



DEPARTMENT OF THE ARMY  
INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON, PICATINNY  
PICATINNY ARSENAL, NEW JERSEY 07806-5000

July 22, 2011



REPLY TO  
ATTENTION OF

Environmental Affairs Division

SUBJECT: Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/Interagency Agreement (IAG) Administrative Docket No. II-CERCLA-FFA-001-04, Section XXV: Submittal of **Fourth Five-Year Review Report Picatinny Arsenal**: Review is ER,A-eligible

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Division of Responsible Party Site Remediation  
Bureau of Case Management,  
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Dear Sirs:

Enclosed for your review are copies of the **Fourth Five-Year Review Report Picatinny Arsenal** (the 5 Year Review) developed by ARCADIS for Picatinny. The document is signed by the Picatinny Garrison Commander; it has been approved by the Army technical team and by Army legal offices.

An originally signed copy will be sent to only Mr. Roach and one original kept here. Copies of the documents with a copied signature page will be sent separately by ARCADIS. An electronic version is on the ARCADIS FTP site.

The 5 Year Review follows the latest EPA guidance and our agreements for formatting this multi-site Five-Year Review. The document was signed before your technical review as we had agreed in April. This agreement may have somewhat inhibited us - as the EPA guidance suggests - to work together throughout the process before finalizing the report; however, we have provided Annual Reports for your reviews discussed the same data used in this report at our technical and RAB meetings.

As you could surmise from our June RAB meeting, this report concludes that conditions of sites under the signed 14 Records of Decision are protective of human health and the environment and their remedies are functioning as intended. Once EPA concurs on the protectiveness statements, we will comply with the notification requirements to the public. We have already public noticed starting the 5 Year process earlier this year. The document will be provided to Technical Assistance Public Participation contractor for the RAB who will be requested to prioritize this for review and present her report to the RAB.

Sincerely,



**Project Manager for**  
Environmental Restoration

Enclosures

CC

Mr. Jim Kealy, NJDEP

Mr. Joe Marchesani, NJDEP

Ms. Barbara Dolce, TAPP Contractor

Mike Glabb, RAB Co-Chair (FTP site only)



# **FOURTH FIVE-YEAR REVIEW REPORT**

## **PICATINNY ARSENAL NEW JERSEY**

**FINAL**

**JULY 2011**

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- B Site Inspection Forms
- C Site Photos

### List of Acronyms and Abbreviations

%	Percent
µg/L	Micrograms per liter
1,1-DCE	1,1-Dichloroethene
1,2,3,7,8-PeCDD	1,2,3,7,8-pentachlorodibenzo-p-dioxin
2,3,7,8-TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
4,4'-DDE	4,4'-Dichlorodiphenyldichloroethylene
4,4'-DDT	4,4'-Dichlorodiphenyltrichloroethane
AA	Area of Attainment
AETC	Armaments Engineering and Technology Center
ANL	Argonne National Library
AOCs	Areas of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
ARCADIS	ARCADIS U.S., Inc.
AST	Aboveground Storage Tank
ATEPS	Army Total Environmental Program Support
BERA	Baseline Ecological Risk Assessment
BGS	Below Ground Surface
BRAC	Base Realignment and Closure
BSB	Bear Swamp Brook
BTAG	Biological Technical Assistance Team
CEA	Classification Exception Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cis-1,2 DCE	cis-1,2-Dichloroethene
COC	Constituent of Concern
COPEC	Contaminant of Potential Ecological Concern
CT	Carbon Tetrachloride
CY	Cubic Yards
DBA	Drum Burial Area
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene

### List of Acronyms and Abbreviations

DDT	Dichlorodiphenyltrichloroethane
DNT	Dinitrotoluene
DRMO	Defense Reutilization and Marketing Office
DU	Depleted Uranium
ERA	Ecological Risk Assessment
EUL	Enhanced Use Lease
EVO	Emulsified Vegetable Oil
FS	Feasibility Study
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
FSAC	Fire Support Armament Center
FT	Feet
GIS	Geographic Information System
GPB	Green Pond Brook
HAL	Health Advisory Level
HHRA	Human Health Risk Assessment
HI	Hazard Index
HMX	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
IC	Institutional Control
ICFKE	ICF Kaiser Engineers
ICM	Improved Conventional Munitions
IDW	Investigation Derived Waste
IFS	Integrated Facility System
IRAR	Interim Remedial Action Report
IRIS	Integrated Risk Information System
IT	IT Corporation
LOC	Level of Concern
LTM	Long-Term Monitoring
LTMP	Long-Term Monitoring Plan
LUC	Land Use Control
LUCIP	Land Use Control Implementation Plan
MCL	Maximum Contaminant Level

### List of Acronyms and Abbreviations

MEC	Munitions and Explosives of Concern
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MMRP	Military Munitions Response Program
MNA	Monitored Natural Attenuation
MSL	Mean Sea Level
NARTS	Navel Air Rocket Test Station
NBA	Northern Burial Area
NCP	National Contingency Plan
ng/kg	Nanograms per Kilogram
NJDEP	New Jersey Department of Environmental Protection
NJGWQS	New Jersey Groundwater Quality Standard
NJNRDCSCC	New Jersey Non-Residential Direct Contact Soil Cleanup Criteria
NJNRDCSRS	New Jersey Non-Residential Direct Contact Soil Remediation Standard
NPL	National Priorities List
NRC	Nuclear Protection Commission
ORP	Oxidation-reduction potential
O&M	Operations and Maintenance
PAHs	Poly Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene (also referred to as perchloroethene)
PEL	Permissible Exposure Limits
PEMS	Picatinny Environmental Management System
PETN	Pentaerythritol Tetranitrate
PP	Proposed Plan
PRB	Permeable Reactive Barrier
PQL	Practical Quantitation Limit
PRG	Preliminary Remediation Goal
RA	Response Action
RAO	Remedial Action Objective
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan

### List of Acronyms and Abbreviations

RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RDX	Cyclotrimethylenetrinitramine
RFA	RCRA Facility Assessment
RG	Remedial Goal
RI	Remedial Investigation
ROD	Record of Decision
RPO	Radiation Protection Office
SCL	Site Cleanup Level
sf	square feet
Shaw	Shaw Environmental, Inc.
SI	Site Investigation
SOP	Standard Operating Procedure
SWQS	Surface Water Quality Standard
SVOCs	Semi-Volatile Organic Compounds
TCE	Trichloroethene
TECUP	Toxic Energetics Cleanup Program
TEQ	Toxicity Equivalent
TERC	Total Environmental Restoration Contract
TNT	Trinitrotoluene
TOC	Total Organic Carbon
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USATHAMA	United States Army Toxic and Hazardous Materials Agency
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VC	Vinyl Chloride
VOC	Volatile Organic Compound
WWI	World War I
WWII	World War II

## **Executive Summary**

Picatinny Arsenal, with the United States Army Corps of Engineers' (USACE) technical concurrence and the United States Army Environmental Command's (USAEC) approval, has prepared the fourth Five-Year Review of remedial actions (RAs) implemented at Picatinny Arsenal. Picatinny Arsenal is located in Rockaway Township, Morris County, in north central New Jersey. This Five-Year Review was prepared pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) § 121 and the National Contingency Plan (NCP). The Five-Year Review process is required because selected remedies have resulted in hazardous substances remaining onsite at concentrations that do not allow for unlimited use and unrestricted exposure. The third Five-Year Review was approved by the United States Environmental Protection Agency (USEPA) in September 2006. This document represents the fourth Five-Year Review conducted for Picatinny Arsenal and encompasses the period 2006 through 2010.

As of December 31, 2010, Records of Decisions (RODs) have been signed for the following sites:

- Site 23 (PICA 065) – Post Farm Landfill
- Site 20/24 (PICA 066) – Pyrotechnic Testing Range/ Sanitary Landfill
- Site 25/26 (PICA 067) – Sanitary Landfill/ Dredge Pile
- Area D (PICA 076) Groundwater
- Area E (PICA 077) Groundwater
- Site 180 (PICA 093) – Waste Burial Area
- Green Pond Brook and Bear Swamp Brook (PICA 193)
- Group of 13 Sites (PICA 020)
- Site 61/104 (PICA 102) – Waste Dumps and Chemical Laboratories
- Area B (PICA 205) Groundwater
- Site 31/101 (PICA 072) – Former DRMO Yard
- Area C (PICA 206) Groundwater
- Group 3 Sites (PICA 008) Groundwater
- Group 1 Sites (PICA 079)

As of December 31, 2010, a ROD has been signed and the remedial action is pending at:

- Site 34 (PICA 002) – Lower Burning Grounds

## Final Fourth Five-Year Review

Picatinny Arsenal

The purpose of this document is to determine if selected remedies presented in the decision documents remain protective of human health and the environment. To achieve this purpose, the implementation, performance, and effectiveness of each remedy was evaluated. Technical assessments, as required under USEPA guidance, were performed for each of the sites. These assessments consisted of answering the following questions:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial actions objectives used at the time of the remedy selection still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The answers to these questions provided the basis for making conclusions regarding the continued protectiveness of the remedies specified in the ROD for each site.

The technical assessments and evaluations conducted as part of this Five-Year Review support the conclusions that selected remedies are expected to be protective of human health and the environment upon completion and, in the interim, exposure pathways that could result in unacceptable risk are being controlled.

This document provides both a site specific (operable unit) Protectiveness Statement and an Arsenal Wide Protectiveness Statement. It is the finding of this Five-Year Review that all remedies are functioning as intended and are protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years. Although site specific issues and regulatory discussions are documented herein, this Five-Year Review process has not identified any deficiencies which call into question the protectiveness of the remedies or necessary recommendations to address the remedies' functionality. These findings are largely a result of regularly held technical meetings with USEPA and the New Jersey Department of the Environmental Protection (NJDEP) during which remedy operation and monitoring data is routinely discussed.

Additional information pertaining to remedial actions, progress since the last Five-Year Review process, technical assessments, issues and discussions, recommendations, and protectiveness statement are presented on a site specific basis in chronological order of remedy implementation starting in Section 4.0 of this document. The Administrative Record for Picatinny Arsenal, in its entirety, can be found on two DVDs

**Final Fourth  
Five-Year Review**

Picatinny Arsenal

in **Appendix A**. This Administrative Record includes all 2010 Annual Data Reports which include all chemical data and trend plots to support the findings of this Five-Year Review.

## Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Picatinny Arsenal		
EPA ID (from WasteLAN): NJ3210020704		
Region: 2	State: NJ	City/County: Dover/Morris County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input checked="" type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs?* <input checked="" type="checkbox"/> YES NO	Construction completion date: NA	
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: EPA State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency: Department of Army		
Author name: Ted Gabel		
Author title: Project Manager	Author affiliation: Department of Defense	
Review period: 8/31/2006 to 12/31/2010**		
Date(s) of site inspection: 12/28/2010, 12/29/2010, 1/5/2011		
Type of review: <input type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
Review number: 1 (first) 2 (second) 3 (third) <input checked="" type="checkbox"/> Other (specify) 4 (Fourth)		
Triggering action: Actual RA Onsite Construction at OU # _____ Actual RA Start at OU# _____ Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report Other (specify) _____		
Triggering action date (from WasteLAN): 09/06/2006		
Due date (five years after triggering action date): 09/06/2011		

\* ["OU" refers to operable unit.]

\*\* [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

## **1. Introduction**

The purpose of the Five-Year Review is to determine if a remedy is protective of human health and the environment. The methods, findings, and conclusions of site activities are documented in Five-Year Review Reports. In addition, Five-Year Review Reports identify issues found during the review, if any, and identify recommendations to address them.

The Five-Year Review is a statutory requirement for Picatinny Arsenal located in Morris County, New Jersey. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(c) states the following:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that the action is appropriate at such site in accordance with Section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The U.S. Environmental Protection Agency (USEPA) interpreted this requirement further in the National Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300.430(f)(4)(ii)), which states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

ARCADIS U.S., Inc. (ARCADIS) was contracted by the U.S. Army Environmental Command (USAEC) to conduct the fourth Five-Year Review of the Remedial Actions (RAs) implemented at Picatinny Arsenal. Picatinny Arsenal is located approximately four miles north of the City of Dover in Morris County, New Jersey (**Figure 1-1**). This Five-Year Review includes the review of site conditions and site data available as of

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December 31, 2010. As of December 31, 2010, Records of Decisions (RODs) and RAs have been implemented to address contamination at the following sites:

- Site 23 (PICA 065) – Post Farm Landfill
- Site 20/24 (PICA 066) – Pyrotechnic Testing Range/ Sanitary Landfill
- Site 25/26 (PICA 067) – Sanitary Landfill/ Dredge Pile
- Area D (PICA 076) Groundwater
- Area E (PICA 077) Groundwater
- Site 180 (PICA 093) – Waste Burial Area
- Green Pond Brook and Bear Swamp Brook (PICA 193)
- Group of 13 Sites (PICA 020)
- Site 61/104 (PICA 102) – Waste Dumps and Chemical Laboratories
- Area B (PICA 205) Groundwater
- Site 31/101 (PICA 072) – Former DRMO Yard
- Area C (PICA 206) Groundwater
- Group 3 Sites (PICA 008) Groundwater
- Group 1 Sites (PICA 079)

As of December 31, 2010, a ROD has been signed and the RA is pending at:

- Site 34 (PICA 002) – Lower Burning Ground

Because of the complexity and number of individual sites addressed in this report, the report organization deviates from the Five-Year Review Report Guidance (USEPA, 2001) to provide a more readable document. Required information has been grouped by site or operable unit in order to present a complete review and provide recommendations in one place. The content of this report, however, is comprehensive and consistent with the guidance. The chart below presents the guidance outline and identifies where the appropriate information can be found in this report.

<b>Guidance Organization</b>	<b>Five-Year Review Report Organization</b>
I. Introduction	Section 1 – Introduction provides general information for the five-year review and purpose of the report.
II. Site Chronology	Section 2 – Site Chronology summarizes major activities at Picatinny Arsenal ( <b>Table 1</b> ).
III. Background	Section 3 – Background summarizes general historical activities and features of Picatinny Arsenal as well as initial response activities.

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Guidance Organization	Five-Year Review Report Organization
<p>IV. Remedial Actions, Progress Since Last Review, Five-Year Review Process. Technical Assessment, Discussions and Issues, Recommendations and Protectiveness Statements</p>	<p>This information is presented on a site specific basis for improved readability. Sites are presented in chronological order of remedy implementation and information for each site is in the following sections:</p> <p><u>2007</u></p> <p>Section 4 – Site 23 (PICA 065) – Post Farm Landfill</p> <p>Section 5 – Site 20/24 (PICA 066) – Pyrotechnic Testing Range/ Sanitary Landfill</p> <p>Section 6 – Site 25/26 (PICA 067) – Sanitary Landfill/ Dredge Pile</p> <p>Section 7 – Area D (PICA 076) Groundwater</p> <p>Section 8 – Area E (PICA 077) Groundwater</p> <p>Section 9 – Site 180 (PICA 093) – Waste Burial Area</p> <p>Section 10 – Green Pond Brook and Bear Swamp Brook (PICA 193)</p> <p><u>2008</u></p> <p>Section 11 – Group of 13 Sites (PICA 020)</p> <p>Section 12 – Site 61/104 (PICA 102) – Waste Dumps and Chemical Laboratories</p> <p>Section 13 – Area B (PICA 205) Groundwater</p> <p><u>2009</u></p> <p>Section 14 – Site 31/101 (PICA 072) – Former DRMO Yard</p> <p>Section 15 – Area C (PICA 206) Groundwater</p> <p><u>2010</u></p> <p>Section 16 – Group 3 Sites (PICA 008) Groundwater</p> <p>Section 17 – Group 1 Sites (PICA 079)</p> <p><u>RA Not Yet Implemented</u></p> <p>Section 18 – Site 34 (PICA 002) – Lower Burning Grounds</p>
<p>V. Protectiveness Statement(s)</p>	<p>The site-wide protectiveness statement is presented in Section 19.</p>
<p>VI. Five-Year Review Process and Next Review</p>	<p>Provided in Sections 20 and 21.</p>
<p>VII. References</p>	<p>References for supporting documents used to prepare this report are provided on a site specific basis in Sections 4 – 18 and in Section 22.</p>

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**2. Site Chronology**

Site Chronology is detailed below. An updated Administrative Record roster and associated DVDs are included in **Appendix A**.

