage Program, NYS DEC Albany, NY



Legend

- Project Site

NY Natural Heritage Program Database Records*

- Calcareous Pavement Barrens
- Calcareous Shoreline Outcrop
- Cork Elm

1:24,000

0 0.15 0.3 0.6 0.9 1.2 Miles

*The locations that are displayed are considered sensitive and should not be released to the public without permission. We do not provide map locations for all records. Please see report for details.

N W E S

USERS GUIDE TO NY NATURAL HERITAGE DATA

New York Natural Heritage Program, 625 Broadway, 5th Floor, Albany, NY 12233-4757 phone: (518) 402-8935

NATURAL HERITAGE PROGRAM: The NY Natural Heritage Program is a partnership between the NYS Department of Environmental Conservation (NYS DEC) and The Nature Conservancy. Our Mission is to facilitate the conservation of New York's biodiversity by providing comprehensive information and scientific expertise on rare species and natural ecosystems to resource managers and other conservation partners. We accomplish this mission by combining thorough field inventories, scientific analyses, expert interpretation, and the most comprehensive database on New York's distinctive biodiversity to deliver the highest quality information for natural resource planning, protection, and management.

DATA SENSITIVITY: The data provided in the report are ecologically sensitive and should be treated in a sensitive manner. The report is for your in-house use and should **not** be released, distributed or incorporated in a public document without prior permission from the Natural Heritage Program.

EO RANK: A letter code for the quality of the occurrence of the rare species or significant natural community, based on population size or area, condition, and landscape context.

A-E = Extant: A=Excellent, B=Good, C=Fair, D=Poor, E=Extant but with insufficient data to assign a rank of A-D.
F = Failed to find. Did not locate species during a limited search, but habitat is still there and further field work is justified.
H = Historical. Historical occurrence without any recent field information.
X = Extirpated. Field/other data indicates element/habitat is destroyed and the element no longer exists at this location.
U = Extant/Historical status uncertain.
Blank = Not assigned.

LAST REPORT: The date that the rare species or significant natural community was last observed at this location, as documented in the Natural Heritage databases. The format is most often YYYY-MM-DD.

NY LEGAL STATUS – Animals:

Categories of Endangered and Threatened species are defined in New York State Environmental Conservation Law section 11-0535. Animals listed as Endangered, Threatened, or Special Concern are protected against taking, importation, transportation, possession, or sale without a permit. Endangered, Threatened, and Special Concern species are listed in regulation 6NYCRR 182.5.

E - Endangered Species: any species which meet one of the following criteria:
- Any native species in imminent danger of extirpation or extinction in New York.
- Any species listed as endangered by the United States Department of the Interior, as enumerated in the Code of Federal Regulations 50 CFR 17.11.

T - Threatened Species: any species which meet one of the following criteria:
- Any native species likely to become an endangered species within the foreseeable future in NY.
- Any species listed as threatened by the U.S. Department of the Interior, as enumerated in the Code of the Federal Regulations 50 CFR 17.11.

SC - Special Concern Species: those species which are not yet recognized as endangered or threatened, but for which documented concern exists for their continued welfare in New York.

P - Protected Wildlife (defined in Environmental Conservation Law section 11-0103): wild game, protected wild birds, and endangered species of wildlife.

U - Unprotected (defined in Environmental Conservation Law section 11-0103): the species may be taken at any time without limit; however a license to take may be required.

G - Game (defined in Environmental Conservation Law section 11-0103): any of a variety of big game or small game species as stated in the Environmental Conservation Law; many normally have an open season for at least part of the year, and are protected at other times.

NY LEGAL STATUS – Plants:

The following categories are defined in regulation 6NYCRR part 193.3 and apply to NYS Environmental Conservation Law section 9-1503.

E - Endangered Species: listed species are those with:
- 5 or fewer extant sites, or
- fewer than 1,000 individuals, or
- restricted to fewer than 4 U.S.G.S. 7 ½ minute topographical maps, or
- species listed as endangered by U.S. Dept. of Interior, as enumerated in Code of Federal Regulations 50 CFR 17.11.

T - Threatened: listed species are those with:
- 6 to fewer than 20 extant sites, or
- 1,000 to fewer than 3,000 individuals, or
- restricted to not less than 4 or more than 7 U.S.G.S. 7 and ½ minute topographical maps, or
- listed as threatened by U.S. Department of Interior, as enumerated in Code of Federal Regulations 50 CFR 17.11.

R - **Rare**: listed species have:
- 20 to 35 extant sites, or
- 3,000 to 5,000 individuals statewide.

V - **Exploitably vulnerable**: listed species are likely to become threatened in the near future throughout all or a significant portion of their range within the state if causal factors continue unchecked.

U - **Unprotected**; no state status.

FEDERAL STATUS (PLANTS and ANIMALS): The categories of federal status are defined by the United States Department of the Interior as part of the 1974 Endangered Species Act (see Code of Federal Regulations 50 CFR 17). The species listed under this law are enumerated in the Federal Register vol. 50, no. 188, pp. 39526 - 39527. The codes below without parentheses are those used in the Federal Register. The codes below in parentheses are created by Heritage to deal with species which have different listings in different parts of their range, and/or different listings for different subspecies or varieties.

(blank) = No Federal Endangered Species Act status.
LE = Formally listed as endangered.
LT = Formally listed as threatened.
C = Candidate for listing.
LE,LT = Formally listed as endangered in part of its range, and as threatened in the other part; or, one or more subspecies or varieties is listed as endangered, and the others are listed as threatened.
LT,PDL = Populations of the species in New York are formally listed as threatened, and proposed for delisting.

GLOBAL AND STATE RANKS (animals, plants, ecological communities and others): Each element has a global and state rank as determined by the NY Natural Heritage Program. These ranks carry no legal weight. The global rank reflects the rarity of the element throughout the world and the state rank reflects the rarity within New York State. Infraspecific taxa are also assigned a taxon rank to reflect the infraspecific taxon's rank throughout the world. ? = Indicates that the state or global rank is uncertain and more information is needed. Range ranks, e.g. S1S2, indicate not enough information is available to distinguish between two ranks.

GLOBAL RANK:

G1 - **Critically imperiled** globally because of extreme rarity (5 or fewer occurrences), or very few remaining acres, or miles of stream) or especially vulnerable to extinction because of some factor of its biology.

G2 - **Imperiled** globally because of rarity (6 - 20 occurrences, or few remaining acres, or miles of stream) or very vulnerable to extinction throughout its range because of other factors.

G3 - **Vulnerable**: Either rare and local throughout its range (21 to 100 occurrences), or found locally (even abundantly at some of its locations) in a restricted range (e.g. a physiographic region), or vulnerable to extinction throughout its range because of other factors.

G4 - **Apparently secure** globally, though it may be quite rare in parts of its range, especially at the periphery.

G5 - **Demonstrably secure** globally, though it may be quite rare in parts of its range, especially at the periphery.

GH - Historically known, with the expectation that it might be rediscovered.

GX - Species believed to be extinct.

GU - Lack of information or substantial conflicting information about status or trends makes ranking infeasible at this time.

NYS RANK:

S1 - **Critically imperiled**: Typically 5 or fewer occurrences, very few remaining individuals, acres, or miles of stream, or some factor of its biology making it especially vulnerable in New York State.

S2 - **Imperiled**: Typically 6 to 20 occurrences, few remaining individuals, acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State.

S3 - **Vulnerable**: Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State.

S4 - Apparently secure in New York State.

S5 - Demonstrably secure in New York State.

SH - Historically known from New York State, but not seen in the past 20 years.

SX - Apparently extirpated from New York State.

SU - Lack of information or substantial conflicting information about status or trends makes ranking infeasible at this time.

SxB and SxN, where Sx is one of the codes above, are used for migratory animals, and refer to the rarity within New York State of the breeding (B)populations and the non-breeding populations (N), respectively, of the species.

TAXON (T) RANK: The T-ranks (T1 - T5) are defined the same way as the Global ranks (G1 - G5), but the T-rank refers only to the rarity of the subspecific taxon.

T1 through T5 - See Global Rank definitions above.

Q - Indicates a question exists whether or not the taxon is a good taxonomic entity.

Revised December, 2008

New York State Department of Environmental Conservation

Regional Permit Administrators

Region	Counties	Regional Permit Administrator
1	Nassau & Suffolk FAX: 631-444-0360	Roger Evans NYSDEC 50 Circle Rd SUNY @ Stony Brook Stony Brook, NY 11790-3409 631-444-0365 631-444-0355 (Duty Analyst-M,W&F only)
2	New York City, (Boroughs of Manhattan, Brooklyn, Bronx, Queens & Staten Island) FAX: 718-482-4975	John Cryan NYSDEC One Hunters Point Plaza 47-40 21st St. Long Island City, NY 11101-5407 718-482-4997
3	Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster & Westchester FAX: 845-255-3042	Margaret Duke NYSDEC 21 South Putt Corners Rd. New Paltz, NY 12561-1620 845-256-3054
4	Albany, Columbia, Greene, Montgomery, Rensselaer & Schenectady FAX:518-357-2460	William Clarke NYSDEC 1130 North Westcott Rd. Schenectady, NY 12306-2014 518-357-2069
4 (sub-office)	Delaware, Otsego & Schoharie FAX: 607-652-2342	Kent Sanders* NYSDEC 65561 State Highway - Route 10 HCR #1, Box 3A Stamford, NY 12167-9503 607-652-7741
5	Clinton, Essex, Franklin & Hamilton FAX: 518-897-1394	Michael McMurray NYSDEC Route 86, P.O. Box 296 Ray Brook, NY 12977-0296 518-897-1234
5 (sub-office)	Fulton, Saratoga, Warren & Washington	Marc Migliore* NYSDEC

http://www.dec.ny.gov/about/39381.html 8/20/2009

	FAX: 518-623-3603	P.O. Box 220 232 Golf Course Rd. Warrensburg, NY 12885-0220 518-623-1281
6	Jefferson, Lewis & St. Lawrence FAX: 315-785-2242	Larry Ambeau NYSDEC State Office Bldg. 317 Washington St. Watertown, NY 13601-3787 315-785-2245 or 2246
6 (sub-office)	Herkimer & Oneida FAX: 315-793-2748	Patrick Clearey* NYSDEC State Office Building 207 Genesee St. Utica, NY 13501-3787 315-793-2555
7	Cayuga, Madison, Onondaga & Oswego FAX: 315-426-7425	John Feltman NYSDEC 615 Erie Blvd. West (Env. Permits Room 206) Syracuse, NY 13204-2400 315-426-7438
7 (sub-office)	Broome, Chenango, Cortland, Tioga & Tompkins FAX: 607-753-8532	Michael Barylski* NYSDEC 1285 Fisher Ave. Cortland, NY 13045-1090 607-753-3095
8	Chemung, Genesee, Livingston, Monroe, Ontario, Orleans, Schuyler, Seneca, Steuben, Wayne & Yates FAX: 585-226-2830	Peter Lent NYSDEC 6274 East Avon Lima Rd. Avon, NY 14414-9519 585-226-5400
9	Erie, Niagara & Wyoming FAX: 716-851-7168	Steve Doleski NYSDEC 270 Michigan Ave. Buffalo, NY 14203-2999 716-851-7165
9 (sub-office)	Allegany, Cattaraugus, & Chautauqua FAX: 716-372-2113	Charles Cranston* NYSDEC Suite 3, 182 East Union Allegany, NY 14706-1328 716-372-0645

*Deputy Regional Permit Administrator

http://www.dec.ny.gov/about/39381.html 8/20/2009

NEW YORK STATE OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION

New York State Office of Parks, Recreation and Historic Preservation

The Governor Nelson A. Rockefeller Empire State Plaza • Agency Building 1, Albany, New York 12238
www.nysparks.com

David A. Paterson
Governor

Carol Ash
Commissioner

October 28, 2009

Kimberly Evers
Environmental Scientist
Alion Science and Technology
3975 Fair Ridge Drive
Suite 125 South
Fairfax, VA 22033

Dear Ms. Evers:

Enclosed is a copy of the "Rare Species and Ecological Communities of Wehle State Park" prepared by the New York Natural Heritage Program dated November 25, 2008 for your use in the ordinance study at the park. We encourage you to consult with Julie Lundgren, State Park Ecologist, if you require additional information or evaluation pertaining to the Natural Heritage process or data contained in the reports.

If you have any questions, please do not hesitate to give Edwina Belding a call at (518) 474-6703.

Sincerely,

Thomas B. Lyons
Director, Resource Management

Enclosure

cc: Dan Heneka
Edwina Belding
Christina Croll
Julie Lundgren
D.J. Evans

Rare Species and Ecological Communities of Robert G. Wehle State Park

Prepared for
New York State Office of Parks, Recreation and Historic Preservation
Environmental Management Bureau
Empire State Plaza, Agency Bldg. 1, 17th floor
Albany, NY 12238

by

Julie A. Lundgren and Kimberly J. Smith
NYS OPRHP and New York Natural Heritage Program
Albany, NY
Nov 25, 2008

The New York Natural Heritage Program

625 Broadway, 5th Floor; Albany NY 12233-4757
518-402-8935 Fax 518-402-8925
www.nynhp.org

The New York Natural Heritage Program is a partnership between the New York State Department of Environmental Conservation (NYS DEC) and The Nature Conservancy. Our mission is to facilitate conservation of rare animals, rare plants, and significant natural communities (e.g., different types of forests, wetlands, grasslands). We accomplish this mission by providing comprehensive information and scientific expertise on rare species and natural ecosystems to resource managers and other conservation partners.

New York Natural Heritage was established in 1985 and is based in NYS DEC's Division of Fish, Wildlife, & Marine Resources. The program is staffed by more than 30 scientists and specialists with expertise in ecology, zoology, botany, information management, and computer mapping.

New York Natural Heritage maintains New York's most comprehensive database on the status and location of rare species and natural communities. We presently monitor the status of more than 174 natural community types, 750 rare plant species, and 415 rare animal species across New York, keeping track of more than 12,000 locations where these species and communities are found. The database also includes detailed information on the relative rareness of each species and community, the quality of their occurrences, and descriptions of sites. The information is used by public agencies, the environmental conservation community, developers, and others to aid in land-use decisions. Our data are essential for prioritizing those species and communities in need of protection and for guiding land-use and land-management decisions where these species and communities exist.

In 1990, New York Natural Heritage published *Ecological Communities of New York State*, an all inclusive classification of natural and human-influenced communities. From 40,000-acre beech-maple mesic forests to 40-acre maritime beech forests, sea-level salt marshes to alpine meadows, our classification quickly became the primary source for natural community classification in New York and a fundamental reference for natural community classifications in the northeastern United States and southeastern Canada. This classification, which has been continually updated as we gather new field data, has also been incorporated into the International Vegetation Classification that is being developed and refined by NatureServe, The Nature Conservancy, and Natural Heritage Programs throughout the United States.