<b>Event</b>	<b>Year</b>
Installation Assessment completed by the United States Army Toxic and Hazardous Materials Agency (USATHAMA)	1976, 1981
Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) completed by the New Jersey Department of Environmental Protection (NJDEP)	1987
Site Investigation (SI) completed by Army	1989
Area D Groundwater Interim Action ROD signed	1990
Picatinny Arsenal placed on National Priorities List (NPL)	1990
Federal Facility Agreement signed between the Department of the Army-Picatinny Arsenal and USEPA	1991
Remedial Investigation (RI) Concept Plan completed	1991
Lagoons and dry well associated with Building 24 removed under RCRA	1991
Area D Groundwater Interim Action Remedy commenced	1992
Building 95 Impoundments removed	1992
Post Farm Landfill Removal Action	1993
Lead Removal Action – Site 35/ Building 1363A and Site 167/Building 1373	1995
Wharton Waterline Extension	1996
<b>First Five-Year Review</b>	1996
Guncotton Line Removal Action – Site 16	2000
<b>Second Five-Year Review</b>	2001
Tetryl Removal Action – Site 17	2002
Site 20/24 (Pyrotechnic Testing Range/Sanitary Landfill) ROD signed	2002
Site 20/24 Remedial Action Construction commenced	2002
Clarification of the Statement of Protectiveness Amending the Second Five-Year Report signed	2002
Polychlorinated Biphenyl (PCB) Removal Action at Site 122/Building 60	2003
Bear Swamp Brook Sedimentation Basin Removal	2004
Area D Groundwater Final ROD signed	2004
Site 23 (Post Farm Landfill) ROD signed	2004
Site 20/24 Remedial Action Construction completed	2004
Lead Sites Removal Action	2004
Green Pond Brook and Bear Swamp Brook ROD signed	2005
Site 24 (Burning Ground) ROD signed	2005
Facility-Wide Removal of Sumps and Dry Wells	2005
<b>Third Five-Year Review Signed</b>	2006
Area D Groundwater Final Remedy (PRB) installed	2007

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<b>Event</b>	<b>Year</b>
Site 25/26 (PICA 67), Site 180 (PICA 93), Area E Groundwater (PICA 77), ROD Signed	2007
Site 23 (PICA 65), Site 25/26 (PICA 67), Site 180 (PICA 93), Area E Groundwater (PICA 77), Green Pond Brook (PICA 193), Group of 13 Site (PICA 20) RAs completed	2007
Group of 13 Site (PICA 20) ROD signed	2008
Site 31/101 (PICA 72) and Area B Groundwater (PICA 205) ROD signed	2008
Area B Groundwater (PICA 205) RA completed	2008
Site 61/104 (PICA 102) ROD Signed and RA completed	2009
Site 31/101 (PICA 72) RA completed	2009
Area C Groundwater (PICA 206) ROD Signed	2009
Group 1 (PICA 79) and Group 3 (PICA 008) RODs signed	2010
Area C (PICA 206) Groundwater RA completed	2009
Group 1 (PICA 79) and Group 3 (PICA 008) RAs completed	2010
<b>Fourth Five-Year Review Planned</b>	2011

### **3. Facility-Wide Background**

This section provides a brief overview of the site location and history, geology and hydrogeology, land and resource use, history of contamination, and the initial response. Site specific information can be found in subsequent sections.

#### **3.1 Site Location and History**

Picatinny Arsenal is a 5,900 acre government-operated munitions research and development facility located in Morris County, New Jersey, approximately 40 miles west of New York City and four miles northeast of Dover, New Jersey. The Arsenal sits in the Highlands of the State of New Jersey.

Picatinny Arsenal was established in 1880 by the U.S. War Department as a storage and powder depot. Later it was expanded to assemble powder charges for cannons and to fill projectiles with maximitite (a propellant). During World War I (WWI), Picatinny Arsenal produced all sizes of projectiles. In the years following WWI, Picatinny Arsenal began projectile melt-loading operations and began to manufacture pyrotechnic signals and flares on a production basis. During World War II (WWII), Picatinny Arsenal produced artillery ammunition, bombs, high explosives, pyrotechnics, and other ordnance. After WWII, Picatinny Arsenal's primary role became the research and engineering of new ordnance. However, during the Korean and Vietnam conflicts, Picatinny Arsenal resumed the production and development of explosives, ammunition and mine systems.

In recent years, Picatinny Arsenal's mission has shifted to conducting and managing research development, life-cycle engineering, and support of other military weapons and weapon systems. The facility has responsibility for the research and development of armament items. The Base Realignment and Closure process in 2005 resulted in Picatinny being designated to remain open and to expand in mission.

#### **3.2 Geology and Hydrogeology**

Picatinny lies within Green Pond Valley, a glaciated river valley bounded by Green Pond Mountain to the northwest and Copperas Mountain to the southeast. Elevations at Picatinny range from approximately 1,000 feet (ft) above mean sea level (msl) to 700 ft above msl at Green Pond Brook at the southern installation boundary. Green Pond Valley is filled with glacially-derived sediments surrounded and underlain by bedrock. The basement rocks are faulted by a series of northeast/southwest trending faults.

Four major aquifers have been identified beneath Picatinny:

1. The unconfined aquifer occurs within the valley floor and has a thickness of approximately 20 to 35 ft. This aquifer is continuous throughout the valley, with the exception of areas on the ridges where bedrock is exposed at the surface. Groundwater within this unit occurs from relatively near ground surface to about 30 ft below ground surface (bgs) in upland areas. Groundwater in the unconfined aquifer generally flows toward surface water discharge areas, such as Green Pond Brook (GPB), Bear Swamp Brook (BSB), and Lake Picatinny. Groundwater flow velocities vary greatly in the unconfined unit based on varying permeability and gradient, and are estimated to range from 50 ft per year to over 300 ft per year.
2. The upper semi-confined aquifer is generally encountered in the southern half of the valley.
3. The lower semi-confined aquifer occurs beneath the upper only in the central valley portion of this area. As the unconsolidated sediments become thinner on the sides of the valley, this lower aquifer pinches out against the bedrock.
  - o Groundwater flow direction in the semi-confined aquifers is generally down valley to the southwest and towards surface water discharge areas. Vertical flow is typically upward towards discharge areas except where affected by groundwater withdrawal wells. Groundwater flow velocities are generally similar to the unconfined aquifer, though in some areas the lower semi-confined aquifer consists of coarser deposit with generally low hydraulic gradients.
4. The bedrock aquifer exhibits faults, fold axes, bedding planes, and foliation trends that affect contaminant transport. Groundwater flow in the bedrock is generally towards the central valley and surface water features; however, locally the foliation and fracturing can alter and control flow directions along fractures and fault planes. Impacts to the bedrock aquifer, including trichloroethene (TCE) and explosives, have been documented in the Mid-Valley Groundwater (PICA 204); the 800 Building Area (PICA 079); Area K (PICA 50); and Area J (PICA 008).

The upper three valley-fill aquifers (unconfined, upper semi-confined, and lower semi-confined) have a maximum thickness of approximately 175 ft, and are impacted with various contaminants including chlorinated and hydrocarbon compounds, and explosives at the following PICA sites: Area D Groundwater (PICA 076); Area B

Groundwater (PICA-204); Area E Groundwater (PICA 077); 800 Area Buildings (PICA-079); the Mid-Valley Groundwater (PICA-205); and the Optics Lab (PICA-013).

GPB is the main surface water drainage pathway within the valley. Two man-made lakes (Lake Denmark and Picatinny Lake) are present, both drained by GPB. Two tributaries to GPB, Robinson Run, and BSB flow from the ridges on the southeast and northwest sides of the valley, respectively. Wetlands and transition zones around the brooks are present throughout Picatinny Arsenal.

### **3.3 Land and Resource Use**

Picatinny Arsenal has the responsibility for research and development of armament items for the U.S. Army. Research and development operations are generally located on the valley floor and to a lesser extent on the valley walls and ridges.

Picatinny Arsenal is located within the Appalachian Oak Forest Region which at upper elevations is characterized by the birch-hemlock-maple-oak forest type. This cover type persists mainly in the relatively undisturbed ridge crests, slopes, and moist ravines of Picatinny Arsenal. Bottomland areas prevalent in the valley floor consist of poorly-drained silty clays and peats which primarily support red-maple swamp forest. Much of the poorly-drained swamp area has been drained and filled to support base operations. Nevertheless, sufficient ecological habitat remains at Picatinny Arsenal to support a robust wildlife community.

### **3.4 History of Contamination**

Picatinny Arsenal is owned and operated by the U.S. Army and was a major source of munitions for WWI, WWII, the Korean War, and the Vietnam Conflict. During those periods, Picatinny Arsenal was involved in the production of explosives, rocket and munitions propellants, pyrotechnic signals and flares, and metal components. It was during this period that the production processes in effect at the time led to contaminant releases to the environment.

### **3.5 Initial Response**

Over the years, environmental investigations into the operations and waste management production activities at Picatinny Arsenal have indicated the potential for contamination at a number of sites. Between 1976 and 1981, USATHAMA conducted studies into possible contamination by chemical, biological, and radiological material at

the facility. Based on this study, USATHAMA concluded that large sections of Picatinny Arsenal were contaminated by manufacturing wastes and unexploded ordnance (UXO). In 1987, NJDEP completed a RCRA Facility Assessment (RFA) for Picatinny Arsenal. The RFA identified 55 solid waste management units, many of which had been previously identified in the USATHAMA study. Subsequently, the Army conducted a Site Investigation in 1989 to assess the presence and potential for contaminant migration in groundwater.

Picatinny Arsenal was added to the NPL in March 1990. A Federal Facility Agreement (FFA) was signed by the USEPA Region II and the Army in July 1991 to integrate the Army's CERCLA response and RCRA corrective action obligations into a comprehensive agreement. A Remedial Investigation/Feasibility Study (RI/FS) Concept Plan was prepared by Argonne National Laboratory in 1991 which identified 156 potentially-contaminated sites at Picatinny Arsenal. This concept plan was developed based on data gathered during previous investigations and a review of production records at Picatinny Arsenal.

The investigative approach suggested by the RI Concept Plan, initiated by the Army and approved by the regulatory agencies in 1990, was to break the defined RI Concept Plan sites into Areas (Area A-P). These sixteen (16) RI Concept-defined areas were prioritized and divided into three phases of investigation called Phase I, II, and III. The investigation of the Lower Burning Ground (RI-Concept Site 34 (PICA 002) of Area A), however, was initiated before the approval and normalization of this approach.

This original approach was modified by the implementation of the Department of Defense's Relative Risk Funding Policy. The goal of the relative risk policy is to attempt to address the worst sites first from a national or Department of Defense perspective. According to the guidance, the investigative and remedial actions for sites with the highest relative-risk were funded first with few exceptions.

Picatinny Arsenal RI Concept Sites were consolidated into PICA sites as a result of the agreements made at a series of meetings that occurred in 2003 with USEPA, NJDEP, and USAEC program managers. The consolidation was based on geographic attributes, similar schedules, and similar remedies. PICA nomenclature is provided in parentheses in this Five-Year Review.

#### **4. Site 23 (PICA 065) - Post Farm Landfill**

Site 23 (PICA 065) is approximately 10.3 acres in size and is located near the southern corner of Picatinny along the top of a ridge that forms the eastern boundary of the arsenal (**Figure 4-1**). The Site consists of the Drum Burial Area (DBA) located in the southern end of the site, the Northern Burial Area (NBA), and the Central Borrow Pit, a cleared flat area located in the middle of the site. Both the DBA and the NBA are landfilled areas and are currently surrounded by perimeter fencing. The Central Borrow Pit is open, and currently contains a linear mound of brush, debris, and fill dirt.

Prior to 1940, Site 23 (PICA 065) was a farm. From the 1940s to the 1970s, the DBA received industrial wastes that included wastes generated at Picatinny. These drummed wastes included caustic paint stripper, used hydraulic oils, wastewater from oil reservoirs, tank cleaning wastes, fly ash, and solid waste. By 1951, farm buildings at the site had been demolished. In the 1950s, Site 23 (PICA 065) served mostly for borrow pit materials. Drums of paint remover were reportedly disposed of in trenches within the DBA. In the 1960s, a pit in the southern portion of the site received fly ash from coal burning operations, paint stripping wastes, phenols, and explosive-laden hydraulic oils either in containers or as free liquid. This pit was then covered with soil obtained from the Central Borrow Pit area. The site has been recently used for disposal of clean fill and vegetative matter (west side of the central borrow area). The area around the site is currently used for recreational activities, primarily hunting.

#### **4.1 Remedial Actions**

##### **4.1.1 Basis for Taking Action**

As part of the HHRA (Dames and Moore, 1999), the carcinogenic risk and non-carcinogenic hazard was evaluated for the following three populations: current outdoor maintenance workers, future industry/research workers, and future construction/excavation workers. For exposure to surface and subsurface soils carcinogenic risk fell within the NCP target range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$  and the non-carcinogenic hazard was equal to the hazard index (HI) criterion of 1 for future industry/research workers and less than 1 for current outdoor maintenance workers and future construction/excavation workers. Based on a comparison of contamination found in surface and subsurface soils to that of groundwater, no continued impact to groundwater is expected.

A remedial action was required to address maximum contaminant level (MCL) exceedances in groundwater in order to restore the groundwater to its beneficial use as a drinking water aquifer.

In culmination of the findings of numerous studies the following chemicals were originally identified as contaminants of concern (COCs) in groundwater:

- aluminum;
- cadmium;
- iron;
- lead
- radium;
- silver;
- 1,1-dichloroethene (1,2- DCE);
- 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (2,3,7,8-TCDD);
- Gross alpha; and
- Gross Beta.

#### 4.1.2 Remedy Selection

The ROD for Site 23 (PICA 065) was signed on December 20, 2004 and RA began in 2005 with the collection of the first long-term monitoring (LTM) samples and was completed in 2007 when land use controls (LUCs) were fully implemented.

The remedial action objectives, as developed in the ROD, for Site 23 (PICA 065) are as follows:

- Prevent human exposure to groundwater contaminated with constituents of concern at levels greater than the chemical-specific Applicable or Relevant and Appropriate Requirements (ARARs) through protection of points of compliance:
- Prevent human exposure to and spread of fly ash and contaminated soil;
- Protect uncontaminated on-post groundwater for future use;

- Protect off-post groundwater, surface water, sediment, and soils for unlimited use; and,
- Prevent human exposure to surface soils contaminated with COCs at levels greater than the chemical-specific Levels of Concern (LOCs).

The selected remedy included the following components:

- Long-term groundwater monitoring using the existing groundwater wells;
- Long-term monitoring of surface water and sediment from the off-post spring and seep;
- Implementation of LUCs; and
- Collection of one round of surface soil samples from locations that have previously exhibited exceedances of the LOCs to ensure isolated areas of contamination are not more widespread. If unexpected levels of contamination are found in the surface soil samples, additional topsoil may be placed at the site.

A site map depicting the current LUCs at Site 23 (PICA 65) is included as **Figure 4-1**.

#### 4.1.3 Remedy Implementation

Quarterly long-term groundwater monitoring began in 2007 and consisted of sampling 11 existing wells. With USEPA and NJDEP approval, sampling frequency was reduced to annual in 2008 and has continued through 2010. Twenty-four surface soils samples were collected in 2007. Each sample was located 25 ft from six previous locations to provide further delineation of potential impacted soils. All contaminants were documented below LOCs and placement of additional topsoil was not warranted.

In addition, four signs were posted along the fence enclosing the drum burial area soil cover and three signs were posted along the fence enclosing the northern burial area soil cover to preclude unacceptable human health risks from exposure to contaminated soils or groundwater.

4.1.4 Systems Operations/O&M Requirements

Quarterly LTM data reports were prepared and submitted in 2007 and 2008 following remedy implementation. Following a Mann-Kendall statistical evaluation, completed in accordance with the Remedial Design (RD), the sampling frequency was reduced to annual in October of 2008 and annual LTM data reports were submitted for 2008, 2009, and 2010. The RD required a second Mann-Kendall statistical evaluation be performed following the completion of year five (2010). The exit strategy presented in the RD allows for the results of the Mann-Kendall statistical evaluation and comparison to ARARs to be used to modify the sampling parameters and frequency. As a result of the 2007 and 2010 analyses, the sampling parameters and network have been reduced as COCs have been consistently documented below ARARs and the Mann-Kendall evaluation did not identify any increasing trends. The table below presents the revisions to the monitoring program in accordance with the exit strategy.

<b>Monitoring Well</b>	<b>Original Parameters (Per RD)</b>	<b>Revised Parameters (per 2007 ARAR analysis and Mann-Kendall)</b>	<b>Revised Parameters (per 2007 ARAR analysis and Mann-Kendall)</b>
<b>Frequency</b>	<b>Quarterly</b>	<b>Annual</b>	<b>Annual</b>
C-DM23-1	TAL Metals, Radiologicals	Radium-226	Well dropped from program
C-DM23-2	TAL Metals, Radiologicals	Cadmium and Radium-226	Well dropped from program
C-DM23-3	TAL Metals, Radiologicals	Cadmium	Cadmium
C-MW23-1B	TAL Metals, Radiologicals	gross beta	Well dropped from program
C-MW23-4B	TAL Metals, Radiologicals, VOCs	Radium-226	Well dropped from program
C-MW23-5B	TAL Metals, Radiologicals	Radium-226	Well dropped from program
C-MW-14	TAL Metals, Radiologicals	TAL Metals, Radiologicals	No change – well is typically dry
C-23-MW-001	TAL Metals, Radiologicals, VOCs	Radium-226	Well dropped from program
C-23-MW-002	TAL Metals, Radiologicals, VOCs	Radium-226	Well dropped from program
C-23-MW-003	TAL Metals, Radiologicals, VOCs	Well dropped from program	NA
C-23-MW-004	TAL Metals, Radiologicals	Radium-226	Well dropped from program
Seep	VOCs	cis-1,2-DCE	No change
Spring	VOCs	cis-1,2-DCE	No change

Annual site inspections were initiated in 2007 and continue through 2010. Land use and the general condition of the soil cover, fence, and signs are examined during these inspections. Operation and maintenance (O&M) required for the soil cover is minimal, but will be perpetual.

## **4.2 Progress Since Last Review**

### 4.2.1 Recommendations from the Third Five-Year Review

The primary recommendation specified in the third Five-Year Review stated “Approve and implement the Remedial Design Plan, including the Land Use Control Implementation Plan and Long Term Monitoring Plan”. As detailed above, this recommendation was successfully implemented. The Final RD and Interim Remedial Action Report (IRAR) for Site 23 (PICA 065) is included in **Appendix A**.

### 4.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the remedial action was implemented and long-term groundwater monitoring began in 2007.

## **4.3 Document Review**

Relevant and appropriate documents associated with the Site 23 (PICA 065) remedy selection, implementation, long-term monitoring and sampling results were reviewed for this fourth Five-Year Review Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS, 2007. 1<sup>st</sup> and 2<sup>nd</sup> Quarter 2007 Groundwater Monitoring, One Time Surface Soil Sampling, Site 23 (PICA 065) Post Farm Landfill – Picatinny Arsenal. August.

ARCADIS, 2008. 3Q07 and 4Q07 Quarterly Groundwater Report, PICA 65 (Site 23) Post Farm Landfill, PICA 076 (Site 37) Area D, and PICA 077 (Site 38) Area E. April.

ARCADIS, 2008. 2007 Annual Groundwater Monitoring Report. Site 23 (PICA 65) Post Farm Landfill. February.

ARCADIS, 2009. Remedial Action Report for Post Farm Landfill (PICA 065). June.

ARCADIS, 2009. 2008 Annual Monitoring Report for Post Farm Landfill (PICA 065), Area D (PICA 076), and Area E (PICA 077). February.

ARCADIS, 2010. 2009 Annual Groundwater Monitoring Report. Site 23 (PICA 65) Post Farm Landfill. February.

ARCADIS, 2011. 2010 Annual Groundwater Monitoring Report. Site 23 (PICA 65) Post Farm Landfill. April.

ARCADIS, 2011. 2010 Annual Land Use Certification. Picatinny Arsenal, New Jersey. April.

Dames and Moore. 1999. Phase I Remedial Investigation Report Vol. 8, Human Health Assessment for Picatinny Arsenal, New Jersey. Prepared by Dames and Moore, Bethesda, MD for Army Total Environmental Program Support Aberdeen Proving Ground, Maryland.

Shaw Environmental Inc., 2004. Record of Decision, Site 23 (PICA 065) – The Post Farm Landfill. August.

Shaw Environmental Inc., 2006. Long Term Monitoring Plan and Land Use Control Remedial Design for Site 23 (PICA 065) – The Post Farm Landfill, Picatinny Arsenal, New Jersey. December.

#### **4.4 Data Review and Evaluation**

The statistical evaluation of data trends for COCs was completed in 2007 and most recently conducted again in 2010 in accordance with the RD. The following data comparison is based on the results of annual monitoring data collected during 2008 and 2009 at Site 23 (PICA 065) Post Farm Landfill.

- In 2007, 2008, 2009, and 2010 only cadmium was detected above Site Cleanup Levels (SCLs). A review of the current data set (2010) indicates that cadmium was detected at one location at an estimated concentration of 4.72 micrograms per liter ( $\mu\text{g/L}$ ). This concentration exceeds the SCL of 4  $\mu\text{g/L}$ . However, it is consistent with the results from both the 2008 and 2009 annual reports.

No significant upward trends were detected for any of the three COCs based on historical data and the 2010 data analysis.

#### **4.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. All contaminants have been repeatedly detected below SCLs, with the exception of cadmium at one location. Per the requirements in the RD and associated exit strategy, a statistical analysis was performed in 2007 and 2010. A Mann-Kendall Trend Test was performed, and none of the nine monitoring wells demonstrated a statistically significant trend for the COCs. Additional details on this statistical evaluation can be found in the 2010 Annual Groundwater Monitoring Report for Site 23 (PICA 065) which is included in the Administrative Record in **Appendix A**. LUCs continue to restrict site access, mitigate exposure pathways, and prevent groundwater from being used as drinking water.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives (RAOs) used at the time of the remedy selection still valid?*

Yes. There have been no changes in the physical conditions of the site or the land use at Picatinny Arsenal since USEPA's last Five-Year Review that would affect the routes of exposure and the protectiveness of the remedy. Cleanup levels selected in the ROD remain valid. Site cleanup levels are summarized in **Table 1**.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

#### **4.6 Issues and Discussions**

Since implementation of the remedy in 2007, no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Discussions with USEPA and NJDEP about this site have focused on the ongoing groundwater monitoring, the chemical results, and the statistical evaluations.

#### **4.7 Recommendations**

None.

#### **4.8 Protectiveness Statement**

The remedy for Site 23 (PICA 65) is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **5. Site 20/24 (PICA 066) - Pyrotechnic Testing Range/Sanitary Landfill**

Site 20/24 (PICA 66), Pyrotechnic Testing Range/Sanitary Landfill, is located in Area B near the southern boundary of Picatinny Arsenal (**Figure 5-1**). In 1940, Site 20/24 was an undeveloped wetland area. Historical aerial photographs indicate the slow expansion of the site from two small clearings to the current site of approximately 28 acres. It should be noted that Site 20 is a sub-area of Site 24. Approximately seven acres of Site 20/24 have been used for miscellaneous waste and debris disposal that began in the 1960's and continued until 1972. Site 20/24 also has been used for pyrotechnic testing. These activities led to contaminated soil and groundwater at the site. The Site 20/24 ROD addresses only contaminated soil. Contaminated groundwater at this site is addressed in the Area B Groundwater (PICA 205) ROD.

### **5.1 Remedial Actions**

#### 5.1.1 Basis for Taking Action

Previous Investigations at this site have determined contaminants of concern in surface and subsurface soils. COCs in soil, as identified in the ROD, for Site 20/24 include:

- PCBs;
- lead; and
- 4,4' – Dichlorodiphenyltrichloroethane (4,4'-DDT).

The risk to human health posed by these COCs fell within the NCP target range of  $1 \times 10^{-04}$  to  $1 \times 10^{-06}$  and the HI is below 1 for the current and reasonably anticipated future land use (Dames and Moore, 1999). These receptors included the current outdoor maintenance workers, future industry/research workers, and future construction/excavation workers. However, because this soil contamination does not allow for unrestricted use and unlimited exposure, an action was required to ensure land use remains protective of site users.

A baseline ecological risk assessment was performed as part of the feasibility study (IT, 2000) to provide an estimate of ecological risks associated with contaminants found at Site 20/24 (PICA 66). The ecological assessments for Site 20/24 (PICA 66) indicated no impacts to the plant community, toxicity to earthworms, or impact to small mammal populations. Risk modeling indicated a potential risk to the veery (a small

bird) and woodcock from 4,4'-DDT and lead in soil and to a minor extent from exposure to aluminum and PCBs.

An additional basis for action at this site was a specific request by USEPA and NJDEP to consider more active remediation. Therefore, although there was no legal requirement for taking action based on the  $4 \times 10^{-05}$  calculated risk, the Army chose to actively remediate the site. This agreement was in accordance with inter-agency agreements in place at the time.

#### 5.1.2 Remedy Selection

The ROD for Site 20/24 (PICA 66) was signed on June 4, 2002. The remedial action objectives developed in the ROD are specific to contaminated surface soils, subsurface soils, surface water, and sediment originating from Site 20/24 (PICA 66). The remedial action objectives for this site are as follows:

- Prevent exposure to contaminated media by human and biological receptors;
- Protect uncontaminated media for future use;
- Minimize migration of contaminants to adjacent media; and,
- Protect environmental receptors.

The selected remedy included the following components:

- Containment of soils with PCBs, lead, and 4,4'-DDT using a vegetated soil cover;
- Excavation of soils that lie outside of the area to be capped and contain contaminants above remedial goals (RGs) and placement of those soils within the area proposed for capping; and
- Enforcement of access restrictions designed to prevent disturbances of the soils cover to prevent any non-industrial use of the site.

A site map depicting the LUCs established at the site is included as **Figure 5-1**.

### 5.1.3 Remedy Implementation

Remedial activities began in 2002 and continued through 2004. One hundred and sixty cubic yards (CY) of soil containing PCBs was removed and transported for off-site disposal. A two foot cover of clean soil was placed to cap approximately three acres of soil contaminated with PCBs, lead, and 4,4-DDT. Site restoration was completed to develop wetlands, and LUCs were implemented to restrict site access and soil cover disturbance.

### 5.1.4 Systems Operations/O&M Requirements

Quarterly site inspections were initiated in December 2003 and continued through 2006. In 2006, the site inspection frequency was decreased to annually in compliance with the Land Use Control Implementation Plan (LUCIP). The presence of LUCs and condition of the soil cover also are verified in the inspection and subsequently certified in Annual Land Use Certification Reports. Annual Certifications have been prepared for 2007 through 2010, and will continue until LUCs are no longer required.

O&M required for the soil cover is minimal, but will be perpetual. Maintenance to the cap will be limited to the repair of any damage noted in the inspections and annual mowing of the cap area.

## **5.2 Progress Since Last Review**

### 5.2.1 Recommendations from the Third Five-Year Review

The primary recommendation specified in the third Five-Year Review stated “Reduce the frequency of site inspections and maintenance from quarterly to annually”. As detailed above, this recommendation was successfully implemented.

### 5.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, inspections and LUC Certifications were performed annually from 2006 to 2010. The selected final remedy for groundwater was implemented in 2008 and detailed in Section 13 of this report.

### 5.3 Document Review

Relevant and appropriate documents associated with Site 20/24 (PICA 066) were reviewed for this fourth Five-Year Review Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS, 2007. Site 20/24 Pyrotechnic Testing Range Annual Land Use Certification. Picatinny, New Jersey. January.

ARCADIS, 2008. 2007 Annual Land Use Certification. Picatinny Arsenal, New Jersey. March.

ARCADIS, 2009. 2008 Annual Land Use Certification. Picatinny Arsenal, New Jersey. February.

ARCADIS, 2010. 2009 Annual Land Use Certification. Picatinny Arsenal, New Jersey. June.

ARCADIS, 2011. 2010 Annual Land Use Certification. Picatinny Arsenal, New Jersey. April.

Dames and Moore. 1999. Phase I Remedial Investigation Report Vol. 8, Human Health Assessment for Picatinny Arsenal, New Jersey. Prepared by Dames and Moore, Bethesda, MD for Army Total Environmental Program Support, Aberdeen Proving Ground, Maryland.

IT Corporation (IT). 2002. Remedial Action Work Plan for the Construction of a Soil Cap at Site 20/24 Pyrotechnic Testing Range (Final). Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract No. DACA-31-95-D-0083. July.

IT, 2000. Final Feasibility Study of Site 20/24, Picatinny Arsenal, New Jersey. Prepared by IT Corporation, Mt. Arlington, New Jersey for the US Army Corp of Engineers-Baltimore District Total Environmental Restoration Contract (TERC). March.

Picatinny Arsenal. 2002. Site 20/24 Record of Decision (Final). Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract No. DACA-31-95-D-0083. June.

Shaw Environmental, Inc. (Shaw). 2003a. Supplement to the Work Plan for Picatinny Arsenal Task Order 19 Construction of a Soil Cap at Site 20/24 (Final). Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract No. DACA-31-95-D-0083. April.

Shaw Environmental, Inc. (Shaw). 2005. Site 20/24 – Site Closure Report (Draft Final). Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract No. DACA-31-95-D- 0083. October.

#### **5.4 Data Review and Evaluation**

No new data have been collected since the third Five-Year Review. Analytical data are not collected as part of the annual site inspections.

#### **5.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. Land use remains consistent with the assumptions made at the time of the decision documents, and the soil cover continues to function as intended and is protective of human health and the environment. Since 2007 the soil cover has not required any repairs; only annual mowing has been performed.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Yes. There have been no changes to site conditions, land use, or integrity of the soil cover.

Cleanup levels were based on the New Jersey Non-Residential Direct Contact Soil Cleanup Criteria (NJNRDCSCC) which were replaced with the New Jersey Non-Residential Direct Contact Soil Remediation Standards (NJNRDCSRS) in June 2008. The new standards for lead and 4,4'-DDT are both higher than the cleanup criteria established in the ROD and RD. The revised dermal contact standard for PCBs decreased from 2 milligrams per kilogram (mg/kg) to 1 mg/kg. Per CERCLA Five-Year Review guidance (USEPA, 2001), cleanup standards are typically frozen at the time of ROD signing unless a new or modified requirement calls into question the protectiveness of the selected remedy. A comparison of SCLs established in the decision documents and current LOCs is provided in **Table 1**. A review of USEPA's

Integrated Risk Information System (IRIS) Database confirmed that the toxicity values for PCBs have not been revised since the time of ROD signature. Therefore, it can be concluded this revision of a dermal contact standard for PCBs does not call into question the overall protectiveness of the implemented remedy.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

#### **5.6 Issues and Discussions**

Since implementation of the remedy in 2007 no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Discussions with USEPA and NJDEP about this site have focused on annual land use certifications and mowing of the soil cover.

#### **5.7 Recommendations**

None.

#### **5.8 Protectiveness Statement**

The remedy for Site 20/24 (PICA 66) is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **6. Site 25/26 (PICA 067) – Sanitary Landfill/ Dredge Pile**

Site 25 (Sanitary Landfill) is located within the central valley of Picatinny Arsenal near the southern boundary (**Figure 6-1**). The northeastern section of the site is next to a parking lot used for the softball fields. A large and dense thicket covers the section of the site next to the parking lot. Behind the thicket are shrubs and overgrown grasses. At its closest point (the northwest corner), Site 25 is approximately 50 ft east of GPB. The eight-acre site consists of level grasslands, mounds, and low-lying wet areas.

An abandoned railroad track forms the northern boundary of the site. The eastern and southern boundaries of the site consist of Site 163 (Baseball Fields) and the western boundary is largely formed by South Brook Road. Site 26 (The Dredge Pile) consisted of an irregularly shaped pile of sediments (approximately 12,000 CY of sediments) dredged from portions of GPB. The 2,000 square foot (sf) site lies approximately in the center of Site 25.

### **6.1 Remedial Actions**

#### 6.1.1 Basis for Taking Action

Several historical investigations were conducted at Site 25/26 (PICA 067) to determine the nature and extent of site impacts to surface and subsurface soil. Several poly aromatic hydrocarbons (PAHs) and copper were detected at a concentration that exceeded their respective screening levels for surface soil. The COCs identified in surface soil are as follows:

- copper;
- lead;
- benz(a)anthracene;
- benzo(a)pyrene;
- benzo(b)fluoranthene;
- chrysene;
- benzo(k)fluoranthene;
- dibenz(a,h)anthracene;
- indeno(1,2,3-cd)pyrene;

- total PCBs;
- 4,4-DDT;
- pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD); and
- 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD).

The only class of constituents that exceeded screening levels for subsurface soil were PAHs. This examination concluded that contaminants in subsurface soil do not adversely affect groundwater beneath the site.

The risk to human health posed by these COCs fell within the NCP target range of  $1 \times 10^{-04}$  to  $1 \times 10^{-06}$  and the HI is below 1 for the current and reasonably anticipated future land use (Dames and Moore, 1998). These receptors included the current outdoor maintenance workers, future industry/research workers, and future construction/excavation workers. However, because this soil contamination does not allow for unrestricted use and unlimited exposure, an action was required to ensure land use remains protective of site users.

An Ecological Risk Assessment (ERA) (Dames and Moore, 1998) and Risk Management Plan (IT, 2000) concluded the ecological hazards are acceptable for all contaminants, except for selenium and DDT. Selenium concentrations were determined to be within background levels and thus eliminated as a contaminant of potential ecological concern (COPEC). The ROD determined a RA for DDT was not warranted because the state cleanup level is higher than the maximum detected concentration of DDT, the site is too small to support enough species of concern, and the ecological receptors do not spend a sufficient amount of time contacting the affected media.

An additional basis for action at this site was a specific request by USEPA and NJDEP to consider more active remediation. Therefore, although a more active remedial action is not mandated based on the  $4.8 \times 10^{-05}$  calculated risk, the Army chose to actively remediate the site because the risks posed by the site were considered by the USEPA to be high enough to warrant action. This agreement was in accordance with inter-agency agreements in place at the time.

SCLs were established for certain COCs which contributed (through dermal exposure) to unacceptable risk to human health and the environment at Sites 25/26 (PICA 067). Ultimately, SCLs were established for the following three constituents: benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene.

### 6.1.2 Remedy Selection

The ROD for Site 25/26 (PICA 067) was signed on July 3, 2007. The RAO developed in the ROD is specific to the contaminated soils originating from Site 25/26. The RAOs for Site 25/26 are:

- Prevent exposure to contaminated soils impacted by COCs above SCLs.

The selected remedy for Site 25/26 (PICA 067) included installation of a vegetated soil cover and implementation of LUCs.

### 6.1.3 Remedy Implementation

The response action was completed in 2007 and included construction of a vegetated soil cover over 12,700 sf of the site. The vegetated soil cover consisted of a 12 inch compacted common fill layer overlain by a six-inch topsoil layer. The vegetated soil layer is above the existing grade, and the soil cover transitions with a 3:1 slope to match the existing grade. Approximately two CY of soil was excavated from soil sample location 25/26GR-3. The excavated soil was consolidated and covered by the vegetated soil cover.

In addition, LUCs were implemented for the entire site to ensure the integrity of the vegetative cover and maintain protectiveness of human health. A site map with the LUC area of applicability is included as **Figure 6-1**.

### 6.1.4 Systems Operations/O&M Requirements

Annual site inspections were initiated in December 2007 and continue to be completed on an annual basis. The presence of LUCs and condition of the soil cover are also verified in the inspection and subsequently certified in Annual Land Use Certification Reports. O&M required for the soil cover is minimal, but will be perpetual.