New York Natural Heritage is an active participant in NatureServe, the international network of biodiversity data centers. There are currently Natural Heritage Programs in all 50 states and 21 Conservation Data Centers (the international equivalent of Natural Heritage Programs) in Canada, Latin America, and the Caribbean. These programs work with NatureServe to develop biodiversity data, maintain compatible standards for data management, and provide information about rare species and natural communities that is consistent across many geographic scales – from ¼-acre wetland sites to the North American continent.

Front cover photos of Wehle State Park by Julie Lundgren, OPRHP and NYNHP

NYNHP and OPRHP

THIS REPORT CONTAINS SENSITIVE DATA

This report is for **internal use only**, and **not for public distribution.**

This report contains information regarding the locations of rare species. This information is considered sensitive. The release of information that identifies the locations of rare species or their habitats may lead to the collection or disturbance of the animals and plants at those locations. NYS DEC has the legal authority, under New York State Environmental Conservation Law, to restrict access to such information. The following guidelines for the release of Natural Heritage data will help ensure that the species involved are not harmed.

Information in this report on the precise location of rare species is for the internal use of NYS Office of Parks, Recreation and Historic Preservation (OPRHP) only. Any part of this report, or any documents or maps that are prepared using the data in this report and that will be available to the public, should not identify the precise locations of rare species within state lands. Maps made available to the public should generalize the information available in the report; i.e., they should obscure precise locations within larger, more general areas of environmental sensitivity and should not include species names. Documents made available to the public should only indicate the presence of a species but not specify its precise location. For assistance in designing maps and documents suitable for public distribution which deal with rare species, please contact OPRHP EMB Natural Heritage Scientists or the GIS Specialist/Natural Resource Planner. Requests by outside parties should go directly to OPRHP as well, but may be referred to the New York Natural Heritage Program where precise locational information, electronic data or sensitive species details are requested.

Table of Contents

List of Tables

List of Appendices

I. INTRODUCTION

A. Purpose of the Biodiversity Inventory

The New York State Office of Parks, Recreation and Historic Preservation (OPRHP) manages nearly 325,000 acres in parks and historic sites across New York State. These parks contain a number of New York's outstanding natural areas and rare species habitats. In order to make informed land-use decisions and balance the full range of objectives, OPRHP needs ecological and biological information on the natural communities, plants, and animals present within their parks. In 1996, NY Natural Heritage Program (NYNHP) began a state park inventory project to collect biological and ecological information within all state parks that contain natural areas. In 2008, a new partnership between OPRHP and NYNHP was formed to continue that inventory effort and to advance the interpretation and application of Heritage information for park planning and management.

The results of this inventory include the identification and documentation of rare and/or high quality natural communities, rare plant species and rare animal species. The reports include descriptions and distributions of the rare plants, animals, and rare and outstanding natural communities within each park, as well as an evaluation of potential threats. Recommendations for the protection and management of these sensitive resources are presented. All data collected are geographically referenced, converted to digital format, and stored in a geographic information system. Products include a hard copy report and maps, digital copy of report and maps (pdf format), and digital data layers for approved GIS users. This information can be used to improve our understanding of New York's biodiversity and as a tool for guiding management and identifying protection priorities within individual parks and across the state park system. In addition, general information about the rare species and natural communities within this report is available to the public at the NY Natural Heritage website (http://guides.nynhp.org).

B. Overview of Robert G. Wehle State Park

Cultural Environment

The 1,087 acre Wehle State Park is located on the eastern shore of Lake Ontario on a prominent headland known as Stony Point. The point was historically known for its treacherous waters and its rough and rocky shores and development was thus concentrated at safer landings to the north and south. The site has a history of sparse habitation, clearing for agriculture (primarily for grazing), and later as a gunnery range before and after World War II. It remained in use as the Stony Point Rifle Range under U.S. Government ownership until 1968 when the parcel was purchased by Robert G. Wehle, owner of the Genesee Brewing Company in Rochester. His family was locally known for other interests as well, including sculpture, conservation, and breeding and training English Pointers – interests which are reflected at the park. The Wehle family sold the property to the state in 1990 with the intention of providing access to the public and in 2003 the site was designated as a State Park under the Office of Parks, Recreation and Historic Preservation. The family manages a generous trust that funds some of the facilities and stewardship of the site. The park provides

large fields, picnic areas, tennis and volleyball courts, scenic shoreline overlooks, as well as wooded and open land with trails for hiking, cross-country skiing, and dog-walking. Hunting is allowed in designated areas during the season. Facilities include the park office, maintainance and storage buildings, rest rooms, parking area and informational kiosk. The family summer home also remains and is rented out on a seasonal basis.

Natural Environment

The park is situated on the shores of Lake Ontario at roughly 250 to 310 feet above sea level. Soils of the area are mapped as Farmington silts, originating from lacustrine silt and clay deposits of glacial origin and underlain by limestone bedrock. Patches of exposed bedrock within some of the grasslands and woodlands give rise to the name of one rare community at the site, the calcareous pavement barrens. Rocky shores and cliffs characterize the three miles of undeveloped shoreline along the western edge. Other ecological communities at the park include open fields, successional woodlands, hardwood forests, and rocky shores and outcrops. Oaks, cedars, hickories, and elm characterize the woodlands and over 24 native tree species have been documented at the park to date.

II. METHODS

A. Heritage Methodology

The Natural Heritage Network is a nation-wide cooperative effort established between The Nature Conservancy and state governments that specializes in compiling biodiversity information by conducting inventories of rare plants, rare animals and ecologically significant natural communities. Aimed at identifying the most sensitive resources in a defined geographic area, The Nature Conservancy spent more than two decades developing and refining the inventory methodology used by Natural Heritage Programs throughout all 50 states, most Canadian Provinces and some Central and South American countries. In 1994, NatureServe (www.natureserve.org) was created to take on this role and the network has grown to 74 Natural Heritage Programs and conservation data centers throughout the Western Hemisphere. These programs work with NatureServe to develop biodiversity data, maintain compatible standards for data management, and provide information about rare species and natural communities that is consistent across many geographic scales. NatureServe and its network of Natural Heritage Programs are the leading source of information about rare and endangered species and threatened ecosystems.

The collaboration of NYNHP with NatureServe and other states helps put the information into a broader context; rarity of species and natural communities are tracked at both state and global scales. For example, the database includes plant species with just a few populations in the world as well as many that are limited to a few populations in New York, but are more abundant outside the state. The data can also be pooled and compared across state lines to facilitate conservation strategies or assessments and to identify where New York's examples are of utmost significance.

Inventory methods typically focus on the identification, documentation and mapping of all occurrences of rare species and significant natural communities. The Heritage Network

considers each plant species, animal species and unique ecological community an **element of biodiversity**, or **element**. The documented locations of rare plants, rare animals, and significant natural communities are considered element occurrences. These terms will be used throughout this report. Note that for this report, all **ecological communities** within the park will be mapped (similar to a land use map which includes natural and cultural types from forests to developed lands), but only the significant natural communities are included in the Heritage database. A **significant natural community** is considered important from a statewide perspective and includes known locations of rare natural community types in New York (such as a sea level fen or alvar grassland) as well as the best known examples of common types (such as beech-maple forest or shrub swamps).

Ecological Community Classification System

In 1990, NY Natural Heritage published Ecological Communities of New York State, an all-inclusive classification of natural and human-influenced communities (Reschke 1990). This classification system is now the primary source for natural community classification in New York and a fundamental reference for natural community classifications in the northeastern United States and southeastern Canada. This classification is continually updated as we gather new field data (Edinger et al. 2002) and has been incorporated into the National Vegetation Classification (Grossman et al. 1998, Sneddon et al. 1998) that is being developed and refined by NatureServe (NatureServe 2003), The Nature Conservancy, and Natural Heritage Programs throughout the United States (including New York).

The Federal Geographic Data Committee has established the International Vegetation Classification as the standard vegetation classification system for use by Federal government agencies and their cooperators (Federal Geographic Data Committee 2008). The International Vegetation Classification has been accepted as the primary systematic taxonomy of vegetation assemblages in North America by the Ecological Society of America and the National Biological Information Infrastructure.

The Coarse Filter/Fine Filter Approach

Heritage inventory methodology works by focusing on the identification, documentation and mapping of all occurrences of rare species and significant ecological communities. A "coarse filter/fine filter" approach is used to identify and prioritize the protection of these significant biological resources. Ecological communities represent a "coarse filter", an analysis of biodiversity at a larger scale than the species level. Their identification and documentation encompasses whole assemblages of plant and animal species, both common and rare. The conservation of good examples of natural communities assures the protection of most of the species that make up the biological diversity of the state.

However, many rare animals and plants have narrow or unusual habitat requirements. These species may "fall through" the coarse filter, and are sometimes not captured within protected communities. Identifying and documenting viable populations of each of the rare species serves as the "fine filter" for protecting the state's biological diversity. This coarse filter/fine filter approach to a natural resources inventory is an efficient means to account for the most sensitive animals, plants, and communities of an area.

Element (Species and Natural Community) Rarity and Vulnerability

The New York Natural Heritage Program statewide inventory efforts revolve around lists of rare species and all types of natural communities known to occur, or to have historically occurred, in the state. These lists are based on a variety of sources including museum collections, scientific literature, information from state and local government agencies, regional and local experts and data from neighboring states. Each natural community and rare species is assigned a rank based on its rarity and vulnerability.

Like all state Heritage Programs, the New York Natural Heritage Program ranking system assesses rarity at two geographic scales. Each community and rare species is assigned a global rank and a state rank. The global rank reflects the rarity of the species or community throughout its range, whereas the state rank indicates its rarity within New York State. Both of these ranks are usually based on the range of the species or community, the number of occurrences, the viability of the occurrences, and the vulnerability of the species or community around the globe or across the state. As new data become available, the ranks may be revised to reflect the most current information. Subspecific taxa are also assigned a taxon rank which indicates the subspecies rank throughout its range. Individuals who are knowledgeable about the range-wide status of each particular species or natural community typically assign global ranks. These knowledgeable individuals may come from either within or outside the Heritage Network. State ranks are assigned by biologists of the New York Natural Heritage Program, with the assistance of other knowledgeable individuals from within or outside the state government. Heritage ranking criteria are enumerated in Table 1 and used throughout this report. The current lists for all of the plants and animals tracked by Natural Heritage can also be found at www.nynhp.org.

Table 1. Explanation of ranks and codes used in Natural Heritage database reports. Each element has a global and state rank as determined by the NY Natural Heritage Program. These ranks carry no legal weight but are believed to accurately reflect the relative rarity given of the species. The global rank reflects the rarity of the element throughout the world and the state rank reflects the rarity within New York State. Infraspecific taxa are also assigned a taxon rank to reflect the infraspecific taxon's rank throughout the world. The Taxon or T-ranks (T1 - T5) are defined like the Global ranks (G1 - G5), but the T-rank *only* refers to the rarity of the subspecific taxon of the species.

GLOBAL RANK

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences), or very few remaining acres, or miles of stream) or especially vulnerable to extinction because of some factor of its biology.

G2 = Imperiled globally because of rarity (6 - 20 occurrences, or few remaining acres, or miles of stream) or very vulnerable to extinction throughout its range because of other factors.

G3 = Either rare or local throughout its range (21 to 100 occurrences), or found locally (even abundantly at some of its locations) in a restricted range (e.g., a physiographic region), or vulnerable to extinction throughout its range because of other factors.

G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

GH = Historically known, with the expectation that it might be rediscovered.

GX = Species believed to be extinct.

GU = Status unknown.

STATE RANK

S1 = Typically 5 or fewer occurrences, very few remaining individuals, acres, or miles of stream, or some factor of its biology making it especially vulnerable in New York State.

S2 = Typically 6 to 20 occurrences, few remaining individuals, acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State.

S3 = Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State.

S4 = Apparently secure in New York State.

S5 = Demonstrably secure in New York State.

SH = Historically known from New York State, but not seen in the past 15 years.

SX = Apparently extirpated from New York State.

SE = Exotic, not native to New York State.

SR = State report only, no verified specimens known from New York State.

SU = Status unknown.

TAXON RANK

T1 - T5 = indicates a rank assigned to a subspecies following the Global Rank definitions above.

Q = indicates a question exists whether or not the taxon is a good taxonomic entity.

? = indicates a question exists about the rank.

Element Occurrence Quality

Individual occurrences of rare plants, rare animals and natural communities are ranked according to their quality, or perceived viability, based on factors such as size, condition, and the landscape context in which they are found. All occurrences of the elements documented in this report have been assigned a quality rank of A – F, H or X (Table 2). Combinations of letters, or intermediate ranks, such as AB, BC and CD are also possible.

Table 2. Explanation of element occurrence quality ranks used in Natural Heritage database reports.

Element Occurrence Rank	Definition
A	EXCELLENT
B	GOOD
C	MARGINAL
D	POOR
E	EXTANT. Existing, but not enough information to rank A-D
F	FAILED TO FIND. Not found at the previously documented site, but potential habitat was observed and /or a more thorough searching needed.
H	HISTORICAL. No recent field information. For animals this means the particular population has not been seen or, in the case of a nest, has not been active within last 15 years. For plants a "historical" rank means that the population has not been observed in greater than 20 years.
X	EXTIRPATED. Believed to no longer exist. In many cases, habitat has been significantly altered and is believed no longer suitable for maintenance of the element.

Plant and animal occurrences, or populations, can be assigned any of the ranks listed above. Species occurrence ranks are based on historical evidence of presence and/or on current population data. The element occurrence rank of a species is determined by evaluating total population size, density, condition, the reproductive health of the population, ecological processes needed to maintain the population, total landscape condition and a series of other factors. Each of these factors is compared against specifications gathered from other populations throughout its global range. A final element occurrence rank is calculated from this comparative review. Generally, an A-ranked occurrence is considered to represent one of the largest, most viable populations within a natural landscape known to support populations of the species. Significant natural communities are also assigned ranks based on quality and are evaluated within the context of the known or hypothesized distribution of that particular community. Several ecological and spatial factors must be considered when determining the element occurrence rank of a community. These include the occurrence size, maturity, evidence and degree of unnatural disturbance, continued existence of important ecological processes, overall landscape context, and existing and potential threats. A-ranked community occurrences are among the largest and highest quality of their type. These community occurrences should be large enough to provide reasonable assurance for long-term viability of component ecological processes. They are essentially undisturbed by humans or have nearly recovered from past human disturbance, typically exhibiting little or no unnatural

fragmentation. Exotic or particularly invasive native species are usually lacking in high quality community occurrences, or, if present, are observed at very low levels.

Heritage Data Collection Priorities

"Significant" natural communities are determined using occurrence quality ranks in conjunction with global and state rarity ranks (Table 3). In this way, communities are documented and mapped in the Heritage Program databases if they are either rare in New York State or are an outstanding example of a more common natural community. Cultural communities (as defined in Reschke 1990 and Edinger et al. 2002) and low-quality examples of common communities are not considered significant on a statewide basis and are therefore not tracked by the Heritage Program. However, some of those areas may still enhance local biodiversity and provide other ecological values.

Table 3. Criteria used by Heritage Programs to determine significant natural communities.

Element Rarity Rank			Element Occurrence Rank
G1, G2	or	S1	all occurrences ranked A-D
G3	or	S2	all occurrences ranked A-C
G3G4	or	S3	all occurrences ranked A-BC
G4, G5	or	S4, S5	all occurrences ranked A-B

Heritage Programs typically maintain data on all plants and animals with fewer than one hundred occurrences statewide. In New York, information is gathered through active field inventory, review of museum records, and solicitation of records from other sources for all species ranked S1 or S2 by the Heritage Program (generally 20 or fewer occurrences statewide) or listed as Endangered or Threatened by the New York State Department of Environmental Conservation (NYSDEC). Information on each species' status and all known occurrences are entered into the computerized Biotics database (www.NatureServe.org), a customized application for spatial data management, tabular data management, data import/export and reconciliation, and reporting. Population locations are recorded using GPS technology or are delineated on official Heritage Program maps and converted to digital format for use in a geographic information system (GIS). In addition, information is gathered on some of the rarer S3 species (21 to 100 occurrences). Many S3 species, along with those ranked S1 and S2, are included on the "Active Inventory List" of the New York Natural Heritage Program.

The Heritage Program also maintains records for other uncommon species and includes them on the Program's "Watch List." These species are usually ranked S3 by the Heritage Program or are listed as Special Concern (animals) or rare (plants) by the New York State Department of Environmental Conservation (NYSDEC). Specific locations and other documentation for these species are maintained in manual files, but are not entered in the computer database or stored in the Heritage Program's GIS.

Information may also be gathered on certain types of "Animal Concentration Areas," such as large bird rookeries, bat hibernacula, raptor concentration areas, and fish concentration areas. These areas are of conservation concern because of their vulnerability during specific seasons of the year when populations occur in large concentrations. Long standing interest on the part of the NYSDEC and the United States Fish and Wildlife Service has contributed to the maintenance of these types of occurrences in Heritage records.However, only the highest quality occurrences of these elements, or those previously identified by NYSDEC as part of the Significant Habitat Unit, are currently being stored in the New York Natural Heritage Program databases and GIS.

Legal Protection for Rare Elements in New York State

Federally Protected Species: The United States Department of the Interior Endangered Species Act of 1974 protects listed plant and animal species from import, export, interstate commerce or sale. Before a species can become federally listed, it must be considered a candidate for federal listing. An explanation of Federal status for species listed under the U.S. Endangered Species Act is described in Appendix A. Additional Federal laws, the Migratory Bird Treaty Act of 1918 and the Marine Mammal Protection Act of 1972, protect migratory birds and marine mammals, respectively.

Animals: Listing on New York's Endangered and Threatened Species List regulates animal protection under New York State's Environmental Conservation Law. Animals listed as endangered or threatened are protected against taking, importation, transportation, possession or sale. Species listed as Special Concern usually have no legal protection unless they are among those taxa covered under a separate piece of federal or state legislation. However, listings of Special Concern indicate elevated interest in the status of the species within the state and serve as a mechanism for monitoring and tracking species that do not quite meet the criteria for active regulation. A summary of the New York State Animal Status definitions is presented in Appendix A.

Plants: New York State's Protected Plant Law, passed in 1974, prohibits the collection or destruction of listed protected plants without prior consent from the landowner. Violations of this law are punishable by a $25.00 fine per stem. The most recent list of endangered, threatened, rare and exploitably vulnerable plants was adopted through rule making in 2000. Criteria for assigning plants to these categories are shown in Appendix A.

Ecological Communities: Reschke (1990) developed the first comprehensive ecological community classification for New York State. Based on this classification and earlier drafts, the New York Natural Heritage Program has conducted natural community inventories since 1985. One of the objectives of this effort is to assess the rarity of each perceived natural community type in New York State. To date, there is no comprehensive legislation at the federal or state level providing legal protection to rare natural communities or high quality examples of more common community types. Federal, state and local laws protect certain types of wetlands, streams and beaches, but most terrestrial communities have no legal status.

B. Project Methodology

Methods used to identify and document rare elements in this study follow methodology developed by The Nature Conservancy, NatureServe, and the network of Natural Heritage Programs. The goal for this project is to document the rare species and significant natural communities that occur within New York's system of state parks and historic sites as part of an overall, ongoing effort to address biodiversity issues across the state. In all aspects of this project, the Heritage Program uses a prioritized approach to data collection, focusing first on those species and communities of global significance and, later, on those of regional and state importance. Parks are selected for survey under the direction of the New York State Office of Parks, Recreation and Historic Preservation.

This biodiversity inventory represents an initial effort to document all significant natural communities, rare plants and rare animals currently being managed by the New York State Office of Parks, Recreation and Historical Preservation. As mentioned above, species surveys for this project are based largely on existing information and leads, focusing on the rarest species first and secondarily on those that are rare or of limited distribution in New York, but believed to be regionally or globally secure. Rare species surveys conducted for this project are by no means comprehensive and should not be presented as such. It is possible that other rare plants or animals exist or could be found in the surveyed areas in the future. It is also possible that the boundaries of the communities identified and mapped under the scope of this project will need modification as further data on natural communities across New York State are gathered, existing information is updated, and new community descriptions are developed. Further species surveys, natural community documentation and monitoring are highly encouraged. Any observations of rare plants, rare animals, or significant natural communities should be reported to the New York Natural Heritage Program in order to update the information in the Heritage database.

Ecological Communities

Community Element Occurrence Documentation: Natural community field surveys are conducted according to current program standards and all communities are classified following Reschke (1990) and Edinger et al. (2002). Community surveys include collecting data on plant species composition and structure for all vegetative strata, sampling and noting important soil properties, and recording information on surficial and bedrock geology, slope, aspect, elevation and hydrologic regimes within the community. All of these data are used to identify and delineate the community. Information on the maturity of the occurrence, anthropogenic and natural disturbances influencing the community, and the condition of the surrounding landscape are also recorded. Combined with the detailed information on the biological and physical properties of the community, data documenting landscape condition allow a complete assessment of the ecological quality of the occurrence. The collection of a consistent set of data on each natural community allows quick and accurate comparisons between communities of the same type, which ultimately determine the overall quality rank of the occurrence. Regardless of whether they are wholly contained within the park boundary, significant natural communities are mapped to their extent through aerial photo interpretation and entered into a GIS following the methods described below.

Community Mapping: Community mapping involves first delineating preliminary polygons on 1:40,000 to 1:12,000 digital orthophotos on screen in ArcMap or on printed images to help guide field work. The preliminary delineation is then validated and modified through field data collection by overlaying GPS points and descriptions on the preliminary coverage in ArcMap. The final community coverage is created by screen digitizing in ArcMap, using 1:12,000 Color Infrared Digital Orthophoto Quarter Quads (in NAD83 datum and true UTM projection zone) obtained through the United States Geological Survey, EROS Data Center. The screen digitizing process allows simultaneous use of aerial photography and several additional supplemental data layers useful in delineating community boundaries, including digital USGS Quadrangle maps, Department of Transportation digital road coverages, digital hydrology coverages, and OPRHP boundaries. All polygons are attributed with a community code at the time of digitizing. The attribute table is then automatically populated with an area (m^2), a perimeter (m) and converted to total acres for each polygon using an ArcMap script. The final digital products for the park include the layer file and attributes for each ecological community observed in the park.

Rare Plants

Field surveys for rare plants involve mapping the extent of the population and collecting data on population size, reproductive biology, and habitat characteristics, including topography, geologic features, and associated species. Observations on disturbances, threats, and general site quality are also recorded. All of the information gathered is then compared to other occurrences of the species across its range and used to assign an overall rank to the occurrence. Specimens are collected when population sizes are large enough to ensure that collection will not adversely impact the occurrence. All voucher specimens are mounted, labeled, and deposited in the New York State Museum Herbarium. When collection is not possible due to population size or perceived vigor, photographs are taken and deposited in the New York Natural Heritage Program Digital Image Database.

Rare Animals

Field surveys for rare animals are based on a review of records in Heritage files, records obtained through the NYSDEC Endangered Species and Nongame and Habitat Units, consultation with OPRHP staff, and consultation with other scientists and field biologists familiar with rare species locations and habitat within the local area. Data on colonial waterbirds and piping plovers are compiled from the annual reports of the Long Island Colonial Waterbird and Piping Plover Survey from 1983 through 1998. Systematic searches for priority species are completed during the season when the species of interest are most easy to detect, applying methods typically used for the taxa sought. Field surveys involve mapping the extent of the population and collecting data on population size, reproductive biology, and habitat characteristics. Observations on disturbances, threats and general site quality are also recorded. Voucher specimens are collected for some rare insects or fish, particularly for those species that are extremely difficult to identify in the field or where confirmation by a specialist may be required to confirm a tentative identification made in the field. Voucher specimens are typically deposited in the New York State Museum in Albany, NY.

III. RESULTS

A. Ecological Communities and Significant Natural Communities

There were 13 distinctive ecological community types observed within the 1087 acre state park representing Palustrine and Terrestrial classification systems and 4 subsystems (Table 4 and Appendix B). The Lacustrine communities of adjacent Lake Ontario were not included. Most of the park is upland grassland and woodland with smaller wetlands throughout. A total of 16 acres of land are typed as "developed"; this classification includes buildings, main roads, parking lots, other structures and the land immediately around them. Ninety-two acres are typed as "mowed lawn" to indicate that they are artificially maintained by repeated mowing. With the parcel's history of being cleared for agriculture and other uses, many of the plant communities on the site today are early-successional (in the early stages of growth). Disturbances to the natural areas include an extensive infestation of pale swallow-wort (*Cynanchum rossicum*), an aggressive non-native plant species that suppresses growth of native species. This invasive species is a serious problem for biodiversity at the park, but is also problematic for maintenance and enjoyment of the trails. Other non-native invasive plant species include: multiflora rose (Rosa multiflora), buckthorn (*Rhamnus catharitica*), phragmites (*Phragmites australis*), and purple loosestrife (*Lythrum salicaria*) in the wetlands and shore communities. Zebra mussel (*Dreissena polymorpha*), a non-native animal, is also present in Lake Ontario and may be affecting the ecological dynamics of organisms using the shoreline communities.

Table 4. Ecological communities observed within Wehle State Park. The two bolded types are mapped as significant natural communities in the Natural Heritage database.

System	Subsystem	Community Type	Acres
Palustrine	Open Mineral Soil Wetlands	Shallow emergent marsh	2
		Silver maple – ash swamp	32
		Sinkhole wetland	<1
Terrestrial	Open Uplands	Calcareous cliff community	3
		Calcareous pavement barren	245
		Calcareous shoreline outcrop	6
		Cobble shore	2
		Successional old field	2
	Forested Uplands	Calcareous talus slope woodland	9
		Limestone woodland	201
		Successional red cedar woodland	478
	Terrestrial Cultural	Developed	16
		Mowed lawn	92
Total Acres			**1088**

Two significant natural communities were documented during the course of this survey. The term 'significant' refers to communities that are rare in the state or good examples of more common communities. **Calcareous pavement barrens** (rank G3, S1) are a globally rare or restricted community and very rare in the state, while **calcareous shoreline outcrops** (rank G3G4, S2) are more widespread, but good examples are quite rare in the

state. The calcareous shoreline community is in good condition with relatively few invasives and limited human disturbance or impacts. In contrast, the calcareous pavement barrens community has been severely degraded by the presence of pale swallow-wort. More detailed descriptions of these communities and the occurrence at the park are included in the Appendices B through D.

B. Rare Plants

Preliminary searches of the Heritage database and record reviews at the New York State Museum revealed no known or historical rare plant populations within Wehle State Park, although several rare species are known from the vicinity. One rare plant species, the **cork elm** (*Ulmus thomasii*), was discovered at the park in 2008 (see map Appendix B). This tree species is rare statewide, but characteristic of the limestone barrens areas of Jefferson County. About two dozen individuals were located and it is likely that more could be found with additional surveys. Further surveys are warranted both within and outside the park to better assess the rarity and rank of this tree species; there is some indication that the species has been overlooked and may be more common in New York than previously thought. Prior to any management actions such as creating trails or clearing of new areas, a thorough search for the cork elm should be conducted. Another rare plant species that may occur at the park is troublesome sedge (*Carex molesta*) which is known from similar habitat within five miles of Wehle State Park. Further botanical inventory is recommended for this species.

Cork elm has leaves like American elm, but the branches are lined with corky ridges and the tree has a more rounded shape compared to the arching form of our other elms (Photo J. Lundgren NYNHP & OPRHP).

C. Rare Animals

Preliminary searches of the Heritage database and other records revealed no known occurrences of rare animals within Wehle State Park or within one mile of the park boundary. This does not mean that rare animals are not located within the park, only that current Heritage data does not include any known occurrences within the park boundary. Prior to any management practices that alter natural habitats, a thorough search for rare animals should be conducted. There is some potential for Indiana bats to occur here based on records elsewhere in Jefferson County, although none were found in surveys conducted in 2006.

IV. SUMMARY

A. Significance of the Site for Natural Heritage Elements

Wehle State Park contains two significant natural communities: a calcareous shoreline outcrop along much of the park's western perimeter, and a calcareous pavement barren that extends across much of the park and across to the adjacent Henderson Unique Area owned by NYSDEC. The shoreline community is in good condition, with relatively few invasives and limited human disturbance. The calcareous pavement barren is a rare and vulnerable community in New York State, mainly occurring on the eastern side of Lake Ontario, the St. Lawrence River and along Lake Champlain. Globally it is restricted primarily to the Great Lakes Region, in both the United States and Canada. Unfortunately, the quality of the calcareous pavement barren at Wehle and adjacent lands has been severely degraded by the invasion of pale swallow-wort (*Cynanchum rossicum*), an aggressive non-native plant that crowds out other species. Research is underway by a number of organizations to assess better methods of controlling and removing this invasive plant to improve the quality of natural areas that have been impacted.

A population of one rare plant species has been documented at the park; cork elm (*Ulmus thomasii*) was found in 2008 with nearly two dozen trees. Cork elm is characteristic of the calcareous pavement barrens community and is readily identifiable by its corky branches. Because a comprehensive survey for this species was not conducted across the entire property, further surveys are recommended.

No rare animals have been documented at the park. However, animals of interest for the state wildlife plans, grassland bird initiative, and other conservation plans are present or potential here.

Table 5. Summary of biodiversity inventory results for Robert G. Wehle State Park.

Element	Global Rank	State Rank	Quality Rank	NY State Protection Status	Federal Protection
Calcareous pavement barren	G3	S1	D	Unprotected	None
Calcareous shoreline outcrop	G3G4	S2	B	Unprotected	None
Cork elm (*Ulmus thomasii*)	G5	S2	B	Threatened	None

B. General Biodiversity Significance

Wehle State Park contains few rare species and rare or high quality natural communities; however, it is still a valuable natural area that contributes to the long-term biodiversity of the region.