## **6.2 Progress Since Last Review**

### 6.2.1 Recommendations from the Third Five-Year Review

At the time of the third Five-Year Review (2006), the ROD for Site 25/26 (PICA 67) had yet to be approved. Thus the third Five-Year Review recommended approving the ROD and implementing the remedy. The signed ROD is included in **Appendix A**.

#### 6.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the ROD and RD were submitted and approved, and the remedial action was completed at Site 25/26 (PICA 067). The Remedial Action Report (RAR) has been approved, and four consecutive years of annual inspections and LUC certifications have been completed.

#### 6.3 Document Review

Relevant and appropriate documents associated with Site 25/26 (PICA 067) were reviewed for this fourth Five-Year Review Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS. 2007. Final Remedial Action Work Plan, Site 25/26 (PICA 067) – Sanitary Landfill and Dredge Pile. July.

ARCADIS. 2008. 2007 Annual Land Use Certification. Picatinny Arsenal, New Jersey. March.

ARCADIS. 2009. 2008 Annual Land Use Certification. Picatinny Arsenal, New Jersey. March.

ARCADIS. 2009. Final Remedial Action Report, Site 25/26 (PICA 067) – Sanitary Landfill and Dredge Pile. Picatinny Arsenal, New Jersey. June.

ARCADIS. 2010. 2009 Annual Land Use Certification Picatinny Arsenal, New Jersey. June.

ARCADIS. 2011. 2010 Annual Land Use Certification. Picatinny Arsenal, New Jersey. April.

Dames & Moore. 1998. Picatinny Arsenal Phase I Remedial Investigation Report. Prepared for Army Total Environmental Program Support (ATEPS). July.

IT Corporation (IT). 2000. Risk Management Plan for 9 Sites in the Phase I Area – Draft Final. Prepared for the U.S. Army Corps of Engineers, Baltimore District. August.

IT, 2002. Picatinny Arsenal Area C Groundwater Data, Unpublished, IT Corporation, Mt. Arlington, New Jersey Office, February.

ICF Kaiser Engineers (ICFKE). 1997. Memorandum from Douglas L. Schicho of ICFKE to Greg Hatchett of USACE Baltimore District on the Subject of Site 25 Surface Soil Grid Sampling Data, WBS# 07.005.04 Delivery Order 0007. DACA31-95-D-0083. August

U.S. Army, 2007. Record of Decision, Site 25/26 (PICA 067) – Sanitary Landfill and Dredge Pile. January.

#### **6.4 Data Review and Evaluation**

No new data have been collected since the third Five-Year Review. Analytical data are not collected as part of the annual site inspections.

#### **6.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. The soil cover continues to function as intended and prevents the potential exposure of human and environmental receptors to COCs. The land use at Sites 25/26 (PICA 067) has remained the same and provided that the land use does not change, the remedy will continue to function as intended by the decision documents.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial RAOs used at the time of the remedy selection still valid?*

Yes. There have been no changes to site conditions or land use.

The NJNRDCSCC used to establish SCLs were replaced with the NJNRDCSRS in June 2008. The new standards for benzo(a)anthracene benz(a)pyrene, benzo(b)fluoranthene are lower than the SCLs established in the ROD and RD. The new standards for benzo(a)anthracene benz(a)pyrene, benzo(b)fluoranthene decreased from 4 mg/kg to 2 mg/kg, 0.66 to 0.2, and 4 mg/kg to 2 mg/kg, respectively. A comparison of SCLs established in the decision documents and current LOCs is provided in **Table 1**. Per CERCLA Five-Year Review guidance, cleanup standards are typically frozen at the time of ROD signing unless a new or modified requirement calls into question the protectiveness of the selected remedy. A review of USEPA's IRIS

Database confirmed that the toxicity values for these compounds have not been revised since the time of ROD signature. Therefore, it can be concluded that this revision of a dermal contact standard for PAHs does not call into question the overall protectiveness of the implemented remedy and the SCLs established in the ROD and RD remain valid.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

#### **6.6 Issues and Discussions**

Since implementation of the remedy in 2007, no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual land use certifications. Discussions with USEPA and NJDEP about this site have focused on the ongoing land use certifications. Discussions at the time of ROD signature and remedy implementation included addressing how the enhanced use lease might affect Site 25/26 (PICA 67). Both the ROD and RD included provisions for maintaining protectiveness should the land use at this site change as a result of the enhanced use lease. However, Picatinny is no longer pursuing the enhanced use lease at the southern boundary, and the current land use at Site 25/26 (PICA 67) is expected to remain unchanged.

#### **6.7 Recommendations**

None.

#### **6.8 Protectiveness Statement**

The remedy for Site 25/26 (PICA 67) is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **7. Area D (PICA 076) Groundwater**

Area D (PICA 076) Groundwater contamination is located in the southern portion of Picatinny Arsenal (**Figure 7-1**). Building 24 was a plating facility in operation from 1930 to 1981 and is considered the source of Area D (PICA 076) Groundwater contamination. Washing and degreasing of metal parts prior to plating generated waste TCE which reportedly flowed to a dry well located adjacent to Building 24 via an overflow line. It is posited that this dry well was the primary release mechanism of TCE to groundwater. In addition, two infiltration lagoons were associated with Building 24 operations. Treated waste water from Building 24 was diverted to these lagoons. The lagoons and dry well were removed and closed under RCRA in 1991.

Between 1981 and 1985, 21 wells were installed in the vicinity of Building 24. These wells were sampled periodically between 1981 and 1985 by various agencies and analyzed for volatile organic compounds (VOCs), phenol, metals, anions, and cyanide. Results of this sampling indicated that TCE migrated to groundwater forming a plume which discharges to GPB 1,600 ft away. Approximately 1,100 ft at its widest point, the plume is primarily located in the unconfined aquifer. Site maps are provided as **Figures 7-1** and **7-2**, and a cross section of the plume is depicted on **Figure 7-3**.

### **7.1 Remedial Actions**

#### 7.1.1 Basis for Taking Action

In culmination of the findings of numerous studies, the following chemicals have been identified as COCs:

- 1,1-DCE (1,1-Dichloroethene);
- cis-1,2,-Dichloroethene (cis-1,2-DCE);
- Tetrachloroethene (PCE);
- TCE; and
- Vinyl Chloride (VC).

However, it should be noted that the majority of the Area D Groundwater plume contains only TCE. The remaining COCs listed above are found at lower levels or are not detected in the majority of monitoring wells.

The Phase I RI (Dames and Moore, 1998) included an HHRA for Area D groundwater, surface water, and air. Hypothetical future exposure of groundwater to workers, adult/child residents, and child residents were evaluated for ingestion, inhalation, and skin contact risks. Groundwater contact through any of these pathways is not expected to occur because of the facility-wide CEA and LUCs that are in place. The evaluation of the potential risk from contaminated surface water considered the risk to trespasser swimmers. The results of the HHRA indicated that under the current and hypothetical exposure scenarios at Area D (PICA 76) Groundwater, the COCs pose an unacceptable risk to human health and exceed applicable drinking water standards. A remedial action was required to address this unacceptable risk to human health and restore the groundwater to its beneficial use as a drinking water aquifer.

#### 7.1.2 Remedy Selection

The Interim Action ROD for Area D Groundwater was signed on September 28, 1990. The selected interim remedy for Area D Groundwater consisted of a pump and treat remedy to intercept contaminated groundwater prior to discharge into GPB. The interim remedy was implemented in 1992 and included the following components:

- Extraction of contaminated groundwater;
- Pretreatment system for the removal of metals and solids;
- Air stripping for removal of VOCs; and
- Discharge of treated water to GPB.

The Final ROD for Area D Groundwater was signed on September 22, 2004. As part of the Final ROD for Area D Groundwater the following RAOs were developed:

- Prevent exposure to contaminated groundwater;
- Establish institutional controls (ICs) to restrict access to the contaminant plume;
- Protect uncontaminated ground and surface water for designated uses;
- Minimize migration of contaminants to adjacent ground and surface water;

- Restore contaminated ground and surface water to comply with their respective use designations;
- Comply with ground and surface water ARARs; and,
- Continue to ensure the protection of environmental receptors.

The final remedy was implemented in 2007 and included the construction of a permeable reactive barrier (PRB) with monitored natural attenuation (MNA), discontinuation and decommissioning of the pump and treat system and implementation of ICs.

#### 7.1.3 Remedy Implementation

In September of 1992, an interim action hydraulic barrier pump and treat system was implemented to intercept contaminated groundwater prior to discharge to GPB. The hydraulic barrier pump and treat system was installed between the plume centroid and GPB. This pump and treat system was operated from 1992 until 2007.

In April 2007, the PRB was installed using continuous trenching technology which consisted of simultaneous excavation of soil and backfilling with an iron-sand mixture. Trenching was conducted on 11 April 2007 through 12 April 2007. The PRB includes two distinct sections. The first 80 ft length has a depth of 35 ft and a 55 percent target iron percentage (by mass); the second section is 220 ft long with a depth of 28 ft and a target iron percentage of 45 percent (by mass). The width of the PRB varies between 1.1 ft and 1.2 ft. This PRB was designed to treat groundwater prior to it discharging to GPB; therefore it is considered the final action required to address surface water.

Also in 2007, the MNA program which is the final remedial action for groundwater was initiated. The projected duration of the MNA remedy is 170 years.

Upon collecting three years of data to monitor MNA at the site, the PRB performance, and surface water conditions, USEPA concurred with removing the pump and treat system that was idle from 2007 through 2010. The pump and treat system was decontaminated and decommissioned in August 2010.

#### 7.1.4 Systems Operations/O&M Requirements

The PRB is designed to function without the need for maintenance and will remain in place at the end of the remedial action. Per the RD (ARCADIS, 2008), the PRB was designed to eliminate the need for zero-valent iron change out. The O&M requirements associated with the PRB include compliance and performance monitoring. The PRB is a remedy implemented for the protection of surface water. For this reason, compliance sampling, defined as monitoring to verify that the PRB is achieving the RAOs and surface water performance objectives, is based on surface water sampling in Green Pond Brook. In addition to the compliance sampling, additional performance monitoring is conducted to evaluate the performance of the PRB. The wells comprising the PRB performance monitoring network and MNA network will be inspected periodically and maintained throughout the remedial action.

Quarterly MNA and Remedial Action Operation data reports were prepared and submitted for the first two years of active system operation. These reports were initiated on completion of the PRB in April 2007. Starting in 2010, semi-annual reports were submitted which provided tabulated performance and compliance monitoring data and summarized operational issues. A summary of this operations data is included in Section 7.4 below and a more detailed interpretation of the data is included in the Annual Reports which were prepared for 2007, 2008, 2009, and 2010 and will continue until the completion of the MNA remedy.

PRB performance and MNA monitoring will continue to be completed in accordance with project documents and data reports will be generated.

## 7.2 Progress Since Last Review

### 7.2.1 Recommendations from the Third Five-Year Review

The primary recommendation specified in the third Five-Year Review stated “perform remedial design of the final remedy and initiate the final remedial action”. As detailed above, this recommendation was successfully implemented. Electronic copies of the approved RD and subsequent Annual Reports are provided in **Appendix A**.

### 7.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the RD for Area D (PICA 076) Groundwater was completed and approved, and the selected final remedy was implemented at the

site. In addition, the interim remedial action, hydraulic barrier pump and treat system, was decontaminated and decommissioned.

### **7.3 Document Review**

Relevant and appropriate documents associated with Area D (PICA 076) Groundwater investigations, remedy development, and operations were reviewed for this fourth Five-Year Review Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS, 2007. 1Q07, 2Q07, 3Q07, 4Q07 Quarterly MNA and Remedial Action Operation Data Reports, Area D (PICA 076) Groundwater. 2007.

ARCADIS, 2007. 2007 Annual Monitoring Report, Area D (PICA 076) Groundwater. May.

ARCADIS, 2008. 1Q08, 2Q08, 3Q08, 4Q08 Quarterly MNA and Remedial Action Operation Data Reports, Area D (PICA 076) Groundwater. 2008.

ARCADIS, 2008. 2008 Annual Monitoring Report, Area D (PICA 076) Groundwater. May.

ARCADIS, 2008. Final Remedial Design, Area D Groundwater. July.

ARCADIS, 2008. Interim Remedial Action Report Area D Groundwater. August.

ARCADIS, 2009. 1Q09, 2Q09, 3Q09, 4Q09 Quarterly MNA and Remedial Action Operation Data Report, Area D (PICA 076) Groundwater. September 2009.

ARCADIS, 2009. 2009 Annual Monitoring Report, Area D (PICA 076) Groundwater. May.

ARCADIS, 2010. 1st Half 2010 Semi-Annual MNA and Remedial Action Operation Data Report Area D (PICA 076) Groundwater. September.

ARCADIS, 2010. 2010 Annual Monitoring Report, Area D (PICA 076) Groundwater. May.

Dames & Moore. 1998. Picatinny Arsenal Phase I Remedial Investigation Report. Prepared for Army Total Environmental Support (ATEPS). July.

ERC Environmental and Energy Services Company, 1989. Record of Decision for Interim Groundwater Remediation Plan, Picatinny Arsenal, New Jersey. May.

U.S. Army. 2004. Picatinny Arsenal Area D Groundwater Record of Decision.

#### **7.4 Data Review and Evaluation**

The following trends in data were identified as part of this Five-Year Review Process and documented in the four Annual Reports (2007 - 2010):

- **PRB Performance:** Performance groundwater monitoring data indicate that the PRB is performing as designed and protecting Green Pond Brook. Maximum TCE concentrations immediately upgradient of the PRB range from approximately 3 to 5 mg/L in performance well D-PRB-1. These elevated concentrations are treated in the PRB, where the maximum detected TCE concentration has remained below 5 µg/L, and concentrations are frequently non-detect.
- **PRB Compliance:** Surface water data from Green Pond Brook further indicate the protectiveness of the PRB. Historically, low concentrations of COCs periodically have been detected in surface water samples D-SW-2, D-SW-8, D-SW-3, and D-SW-4 prior to installation of the PRB in April 2007. After installation of the PRB, at upstream location D-SW-2, all COCs displayed stable trends (based on a review of COC concentration plotted versus time), and no COCs have been detected since September 2007. At downstream locations, sporadic detections of VC above the regulatory standard have been observed in GPB. These exceedances have never been duplicated in subsequent sampling events. A decreasing frequency of detection of VC and other COCs was observed in samples from D-SW-3, D-SW-8 (directly downgradient from the PRB) and D-SW-4 (the farthest downgradient location) since installation of the PRB. Overall, the data suggest that the PRB has improved the surface water quality in GPB.
- **Former Source Area/Plume Fringe/Centerline Wells:** Concentrations of TCE in the eight monitoring wells in the Former Source Area, Plume Fringe, and Plume Centerline indicate stable or decreasing concentrations in most locations. Significant decreasing trends were documented through the performance of a Mann-Whitney U-Test in both 2009 and 2010). Fluctuating or increasing TCE

concentrations at several centerline locations (e.g., D-112-6 and D-92-3) likely reflect reconfiguration of the plume following shut-down of the pump and treat system and downgradient advective transport. Daughter products cis-1,2-DCE, 1,1-DCE, and VC appear to follow the same general trends as TCE, although at significantly lower concentrations in almost all locations.

- **Sentinel Wells:** Trends in sentinel wells (D-41-9, D-41-16, D-41-17, D-MWD-1, and D-MW-1), are used to evaluate the stability of the Area D plume. Trends in the five sentinel wells were stable for all COCs since final remedy implementation and beginning of MNA monitoring in 2007. TCE was detected at a low concentration exceeding the cleanup standard in three wells (D-41-9, D-41-16, and D-41-17). Prior to installation of the PRB, the concentration of TCE in well 41-9, located immediately downgradient from the PRB, displayed an increasing trend and was 1,810 µg/L in March 2007, compared to less than 25 µg/L in 2009 – 2010. A Mann-Whitney U-Test in 2010 confirmed a significant decreasing trend of cis-1,2,DCE concentrations. Since 2007, no COCs were reported in sentinel monitoring wells D-MWD-1 or D-MW-1, located downgradient from the PRB and downgradient across GPB.
- Concentrations of TCE were reported above the cleanup standard of 1 µg/L in the potable water supply sample from D-PW-131 during 10 of the 10 monitoring events conducted in 2007, 2008, 2009, and 2010. A review of the concentration versus time trend plots (included in the Annual Groundwater Data Reports) indicates the concentration has remained stable and ranged between 4.73 µg/L (June 2009) and 6.17 µg/L (November 2007). Concentrations in D-PW-131 are expected to meet remedial goals in the future when RAOs for the plume are met. It is noted these samples are influent samples collected prior to treatment and distribution for potable purposes.