The New York State Breeding Bird Atlas (2000-2005) identified 90 bird species as possibly nesting in the Stony Point area, with 48 of those confirmed breeding on site and another 30 as probable. Three species of concern (DEC status; see Appendix A) are listed as

possibly nesting here (whip-poor-will, sharp-shinned hawk and cooper's hawk) and several other bird species are noted in the State Wildlife Plan and/or Grassland Bird initiatives. Whip-poor-will are very likely in the park based on the numbers found in similar habitats within the county; future surveys are recommended. Futhermore, the park and adjacent lands on Stony Point are likely to host good concentrations of migrant landbirds, particularly as birds make their way north along the shoreline during spring migration.

The 980 acres of undeveloped lands with woodlands, wetlands, and savannah-like habitat also supports many common species. At least 80 native plant species have been documented on the calcareous pavement barrens alone, and at least 24 tree species are present - including four oaks (white oak, red oak, chinquapin oak, burr oak) and the rare cork elm noted above. Beautiful, gnarly old white cedars (*Thuja occidentalis*) grow on the shore, trees that have survived the natural processes of wind, waves and ice scour. Tiger beetles scurry over the rocks and butterflies and a variety of invertebrates thrive in the meadows and barrens. Wehle State Park offers an opportunity for visitors to enjoy nature and learn about some of the natural communities that are uncommon to New York State or the region, boasting over three miles of undeveloped shoreline and bluffs along Lake Ontario as well as public access to those shores and views.

Arborvitae or northern white cedar on the Wehle State Park shoreline. (Photo J. Lundgren NYNHP and OPRHP)

V. THREATS AND MANAGEMENT RECOMMENDATIONS

A. Threats

The biggest threat to biodiversity at Wehle State Park is the prevalence of the aggressive non-native plant, pale swallow-wort (*Cynanchum rossicum*) (see management recommendations). To date, methods for controlling the species are very limited. Control experiments are ongoing due to the high risk this plant poses to biodiversity at numerous locations in the state. Other non-native weedy species are also abundant in some areas of the park and may pose a threat to the native diversity. Canada bluegrass (*Poa compressa*) is abundant in some of the calcareous pavement barren areas and other invasives include multiflora rose (*Rosa multiflora*), buckthorn (*Rhamnus cathartica*), purple loosestrife (*Lythrum salicaria*), and phragmites (*Phragmites australis*). Heavy deer browse is also

present in parts of the park and may be preventing establishment or persistence of some plant species.

Impacts to the significant communities and rare species can be minimized by avoiding or limiting development or clearing in sensitive areas (see maps of the significant communities and rare species, Appendix B). More detailed surveys for rare species should be conducted prior to any new building, trail, or other construction. The impacts of recreational development are currently contained as recreation is restricted to the north end of the park and to a very small, contained picnic area to the south along the shoreline. On a broader scale, regulation of Lake Ontario water levels may pose a threat by altering the natural disturbance regime that the natural shoreline communities depend upon.

B. Management Recommendations

The following management recommendations are made with limited knowledge of other resource management issues driving the planning process of Wehle State Park. They are focused on the intent to maintain or increase the ecological integrity of the natural features of the park and can be used in future planning efforts or in the development of management goals. These recommendations should be updated, re-evaluated and added to as new data, methods or goals arise in the future.

Conduct surveys to document additional locations of cork elm and other rare plants

Cork elm (*Ulmus thomasii*), a rare tree species, is readily identified on close observation by the corky ridges on the twigs. In addition, the cork elm's shape is boxier and unlike the vase-like form of American elm. However, it is easy to miss in the context of the woodlands and was first documented at the park in 2008. Any areas identified for clearing, mowing or trail work should be surveyed for this species and marked to avoid damaging existing trees or any seedlings or saplings that may be present. In addition, surveys for other rare plants such as the troublesome sedge (*Carex molesta*) should be conducted in the park. This species is known at other locales on Stony Point so is likely to occur within Wehle State Park. A detailed description of this species can be found in the NYNHP plant conservation guides at the back of this report (Appendix C) and at http://guides.nynhp.org.

Provide educational information on the Natural Heritage elements

The park currently has one kiosk that provides some information about the calcareous pavement barrens and the problem of swallow-wort. Additional interpretive displays, materials or programs providing positive messages and descriptions of the calcareous shoreline outcrop and the cork elm, as well as general biodiversity information or interesting facts can add to the public's appreciation of the park's natural features.

Monitor and prevent further spread of swallow-wort within the park

The exotic species that currently poses greatest threat to the natural areas of Wehle State Park is pale swallow-wort. It covers large areas of the park and creates dense cover that shades out other plants, alters habitat for animal species, and creates an impenetrable tangle

that deters use of trails and increases maintenance costs with the need for constant clearing or mowing. The seeds are abundant and windborne (like related milkweed pods) and are easily spread by wind, animals, people and vehicles. No effective means of controlling swallow-wort over large areas has been established short of broad-scale herbicide application. Presently, several agencies are working together to address this problem, particularly where other rare ecological communities are threatened. The Nature Conservancy, Cornell University, NYS Department of Environmental Conservation, OPRHP, and others are working on management strategies and implementation at some sites. At Wehle State Park, identifying the best options for management of swallow-wort control, especially within the significant communities, should be a high management priority. The following steps can be taken to facilitate this process:

- Identify the areas within the park's significant communities that are relatively free of swallow-wort (or other invasive species) and work to keep these areas free of swallow-wort or other aggressive non-native plants. At this time, it is not feasible to eradicate invasives throughout the park, but keeping some more discrete "weed-free zones" can help maintain the best of what remains until more successful eradication measures are developed.

- Continue to work with partners to explore or expand testing control methods (e.g. Cornell's bio-control study that has been proposed or tried at the site).

- Work with NYS DEC to coordinate efforts on the adjacent Henderson Unique Area which also supports the significant calcareous pavement barrens community and has a similar scale problem with swallow-wort.

- Pursue educational options to prevent spread of swallow-wort, especially during late summer and fall when swallow-wort seed production is at its peak.

- Consider closing off some of the trails in fall to reduce foot traffic through the densest areas of swallow-wort. Focus trail maintenance on the most used trails (such as the shoreline trail) to minimize contact with the seed pods and reduce spread.

Prevent the spread of swallow-wort from Wehle State Park to other locations

Pale swallow-wort is found at many locations across the region, in part due to unintentional dispersal of seeds from one site to another as vehicles and visitors move from one site to another. These incidences can be reduced by educating park staff and the public about the problems associated with this plant and its ease of spread. State Parks can serve as a model for educating others in how to reduce the spread of this plant. Specific recommendations on how to prevent the spread of swallow-wort from Wehle State Park to other locations are as follows:

- Continue the aggressive mowing program on existing recreational fields at the north end of the park. In many parks it is recommended that some areas be infrequently mowed to reduce mowing costs and to provide habitat for butterflies and other

invertebrates. However, in this case, mowing to the edge of the woodlands in the area already designated for recreational use can reduce the swallow-wort seed load and the chance of the public unintentionally carrying seeds to other locations. This is not a recommendation to expand mowing beyond the existing areas; any plans for mowing expansion should be evaluated for ecological impacts.

- Keep maintenance vehicles and equipment on site and monitor and clean vehicles that must go off-site. Fortunately, many of the existing maintenance vehicles are for use only at Wehle State Park use as they were purchased with funds from the Wehle Trust. However, other vehicles can unintentionally carry hundreds of seeds outside the park. A wash station has been proposed to remove plant material from state vehicles that leave the site. Simple wash stations for public use may be considered as well, similar to those in place for removing non-native weedy plants from boats.

- Educate visitors on problems with invasives and post recommendations for preventing spread by removing seeds from shoes, clothing, pets and vehicles before leaving park. This is particularly critical in the late summer and fall when the plants are in seed (their milkweed-like seeds become airborne on white plumes and are widely distributed). Visitors may appreciate knowing how to avoid bringing this pest home or to other favorite places, after they have seen how its dense tangles invade the landscape.

Assess level of action on other non-native species

Other non-native invasive species occur at the park and could be a threat as well, but the threat they pose is less urgent that that of swallow-wort. Buckthorn, multiflora rose, purple loosestrife, and phragmites are all known from the site. Non-native animal species are also present; the most notable is the zebra mussel, now common throughout Lake Ontario. There is currently no known way to eliminate zebra mussels and their full impact on the natural shoreline community and associated species may be subtle and is presently unknown.

Management plans for the park should provide details on which invasive species are present, whether or not actions are warranted, and why those decisions are made. It is likely infeasible to remove all invasives from the park, so maintaining a record of those decisions can help guide current and future land managers. When new invasive species are detected within previously uninfested areas, quick action to remove these pests may prevent long-term ecological impacts and reduce potential costs associated with invasive species control.

ACKNOWLEDGEMENTS

The Wehle State Park inventory was conducted and compiled by New York Natural Heritage staff and staff of the new OPRHP and NYNHP Partnership implemented in 2008. Funding for the project was provided by the New York State Office of Parks, Recreation and Historic Preservation. Special thanks to OPRHP Environmental Management Bureau staff Tom Lyons, Nancy Pierson, Edwina Belding, and Amanda Stein and toWehle Park staff Daniel Heneka and John Shultz for their hospitality and detailed information on the park.

Natural Heritage Program staff directly involved in the project are listed below.

Field Inventory and Documentation
DJ Evans (NYHP Director)
Project coordination, community inventory, community mapping and documentation
Julie Lundgren (State Parks Ecologist, NYNHP and OPRHP)
Project coordination, community inventory, community mapping and documentation
Kimberly Smith (State Parks Botanist, NYNHP and OPRHP)
Rare plant review, evaluation and data entry
Heidi Krahling (NYHP Information Management Specialist)
Map layouts and production
Elizabeth Spencer (Ecologist, NYNHP)
Community inventory, community mapping and documentation on Henderson Preserve

GIS and Information Management
Aissa Feldmann (NYHP Ecologist)
Map layouts, report templates and production
Rachel Novak (NYHP Database Manager)
Database oversight, maintenance and quality control
Nancy Davis-Ricci (NYNHP Assistant Botanist)
Rare species data entry and mapping

REFERENCES AND CITATIONS

Edinger, G. J., D.J. Evans, A.D. Finton, D. M. Hunt, L. Lyons-Swift, and A.M. Olivero. 2000. *New York Natural Heritage Program Community Field Form Instructions*. Unpublished document. New York Natural Heritage Program, Latham, NY.

Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero editors). 2002. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's *Ecological Communities of New York State*. (Draft for review). New York Natural Heritage Program, New York Department of Environmental Conservation, Albany, NY.

Federal Geographic Data Committee. 2008. National Vegetation Classification Standard (Version 2). FGDC Document number FGDC-STD-005-2008. U.S. Geologic Suvery, Reston, Virginia

Fernald, M. L. 1970. *Gray's Manual of Botany*. D. Van Nostrand, New York. 1632 pp.

Gleason, Henry A. and A. Cronquist. 1991. *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*. The New York Botanical Garden, Bronx, NY. 910 pp.

Mitchell, Richard S. and Gordon C. Tucker. 1997. *Revised Checklist of New York State Plants. Contributions to a Flora of New York State*. Checklist IV. Bulletin No. 490. New York State Museum. Albany, New York. 400 pp.

New York Natural Heritage Program (NYNHP). 2008. Biodiversity databases. NYNHP, NY Department of Environmental Conservation, Albany, NY.

New York State Breeding Bird Atlas 2000 [Internet]. 2000-2005. Release 1.0. Albany (New York): New York State Department of Environmental Conservation. [updated 2007 Jun 11; cited 2008 Oct 02]. http://www/dec/ny.gov/animals/7312.html

Reschke, Carol. 1990. *Ecological Communities of New York State*. New York Natural Heritage Program, NYS Department of Environmental Conservation, Latham, NY. 96 pp + xi.

U.S. Geological Survey, 1986-present. National Aerial Photography Program 1:40,000 color infrared aerial photography. United States Geological Survey, Eros Data Center, Sioux Falls, SD.

U.S. Geological Survey. 1994. Digital Orthophoto Quadrangle. United States Geological Survey, Eros Data Center, Sioux Falls, SD.

Young, S.M. 2002. *New York Rare Plant Species List*. New York Natural Heritage Program. Albany, NY.

APPENDIX A

Legal Protection for Rare Plant and Animal Species in New York State

Federal Status (plants and animals): The categories of federal status are defined by the United States Department of the Interior as part of the 1974 Endangered Species Act (see Code of Federal Regulations 50 CFR 17). The species listed under this law are enumerated in the Federal Register vol. 50, no. 188, pp. 39526 - 39527.
(blank)= No Federal Endangered Species Act status.

LE = The taxon is formally listed as endangered.

LT = The taxon is formally listed as threatened.

LELT= The taxon is formally listed as endangered in part of its range and threatened in other parts.

PE = The taxon is proposed as endangered.

PT = The taxon is proposed as threatened.

C = Candidate for listing - There is sufficient information to list the taxon as endangered or threatened.

* = Petition recycled

Additional codes:
(C2NL) = Heritage code indicating that the taxon is a candidate in some areas, not listed in other areas.
(E/SA) = Heritage code indicating that the taxon is endangered because of similarity of appearance to other endangered species or subspecies.

New York State Legal Status - Animals: Categories of Endangered and Threatened species are defined in New York State Environmental Conservation Law section 11-0535. Endangered, Threatened, and Special Concern species are listed in regulation 6NYCRR 182.5.

E = Endangered Species: any species which meet one of the following criteria:
1) Any native species in imminent danger of extirpation or extinction in New York.
2) Any species listed as endangered by the United States Department of the Interior, as enumerated in the Code of Federal Regulations 50 CFR 17.11.

T = Threatened Species: any species which meet one of the following criteria:
1) Any native species likely to become an endangered species within the foreseeable future in New York.
2) Any species listed as threatened by the U.S. Department of the Interior, as enumerated in the Code of the Federal Regulations 50 CFR 17.11.

SC = Special Concern Species: those species which are not yet recognized as endangered or threatened, but for which documented concern exists for their continued welfare in New York. Unlike the first two categories, species of special concern receive no additional legal protection under Environmental Conservation Law section 11-0535 (Endangered and Threatened Species).

P = Protected Wildlife (defined in Environmental Conservation Law section 11-0103): wild game, protected wild birds, and endangered species of wildlife.

U = Unprotected (defined in Environmental Conservation Law section 11-0103): the species may be taken at any time without limit; however a license to take may be required.

G = Game (defined in Environmental Conservation Law section 11-0103): any of a variety of big game or small game species as stated in the Environmental Conservation Law; many normally have an open season for at least part of the year, and are protected at other times.

New York State Legal Status - Plants: The following categories are defined in regulation 6NYCRR part 193.3 and apply to New York State Environmental Conservation Law section 9-1503.
(blank)= no state status

E = Endangered Species: listed species are those with:

1) 5 or fewer extant sites, or
2) fewer than 1,000 individuals, or
3) restricted to fewer than 4 U.S.G.S. 7 ½ minute topographical maps, or
4) species listed as endangered by U.S. Department of Interior, as enumerated in Code of Federal Regulations 50 CFR 17.11.

T = Threatened: listed species are those with:

1) 6 to fewer than 20 extant sites, or
2) 1,000 to fewer than 3,000 individuals, or
3) restricted to not less than 4 or more than 7 U.S.G.S. 7 and ½ minute topographical maps, or
4) listed as threatened by U.S. Department of Interior, as enumerated in Code of Federal Regulations 50 CFR 17.11.

R = Rare: listed species have:

1) 20 to 35 extant sites, or
2) 3,000 to 5,000 individuals statewide.

V = Exploitably vulnerable: listed species are likely to become threatened in the near future throughout all or a significant portion of their range within the state if causal factors continue unchecked. (The attached list does not contain a complete listed of the species in this category.

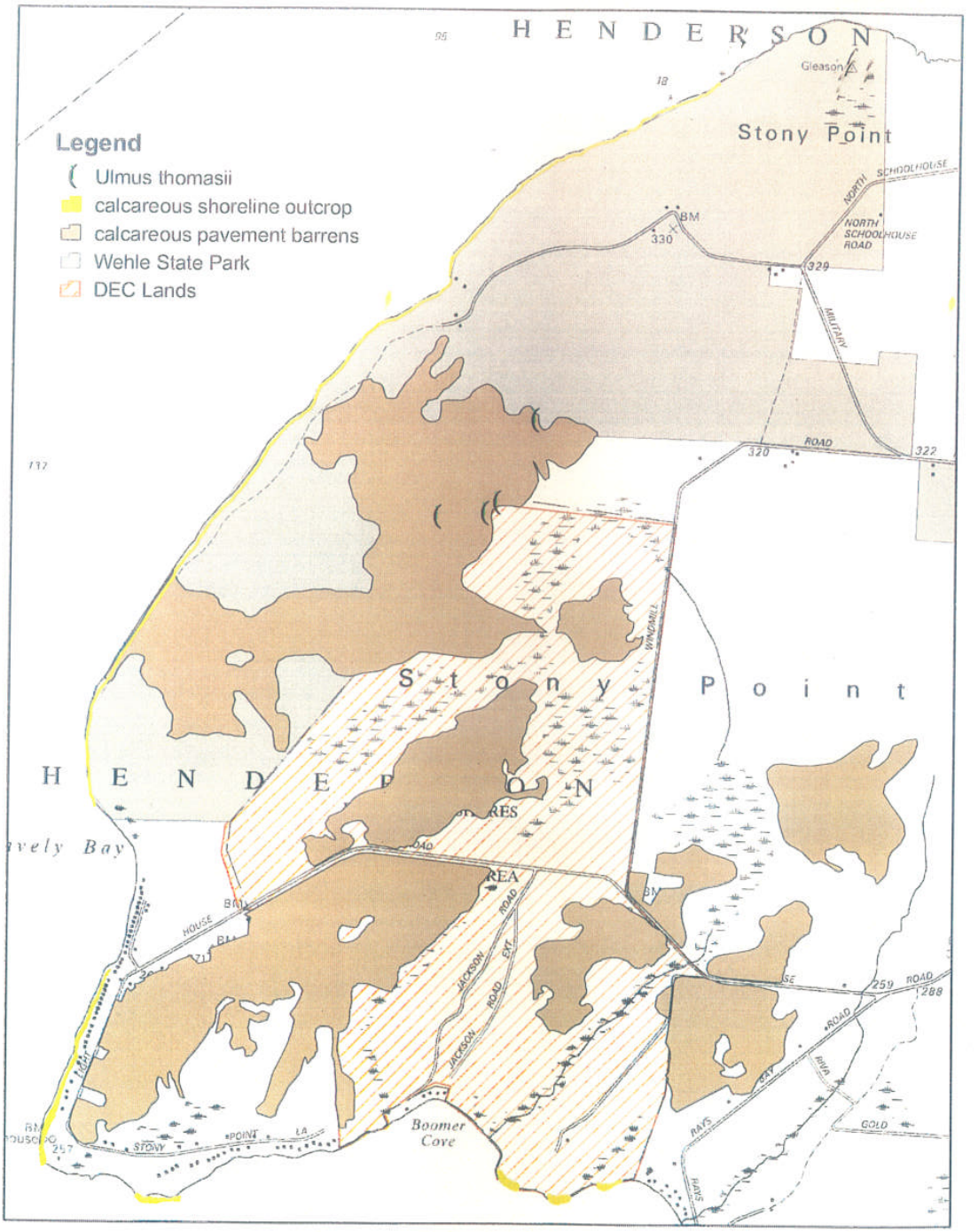
U = Unprotected (defined in Environmental Conservation Law section 11-0103): the species may be taken at any time without limit; however a license to take may be required.

APPENDIX B

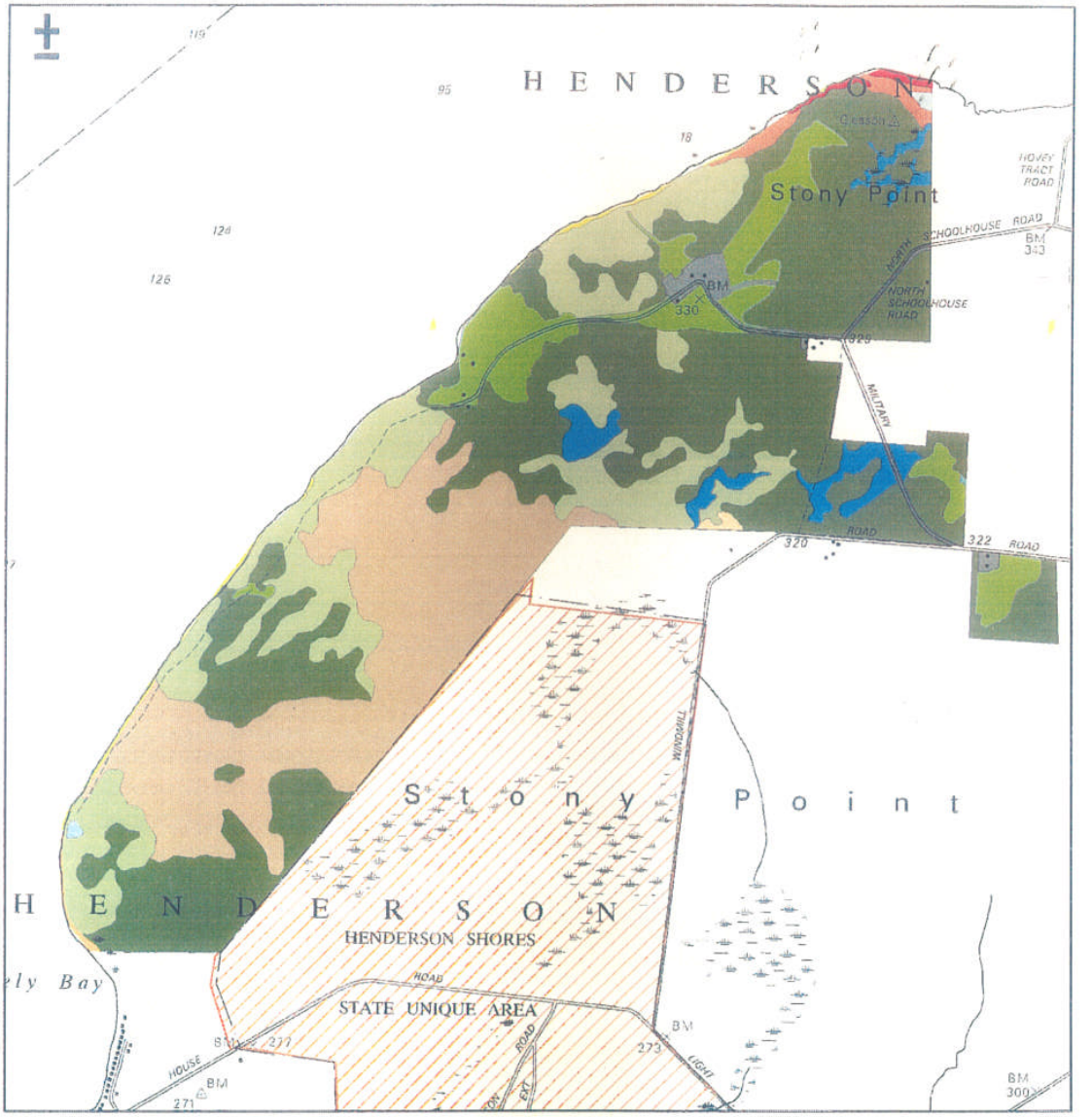
Significant Natural Community, Ecological Community and
Rare Species Maps of Wehle State Park

Note: Significant natural communities and rare species shown on these maps are incorporated into the Natural Heritage Database. In contrast, the wall-to-wall map of ecological communities contains a variety of information that is not included in the Natural Heritage database.

Rare Species and Significant Natural Communities of Wehle State Park



Ecological Communities of Wehle State Park



Legend

Ecological Communities

- Calcareous cliff community
- Calcareous pavement barrens
- Calcareous shoreline outcrop
- Calcareous talus slope woodland
- Cobble shore
- Developed
- Limestone woodland
- Mowed lawn
- Shallow emergent marsh
- Silver maple-ash swamp
- Sinkhole wetland
- Successional old field
- Successional red cedar woodland

- Wehle State Park
- DEC Lands

scale 1.24,000

0 0.3 0.6 Miles

0 0.3 0.6 Kilometers

OPRHP and NYNHP 2008

APPENDIX C

Conservation Guides for Significant Natural Communities and
Rare Species of Wehle State Park

Note: These guides are also available in full-page digital format at http://guides.nynhp.org

Calcareous Pavement Barrens

Alvar grassland with patches of calcareous pavement barrens at Chaumont Barrens, Jefferson County, NY

Photo credits: *Carol Reschke*

System Terrestrial

Subsystem Barrens And Woodlands

Did you know?

These calcaerous pavement landforms originated from sedimentary deposits in a vast, shallow inland sea that covered much of New York approximately 450 million years ago. Many of these deposits are rich in fossils (Isachsen et. al 2000). Cracks in the pavement bedrock are called "grykes." They are formed when rain water dissolves the limestone producing solution fissures that often collect leaves and debris, so take care when walking in a calcareous pavent barrens and avoid stepping into the grykes.

Summary

Protection Not listed in New York State, not listed federally.

Rarity G3, S1

A global rarity rank of G3 means: Either rare and local throughout its range (21 to 100 occurrences), or found locally (even abundantly at some of its locations) in a restricted range (e.g. a physiographic region), or vulnerable to extinction throughout its range because of other factors.
A state rarity rank of S1 means: Typically 5 or fewer occurrences, very few remaining individuals, acres, or miles of stream, or some factor of its biology makes it especially vulnerable in New York State.

State Ranking Justification

There are probably much less than 50 occurrences statewide. A few documented occurrences have good viability and several are protected on public land or private conservation land. This community is limited to the calcareous regions of the state, and there are only a few high quality examples. The current trend of this community is probably stable for occurrences on public land and private conservation land, or declining slightly elsewhere due to moderate threats that include conversion to pastureland, development, trampling by visitors, ATVs, and invasive species.

Conservation Issues

Threats

Calcareous pavement barrens are threatened by development (e.g., conversion to agricultural uses such as pastureland, residential, industrial), either directly within the community or in the surrounding landscape. Other threats include habitat alteration (e.g., road crossings, intensive cedar logging, mining) and relatively minor recreational overuse (e.g., ATVs, trampling by visitors, trash dumping). Deer overbrowsing may be a threat at a few sites. Several calcareous pavement barrens are threatened by invasive species, such as black swallow-wort *(Cynanchum louiseae)*, Morrow's honeysuckle *(Lonicera morrowii)*, and buckthorn *(Rhamnus calhartica)*.

Management Considerations

Increase and/or maintain the size of existing calcareous pavement barrens by increasing patch size where appropriate, by "softening" the abrupt forest edges by maintaining a native shrub transition zone. Improve the condition of existing calcareous pavement barrens by reducing and/or eliminating invasive species, such as black swallow-wort *(Cynanchum louiseae)*, Morrow's honeysuckle *(Lonicera morrowii)*, and buckthorn *(Rhamnus cathartica)*. Improve barrens by minimizing trail network and clearly marking existing trails, and developing and implementing a prescribed burn plan at appropriate sites. Improve the landscape context of the barrens by encouraging surrounding landowners to establish natural buffers and restore natural corridors to other larger natural landscape blocks.

Inventory Needs

Need to survey for occurrences statewide to advance documentation and classification of calcareous pavement barrens. Continue searching for large sites in good condition (A- to AB-ranked). Periodic inventory of the calcareous pavement barrens is needed, especially in the alvar areas in Jefferson County, in order to keep occurrence data current.

Research Needs

Need to research the composition of calcareous pavement barrens statewide in order to characterize variations (e.g., alvar vs. non-alvar types). Need to collect sufficient plot data to support the recognition of the more restricted "alvar pavement-grassland" and distinguish it from the broader concept of calcareous pavement barrens.

Short Term Trends

The number and acreage of calcareous pavement barrens in New York have probably declined slightly in recent decades as a result of development, conversion to pastureland, recreational ATVs, and invasive species.

Long Term Trends

The number and acreage of calcareous pavement barrens in New York have probably declined moderately to substantially from historical numbers likely correlated with past conversion to pastureland.

Development Considerations

Soils are very thin or lacking in and around this community and the effect of clearing and construction on soil retention and erosion must be considered during any development activities. Similarly, these pavements have wide cracks and fissures and any soil enrichment contamination (e.g., from septic leach fields and fertilized lawns) may rapidly alter the water quality of underlying aquifers as well as altering the barrens community structure and function (White 1977).

Rare Species

Northern Harrier (*Circus cyaneus*)
Common Moonwort (*Botrychium lunaria*)
Golden Corydalis (*Corydalis aurea*)
Karner Blue (*Plebejus melissa samuelis*)
Rock-cress (*Draba arabisans*)
Clay-colored Sparrow (*Spizella pallida*)
Side-oats Grama (*Bouteloua curtipendula var. curtipendula*)
Alpine Willow-herb (*Epilobium hornemannii ssp. hornemannii*)

Range

The map shows the known locations for calcareous pavement barrens (black dots) based on the New York Natural Heritage Program database. A general approximation of the potential range (blue shading) throughout the state is based on the U.S. Forest Service Ecological Units (Keys et al. 1995).