## **7.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. Data presented in the 2007, 2008, 2009, and 2010 Annual Reports document the PRB is performing as designed and natural attenuation is occurring.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Yes. There have been no changes in the physical conditions of the site or the land use at Picatinny Arsenal since the Army's last Five-Year Review that would affect the routes of exposure and the protectiveness of the remedy. The groundwater standards identified in the ROD are based on the lower of the Federal Drinking Water Standards MCLs and New Jersey Groundwater Quality Standard (NJGWQS) and remain unchanged, with the exception of 1-1 DCE. The current comparison criteria for 1,1-DCE established in the ROD and RD is 2 µg/L. Since establishing these comparison criteria, the NJGWQS has been revised to 1 µg/L. A comparison of SCLs established in the decision documents and current LOCs is provided in **Table 1**. Per CERCLA Five-Year Review Guidance (USEPA, 2001), cleanup standards are typically frozen at the time of ROD signing unless a new or modified requirement calls into question the protectiveness of the selected remedy. This revised NJGWQS does not call into question the overall protectiveness of the implemented remedy at Area D (PICA 76) as the USEPA toxicity values have not changed; and therefore revision of the comparison criteria established in the ROD and RD is not warranted as the cleanup standards are still valid.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

## **7.6 Issues and Discussions**

Since implementation of the remedy in 2007, no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Discussions with USEPA and NJDEP about this site have focused on the monitoring well network and well repair. Specifically, during construction of the PRB, well 41-9 was damaged such that it could not be sampled. Well 41-9 was repaired in 2009 and has been restored to the MNA program. Well 9-H was last sampled in third quarter 2009 because it is located along a road which underwent construction and paving activities in 2009/2010 and was paved over. This well will be repaired (spring/summer 2011) to allow scheduled sampling during the third quarter of 2011.

Discussions with USEPA and NJDEP have also included the use of Hydrasleeves™ at Area D (PICA 76) Groundwater. During the third quarter of 2010, Hydrasleeves™ were not deployed in accordance with the Hydrasleeve™ Sampling Standard Operating Procedure (SOP) for all parameters. The Hydrasleeves™ being utilized did

not hold enough volume to collect adequate sample volume for all of the parameters, and field staff did not understand the Hydrasleeve™ Sampling SOP. The data collected for Hydrasleeves that were incorrectly deployed were flagged as “rejected” in the database. This issue was rectified by employing larger (2 liter) Hydrasleeves™, revision/clarification of the Hydrasleeve™ Sampling SOP, and field staff training on the revised SOP.

#### **7.7 Recommendations**

None.

#### **7.8 Protectiveness Statement**

The remedy for Area D (PICA 076) Groundwater is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **8. Area E (PICA 077) Groundwater**

### **8.1 Remedial Actions**

Area E (PICA 077) is approximately 38 acres in size and is located in the south-central portion of Picatinny Arsenal (**Figure 8-1**). Area E borders Third Avenue to the northwest, BSB to the northeast, and GPB to the southeast. Area E consists of four study sites:

- Site 22 (Building 95 Impoundment Area), PICA 010;
- Site 28 (Sewage Treatment Plant Sludge Beds), PICA 070;
- Site 38 (Building 95, Printed Circuit Board Manufacturing Operations Treatment Facility), PICA 077; and
- Site 44 (Building 39, Golf Course Maintenance Shop), PICA 083.

Site 22 consists of an area, less than one acre in size, where two unlined sand filter lagoons and one unlined sludge drying bed (jointly referred to as the surface impoundment unit) were formerly located. Building 95 was initially constructed to replace the metal plating operations at Building 24; however, due to the updated weapons systems, printed circuit board operations were initiated instead. The printed circuit board manufacturing operations continued until 1988. The Armament Engineering Division has occupied the southern portion of Building 95 since the completion of its construction. This division has housed multi-faceted operations that included research and development, plotting, lamination, photo engraving, painting, plating, and machining. Since 1977, the northern portion of Building 95 has been occupied by the headquarters of the Fire Support Armament Center (FSAC) division. The FSAC maintains and operates physics laboratories.

Degreasing and cleaning with chlorinated solvents (part of metal plating operations for printed circuit board manufacturing) was conducted at Building 95. These activities produced contaminated wastewater containing VOCs and other chemicals. This wastewater was stored and treated in nine underground storage tanks (USTs) that were installed beneath Building 95 in 1961. This activity no longer takes place in Building 95.

Integrity (leak) testing performed on the USTs by PTA between 1988 and 1991 determined that the USTs may have leaked. The USTs were closed and filled with concrete in accordance with NJDEP-approved RCRA closure plans.

Wastewater and sludge were transported via pipelines from the Site 38 USTs to the surface impoundment unit (Site 22). Contaminated sand and sludge from the impoundment units and their associated piping were excavated and backfilled. Following NJDEP approvals for RCRA closure actions, the surface impoundment unit and its associated piping system and the USTs are considered closed. While the NJDEP approved the RCRA closures, they indicated that additional action would be required at the discharge ditch and Area E (PICA 077) Groundwater under the CERCLA program. These areas were addressed in the ROD for Area E (PICA 077) Groundwater.

#### 8.1.1 Basis for Taking Action

In culmination of the findings of numerous studies, the following chemicals were originally identified as COCs in groundwater:

- 1,1-DCE;
- cis-1,2-DCE;
- PCE;
- TCE; and
- VC.

The Phase I RI (Dames and Moore, 1998) included an HHRA for Area E (PICA 077) Groundwater. Hypothetical future exposure of groundwater to workers, adult/child residents, and child residents were evaluated for ingestion, inhalation, and skin contact risks. Groundwater contact through any of these pathways is not expected to occur because of the facility-wide CEA and LUCs that are in place. The results of the HHRA indicated that under the current and hypothetical exposure scenarios at Area E (PICA 077) Groundwater, the COCs pose an unacceptable risk to human health and exceed applicable drinking water standards.

Per the Final ROD for Area E (PICA 077) Groundwater, the remedial action was undertaken to protect human health and the environment from contaminant concentrations in excess of groundwater standards. A remedial action was required to

address the exceedances of groundwater standards and restore the groundwater to its beneficial use as a drinking water aquifer.

The remedial action for Site 22 was undertaken based on subsurface soil concentrations of beryllium and copper that exceeded the NJDEP non-residential standards.

#### 8.1.2 Remedy Selection

The Final ROD for Area E (PICA 077) Groundwater was signed on September 28, 2007. The RAOs for Area E (PICA 077) Groundwater are specific to groundwater contamination identified within Area E. The RAOs for Area E Groundwater are:

- Prevent human consumption of, and contact with, contaminated Area E groundwater.
- Prevent contamination of uncontaminated Area E groundwater and surface water with COCs.
- Restore contaminated Area E groundwater to comply with its use designation. The designated use of groundwater underlying Area E is Class IIA groundwater, whose primary use is potable water and/or conversion to potable water through conventional treatment mixing, or similar techniques.

The selected remedy for Area E Groundwater included MNA and LUCs. The selected remedy for Site 22 included implementation of LUCs. A site map is included as **Figure 8-1**.

#### 8.1.3 Remedy Implementation

The MNA sampling program was implemented in September 2007. Groundwater samples were collected from the MNA network monitoring wells and surface water samples collected from Green Pond Brook. All samples were analyzed for VOCs, total and dissolved iron, nitrates and sulfates. Field parameters (temperature, pH, oxidation-reduction potential (ORP), specific conductance, dissolved oxygen, and turbidity) were recorded during sampling.

LUCs were implemented to restrict groundwater use and control exposure to beryllium and copper contaminated sub-surface soils. The first LUC site inspection was completed on December 5, 2007.

#### 8.1.4 Systems Operations/O&M Requirements

Quarterly MNA data reports were prepared and submitted for the first two years of active system operation. Beginning in 2010, semi-annual reports were submitted and provide tabulated monitoring data and data trend summaries. More detailed interpretation of the data is included in the Annual Reports which were prepared for 2007, 2008, 2009, and 2010. The MNA monitoring will continue to be completed in accordance with project documents and data reports will be generated.

Annual site inspections were initiated in 2007 and continue through 2010. The site is inspected for any signs of inappropriate land use. Annual Land Use Certification Reports were prepared for 2007 – 2010. Site inspections and certifications will continue annually.

### **8.2 Progress Since Last Review**

#### 8.2.1 Recommendations from the Third Five-Year Review

At the time of the third Five-Year Review, the ROD for Area E (PICA 077) Groundwater and Site 22 had yet to be approved. Thus, the third Five-Year Review recommended approving the ROD and implementing the remedy. As detailed above, this recommendation was successfully implemented. The signed ROD is included in **Appendix A**.

#### 8.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the ROD and RD for Area E Groundwater and Site 22 (PICA 077) were completed and approved. The selected final remedy was implemented at the site.

### **8.3 Document Review**

Relevant and appropriate documents associated with Area E Groundwater and Site 22 (PICA 077) were reviewed for this fourth Five-Year Review Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS. 2007. Final Record of Decision, AREA E Groundwater and Site 22 (Building 95 Impoundment Area). Prepared for U.S. Army Corp of Engineers. July.

ARCADIS. 2008. Final Remedial Design, AREA E Groundwater and Site. Prepared for U.S. Army Corp of Engineers. June.

ARCADIS. 2008. 2007 Annual Land Use Certification. Picatinny Arsenal, New Jersey. March.

ARCADIS 2008. Site 23 (PICA 065) – Post Farm Landfill; Area D (PICA 076) and Area E (PICA 077) Groundwater at Picatinny Arsenal, New Jersey. Picatinny Arsenal, New Jersey. March.

ARCADIS. 2009. 2008 Annual Land Use Certification. Picatinny Arsenal, New Jersey. March.

ARCADIS 2009. 2008 Annual Monitoring Report, Area (PICA 077) Groundwater. Picatinny Arsenal, New Jersey. March.

ARCADIS. 2010. 2009 Annual Land Use Certification Picatinny Arsenal, New Jersey. June.

ARCADIS 2010. 2009 Annual Monitoring Report, Area (PICA 077) Groundwater. Picatinny Arsenal, New Jersey. March.

ARCADIS 2010. Biennial Certification for a Groundwater Classification Exemption Area (CEA). Picatinny Arsenal, New Jersey. June

ARCADIS. 2011. 2010 Annual Land Use Certification. Picatinny Arsenal, New Jersey. March.

ARCADIS 2011. 2010 Annual Monitoring Report, Area (PICA 077) Groundwater. Picatinny Arsenal, New Jersey. Month.

Dames & Moore. 1998. Picatinny Arsenal Phase I Remedial Investigation Report. Prepared for Army Total Environmental Support (ATEPS). July.

Shaw 2008. Picatinny Arsenal Classification Exception Area, Biennial Certification. Picatinny Arsenal, New Jersey. June.

#### **8.4 Data Review and Evaluation**

MNA sampling analytical data indicate stable and/or slightly decreasing concentrations of COCs in groundwater. Concentrations versus time trend plots are included as an appendix with every annual groundwater report. These reports and trend plots are included in the Administrative Record attached as **Appendix A**. Specific data review and evaluation is below:

- **Plume Center/Fringe Monitoring Wells:** In the seven plume center/fringe monitoring wells, concentrations of COCs are generally stable or decreasing. An overall decreasing PCE trend compared to the baseline 2003 or 2007 event is observed at monitoring wells E-WG3-2, E-12-H, and E-95-3. PCE concentrations have fluctuated periodically at E-WG11-1, E-12-L, and E-82-1, but were approximately stable in 2010. An elevated PCE concentration at E-95-3 was reported in August 2008 at 73.6 µg/L. This detection was higher than levels reported previously at well E-95-3 (which ranged from 7.57µg/L to 21.3 µg/L during the four previous quarters). Concentrations dropped in subsequent sample rounds (50.3 µg/L and 57.6 µg/L in 2010). Ongoing sampling at Area E will continue to monitor groundwater quality trends at E-95-3. An increase in cis-1,2-DCE was observed at monitoring well E-82-1, starting in 2008. An increase in cis-1,2-DCE indicates biological degradation of PCE and TCE.
- **Surface Water Sampling:** Concentrations of constituents in surface water samples (D-SW-5, E-38-SW-001, and E-38-SW-004) collected from GPB are generally non-detect or below the New Jersey Surface Water Quality Criteria (SWQC), with occasional low-level concentrations of COCs.

#### **8.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. As detailed above, groundwater analytical data confirm that MNA is occurring as anticipated. In addition, the land use at Area E and Site 22 (PICA 077) has remained the same and provided that the land use does not change, the LUC remedy, which addresses both groundwater and soils, will continue to function as intended by the decision documents.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Yes. There have been no changes to site conditions or the exposure assumptions at the site. The groundwater standards identified in the ROD are based on the lower of the Federal Drinking Water Standards MCLs and New Jersey Groundwater Quality Standard and remain unchanged and are still valid. The NJNRDCSCC which were used as comparison criteria for subsurface soil and sediment at Site 22 have been replaced with the NJNRDCSRS. The current NJNRDCSRS for beryllium increased from 2 mg/kg to 140 mg/kg and the SRS for copper increased from 600 mg/kg to 45,000 mg/kg. A comparison of SCLs established in the decision documents and current LOCs is provided in **Table 1**. Per CERCLA Five-Year Review Guidance (USEPA, 2001), cleanup standards are typically frozen at the time of ROD signing unless a new or modified requirement calls into question the protectiveness of the selected remedy. A review of USEPA's IRIS Database confirmed that the toxicity values have not been revised since the time of ROD signature. Therefore, it can be concluded that this revision of a dermal contact standard for beryllium and copper does not call into question the overall protectiveness of the implemented remedy.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

## **8.6 Issues and Discussions**

Since implementation of the remedy in 2007, no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Discussions with USEPA and NJDEP about this site have focused on the chemical data trends and inconsistencies.

Regarding inconsistencies during the third quarter of 2009, the data for E-95-3 (which typically exhibits the highest concentrations of PCE), and E-MW-2 (which typically has no detection of PCE), seemed to be switched. The sample times for these two samples were close together, so it was suspected that the samples were mislabeled. The following sampling event (first quarter 2010) showed that PCE concentrations at these wells had resumed more typical concentrations at each well.

Concentrations of PCE at well E-95-3, which is in the center of the Area E plume and close to the former source area, are not decreasing per the Mann-Whitney U-Test. In order to verify that the plume is not spreading, two additional wells were sampled during the first quarter of 2010: (E-95-5, which is approximately 100 ft downgradient of

E-95-3, and MW-12A, which is approximately 185 ft downgradient of E-95-3). The VOC concentrations at these two wells adjacent to E-95-3 indicate that the plume center is not expanding. Data from these two wells is below and this sampling event and evaluations are presented in detail in the 2010 Annual Data Report included in the Administrative Record in **Appendix A**.

<b>Monitoring Well</b>	<b>PCE</b>	<b>TCE</b>	<b>cis-1,2 DCE</b>
<b>E-95-5</b>	Non-detect	2.57 µg/L	Non-detect
<b>MW-12A</b>	1.76 µg/L	8.12 µg/L	Non-detect

#### **8.7 Recommendations**

None.

#### **8.8 Protectiveness Statement**

The remedy for Area E (PICA 077) Groundwater is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **9. Site 180 (PICA 093) – Waste Burial Area**

Site 180 (PICA 093) is located in the north central portion of Area C at Picatinny and consists of approximately 6.8 acres on the eastern side of GPB (**Figure 9-1**). The site is a former Waste Burial Area and is bounded by Site 34 (PICA 002) to the west, the Skeet Range to the north, and swampy wooded areas to the south and east. Site 180 (PICA 093) is located within the 100-year floodplain of GPB, and high value wetlands comprise approximately 3 of its 6.8 acres.

### **9.1 Remedial Actions**

#### 9.1.1 Basis for Taking Action

Based on the results of previous site investigations, COCs were not identified for subsurface soil and sediment. The HHRA (Dames and Moore, 1998) determined these media do not pose unacceptable risks to human health and the environment and do not require remedial action. As stated in the ROD, surface water at the site is intermittent and therefore does not present an exposure pathway and does not support a viable aquatic community on a year-round basis. Therefore, there is no unacceptable risk to human health or to ecological receptors associated with COCs in surface water.

Groundwater at Site 180 (PICA 093) is being addressed as part of Area C (PICA 206) Groundwater and is presented in Section 15.

The contaminants in surface soil which were identified as COCs include:

- benz(a)anthracene;
- benzo(a)pyrene;
- benzo(b)fluoranthene;
- benzo(k)fluoranthene;
- chrysene;
- dibenz(a,h)anthracene;
- indeno(1,2,3-cd)pyrene;
- arsenic;
- cadmium;

- copper;
- lead;
- zinc;
- dieldrin; and
- PCBs (Aroclor-1254 and Aroclor-1260).

The HHRA (Dames and Moore, 1998) for Site 180 (PICA 093) included exposure scenarios for the current outdoor maintenance workers, future industry/research workers, and future construction/excavation workers. The results of the HHRA indicated that under the current and hypothetical exposure scenarios excess lifetime carcinogenic risk posed by these COCs are within the NCP target range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  and the HI is below 1 for the current land use. However, because this soil contamination does not allow for unrestricted use and unlimited exposure, an action was required to ensure land use remains protective of site users.

#### 9.1.2 Remedy Selection

The ROD for Site 180 (PICA 093) was signed in September 2007. The RAOs for Site 180 (PICA 093), as developed in the ROD, are:

- Protect industrial and recreational receptors from exposure to the Site 180 (PICA 093) contaminants that results in unacceptable risk.
- Protect residential receptors from exposure to potential unacceptable risks from Site 180 (PICA 093) contaminants.

The selected remedy, as detailed in the ROD, included implementation of LUCs to control disturbance of the site and to prevent any non-industrial use of the site. The selected remedy was chosen based on its protection of human health and the environment, the advantages of a minimally intrusive remedial alternative in the presence of high-value wetlands, and its effectiveness, short completion time, and low cost.

In addition to the LUCs selected for the majority of the site, the selected remedy also included construction of a cover system over the eastern portion of site. This cover system will extend from Site 34 (PICA 002) and will include the waste piles and buried debris areas in the eastern portion of Site 180 (PICA 093). Details regarding the cover

system extension were not addressed as part of the ROD for Site 180 (PICA 093) and will be included in the RD phase of Site 34 (PICA 002) remediation.