Data Sources

- New York Natural Heritage Program (Natural Heritage Element Occurrences)
- NYS GIS Data Sharing Cooperative, simplified by NYS Department of Environmental Conservation, Habitat Inventory Unit (County Boundary for New York State)
- U.S. Department of Agriculture, Forest Service (Subregions of the conterminous United States)

Best Places to See

Ashland Flats Wildlife Management Area (Jefferson County)
Chaumont Barrens Preserve (Jefferson County)
Crown Point State Historic Site (Essex County)
El Dorado Beach Preserve (Jefferson County)
Henderson Shores Unique Area (Jefferson County)
Limerick Cedars Preserve (Jefferson County)
Robert G. Wehle State Park (Jefferson County)

New York State Distribution

The best sites are concentrated in the St. Lawrence Glacial Lake Plain Subsection of the St. Lawrence and Champlain Valley Ecoregion in Jefferson County. Other examples are located in the Eastern Ontario Lake Plain, the St. Lawrence Glacial Marine Plain, and Champlain Glacial Lake and Marine Plain. Additional small sites occur along the Onondaga Escarpment and the Helderberg Highlands.

Global Distribution

This community is mostly limited to the Great Lakes basin. This community has been described from Ontario, where this and related communities are called "alvar." The range is estimated to span north to southern Ontario, west to northern Michigan, south to the Helderburg Highlands of central New York and east to the Lake Champlain Valley of New York and Vermont.

Identification Comments

A savanna community with canopy canopy averaging 25-60% that occurs on nearly level outcrops of calcareous bedrock (limestone and dolomite). The community consists of a mosaic of shrub savanna, grass savanna, and rock outcrop vegetation. The trees are either widely spaced or in small clusters; they are usually rooted in rock crevices.

The Best Time to See

Late summer through early fall is a good time to visit the pavement barrens when its full array of warm colored grasses, nonvascular moss and lichen species combine with the changing colors of the deciduous trees and shrubs.

Characteristics Most Useful for Identification

Characteristic trees include eastern red cedar (Juniperus virginiana), northern white cedar (Thuja occidentalis), bur oak (Quercus macrocarpa), white ash (Fraxinus americana), paper birch (Betula papyrifera), white pine (Pinus strobus), shagbark hickory (Carya ovata), eastern hop hornbeam (Ostrya virginiana), white spruce (Picea glauca), basswood (Tilia americana), American elm (Ulmus americana), rock elm (U. thomasii), and pin cherry (Prunus pensylvanica). Many of the shrubs occur in dense thickets; they are rooted either in rock crevices or in shallow soil over bedrock. Characteristic shrubs include gray dogwood (Cornus foemina ssp. racemosa), fragrant sumac (Rhus aromatica), downy arrowwood (Viburnum rafinesquianum), common juniper (Juniperus communis), round leaf dogwood (Cornus rugosa), juneberry (Amelanchier spp.), poison ivy (Toxicodendron radicans), meadow rose (Rosa blanda), wild honeysuckle (Lonicera dioica), buffalo berry (Shepherdia canadensis), and snowberry (Symphoricarpos albus). The groundlayer in the grass savanna areas is quite diverse. Characteristic herbs include poverty grass (Danthonia spicata), panic grasses (Panicum flexile, P. philadelphicum), sedges (Carex pensylvanica, C. eburnea, C. aurea), slender spikerush (Eleocharis elliptica var. elliptica), bastard toadflax (Comandra umbellata), harebell (Campanula rotundifolia), wild strawberry (Fragaria virginiana), pale bluets (Hedyotis longifolia), penstemon (Penstemon hirsutus), upland white aster (Solidago ptarmicoides), balsam groundsel (Senecio pauperculus), wild columbine (Aquilegia canadensis), blue phlox (Phlox divaricata), aster (Aster ciliolatus), and goldenrod (Solidago hispida). Fruticose and foliose lichens are locally common in the grassy areas, including Cladina rangiferina, C. mitis, Peltigera canina, and Cetraria arenaria. The numerous small exposures of bedrock have a distinctive flora of lichens, mosses, and small herbs, much like the outcrops in an alvar grassland. Characteristic species of rock outcrops include the lichens Cladonia pocillum and Placynthium nigrum; the mosses Tortella tortuosa, Tortula ruralis, Ceratodon purpureus, Grimmia apocarpa, and Bryum argenteum; and several herbs: southern hairgrass (Agrostis hiemalis), early saxifrage (Saxifraga virginiensis), small skullcap (Scutellaria parvula var. leonardii), and

false pennyroyal (Trichostema brachiatum).

Elevation Range

Known examples of this community have been found at elevations between 130 feet and 400 feet.

Similar Ecological Communities

Successional red cedar woodland: Woodlands on calcareous or other bedrock that occur on abandoned agricultural fields and pastures, or that have more than 60% tree cover and are dominated eastern red cedar (Juniperus virginiana) grade into successional red cedar woodland.

Sandstone pavement barrens: A barrens or woodland with shallow soils and sandstone pavement with pH < 5.5 and canopy dominance by jack pine (Pinus banksiana) or in special cases red or white pine (P. resinosa and P. strobus).

Limestone woodland: Woodlands or forests on calcereous bedrock with more than 60% tree cover that are dominated by tree species other than eastern red cedar (Juniperus virginiana) grade into limestone woodland.

Characteristic Species

Trees >5m
Shagbark Hickory (*Carya ovata*)
White Ash (*Fraxinus americana*)
Red Cedar (*Juniperus virginiana*)
Burr Oak (*Quercus macrocarpa*)
Northern White Cedar (*Thuja occidentalis*)
Rock Elm (*Ulmus thomasii*)

Shrubs 2-5m
Red Cedar (*Juniperus virginiana*)
Buckthorn (*Rhamnus cathartica*)
Northern White Cedar (*Thuja occidentalis*)

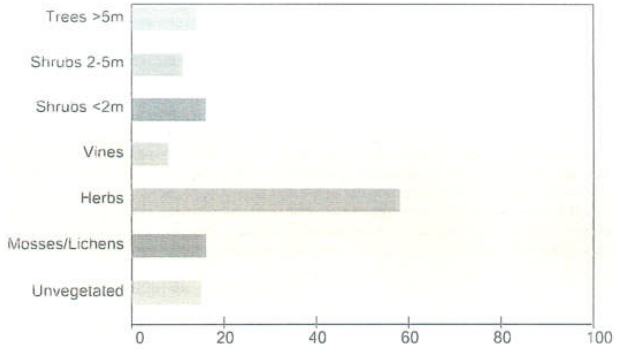
Shrubs <2m
Gray Dogwood (*Cornus racemosa*)
Dwarf Juniper (*Juniperus communis*)
Fragrant Sumac (*Rhus aromatica*)
Downy Arrow-wood (*Viburnum rafinesquianum*)
Northern Prickly-ash (*Zanthoxylum americanum*)

Vines
European Swallow-wort (*Cynanchum rossicum*)

Herbs
American Harebell (*Campanula rotundifolia*)
Bristleleaf Sedge (*Carex eburnea*)

Hidden Sedge (*Carex umbellata*)
Poverty Oatgrass (*Danthonia spicata*)
Virginia Strawberry (*Fragaria virginiana*)
Prairie-smoke (*Geum triflorum*)
Prairie Goldenrod (*Oligoneuron album*)
Balsam Ragwort (*Packera paupercula*)
Canada Bluegrass (*Poa compressa*)
Field Goldenrod (*Solidago nemoralis*)
Sporobolus spp.

Mosses/Lichens
Cladonia spp.
Thuidium spp.
Tortella ruralis
Tortella tortuosa



This figure helps visualize the structure and "look" or "feel" of a typical calcareous pavement barrens. Each bar represents the amount of "coverage" for all the species growing at that height. Because layers overlap (shrubs may grow under trees, for example), the shaded regions can add up to more than 100%.

International Vegetation Classification System Associations

This New York natural community encompasses all or part of the concept of the following International Vegetation Classification (IVC) natural community associations. These are often described at finer resolution than New York's natural communities. The IVC is developed and maintained by NatureServe.

Annual Alvar Pavement Grassland (CEGL005235)

NatureServe Ecological System Associations

This New York natural community falls into the following ecological system(s). Ecological systems are often described at a coarser resolution than New York's natural communities and tend to represent clusters of associations found in similar environments. The ecological systems project is developed and maintained by NatureServe.

Great Lakes Alvar (CES201.721)

Additional Resources

Links

Conserving Great Lakes Alvars - International Alvar Conservation Initiative
http://www.epa.gov/ecopage/shore/alvars/
Chaumont Barrens Preserve (The Nature Conservancy)
http://www.nature.org/wherewework/northamerica/states/newyork/preserves/art11823.html

References

Edinger, Gregory J., D.J. Evans, Shane Gebauer, Timothy G. Howard, David M. Hunt, and Adele M. Olivero (editors). 2002. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. (Draft for review). New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY. 136 pp.

Gilman, B. 1998. Alvars of New York: a site summary. Finger Lakes Community College. Canadaigua, NY.

Isachsen,Y.W., Landing,E., Lauber,J.M., Rickard,L.V., and Rogers,W.B. 2000. Geology of New York: A Simplified Account, Second Edition. New York State Museum's Educational Leaflet # 28.The New York State Education Department. Albany, NY.

Keys, Jr.,J.; Carpenter, C.; Hooks, S.; Koenig, F.; McNab, W.H.; Russell, W.;Smith, M.L. 1995. Ecological units of the eastern United States - first approximation (cd-rom), Atlanta, GA: U.S. Department of Agriculture, Forest Service. GIS coverage in ARCINFO format, selected imagery, and map unit tables.

NatureServe. 2005. NatureServe Central Databases. Arlington, Virginia. USA

Reschke, C., R. Reid, J. Jones, T. Feeney, and H. Potter. 1999. Conserving Great Lakes Alvars: final technical report of the International Alvar Conservation Initiative. The Nature Conservancy, Great Lakes Program, Chicago, IL.

Reschke, Carol. 1990. Ecological communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation. Latham, NY. 96 pp. + xi.

White, William B. 1977. Conceptual models for carbonate aquifers: Revisited, in Dilamarter, R. R. and Csallany, S. C. (editors), Hydrologic Problems in Karst Regions: Western Kentucky University, Bowling Green, KY, p. 176-187.

New York Natural Heritage Program
625 Broadway, 5th Floor
Albany, NY 12233-4757
Phone: (518) 402-8935
acris@nynhp.org

This project is made possible with funding from
- New York State Department of Environmental Conservation Hudson River Estuary Program
- Division of Lands & Forests, Department of Environmental Conservation
- New York State Office of Parks, Recreation and Historic Preservation

Information for this guide was last updated on Jul 17, 2008

Calcareous Shoreline Outcrop

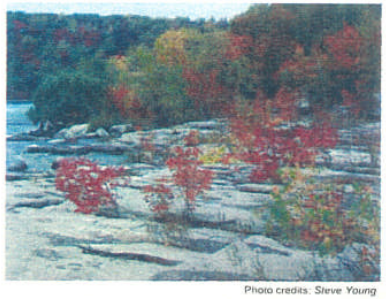


Photo credits: *Steve Young*

System Terrestrial

Subsystem Open Uplands

Did you know?
What is calcareous? Calcareous communities occur around outcrops of calcium-rich bedrock such as limestone, dolomite, and marble.

Summary

Protection Not listed in New York State, not listed federally.

Rarity G3G4, S2

A global rarity rank of G3G4 means:
A state rarity rank of S2 means: Typically 6 to 20 occurrences, few remaining individuals, acres, or miles of stream, or factors demonstrably make it very vulnerable in New York State.

State Ranking Justification

There are several hundred occurrences statewide. Some documented occurrences have good viability and many are protected on public land or private conservation land. This community is limited to the calcareous regions of the state, and there are only a few high quality examples. The current trend of this community is probably stable for occurrences on public land, or declining slightly elsewhere due to moderate threats that include shoreline development, trampling by visitors, and invasive species.

Conservation Issues

Threats

Calcareous shoreline outcrops are threatened by development (e.g., residential, agricultural, industrial), either directly within the community or in the surrounding landscape. Structures built along the shoreline are a particular threat to this community (e.g., riprap, boat launches, cabins). Other threats include habitat alteration (e.g., road crossings, logging, mining), and relatively minor recreational overuse (e.g., boating, ATVs, trampling by visitors, campgrounds, picnic areas, fishing, trash dumping). Threats to the adjacent lake and river may apply to the shoreline outcrop (e.g., pollution, nutrient loading, sedimentation, impoundments/flooding, water release for rafting). Several calcareous shoreline outcrops are threatened by invasive species, such as purple loosestrife *(Lythrum salicaria)*, reed canary grass *(Phalaris arundinacea)*, reedgrass *(Phragmites australis* ssp. *australis)*, Canada bluegrass *(Poa compressa)*, multiflora rose *(Rosa multiflora)*, colt's foot *(Tussilago farfara)*, and buckthorn *(Rhamnus cathartica)*.

Management Considerations

Where practical, establish and maintain a natural forested buffer to reduce storm-water, pollution, and nutrient run-off, while simultaneously capturing sediments before they reach the shoreline. Avoid habitat alteration along the shoreline and surrounding landscape. Restore calcareous shoreline outcrop communities that have been unnaturally disturbed (e.g., remove obsolete impoundments in order to restore the natural hydrology). Prevent the spread of invasive exotic species into the shoreline outcrop through appropriate direct management, and by minimizing potential dispersal corridors, such as roads and bridges.

Inventory Needs

Need to survey for occurrences statewide to advance documentation and classification of calcareous shoreline outcrops. Continue searching for large sites in good condition (A- to AB-ranked).

Research Needs

Need to research composition of calcareous shoreline outcrops statewide in order to characterize variations (e.g., river vs. lake shorelines). Need to collect sufficient plot data to support the recognition of several distinct calcareous shoreline outcrop types based on composition, specific geology, and by ecoregion.

Short Term Trends

The number and acreage of calcareous shoreline outcrops in New York have probably declined slightly in recent decades as a result of shoreline development, trampling by visitors, and invasive species.

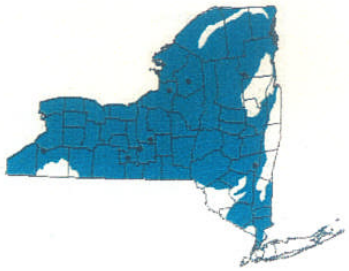
Long Term Trends

The number and acreage of calcareous shoreline outcrops in New York have probably declined moderately from historical numbers likely correlated with past shoreline development, trampling by visitors, and invasive species.

Rare Species

Back's Sedge (*Carex backii*)
Golden Corydalis (*Corydalis aurea*)
Many-head Sedge (*Carex sychnocephala*)
Brown Bog Sedge (*Carex buxbaumii*)
Hair-like Sedge (*Carex capillaris*)
Crawe's Sedge (*Carex crawei*)
Elk Sedge (*Carex garberi*)
Ram's-head Ladyslipper (*Cypripedium arietinum*)
Rock-cress (*Draba arabisans*)
Smooth Rock-cress (*Draba glabella*)
Dwarf Sand-cherry (*Prunus pumila var. depressa*)
Douglas' Knotweed (*Polygonum douglasii*)
Veiny Meadow-rue (*Thalictrum venulosum var. confine*)
Northern Reedgrass (*Calamagrostis stricta*)

Range



The map shows the known locations for calcareous shoreline outcrop (black dots) based on the New York Natural Heritage Program database. A general approximation of the potential range (blue shading) throughout the state is based on the U.S. Forest Service Ecological Units (Keys et al. 1995).

Data Sources

- New York Natural Heritage Program (Natural Heritage Element Occurrences)
- NYS GIS Data Sharing Cooperative, simplified by NYS Department of Environmental Conservation, Habitat Inventory Unit (County Boundary for New York State)
- U.S. Department of Agriculture, Forest Service (Subregions of the conterminous United States)

Best Places to See

Adirondack Park (Essex County)
El Dorado Beach Preserve (Jefferson County)
Fillmore Glen State Park (Cayuga County)
Hudson Gorge Primitive Area, Adirondack Park (Hamilton County)
Watkins Glen State Park (Schuyler County)

New York State Distribution

Found in the calcareous regions of the state including large portions of the Great Lakes region, and narrow river valleys and lakeshores in the High Alleghany Plateau, Northern Appalachians, and Lower New England Ecoregions. Shale variants are concentrated in the High Alleghany Plateau Ecoregion, especially the Finger Lakes region. Smaller, scattered examples of this community variant are known from the Tug Hill escarpment and the Lower New England Ecoregion.

Global Distribution

This physically broadly-defined community is likely to be widespread worldwide. Examples with the greatest biotic affinities to New York occurrences are suspected to span north to southern Canada, west to Minnesota, southwest to Indiana and Tennessee, southeast to Virginia, east to the Hudson Highlands of New York, and northeast to New Brunswick.

Identification Comments

A community that occurs along the shores of lakes and streams on outcrops of calcareous rocks such as limestone and dolomite. The vegetation is sparse, as most of the plants plants are rooted in rock crevices. Mosses and lichens may be common on the rocks. Characteristic species include wild columbine (Aquilegia canadensis), sedges (Carex eburnea, C. granularis), silky dogwood (Cornus amomum), red osier dogwood (Cornus sericea), and meadow rue (Thalictrum spp.). Characteristic mosses include Tortella tortuosa and Tortula ruralis (Edinger et al. 2002).

The Best Time to See

While this community can be identified anytime during the snow-free seasons, it is most enjoyable to visit during the growing season, from late May through summer, when plants are flowering and water temperatures are conducive to wading.

Characteristics Most Useful for Identification

Calcareous shoreline outcrops can be found along streams and lake shorelines in calcareous regions of the state. A shoreline or streambed environment consisting of exposed pavement bedrock and large slabs of sparsely vegetated limestone identify this community. Typical examples have pure calcareous bedrock: limestone, dolostone, calcite, or marble.

Elevation Range

Known examples of this community have been found at elevations between 20 feet and 1600 feet.

Similar Ecological Communities

Shale cliff and talus community: Calcareous shoreline outcrops are close enough to the waters of the lakes and streams they surround to experience significant amounts of wave and ice scouring, which distinguishes them from shale cliff and talus communities that occur on vertical exposures at slightly higher elevations.

Cobble shore: Cobble shores also occur along the shores of lakes and streams, can also experience a significant amount of scouring, and can have vegetation that is very similar to calcareous shoreline outcrops (particularly in the calcareous regions of the state). Cobble shores are distinguished from calcareous shoreline outcrops by their very round rocks that have been well weathered by water action. The cobbles can be loose or embedded in sand, gravel, or peat, usually with vegetation rooted between them. Calcareous shoreline outcrops have large slabs of limestone, angular rocks, and exposed pavement bedrock.

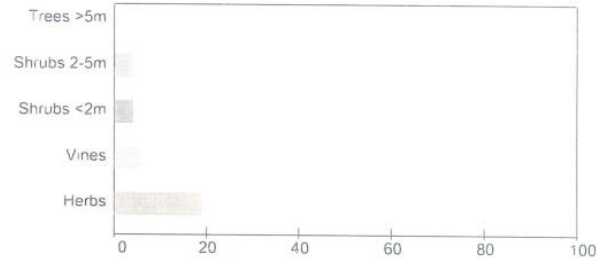
Characteristic Species

Shrubs 2-5m
Northern White Cedar (*Thuja occidentalis*)

Shrubs <2m
Red Osier Dogwood (*Cornus sericea*)
Quaking Aspen (*Populus tremuloides*)

Herbs
Clasping-leaf Dogbane (*Apocynum cannabinum*)
Wild Columbine (*Aquilegia canadensis*)
Small Beggarticks (*Bidens discoidea*)
Bristleleaf Sedge (*Carex eburnea*)
Late-flowering Thorough-wort (*Eupatorium serotinum*)
Common Dandelion (*Taraxacum officinale*)

Mosses/Lichens
Tortella tortuosa



This figure helps visualize the structure and "look" or "feel" of a typical calcareous shoreline outcrop. Each bar represents the amount of "coverage" for all the species growing at that height. Because layers overlap (shrubs may grow under trees, for example), the shaded regions can add up to more than 100%.

International Vegetation Classification System Associations

This New York natural community encompasses all or part of the concept of the following International Vegetation Classification (IVC) natural community associations. These are often described at finer resolution than New York's natural communities. The IVC is developed and maintained by NatureServe.

Midwest Limestone - Dolostone Talus (CEGL002308)

River Ledge Limestone Pavement (CEGL005233)

Boreal Circumneutral Riverside Seep (CEGL006142)

Boreal Alkaline Shoreline Outcrop (CEGL006532)

NatureServe Ecological System Associations

This New York natural community falls into the following ecological system(s). Ecological systems are often described at a coarser resolution than New York's natural communities and tend to represent clusters of associations found in similar environments. The ecological systems project is developed and maintained by NatureServe.

Laurentian-Acadian Rocky Lakeshore (CES201.586)

Laurentian-Acadian Ice-scour Rivershore (CES201.589)

Additional Resources

References

Edinger, Gregory J., D.J. Evans, Shane Gebauer, Timothy G. Howard, David M. Hunt, and Adele M. Olivero (editors). 2002. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. (Draft for review). New York Natural Heritage Program, New York State Department of Environmental Conservation. Albany, NY. 136 pp.

Keys, Jr., J.; Carpenter, C.; Hooks, S.; Koenig, F.; McNab, W.H ; Russell, W.;Smith, M.L. 1995. Ecological units of the eastern United States - first approximation (cd-rom), Atlanta, GA: U.S. Department of Agriculture, Forest Service. GIS coverage in ARCINFO format, selected imagery, and map unit tables.

NatureServe. 2005. NatureServe Central Databases. Arlington, Virginia. USA

Reschke, Carol. 1990. Ecological communities of New York State. New York Natural Heritage Program. New York State Department of Environmental Conservation. Latham, NY. 96 pp. + xi.

New York Natural Heritage Program
625 Broadway, 5th Floor
Albany, NY 12233-4757
Phone: (518) 402-8935
acris@nynhp.org

This project is made possible with funding from:
- New York State Department of Environmental Conservation Hudson River Estuary Program
- Division of Lands & Forests, Department of Environmental Conservation
- New York State Office of Parks, Recreation and Historic Preservation

Information for this guide was last updated on Jul 17, 2008

Cork Elm

Ulmus thomasii (with corky ridges on twigs)

Photo credits: *Troy Weldy*

Scientific Name *Ulmus thomasii* Sarg

Family Name Ulmaceae Elm Family

Did you know?
Ulmus thomasii is known as "Cork Elm" for the distinctive corky ridges on its twigs and branches. It has the hardest and heaviest wood of the elm species, and is desirable for use in furniture, tools, and fence posts. Another common name, "Rock Elm", may refer to the hardness of the wood or to its preferences for rocky ridgetop habitats (Little 1979).

Summary

Protection Threatened Species in New York State, not listed federally.

This level of state protection means: listed species are those with: 1) 6 to fewer than 20 extant sites, or 2) 1,000 to fewer than 3,000 individuals, or 3) restricted to not less than 4 or more than 7 U.S.G.S. 7 ½ minute topographical maps, or 4) listed as threatened by U.S. Department of the Interior.

Rarity G5, S2

A global rarity rank of G5 means: This species is demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
A state rarity rank of S2 means: This plant is threatened/imperiled in New York because of rarity (typically 6-20 populations or few remaining individuals) or is vulnerable to extirpation from New York due to biological factors.

State Ranking Justification

There are at least 15 existing sites, and about 50 historical sites, mostly known from the 1930s and before. Like our other elm species, Ulmus thomasii is threatened by Dutch Elm Disease.

Conservation Issues

Threats

Dutch Elm disease is a threat to populations of Cork Elm. Larger trees may also be threatened by logging.

Management Considerations

Care should be taken to avoid cutting the species in logging operations.

Short Term Trends

In recent years about 10 new populations have been discovered.

Long Term Trends

The long-term trend for this species unknown, though it apparently has persisted in its limited geographical range in the state.

Habitat

In New York, Cork Elm is most often found at dry sites with shallow soils over limestone bedrock, often on ridges or exposed ledges. It may grow with northern hardwood species, oak woodlands and forest edges, or in pastures and savannahs (New York Natural Heritage Program 2008). Rocky slopes, limestone outcrops, rich woods, flood plains, stream banks (Flora of North America 1997). Rich upland woods (Gleason and Cronquist 1991). Rich woods and calcareous uplands (Fernald 1970).

Associated Ecological Communities

Limestone Woodland
A woodland that occurs on shallow soils over limestone bedrock in non-alvar settings, and usually includes numerous rock outcrops. There are usually several codominant trees, although one species may become dominant in any one stand.

Pastureland
Agricultural land permanently maintained (or recently abandoned) as a pasture area for livestock.

Other Probable Associated Communities

Appalachian oak-hickory forest
Calcareous talus slope woodland
Maple-basswood rich mesic forest
Northern white cedar rocky summit
Red cedar rocky summit
Successional red cedar woodland

Associated Species

Sugar Maple (*Acer saccharum*)
Walking-fern Spleenwort (*Asplenium rhizophyllum*)
Maidenhair Spleenwort (*Asplenium trichomanes*)
Back's Sedge (*Carex backii*)
Hitchcock's Sedge (*Carex hitchcockiana*)
Willdenow's Sedge (*Carex willdenowii*)
Bitternut Hickory (*Carya cordiformis*)
Pink Corydalis (*Corydalis sempervirens*)
Beaked Hazelnut (*Corylus cornuta ssp. cornuta*)
Wavy Hair Grass (*Deschampsia flexuosa*)
Marginal Wood Fern (*Dryopteris marginalis*)
White Ash (*Fraxinus americana*)
Herb-robert (*Geranium robertianum*)
Hepatica acutiloba
Butternut (*Juglans cinerea*)
Red Cedar (*Juniperus virginiana*)
Wood Nettle (*Laportea canadensis*)
Hophornbeam (*Ostrya virginiana*)
Wild Blue Phlox (*Phlox divaricata*)
Eastern White Pine (*Pinus strobus*)
Burr Oak (*Quercus macrocarpa*)
Chinkapin Oak (*Quercus muhlenbergii*)
Littleleaf Buttercup (*Ranunculus abortivus*)
Bluestem Goldenrod (*Solidago caesia*)
American Bladdernut (*Staphylea trifolia*)
American Basswood (*Tilia americana*)
Eastern Poison Ivy (*Toxicodendron radicans*)
Eastern Hemlock (*Tsuga canadensis*)
American Elm (*Ulmus americana*)
Northern Prickly-ash (*Zanthoxylum americanum*)

Range

The map shows the known locations for cork elm (black dots) based on the New York Natural Heritage Program database. A general approximation of the potential range (blue shading) throughout the state is based on the U.S. Forest Service Ecological Units (Keys et al. 1995).

Data Sources

- New York Natural Heritage Program (Natural Heritage Element Occurrences)
- NYS GIS Data Sharing Cooperative, simplified by NYS Department of Environmental Conservation Habitat Inventory Unit (County Boundary for New York State)
- U.S. Department of Agriculture, Forest Service (Subregions of the conterminous United States)

Best Places to See

Chaumont Barrens (Jefferson County)

New York State Distribution

Ulmus thomasii is known from scattered locations in most of northern New York. It is rarely found in large stands but seems to occur sporadically in small numbers.

Global Distribution

Cork Elm is found from Quebec and Vermont in the northeast, south and west through New England along the Appalachians as far as Arkansas, and in the Midwest and Plains states as far north as the Dakotas and Ontario. It is most common in the Great Lakes region.

Identification Comments

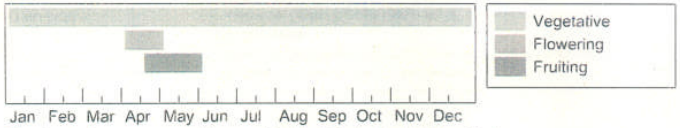
Ulmus thomasii is a medium-sized tree, commonly reaching up to 70 to 80 feet in height, and occasionally up to 100 feet (Burns and Honkala 1990), and may live for up to 300 years. It has a strongly upright form and a narrow crown, markedly different from the spreading shape of American Elm (Ulmus americana). The bark of the trunk is furrowed with flattened, spongy ridges, similar to that of American elm. Young twigs are covered in short hairs, and have reddish buds much like those of American Elm, but twigs a year or more old become covered in the distinctive corky ridges that give the plant its name. The leaves are alternate, with doubly-toothed margins and asymmetrical bases, and are smooth to only slightly pubescent. They also tend to be somewhat shiney and papery in feel, unlike those of American Elm or Slippery Elm. The flowers are small and lack petals, occur in racemes up to 4 cm long and appear in early spring before the leaves. The fruit are flattened, round samaras, notched at the top, and covered with soft hairs.

Best Life Stage for Identifying This Species

Mature Cork Elm can be identified at any time of year.

The Best Time to See

This woody plant may be identified year-round using the very unique and characteristic corky bark. Fruits may be present late April through May.



The time of year you would expect to find Cork Elm in New York.

Similar Species

Ulmus thomasii is the only elm species native to New York which has corky wings on the older twigs and branches. Not every twig develops the corky wings, however, so it may be necessary to look at several. The other two common elm species in New York, Ulmus americana and U. rubra, also both have smooth fruit, more pubescent, softer leaves (unlike Cork Elm's papery leaves), and are not typically found on the dry, limestone ridges and outcrops favored by Ulmus thomasii.

Cork Elm is very similar to Ulmus alata, a southern species which in New York is known only from cultivation. Ulmus alata has smaller leaves, the largest 4-7 cm long, and both young and old branches may have corky bark.