#### 9.1.3 Remedy Implementation

LUCs were implemented at the site in September 2007 in accordance with the approved RD. Remedy implementation included conducting a baseline site inspection and installing eleven signs along the boundary of the site prohibiting uncontrolled digging. A site map with the LUC area of applicability is included as **Figure 9-1**.

#### 9.1.4 Systems Operations/O&M Requirements

Annual site inspections were initiated in December 2007 and continue to be completed on an annual basis. The presence of LUCs and the condition of the signs are also verified during the inspection, and, subsequently certified in Annual LUC Reports.

### **9.2 Progress Since Last Review**

#### 9.2.1 Recommendations from the Third Five-Year Review

At the time of the third Five-Year Review, the ROD for Site 180 (PICA 093) had yet to be approved. Thus the third Five-Year Review recommended approving the ROD and implementing the remedy. These recommendations were completed in 2007.

#### 9.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the ROD and RD were submitted and approved, and the RA was completed at Site 180 (PICA 093). The RAR has been approved, and four consecutive years of annual inspections and LUC Certifications have been completed.

### **9.3 Document Review**

Relevant and appropriate documents associated with Site 180 (PICA 093) were reviewed for this fourth Five-Year Review Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS, 2007. Proposed Plan (PP), Site 180 (PICA 093) – Waste Burial Area. February.

ARCADIS, 2007. Final Remedial Action Work Plan, Site 180 (PICA 093) – Waste Burial Area. October.

ARCADIS. 2008. 2007 Annual Land Use Certification. Picatinny Arsenal, New Jersey. March.

ARCADIS, 2009. Final Remedial Action Report, Site 180 (PICA 093) – Waste Burial Area. June.

ARCADIS. 2009. 2008 Annual Land Use Certification. Picatinny Arsenal, New Jersey. March.

ARCADIS. 2010. 2009 Annual Land Use Certification Picatinny Arsenal, New Jersey. June.

ARCADIS. 2011. 2010 Annual Land Use Certification. Picatinny Arsenal, New Jersey. April.

Dames and Moore, 1998. Phase I Remedial Investigation Report. Prepared for Army Total Environmental Program Support, Delivery Order No. 0005, Draft Final. May.

ICF Kaiser, 1999. PICA 093 Data Report. Prepared for Army Total Environmental Program Support, Delivery Order No. 0019. October.

IT Corporation (IT), 2000. Picatinny Exploratory Trench Investigation Report. Prepared for Army Total Environmental Program Support, Delivery Order No.0017. October.

U.S. Army, 2007. Record of Decision, Site 180 (PICA 093) – Waste Burial Area. September.

#### **9.4 Data Review and Evaluation**

No new data have been collected since the third Five-Year Review. Analytical data are not collected as part of the annual site inspections.

#### **9.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. The land use at Site 180 (PICA 093) has remained the same and provided that the land use does not change, the remedy will continue to function as intended by the decision documents.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Yes. There have been no changes to site conditions, land use, or exposure assumptions. The NJNRDCSCC used to establish SCLs were replaced with the NJNRDCSRS in June 2008. A comparison of the NJNRDCSRS versus the NJNRDCSCC for the 14 COCs indicates that standards for five of the COCs increased and standards for nine of the COCs decreased. A comparison of SCLs established in the decision documents and current LOCs is provided in **Table 1**. Per CERCLA Five-Year Review guidance, cleanup standards are typically frozen at the time of ROD signing unless a new or modified requirement calls into question the protectiveness of the selected remedy. A review of USEPA's IRIS Database confirmed that the toxicity values for these compounds have not been revised since the time of ROD signature. Therefore, it can be concluded that this revision of a dermal contact standard for PAHs does not call into question the overall protectiveness of the implemented remedy and the SCLs established in the ROD and RD remain valid.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

## **9.6 Issues and Discussions**

Since implementation of the remedy in 2007, no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Discussions with USEPA and NJDEP about this site have focused on annual land use certifications.

## **9.7 Recommendations**

None.

**9.8 Protectiveness Statement**

The remedy for Site 180 (PICA 093) is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **10. Green Pond Brook and Bear Swamp Brook (PICA 193)**

GPB and BSB represent the waterways which drain virtually all of Picatinny Arsenal. Numerous stormwater drainage structures exist on Picatinny Arsenal, many of which flow directly into GPB/BSB, including drop inlets with underground conduits, open channels located along road shoulders, and overland flow channels (**Figures 10-1, 10-2, and 10-3**). GPB has received waste from historical operations at Picatinny Arsenal, including sewage and industrial wastewater discharges, stormwater runoff, and discharge from groundwater plumes.

BSB and the upper reaches of GPB in the study area flow through the industrial portion of Picatinny Arsenal. There are numerous buildings that border both brooks. In the past, many of these buildings had drains that discharged directly into the brooks. Currently, waste discharges to GPB and BSB no longer occur. The primary sources of contamination at GPB/BSB are past industrial activities at adjacent sites and stormwater drainage. Past operational activities include production of explosives, rockets, munitions, propellants, pyrotechnic signals and flares, fuses, and metal components.

### **10.1 Remedial Actions**

#### 10.1.1 Basis for Taking Action

The RI of GPB/BSB was conducted under several stages of the Phase I and Phase II RIs between 1993 and 1998. One hundred and thirty six sediment samples and 101 surface water samples were collected in GPB and BSB. These sampling results indicated that past activities at Picatinny Arsenal had contaminated GPB and BSB. Due to the large area represented by GPB and BSB, they were broken into four study areas as follows:

- Region 1, GPB and Burnt Meadow Brook above Picatinny Lake
- Region 2, GPB below Picatinny Lake to the confluence with BSB;
- Region 3, BSB from Area H to the confluence with GPB; and,
- Region 4, GPB from the confluence with BSB to the southern boundary of Picatinny Arsenal.

COCs as identified in the ROD for GPB/BSB per region are as follows:

Region 1

No COCs were identified in this region. Thus, Region 1 will not be further discussed in this review.

Region 2 Sediment

- benz(a)anthracene
- fluoranthene
- phenanthrene
- pyrene
- 4,4'-Dichlorodipenyldichloroethane
- 4,4'-Dichlorodipenyldichloroethylene (4,4'-DDE)
- 4,4'-DDT
- copper

Region 3 Sediment

- cadmium
- chromium
- copper
- benz(a)anthracene
- fluoranthene
- phenanthrene
- pyrene
- PCBs
- 4,4'-DDE
- 4,4'-DDT
- mercury

#### Region 4 Sediment

- copper

The HHRA (Dames and Moore, 1998) for GPB and BSB (PICA 193) included exposure scenarios for the trespass swimmers and consumers of recreationally caught fish. The estimated human health risk for recreational trespassers was in the generally accepted risk range of  $1 \times 10^{-04}$  to  $1 \times 10^{-06}$  and the HI was below 1. The estimated human health risk for the fish consumer was above  $1 \times 10^{-04}$  but was likely overestimated because Picatinny prohibits fishing in the majority of GPB. As a result, human health risks are not driving the active remedial actions discussed in this document. The basis for the response actions selected in the ROD is to formalize LUCs and to reduce the potential for unacceptable risk to ecological receptors.

A baseline ecological risk assessment (BERA) of GPB and BSB was conducted from a watershed perspective (rather than a site-specific basis) during the Picatinny Phase I RI (Dames & Moore, 1998). The BERA concluded there did not appear to be contaminant-related impacts in GPB despite the presence of elevated levels of contaminants in sediment at certain locations and, occasionally, in surface water, and some observed bioaccumulation of select contaminants in fish tissue. There is potential for adverse effects to mink, great blue heron, and the ecological receptors which they represent in the GPB study area, although the modeling results appear to be conservative. However, there does exist hot spots of contamination at which localized effects may occur. The full results of the BERA are summarized in the ROD for GPB and BSB (PICA 193)

#### 10.1.2 Remedy Selection

The ROD for GPB and BSB was signed by USEPA on July 18, 2005. Interim RA measures were conducted in 2000 and 2003 and the Final RA began in 2007. RAOs were identified on a Region specific basis. The RAOs listed in the ROD for Region 2 are as follows:

- Implement alternatives that can effectively reduce the risks to potential ecological receptors caused by the COCs present at the areas of concern (AOCs);
- Limit human exposure to elevated levels of contaminants in sediment and surface water (Note: Based on a restricted use scenario, there is no unacceptable risk to human health in Region 2 from levels of contaminants in sediment and surface water);

- Protect areas downstream of Region 2 from migration of COCs at levels that could potentially impact ecological receptors; and.
- Avoid disturbance of aquatic habitat in Area G where impacts to ecological receptors are uncertain.

The RAOs listed in the ROD for Region 3 are as follows:

- Mitigate the impact to ecological receptors in the sediment retention ponds and the area near Site 128;
- Avoid disturbances of high-quality habitat in Area H;
- Limit human exposure to elevated levels of contaminants in sediment and surface water (Note: Based on a restricted use scenario, there is no unacceptable risk to human health in Region 3 from levels of contaminants in sediment and surface water);
- Prevent contaminants in Region 3 from impacting better quality habitat in Region 4.

The RAOs listed in the ROD for Region 4 are as follows:

- Reduce risks to potential ecological receptors by implementing remedial alternatives for COC source areas selected through Site 34 and Site 20/24 FSS;
- Prevent contaminants in Region 4 from impacting better quality habitat off-site; and,
- Limit human exposure to elevated levels of contaminants in sediment and surface water (Note: Based on a restricted use scenario, there is no unacceptable risk to human health in Region 4 from levels of contaminants in sediment and surface water).

In order to meet the RAOs presented above, the selected remedies for this site as presented in the ROD were: Alternative 3 (Chemical and Biological Monitoring and LUCs) for Regions 2 and 4; and Alternative 2 (Excavation of the Oil/Water Separator Pond, On-site Stabilization, Off-site Disposal, LTM, and LUCs) for Region 3. These

alternatives were selected as the preferred alternatives because they provide the best balance between the assessed criteria while still providing overall protection of human health, ecological receptors, and the environment.

The selected remedy for GPB and BSB includes the following components for each region:

#### Region 2

- Chemical monitoring of surface water and sediment for metals, semi-volatile organic compounds (SVOCs), pesticides and PCBs; and, biological monitoring (benthic macroinvertebrate studies and toxicity testing studies);
- Collection and analysis of deep-sediment samples at the AOCs to verify there are no zones of contamination in deeper sediments that could be released in the future. If sample results indicate deep sediment contamination that could be mobilized in the future, the remedy for this region will be reviewed to determine whether the monitoring program needs to be adjusted or more active remedial measures taken; and,
- Implementation of LUCs to ensure protectiveness.

#### Region 3

- Excavation and on-site stabilization of contaminated sediment from the oil/water separator pond, and the stream tributary adjacent to Site 128;
- Chemical monitoring of surface water and sediment for metals, PAHs, pesticides and PCBs; and, biological monitoring (benthic macroinvertebrate studies and toxicity testing studies);
- Collection and analysis of deep-sediment samples at the AOCs to verify there are no zones of contamination in deeper sediments that could be released in the future. If sample results indicate deep sediment contamination that could be mobilized in the future, the remedy for this region will be reviewed to determine whether the monitoring program needs to be adjusted or more active remedial measures taken; and,
- Implementation of LUCs.

#### Region 4

- Chemical monitoring of sediments for metals; and, biological monitoring (benthic macroinvertebrate studies);
- Collection and analysis of deep-sediment samples at the AOCs to verify there are no zones of contamination in deeper sediments that could be released in the future. If sample results indicate deep sediment contamination that could be mobilized in the future, the remedy for this region will be reviewed to determine whether the monitoring program needs to be adjusted or more active remedial measures taken; and,
- Implementation of LUCs.

#### 10.1.3 Remedy Implementation

There were two removal actions completed in GPB and BSB prior to the approval of the ROD. Both of these removals were conducted in Region 3 (BSB). The first was the removal of PCB-contaminated sediment from the streambed and bank adjacent to Site 122 (Building 60) in early 2000. From January to May 2000, 387 CY (580 tons) of soil and sediment were removed and disposed off-site. The second removal action was the removal of sediment from the two sediment retention basins at Site 193, completed in 2003. This 2003 interim action met the requirements of the removal action as specified in the ROD. Approximately 632 tons of stabilized sediment was disposed off-site as hazardous waste, and 386 tons of excavated soil was disposed as solid waste.

Contaminated sediments were also removed from two separate areas as part of the remedial action activities completed in September 2007. Approximately 185 tons of impacted sediments were excavated from the oil/water separator in the lower section of BSB, and approximately nine tons of impacted sediments were excavated from an unnamed tributary of BSB located within Site 128.

In Regions 2, 3, and 4 the remedial activities included the collection and chemical analysis of both shallow and deep sediment samples, as well as the collection and biological analysis of sediment samples as part of a LTM program. These samples were collected first in 2007. The deep sediment samples confirmed there were no zones of contamination in deeper sediments that could be released in the future. Thus this deep sediment sampling was dropped from the sampling program in accordance

with the ROD and RD. Annual chemical and biological sampling has continued in 2008, 2009, and 2010.

LUCs were implemented in 2007 as part of this remedial action. A Site-Wide Land Use Certification was prepared at the close of 2007 and was approved by the USEPA on April 16, 2008. LUCs have been certified annually from 2007 through 2010.

#### 10.1.4 Systems Operations/O&M Requirements

Site inspections will continue to be conducted on an annual basis to confirm continued compliance with all LUC objectives. The site inspections will include the following:

- Condition of excavated areas and signs – The excavated areas and signs will be inspected for damage. Any repair necessary will be performed as soon as possible; and,
- Evaluation of Land Use – The site will be inspected for any signs of inappropriate land use, such as intrusive activities or construction.

In addition to the annual site inspections, LTM will be conducted for GPB and BSB in accordance with the RD. The LTM for GPB and BSB includes annual chemical and biological monitoring. Chemical monitoring consists of samples of sediment and surface water, while biological monitoring consists of samples of the benthic macroinvertebrate communities as well as sediment samples for biological toxicity testing. The annual sampling of sediment, surface water, and biota was proposed in the FS and subsequent documents.

The overall objective of LTM is to ensure that implementation of RAs at the sedimentation basins, Site 128, and the oil/water separator continue to provide adequate protection of human health and the environment and that the levels of contamination and potential ecological risk in all regions of GPB and BSB continue to improve.

## 10.2 Progress Since Last Review

### 10.2.1 Recommendation from the Third Five-Year Review

The primary recommendation specified in the third Five-Year Review stated “Implement remedy. Begin chemical and biological monitoring. Implement LUCs”. As

detailed above, this recommendation was successfully implemented. The Final IRAR and subsequent Annual Reports are included in **Appendix A**.

#### 10.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the selected remedy has been implemented. The IRAR has been prepared and approved; and four years of annual monitoring has been conducted. Also, four consecutive years of annual inspections and LUC Certifications have been completed.

#### 10.3 Document Review

Relevant and appropriate documents associated with the GPB and BSB (PICA 193) remedy selection, implementation, long-term monitoring and sampling results were reviewed for this fourth Five-Year Review Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS, 2009. 2008 Annual Surface Water and Sediment Monitoring Report. Green Pond Brook/ Bear Swamp Brook (PICA 193). November.

ARCADIS, 2010. 2009 Annual Surface Water and Sediment Monitoring Report. Green Pond Brook/ Bear Swamp Brook (PICA 193). January.

ARCADIS, 2011. 2010 Annual Surface Water and Sediment Monitoring Report. Green Pond Brook/ Bear Swamp Brook (PICA 193). May.

ARCADIS, 2008. Final Interim Remedial Action Report, Green Pond Brook and Bear Swamp Brook (PICA 193). December.

Dames and Moore, 1998. Phase I Remedial Investigation Report. Prepared for Army Total Environmental Program Support, Delivery Order No. 0005, Draft Final. May.

IT Corporation, 2001. Green Pond and Bear Swamp Brooks Focused Feasibility Study. May.

Shaw Environmental Inc., 2005. Record of Decision, Green Pond Brook and Bear Swamp Brook (PICA 193). July.

Shaw Environmental Inc., 2007. Bear Swamp Brook Oil/Water Separator and Tributary Stream Sediment Removal Action Work Plan. March.

#### **10.4 Data Review and Evaluation**

Annual chemical and biological monitoring sampling has been performed since 2007. Annual Reports for 2007 through 2010 are included in **Appendix A**. These annual reports include trend plots which depict contaminant concentration versus time. A summary of this data set is provided below.

- A review of the trend plots of concentration versus time included in the 2010 Annual Report indicate the majority of COC concentrations appear to be stable or decreasing. Most notably, copper concentrations continue to decline at nearly all sample locations.
- Regarding sediments, although a majority of COC concentrations decreased or remained stable over time, varying concentrations have been observed throughout the site from 2007 through 2009. Data variability at a sample location from year to year is expected as the sediment quality can be affected by sedimentation, scouring caused by higher runoff peaks associated with urbanization, low summer flows, and elevated summer water temperatures. Sediments at location GPBSD-26 have consistently shown elevated levels of metals in all historical sampling events. However, remedial actions at Site 31/101 (PICA 072) were conducted in 2009 to address contaminated soil directly adjacent to GPBSD-26, in part to improve sediment quality at this location. Sample location GPBSD-26 is the single location where COCs exceed RGs, and toxicity test results show acute toxicity. In addition, the macroinvertebrate community was rated as severely impaired in 2009, similar to the rating in 2007 (2008 showed moderately impaired rating). Although location GPBSD-26 showed affected conditions in 2008, COC concentrations declined in 2009 and 2010 following completion of the Site 31/101 (PICA 72) removal action. Copper concentrations have decreased from 73,500 mg/kg in 2008 to 11,600 mg/kg in 2009 and 724 mg/kg in 2010.
- The majority of biological sample locations, including the upgradient background locations, have repeatedly had less than optimal habitat and water quality ratings.
- Low-level acute and chronic toxicity observed at several locations appear to be unrelated to COC concentrations and may be caused by other stressors, including low quality habitat associated with the developed nature of Picatinny Arsenal.