Taxonomy

Kingdom Plantae
└ **Phylum** Anthophyta
└ **Class** Dicots (Dicotyledoneae)
└ **Order** Urticales
└ **Family** Ulmaceae (Elm Family)

Additional Common Names

Rock Elm
Winged Elm

Additional Resources

Links

Google Images
http://images.google.com/images?q=ULMUS+THOMASII
NatureServe Explorer
http://natureserve.org/explorer/servlet/NatureServe?searchName=ULMUS+THOMASII
USDA Plants Database
http://plants.usda.gov/java/nameSearch?mode=sciname&keywordquery=ULMUS+THOMASII
Wisconsin Department of Natural Resources
http://www.dnr.state.wi.us/forestry/TreeID/TreePgs/ulmusthomasii.htm
Virginia Tech Department of Forestry
http://www.cnr.vt.edu/dendro/dendrology/syllabus/factsheet.cfm?ID=135
USDA Forest Service. Silvics of North America. Agriculture Handbook 654.
http://www.na.fs.fed.us/spfo/pubs/silvics_manual/volume_2/ulmus/thomasii.htm

Best Identification Reference

Gleason, Henry A. and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. The New York Botanical Garden. 910 pp.

References

Barnes, B. V. and W. H. Wagner, Jr. 1981. Michigan trees: a guide to the trees of Michigan and the Great Lakes region. Ann Arbor: University of Michigan Press. 384 p.

Burns, R. M., and B. H. Honkala, eds. 1990. Silvics of North America, vol. 2: Hardwoods. U.S. Department of Agriculture, Agriculture Handbook 654, Washington, DC. Accessed on 2004.

Edinger, Gregory J., D.J. Evans, Shane Gebauer, Timothy G. Howard, David M. Hunt, and Adele M. Olivero (editors). 2002. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. (Draft for review). New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY. 136 pp.

Fernald, M. L. 1970. Gray's Manual of Botany. 8th edition. D. Van Nostrand, New York. 1632 pp.

Gleason, Henry A. and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. The New York Botanical Garden. 910 pp.

Holmgren, Noel. 1998. The Illustrated Companion to Gleason and Cronquist's Manual. Illustrations of the Vascular Plants of Northeastern United States and Adjacent Canada. The New York Botanical Garden, Bronx, NY.

Keys, Jr.,J.; Carpenter, C.; Hooks, S.; Koenig, F.; McNab, W.H.; Russell, W.;Smith, M.L. 1995 Ecological units of the eastern United States - first approximation (cd-rom), Atlanta, GA: U.S. Department of Agriculture. Forest Service. GIS coverage in ARCINFO format, selected imagery, and map unit tables.

Little, E.L., Jr. 1979. Checklist of United States trees (native and naturalized). Agriculture Handbook No. 541. U.S. Forest Service, Washington, D.C. 375 pp.

NatureServe. 2005. NatureServe Central Databases. Arlington, Virginia. USA

New York Natural Heritage Program, New York State Department of Environmental Conservation. February 2000. Element Occurrence Record Database. Latham, NY.

New York Natural Heritage Program. 2005. Biotics Database. Albany, New York.

Weldy, Troy and David Werier. 2005. New York Flora Atlas. [S.M. Landry, K.N. Campbell, and L.D. Mabe (original application development), Florida Center for Community Design and Research. University of South Florida]. New York Flora Association, Albany, New York. Available on the web at (http://atlas.nyflora.org/).

New York Natural Heritage Program
625 Broadway, 5th Floor,
Albany, NY 12233-4757
Phone: (518) 402-8935
acris@nynhp.org

This project is made possible with funding from:
- New York State Department of Environmental Conservation Hudson River Estuary Program
- Division of Lands & Forests, Department of Environmental Conservation
- New York State Office of Parks, Recreation and Historic Preservation

Information for this guide was last updated on Jul 03, 2008

APPENDIX D

Element Occurrence Records for Significant Natural Communities and Rare Plants of Wehle State Park

Note: These reports are generated directly from NYNHP databases. They may contain information that pertains to adjacent properties when the species or community occurrence extends beyond the state park boundary.

Calcareous shoreline outcrop

Jefferson-116 (Henderson Shores Unique Area), Robert G. Wehle State Park

STATUS

Heritage Global Rank: G3G4
Heritage State Rank: S2
NY State Protection Status: U

LOCATION

Counties: New York State Waters and Jefferson
Towns: Ny State Waters and Henderson
Survey site: Stony Point Shore

OBSERVATION and QUALITY STATUS

Last observed: 2007-09-26

Occurrence Rank: B? - Possibly good estimated viability

Rank comments: This moderately sized shoreline outcrop is in fair to good condition. The best quality areas of the community are along the 2.5 mile section of nw shore where ledges are narrow and sparsely vegetated but little disturbed. South and southwest shores are somewhat broader, but much more disturbed and weedy.

Size (acres): 35.00

ECOLOGICAL DATA

Extensive but narrow limestone ledges along the shore are very sparsely vegetated, with less than 5% cover of herbs in rock crevices, and less than 1% short shrubs or seedlings in crevices. Most rock surfaces seem to be coated with endolithic algae (not identified), but to casual observer they look like bare rock. Characteristic herbs include Euthamia graminifolia (<1%), Phalaris arundinacea (<1%), Verbena hastata (<1%), Eleocharis cf. tenuis (<1%), Solidago cf. gigantea (<1%), Juncus sp., Lythrum salicaria, Geranium robertianum, Eleocharis compressa, and Polygonum cf. persicaria.

HABITAT DESCRIPTION

Extensive limestone ledges along the east shore of Lake Ontario, on the northwest, west, and southwest shores of Stony Point. At the northwest end the ledges are below high limestone cliffs, with limestone woodland above the cliffs. Moving southwest the upland slopes down to low bluffs above the shore ledges; these wooded with overbrowsed limestone woodland and calcarous pavement barrens. There are cobble shores along gravely bay and many residential properties on adjacent uplands. Broader, but more disturbed shore ledges occur near the lighthouse and in patches along Ray Bay, especially east of Boomer Cove. The uplands along this south shore of Stony Point are more disturbed, with several residential properties.

MANAGEMENT

Management Comments: Remove the exotics plants from the outcrop community especially purple loosestrife. Exotics are most abundant on the south shore. Improvements in Lake Ontario water quality would probably benefit shoreline vegetation.

Threats: The spread of invasive exotic plants, shoreline development and artificallly controlled lake levels are the primary threats. Water pollution may also pose a secondary threat.

ADDITIONAL COMMENTS

The privately owned stretches of shoreline need additional surveys to confirm and refine their boundaries, particularly where they border residential development. Data collected from 8 observation points, including one 5 x 5 m releve plot in summer or fall of 1995, and two additional observation points were gathered in along the Henderson Shores section in 2007.

Calcareous pavement barrens

Jefferson-116 (Henderson Shores Unique Area), Robert G. Wehle State Park

STATUS

Heritage Global Rank: G3
Heritage State Rank: S1S2
NY State Protection Status: U

LOCATION

County: Jefferson
Town: Henderson
Survey site: Stony Point Barrens

OBSERVATION and QUALITY STATUS

Last observed: 2007-09-26

Occurrence Rank: D - Poor estimated viability

Rank comments: A large barrens in a moderately small landscape that is somewhat fragmented. It has been very disturbed and degraded by past grazing and the presence of many exotics. The viability of this barrens is highly threatened.

Size (acres): 750.00

ECOLOGICAL DATA

A variable quality barrens. In areas that retain dominance by native species, the tree canopy is variable from 10 to 20% cover, about 5 m tall. The most abundant tree is Juniperus virginiana (10-20%), and Fraxinus americana (1-5%). The tall shrub layer grades into tree layer 2-5 m tall and has about 5-10% cover; most abundant tall shrubs are Juncus virginiana (5-10%), Lonicera tatarica (1-3%), and Rhamnus cathartica (1-2%). Short shrubs under 2 m have about 10-15% cover; most abundant short shrubs are Juniperus communis (10%), Zanthoxylum americanum (1-5%), and Rhus aromatica (1%). Herbs have about 85% cover; the most abundant herbs are Poa compressa (30-50%), Phleum pratense (5-10%), Clinopodium vulgare (5-10%). Cover of mosses and lichens is variable, from 2 to 30%; most abundant mosses are Tortella tortuosa (1-5%), Tortula ruralis (1-2%), Thuidium abietinum (0-30%). In areas now dominated by invaisve exotics the canopy is a near monoculture of Juniperus virginiana (0-50%) with openings featuring a dense understory of viney Cynanchum nigrum (30-75%) and Poa compressa (25-55%), native herbs, trees and shrubs are present but at low cover.

HABITAT DESCRIPTION

A mosaic of open pavement barrens, limestone woodlands, small wet meadow openings and swamps (mostly silver maple-ash swamp) on the western half of Stony Point the barrens patches Pavement barrens and limestone woodlands extend west and south towards the edge of limestone ledges and cliffs along the Lake Ontario shore, but are fragmented by four stretchs of road. Residential development lies to the southwest along the lake. The barrens and woodlands are from about 1 to 18 m above the elevation of lakeshore ledges.

MANAGEMENT

Management Comments: The viability of the barrens is threatened until exotic species, especially the most aggresive species such as Cynanchum nigrum (= Vincetoxicum nigrum), Lonicera tatarica, and Rhamnus cathartica are controlled. Deer population also needs control.

Threats: The continued infestation by invasive exotic plant species is the primary threat. Overbrowsing by deer is a secondary threat.

ADDITIONAL COMMENTS

In both the 1995 and 2007 surveys the boundaries could not be fully checked. Additional surveys on the privately owned portions fo the barrens are need to fully delineate the boundaries. Additional field surveys may identify some less disturbed patches since this large area has not been not fully explored. The community boundaries are based on 1968, 1994 and 2003 airphotos and need to be updated with additional ground-truthing particularly on the privately owned sections.

DATE OF THIS REPORT
12/2/2008

New York Natural Heritage Program

Ulmus thomasii

Cork Elm

Robert G. Wehle State Park

STATUS

Heritage Global Rank: G5
Heritage State Rank: S2S3
NY State Protection Status: T

LOCATION

County: Jefferson
Town: Henderson
Survey site: Stony Point

OBSERVATION and QUALITY STATUS

Last observed: 2008-06-25

Occurrence Rank: B - Good estimated viability

Rank comments: The population is of moderate size and there is evidence of reproduction. The landscape is protected but heavily impacted by invasive species.

Size (acres): 24.71

ECOLOGICAL DATA

Observation Date:	Observation EO Data:
2008-06-25	18 trees, 1 fruiting.

HABITAT DESCRIPTION

The trees are growing in openings within limestone woodland and calcareous pavement barrens communities. The land is flat and was formerly cleared for pasture and military use. The canopy is dominated by Juniperus virginiana and Carya spp. There is a dense understory of Cynanchum rossicum.

MANAGEMENT

Management Comments: Control invasive species and monitor impacts to rare plant populations.

Threats: Severe infestation of Cynanchum rossicum may inhibit reproduction at the site. Management actions to control invasive species such as herbicide application and mowing may also impact the trees and their ability to regenerate.

ADDITIONAL COMMENTS

Plants were discovered incidentally during ecological community mapping work. This species is likely more widespread at the site and further surveys are needed.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New York Field Office
3817 Luker Road
Cortland, NY 13045
Phone: (607) 753-9334 Fax: (607) 753-9699
http://www.fws.gov/northeast/nyfo

Project Number: 100031

To: Corinne Shia Date: Oct 26, 2009

Regarding: Madison Barracks Target Range

Town/County: Town of Henderson / Jefferson County

We have received your request for information regarding occurrences of Federally-listed threatened and endangered species within the vicinity of the above-referenced project/property. Due to increasing workload and reduction of staff, we are no longer able to reply to endangered species list requests in a timely manner. In an effort to streamline project reviews, we are shifting the majority of species list requests to our website at http://www.fws.gov/northeast/nyfo/es/section7.htm. Please go to our website and print the appropriate portions of our county list of endangered, threatened, proposed, and candidate species, and the official list request response. Step-by-step instructions are found on our website.

As a reminder, Section 9 of the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) prohibits unauthorized taking* of listed species and applies to Federal and non-Federal activities. Additionally, endangered species and their habitats are protected by Section 7(a)(2) of the ESA, which requires Federal agencies, in consultation with the U.S. Fish and Wildlife Service (Service), to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. An assessment of the potential direct, indirect, and cumulative impacts is required for all Federal actions that may affect listed species. For projects not authorized, funded, or carried out by a Federal agency, consultation with the Service pursuant to Section 7(a)(2) of the ESA is not required. However, no person is authorized to "take"* any listed species without appropriate authorizations from the Service. Therefore, we provide technical assistance to individuals and agencies to assist with project planning to avoid the potential for "take," or when appropriate, to provide assistance with their application for an incidental take permit pursuant to Section 10(a)(1)(B) of the ESA.

Project construction or implementation should not commence until all requirements of the ESA have been fulfilled. If you have any questions or require further assistance regarding threatened or endangered species, please contact the Endangered Species Program at (607) 753-9334. Please refer to the above document control number in any future correspondence.

Endangered Species Biologist: Sandra Doran *Sandra Doran*

*Under the Act and regulations, it is illegal for any person subject to the jurisdiction of the United States to ***take*** (includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these), import or export, ship in interstate or foreign commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any endangered fish or wildlife species and most threatened fish and wildlife species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. "Harm" includes any act which actually kills or injures fish or wildlife, and case law has clarified that such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife.

APPENDIX H – RESPONSE TO STAKEHOLDER COMMENTS

PROJECT: Madison Barracks MMRP Site Specific Work Plan Addendum (C02NY020400)			
DESIGN REVIEW COMMENTS			
		REVIEW: Draft SSWP Madison Barracks Target Range DATE: 24 November 2009 NAME: Alan S. Warminski (USACE – Baltimore)	
ITEM	DRAWING NO OR REFERENCE	COMMENT	ACTION
1		No comments.	A-ACCEPTED/CONCUR: No action required.

PROJECT: Madison Barracks MMRP Site Specific Work Plan Addendum (C02NY020400)			
DESIGN REVIEW COMMENTS			
		REVIEW: Draft SSWP Madison Barracks Target Range DATE: 23 November 2009 NAME: Constancio Labeste (USACE – New York)	
ITEM	DRAWING NO OR REFERENCE	COMMENT	ACTION
1		No comments.	A-Accept/Concur – No action required.

PROJECT: Madison Barracks MMRP Site Specific Work Plan Addendum (C02NY020400)			
DESIGN REVIEW COMMENTS			
		REVIEW: Draft SSWP Madison Barracks Target Range DATE: 30 November 2009 NAME: Kevin Kieff (OPRHP)	
ITEM	DRAWING NO OR REFERENCE	COMMENT	ACTION
1	Page E-3	It mentions using the Mercy Hospital as the facility for emergency medical needs. As Mercy is no longer a full-service hospital and has been in receivership, we would recommend you use Samaritan Medical Center, Washington Street, Watertown, NY.	A-ACCEPTED/CONCUR – The directions and map have been revised to reflect Mr. Kieff's suggestion.