- Trend plots of concentration versus time are included in the 2010 annual report. A visual comparison identifies that the remaining sampling locations appear to show stable, if not improved, results in 2010 and 2009 compared to 2007 and 2008, and none of these locations display all of the criteria (RG exceedances, toxicity, and benthic impairment) for potential biological impacts.

#### **10.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. Interim removal actions have been completed to address the areas of GPB and BSB which posed the greatest risk to ecological receptors. LUCs are in place and functioning as intended. Long-term monitoring is documented that conditions are not worsening, and contaminant concentrations are largely decreasing over time. Per the RD, further removal actions or more active remedial actions are to be considered if all of the criteria (RG exceedances, toxicity, and benthic impairment) for potential biological impacts are observed over a consecutive two-year period. To date, these conditions have been observed at one of the sampling locations. An additional removal action was conducted in 2009 adjacent to this location, and COC contaminations have decreased substantially thus helping to improve sediment quality in this Region.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Yes. There have been no changes in the physical conditions or land use of GPB and since the ROD. The RGs established for the site were based on the potential effect levels (PELs) calculated in the FS. PELs are estimates of a representative concentration of a chemical in sediment that may cause a toxic effect on aquatic organisms. Additional detail on how the PELs were developed and the potentially impacted receptors for which the PELs were calculated can be found in the final GPB/BSB Focused Feasibility Study (FFS) (IT, 2001). The following table summarizes the COCs and associated PELs at PICA 193:

<b>Summary of COCs and PELs at Site 193</b>		
<b>COC</b>	<b>Region</b>	<b>PEL (mg/kg)</b>
Cadmium	3	34
Chromium	3	247
Copper	4	261
Mercury	2	13.2
Aroclor-1248	3	2
Aroclor-1254	3	2
Aroclor-1260	2	2
Dichlorodiphenyldichloroethane (DDD)	2	0.2
Dichlorodiphenyldichloroethylene (DDE)	3	0.2
DDT	2	0.2
Benz(a)anthracene	2	2.2
Fluoranthene	2	4
Phenanthrene	2	5.4
Pyrene	2	3.8

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

#### **10.6 Issues and Discussions**

Since implementation of the remedy in 2007 no significant issues regarding protectiveness of the remedy have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Comments submitted by USEPA's Biological Technical Assistance Team (BTAG) have focused primarily on the statistical evaluation and comparison of toxicity tests, interpretations of data trends, and overall exit strategy. These comments have been addressed as they are received and Annual Reports finalized. Such comments do not call into question the protectiveness of the remedy. The Remedial Action Work Plan (RAWP) for GPB and BSB included a detailed Exit Strategy Decision Matrix (Table 3-5 of the RAWP). Because the Exit Strategy criteria required five years of annual sampling, all sampling locations will be sampled in 2011 and the data set will be evaluated against the Exit Strategy. The findings and recommendations will be reviewed by USEPA (including BTAG) and NJDEP.

#### **10.7 Recommendations**

None.

**10.8 Protectiveness Statement**

The remedy for GPB and BSB (PICA 193) is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **11. Group of 13 Sites (PICA 020)**

The locations of the 13 sites in the PICA 020 Group of Sites are discussed in more detail below. The locations of these sites within Picatinny Arsenal are shown on **Figures 11-1 through 11-11**.

### **PICA 020/Site 19 – Former Pyrotechnic Demonstration Range**

Site 19 covers 5.5 acres and is located south of the Shinkle Road and South Brook Road intersection. Site 19 was a tree-covered wetland that was filled in during the late 1940s and early 1950s by installing two drainage ditches and land filling with construction debris and borrow pit material. In 1963, the entire site had been filled and land filling activities ceased. This area has not been used as a pyrotechnic demonstration area since the early 1970s. During the implementation of the Phase I RI in 1992 and 1993, Site 19 was temporarily used for storage of drums containing investigation-derived wastes (IDW) such as drill cuttings and personal protective equipment. At the time, the site also contained a decontamination pad for drill rigs. After completion of the remedial investigation, the decontamination pad and all drums were removed. Site 19 is currently unused.

### **PICA 092/Site 163 – Baseball Fields**

Site 163 consists of two baseball fields located immediately north of the intersection of South Brook Road and Klanderman Lane. Site 163 is approximately 400 feet by 800 feet, and is relatively flat with slight slopes to the west and southwest. The Argonne National Laboratory (ANL) RI Concept Plan reported that unknown materials might have been disposed in pits at Site 163 or at Site 176 (a Little League baseball field in Area L). As part of the remedial investigation, the Army looked for evidence of these pits and found none. Currently, the Army continues to use the baseball fields, though they are included in the Enhanced Use Lease (EUL) initiative which includes the lease and development of the baseball fields through a series of leases over a 50-year term.

### **PICA 095/Site 86, Building 12, Former Photo Processing Facility**

Site 86 consists of Building 12 and is located at the intersection of Phipps Road and Fourth Street. Activities at Building 12 ended in 2000. Building 12 was constructed in 1977 and became a study site because of the hazardous chemicals handled during photo processing. Spent photo processing solutions were transferred to the Defense Reutilization and Marketing Office (DRMO) facility at Picatinny for metal recovery.

Building 12 operations also generated scrap film and oil/water wastes that were stored in metal containers at Building 12 and then collected by a waste contractor for off-site disposal. Building 12 is currently used for general administrative purposes.

**PICA099/Site 182 – Building 5, Former Arsenal Reproduction**

Site 182 consists of an asphalt parking lot. In 2010, Building 5 was demolished and to allow for construction of the parking lot. All soils were handled in accordance with Picatinny soil management policy, and no soil was removed from Site 182 (PICA 099). Site land use (industrial) did not change as a result of building demolition. Building 5, was located on First Avenue southwest of the intersection with Farley Avenue. Building 5 was constructed in 1918 and was used to store flammable materials. In the 1990s, the building housed the reproduction shop for Picatinny. Recently, the northern end of Building 5 was used for computer-aided design services; the southern end contained two photo processing units that were used until 1992. Each photo processing unit used a different system to manage wastes. One unit was directly connected to a silver recovery unit, whereas wastes from the second unit accumulated in 5-gallon containers and were then transferred to the DRMO, Building 314 for silver recovery. The maximum waste inventory at Building 5 during a three-month period was six 5-gallon containers of spent photochemicals. Spill response logs and environmental and safety files indicate no spills or releases at Building 5. Exemption from the RCRA Part B permit was claimed for the photo processing units as reported in the Phase 1 RI.

**PICA 100/Site 183 – Building 58, Former Arsenal Reproduction and Training**

Site 183 consists of Building 58 and is located on First Avenue at the intersection of Fourth Street. Building 58 was constructed for lumber storage in 1937 and was also used for general administration and office space. In 1971, Building 58 was listed as a printing plant; it subsequently ceased operations in October 1993. In the 1990s, Building 58 was unoccupied. The entire building was being gutted and renovated for use as a non-hazardous warehouse for Building 12 (northern end) and administrative offices (southern end). Building 58 is currently identified as organization, classroom and administrative service.

**PICA 070/Site 28 – Sewage Treatment Plant Former Sludge Beds**

Site 28 consists of inactive sewage sludge beds and an active sewage treatment plant. The sludge beds are located on the west side of Building 80. Building 80 is located

alongside GPB in the southern portion of Area E. The sludge beds served the Picatinny main sewage treatment plant located in Building 80 with capacity of 400,000 gallons per day. The Building 80 sewage treatment plant was designed to provide primary physical treatment, secondary biological treatment, and tertiary chlorination treatment of sanitary wastewater, and remains operational today.

Sludges generated at the treatment plant were de-watered utilizing a series of four sand filters, (referred to as the sludge beds). The sludge beds occupied an area of approximately 9,500 sf. The leachate collected from the sludge beds was mixed with influent wastewater and re-circulated into the sewage treatment plant. During the late 1960s, the treatment plant was modified and the sludge beds were removed from service. After the sludge beds were decommissioned, sludge generated at the treatment plant was transported to an off-site solid waste disposal facility. According to the Picatinny master planning Integrated Facility System (IFS), Building 80 is identified as a sewage lift station.

#### **PICA 036/Site 106 – Former Building 1010, Propellant Plant**

Site 106 covers 0.22 acres in the eastern corner of Area F where former Building 1010, a propellant plant, was demolished between 1979 and 1991. Picatinny personnel reported that Building 1010 was also used as an acid recovery area and that some of the storage tanks and PCB-based transformers reportedly leaked. When the building was destroyed as part of the Toxic Energetics Cleanup Program (TECUP), the transformers were reportedly overturned and their contents spilled on to the ground. After the building was demolished, all debris was buried on site. The validity of this information was examined during the remedial investigation performed in 1993 and 1994. The area was thoroughly investigated for PCB contamination and buried contamination and nothing significant was discovered. According to the Picatinny master planning IFS, Building 1010 is currently identified as a rock storage area. The USEPA concurs with the decision to use this site for rock storage.

#### **PICA 105/Site 124 – Building 166, Propellant Testing**

Site 124 covers 1.7 acres in the southern portion of Area F near Kibler Road and includes Building 166 and a nearby transformer station, TR 166. Building 166 is a one-story rectangular building, 48 x 58 feet, constructed in 1930. Building 166 was originally called the Test Conditioning Chamber and was used as a test chamber for accelerated aging of propellants. It was still used for this purpose into the 1990s as well as propellant storage and was called a General Purpose Laboratory (USACE

historic structures inventory, 1993). This building is no longer used for propellant testing.

**PICA 110/Site 141 – Building 429, Propellant Crushing**

Site 141 consists of Building 429 and is located on Thirteenth Avenue, northeast of the intersection of Ninth Street. Building 429 was constructed in 1942 for uses including a chemistry laboratory, ammunition surveillance, propellant processing, and propellant property testing. In 1994, Building 429 became inactive. Building 429 is currently identified as an energetics rheology laboratory.

**PICA 112/Site 143 – Building 436, Propellant Processing**

Site 143 consists of Building 436 and covers 0.51 acre in the northwestern portion of Area F. Building 436 is located on Thirteenth Avenue, 400 feet southwest of Picatinny Lake, and was built in 1948. It has been used as a propellant processing plant since it was built. Building 436 is currently identified as a propellant mixing building.

**PICA 118/Site 135 – Building 315 and 316, Metallurgical Laboratory and Former Laboratory**

Site 135 consists of Buildings 315 and 316, and is located along Eighth Avenue. Records indicate Building 315 was constructed prior to 1905 and has been used as a sodium nitrate storehouse, as offices of the engineering division, as research and development laboratories, as physical sciences workshops, and as metallurgical laboratories. Metallurgical laboratory activities have been conducted at Building 315 for at least the past 25 years.

An Environmental Baseline Study conducted on Building 315 in November 1993 identified the following waste streams: oily material, solvents, mixed acids, etching solutions, resins, wastewater contaminated with depleted uranium (DU), and sulfur-based cutting fluids. Chromic acid wastewater and waste hydraulic oil were sent to an off-site hazardous waste disposal facility by a contractor delegated by the operation support command at Rock Island.

An undated Picatinny memorandum addressed DU contamination in the corrosion laboratory, hot machine shop, metallographic laboratory, and mechanical testing area of Building 315. The memorandum identified DU chips and fines as contaminants in the hot machine shop. In addition, the metallographic laboratory generated

wastewater contaminated with DU and mixed waste (DU contaminated chromic acid). Until 1992, the DU wastewater was piped to holding tanks located within the DU wastewater holding tank room. The DU wastewater was decanted in one tank and discharged into another tank where it was tested for chemical content and radioactive concentration. The wastewater was then either discharged into the sewer system or disposed as low-level radioactive waste. However, in 1992, the wastewater holding tank system was shut down, and later in 1994 was disposed of as low-level radioactive waste. After 1992, the DU wastewater generated at Building 315 was stored in 30-gallon polydrums within the building and disposed as low-level radioactive waste at an off-site disposal facility. After completion of the tank removal, an “as left” survey was performed. No radiological contamination was observed above the Nuclear Regulatory Commission (NRC) license requirements. According to the Armaments Engineering and Technology Center (AETC) and the Picatinny master planning IFS, Building 315 is currently under renovation to become a research and development machining laboratory for depleted uranium resource recovery.

Records indicate Building 316 was constructed in 1907 as a sodium nitrate storehouse and has also been used as a shop automation laboratory, a plasma equipment building, a uranium laboratory, a physical sciences facility, and most recently as a metallurgy laboratory. During the summer of 1994, the building underwent decontamination and renovations. In 1996, floor drains and piping were removed that had tested positive for radiological contamination. The piping was removed inside and outside of the building until no radiation was detected in excess of NRC license requirements. Confirmatory samples were also collected from the pipe trench and shown to be below criteria. In 1998, the NRC released Building 316 for unrestricted use. This release removed restrictions previously imposed by the NRC and the Picatinny Radiation Protection Office (RPO). The building is now used as centralized storage of hazardous materials required for Picatinny activities. It is called Hazmart Pharmacy. According to the Picatinny master planning IFS, Building 316 is currently identified as the Hazmart.

**PICA 088/ Site 49 – Building 19 and Former Building 19-A, Former 90-Day Waste Accumulation Area**

Site 49 consists of Building 19, the former location of Building 19-A, and the surrounding grounds. The site covers approximately 0.51 acres and is located between Second and Third Avenues, northwest of Second Street. Building 19 was constructed in 1918 as a flammable materials storehouse and in the 1990s was also used as a training facility for high-reliability soldering. Up until the 1991 RCRA Closure

Investigation and subsequent removal, the generated waste solvents were placed in drums and stored in adjacent Building 19-A (the Former 90-Day Waste Accumulation Area). Building 19-A was a small shed located near Building 19. During renovation of Building 19 in October 1991, Building 19-A was removed from its foundation and placed elsewhere on Picatinny. According to the Picatinny master planning IFS, Building 19 is currently identified as an electronic storage building.

### **PICA 083/Site 44 – Building 39, Golf Course Maintenance Shop**

Site 44 consists of Building 39 and is located at the intersection of First Street and Dunn Avenue. Records indicate Building 39 was used as an experimental propellant building and housed a deluge system in 1929, a storage magazine in 1940, a maintenance shop in 1956, and has been used to maintain and house golf course equipment since 1981.

Small quantities of pesticides and herbicides were stored, mixed, and transferred to maintenance equipment in the building until 1988. Building 160 was constructed as a central pesticide storage and mixing area, thus terminating all pesticide storage and mixing at Building 39.

A UST for storing gasoline was installed southeast of Building 39 in the early 1980s and may also have been used for waste oil storage. The UST was removed from service in late 1989 and was replaced with an above ground storage tank (AST) in 1993. Currently, oil, grease, and solvent wastes generated at Building 39 are placed in 55-gallon drums and removed by contractors for off-site disposal. According to the Picatinny master planning IFS, Building 39 is currently identified as engineering maintenance.

## **11.1 Remedial Actions**

### **11.1.1 Basis for Taking Action**

Based on the results of previous site investigations, contaminants were evaluated only for the current and reasonably anticipated future use. No COCs were identified at any of the 13 sites included in PICA 020. The HHRA (Dames and Moore, 1998) for the sites included in the Group of 13 Sites (PICA 020) included exposure scenarios for the current outdoor maintenance workers, future industry/research workers, and future construction/excavation workers. A land use scenario for current child baseball players was also included for Site 163 (PICA 20) Baseball Fields. The results of the HHRA

indicated that under the current and hypothetical exposure scenarios, the excess lifetime carcinogenic risk posed by contaminants fell within the NCP target range of  $1 \times 10^{-04}$  to  $1 \times 10^{-06}$  and the HI is below 1 for the current land use at each of the 13 sites. However, because soil contamination does not allow for unrestricted use and unlimited exposure, an action was required to ensure land use remains protective of site users.

#### 11.1.2 Remedy Selection

The ROD for PICA 020 Group of Sites was signed by the U.S. Army on July 3, 2008 and by the USEPA on September 30, 2008. The RAO listed in the ROD for PICA 020 is as follows:

- Maintain current land use (industrial) and current institutional controls.

The selected response action for Sites 19, 163, 86, 182, 183, 28, 106, 124, 141, 143, and 135 was implementation of LUCs to maintain the current use of the sites (industrial). Site 49 and 44 did not require a response action and were approved for No Further Action.

#### 11.1.3 Remedy Implementation

Nineteen signs were installed between September 10 and 24, 2007. The signs were installed along the boundary of the site prohibiting uncontrolled digging. Site maps and LUCs area of applicability are depicted on **Figure 11-1** through **Figure 11-11**.

#### 11.1.4 Systems Operations/O&M Requirements

Annual site inspections were initiated in December 2007 and continue to be completed on an annual basis. The presence of LUCs and the condition of the signs are also verified during the inspection and subsequently certified in Annual Land Use Certification Reports.

### **11.2 Progress Since Last Review**

#### 11.2.1 Recommendations from the Third Five-Year Review

The Group of 13 Sites (PICA 020) was not included in the third Five-Year Review; therefore, this section is not applicable.

#### 11.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the PP, ROD and RD were submitted and approved and the remedial action was completed at the Group of 13 Sites (PICA 020). The RAR has been approved and four consecutive years of annual inspections and LUC Certifications have been completed.

#### 11.3 Document Review

Relevant and appropriate documents associated with the Group of 13 Sites (PICA 020) investigations, remedy development, and operations were reviewed for this fourth Five-Year Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS U.S., Inc. 2007. Feasibility Study for the PICA 020 Group of Sites. Picatinny Arsenal, New Jersey. September

ARCADIS. 2008. 2007 Annual Land Use Certification. Picatinny Arsenal, New Jersey. March.

ARCADIS, 2008. Final Remedial Action Work Plan, PICA 020 Group of Sites. Picatinny Arsenal, New Jersey. October.

ARCADIS. 2009. 2008 Annual Land Use Certification. Picatinny Arsenal, New Jersey. March.

ARCADIS, 2009. Final Remedial Action Report, PICA 020 Group of Sites. Picatinny Arsenal, New Jersey. June.

ARCADIS. 2010. 2009 Annual Land Use Certification Picatinny Arsenal, New Jersey. June.

ARCADIS. 2011. 2010 Annual Land Use Certification. Picatinny Arsenal, New Jersey. April.

Dames and Moore, 1998. Phase I Remedial Investigation Report. Prepared for Army Total Environmental Program Support, Delivery Order No. 0005, Draft Final. May.

U.S. Army, 2008. Record of Decision, PICA 020 Group of Sites. September.

#### **11.4 Data Review and Evaluation**

Chemical data is not collected as part of the remedy. Certification that site specific LUCs for the Group of 13 Sites (PICA 020) sites are in effect and are protective of human health and the environment have been completed annually in 2007, 2008, 2009, and 2010.

#### **11.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. The RAO for PICA 020, as outlined in the ROD, is to maintain current land use (industrial) and current institutional controls. Land use controls were implemented for the Group of 13 Sites (PICA 020) to maintain the current land use to ensure that no unacceptable risk to human receptors occurs in the future. Land Use Certifications have been performed each year since remedy implementation, and although minor maintenance issues have been identified, such as sign replacement, no changes in land use or unacceptable risk to human receptors have been documented.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Yes. There have been no changes to site conditions, land use, or exposure assumptions. Since no COCs were identified in the ROD, no site cleanup levels were established. The NJNRDCSCC used as screening values were replaced with the NJNRDCSRS in June 2008. A review of USEPA's IRIS Database confirmed the toxicity values for these compounds have not been revised since the time of ROD signature. Therefore, it can be concluded this revision of a dermal contact standard does not call into question the overall protectiveness of the implemented remedy.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

#### **11.6 Issues and Discussions**

Since implementation of the remedy in 2008, no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical

meetings or during review of the annual data reports. Discussions with USEPA and NJDEP about this site have focused on the Annual Land Use Certifications. Most recently there have been discussions with USEPA regarding the demolition of Building 5 and the use of the site for parking. USEPA was notified of the various Base Realignment and Closure (BRAC) construction projects (which included the parking lot at Site 182 (PICA 099), but official notification of a change of land use was not provided as the site continues to be used for industrial/research purposes (consistent with the HHRA assumptions).

#### **11.7 Recommendations**

None.

#### **11.8 Protectiveness Statement**

The remedy for the Group of 13 Sites (PICA 020) is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **12. Sites 61 and 104 (PICA 102) Waste Dumps and Chemical Laboratories**

Sites 61 and 104 (PICA 102) are centrally located within Picatinny Arsenal, as part of Area F, and are adjacent to GPB (**Figure 12-1**).

### Site 61

Site 61 is located on Sixteenth Avenue northwest of the intersection of Ninth Street and Buffington Road. Site 61 encompasses approximately three acres and includes Buildings 171 and 176. The basement of Building 171 has historically been used as a photographic laboratory. Building 176 was historically used for laboratory equipment storage and ammunition sampling. Currently, Buildings 171 and 176 are used for administrative purposes.

### Site 104

Located south of Site 61, with GPB to the west, Site 104 occupies an area of approximately 0.96 acres and includes former Building 161 and Building 162. Former Building 161 was located on Kibler Road, southwest of Building 162 and was used as a railroad scale house. Former Building 161 was demolished sometime prior to 1942. Building 162 is located on Kibler Road and is presently used for administrative purposes. The primary operations conducted at the building in the past included propellant and ammunition analyses.

## **12.1 Remedial Actions**

### 12.1.1 Basis for Taking Action

Based on the results of previous site investigations, COCs were identified for surface soil, subsurface soil and sediment. As stated in the ROD, no COCs were identified in surface water at the site and groundwater at Sites 61 and 104 (PICA 102) is being addressed as part of Mid Valley Groundwater (PICA 204).

The contaminants in surface soil, subsurface soil, and sediment which were identified as COCs include:

- arsenic;
- beryllium;

- chromium (sediment only);
- copper;
- lead;
- nickel (sediment only);
- silver (sediment only);
- thallium;
- zinc;
- acenaphthylene (sediment only);
- benz(a)anthracene;
- benzo(a)pyrene;
- benzo(b)fluoranthene;
- benzo(k)fluoranthene;
- dibenz(a,h)anthracene;
- flouranthene (sediment only);
- indeno(1,2,3-cd)pyrene;
- phenanthrene (sediment only);
- pyrene (sediment only);
- heptachlor epoxide (sediment only); and
- 4,4'-DDE.

The HHRA (Dames and Moore, 1998) for Sites 61 and 104 (PICA 102) included exposure scenarios for the current outdoor maintenance workers, future industry/research workers, and future construction/excavation workers. The results of the HHRA indicated that under the current and hypothetical exposure scenarios, the excess lifetime carcinogenic risk posed by contaminants fell within the NCP target range of  $1 \times 10^{-04}$  to  $1 \times 10^{-06}$  and the HI is below 1 for the current land use. However, because this soil contamination does not allow for unrestricted use and unlimited exposure, an action was required to ensure land use remains protective of site users.

An additional basis for action at this site was a specific request by NJDEP to remove two areas of concern at Site 104 to address NJNRDCSCC exceedances. Although there were no unacceptable risks to human health at this site, the Army agreed to conduct a limited soil removal, and the basis for this action was in accordance with inter-agency agreements in place at the time.

#### 12.1.2 Remedy Selection

The ROD for Sites 61 and 104 (PICA 102) was signed by the Army on November 6, 2008 and signed by the USEPA on March 17, 2009. The RAOs as listed in the ROD for Sites 61 and 104 (PICA 102) are as follows:

- Manage soils with calculated risk in the risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$  following NCP guidance and the Geis Memorandum (1999);
- Maintain current land use (industrial) and current institutional controls; and, control disturbance and exposure to site soils that could lead to unacceptable human health risks.

Both active (soil excavation) and passive (implementation of LUCs) response actions for soils were selected at this site. The selected response actions included excavations and disposal of impacted soil from two areas of attainment (AA) (AA<sub>104SS-1</sub> and AA<sub>104SS-2</sub>) at Site 104. In addition to soil excavation, the selected response action also included LUCs which include the maintenance of existing engineering controls (vegetative cover).

#### 12.1.3 Remedy Implementation

In September of 2008, approximately 55 CY of impacted soil was excavated from Site 104 and disposed of at an approved off-site facility. In addition to backfilling and maintenance of established vegetation, LUCs were implemented at the site in accordance with the approved RD. Remedy implementation included conducting a baseline site inspection and installing four signs along the boundary of the site prohibiting uncontrolled digging. A site map with the LUC area of applicability is included as **Figure 12-1**.

#### 12.1.4 Systems Operations/O&M Requirements

Annual site inspections were initiated in December 2008 and continue to be completed on an annual basis. The presence of LUCs and the condition of the signs are also verified during the inspection and subsequently certified in Annual LUC Reports.

### **12.2 Progress Since Last Review**

#### 12.2.1 Recommendation from the Third Five-Year Review

The third Five-Year Review (2006) did not discuss Sites 61 and 104 (PICA 102).

#### 12.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the PP, ROD and RD were submitted and approved, and the remedial action was completed at Sites 61 and 104 (PICA 102). The RAR has been approved and three consecutive years of annual inspections and LUC Certifications have been completed. These documents are included in **Appendix A**.

### **12.3 Document Review**

Relevant and appropriate documents associated with Sites 61 and 104 (PICA 102) were reviewed for this fourth Five-Year Review Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS, 2008. Sites 61 and 104 (PICA 102) Remedial Action Work Plan, Picatinny Arsenal, New Jersey. November.

ARCADIS. 2009. 2008 Annual Land Use Certification. Picatinny Arsenal, New Jersey. March.

ARCADIS, 2009. Final Remedial Action Report, Sites 61 and 104 (PICA 102). Picatinny Arsenal, New Jersey. June.

ARCADIS. 2010. 2009 Annual Land Use Certification Picatinny Arsenal, New Jersey. June.

ARCADIS. 2011. 2010 Annual Land Use Certification. Picatinny Arsenal, New Jersey. April.

Dames and Moore, 1998. Phase I Remedial Investigation Report. Prepared for Army Total Environmental Program Support, Delivery Order No. 0005, Draft Final. May.

U.S. Army, 2008. Record of Decision, Site 61 and 104 (PICA 102). Picatinny Arsenal, New Jersey. November.

#### **12.4 Data Review and Evaluation**

No new data have been collected since the third Five-Year Review. Analytical data are not collected as part of the annual site inspections.

#### **12.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. The land use at Sites 61 and 104 (PICA 102) has remained the same, and provided that the land use does not change, the remedy will continue to function as intended by the decision documents.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAO used at the time of the remedy selection still valid?*

Yes. There have been no changes to site conditions, land use, or exposure assumptions. The NJNRDCSCC used to establish SCLs were replaced with the NJNRDCSRS in June 2008. SCLs were established for 18 of the 21 COCs listed above. A comparison of the NJNRDCSRS versus the NJNRDCSCC for the 13 COCs in surface and subsurface soil indicates that standards for six of the COCs increased and standards for seven of the COCs decreased. A comparison of SCLs established in the decision documents and current LOCs is provided in **Table 1**. Per CERCLA Five-Year Review guidance, cleanup standards are typically frozen at the time of ROD signing unless a new or modified requirement calls into question the protectiveness of the selected remedy. A review of USEPA's IRIS Database confirmed that the toxicity values for these compounds have not been revised since the time of ROD signature. Therefore, it can be concluded that this revision of a dermal contact standards do not call into question the overall protectiveness of the implemented remedy and the SCLs established in the ROD and RD remain valid.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

#### **12.6 Issues and Discussions**

Since implementation of the remedy in 2008, no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Discussions with USEPA and NJDEP about this site have focused on the Annual Land Use Certifications.

#### **12.7 Recommendations**

None.

#### **12.8 Protectiveness Statement**

The remedy for Sites 61 and 104 (PICA 102) is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

### **13. Area B (PICA 205) Groundwater**

Area B (PICA 205) is approximately 28 acres in size and is located in the southern portion of Picatinny Arsenal (**Figure 13-1**). Area B includes two study sites, Site 20 (PICA-063) and Site 24 (PICA-066). Because Site 20 is completely contained within the boundaries of Site 24, these sites were considered one site (Site 20/24) for scoping and investigation purposes. Groundwater within Area B (PICA 205) has been separated from the remaining environmental media administratively. Soils at Area B (PICA 205) were addressed in Site 20/24 (PICA 66) which is discussed above in Section 5.0.

#### **13.1 Remedial Actions**

##### 13.1.1 Basis for Taking Action

A chlorinated solvent plume has been identified within Area B (PICA 205) Groundwater and is the result of historic waste disposal practices. The nature and extent of the groundwater plume has been investigated and characterized based on several studies performed at the site. The FS identified four COCs within Area B (PICA 205) Groundwater, and they are as follows:

- PCE;
- TCE;
- cis-1, 2-DCE; and
- VC.

The HHRA (Dames and Moore, 1998) for Area B (PICA 205) Groundwater included groundwater uses for: drinking water by Picatinny workers, child/adult residents, and on-site child residents; bathing water by on-site child residents; and showering water by child/adult residents and on-site child residents. Groundwater contact through any of these pathways is not expected to occur because of the facility-wide Classification Exception Area (CEA) and LUCs that are in place. Risk assessments for Area B (PICA 205) Groundwater indicated that VOCs (VC in particular) contributed to an unacceptable risk when evaluated for an ingestion exposure scenario. However, VOCs did not contribute to an unacceptable ecological risk (Dames and Moore, 1998). A remedial action was required to address this unacceptable risk to human health and restore the groundwater to its beneficial use as a drinking water aquifer.

### 13.1.2 Remedy Selection

The Final ROD for Area B (PICA 205) Groundwater was signed by USEPA on April 1, 2009. The RAOs as listed in the ROD for Area B (PICA 205) Groundwater are as follows:

- Prevent exposure to Area B groundwater COCs at levels above ARARs;
- Protect uncontaminated groundwater for designated uses;
- Minimize migration of contaminants to adjacent groundwater and surface water; and,
- Restore contaminated groundwater to comply with its use designation.

The selected remedy for Area B (PICA 205) Groundwater is Expedited In-Situ Enhanced Bioremediation. This remedial technology consists of the introduction of a biostimulant (molasses) via injection to increase the rate which natural microbial degradation of the COCs will occur to attain the RAOs. Components of this remedial approach include:

- Installation of injection wells oriented perpendicular to the groundwater flow and hydraulically downgradient;
- Injection of a biostimulant into the groundwater treatment area to achieve a 7-year restoration time; and,
- Periodic groundwater and surface water monitoring to evaluate these media for attenuation of the COCs.

### 13.1.3 Remedy Implementation

The implementation of the Expedited In-Situ Enhanced Bioremediation was initiated with the installation of 16 injection wells and nine monitoring wells spanning April 2008 to August 2008. The injection well network consisted of installing the injection wells in three injection lines that are perpendicular to the groundwater flow. Following the installation of the injection well network and the monitoring wells, construction of the carbon amendment delivery system was begun in August 2008 and was completed in September 2008.

A baseline sampling event was conducted during September of 2008 and consisted of collecting groundwater and surface water samples. Groundwater samples were collected to establish a baseline concentration of VOCs and determine the ambient total organic carbon (TOC) content of the aquifer. Surface water samples were also analyzed for VOCs and TOC.

A full scale injection of the dilute molasses (the biostimulant) occurred from September 15 to September 19, 2008. Following the initial injection of dilute molasses, periodic quarterly and annual groundwater monitoring in conjunction with appropriately timed molasses injections have occurred and continue to occur in accordance with the monitoring schedule presented within the Final Remedial Design (ARCADIS, 2008). Area B (PICA 205) groundwater is currently entering year three of seven for performance monitoring.

LUCs are also another component of the remedy implementation and include institutional restrictions, access restriction, and public education. A site map depicting the LUC area of applicability is included as **Figure 13-1**.

#### 13.1.4 Systems Operations/O&M Requirements

Systems operation and maintenance includes the periodic collection of groundwater and surface water samples, injection of molasses into the aquifer, and an annual LUC inspection/certification.

In accordance with the RD, periodic groundwater and surface water sampling and reporting is to occur for a duration of seven years, beginning in 2008. Sampling and reporting consists of performance monitoring, annual groundwater sampling, and surface water sampling. The initial performance monitoring and surface water sample collection frequency was conducted quarterly for two years. Following the initial two year quarterly performance monitoring, the frequency of performance monitoring has been reduced to semi-annual for years three to five. After five years of monitoring, the performance monitoring and surface water sampling will be conducted on an annual basis for years six and seven.

Consistent with the adaptive design strategy presented in the remedial design, the injection frequency of molasses and injection volumes are dependent on the site-specific data collected during the performance monitoring and annual groundwater sampling. Previous molasses injection events have occurred as follows:

- First injection event during September 2008;
- Second injection event during December 2008;
- Third injection event during February 2009;
- Fourth injection event during November 2009; and,
- The fifth injection event was conducted during July 2010.

Annual site inspections were initiated in 2008 and are conducted to inspect for indication of inappropriate land use. Annual Land Use Certification Reports were prepared for 2008, 2009, and 2010. Site inspections and certifications will continue annually.

### **13.2 Progress Since Last Review**

#### 13.2.1 Recommendations from the Third Five-Year Review

Groundwater at PICA 205 Area B was not discussed during the third Five-Year Review.

#### 13.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the ROD and RD were submitted and approved and the RA was completed at Area B (PICA 205). The IRAR has been approved; and three consecutive years of performance monitoring, annual inspections, and LUC Certifications have been completed.

### **13.3 Document Review**

Relevant and appropriate documents associated with Area B (PICA 205) Groundwater were reviewed for this fourth Five-Year Review Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS, 2009. 2008 Annual Groundwater Report Area B (PICA205) Groundwater. Picatinny Arsenal, New Jersey. February.

ARCADIS, 2008. Final Remedial Design Area B (PICA 205) Groundwater. Picatinny Arsenal, New Jersey. October.

ARCADIS, 2010. 2009 Annual Groundwater Report Area B (PICA205) Groundwater. Picatinny Arsenal, New Jersey. February.

ARCADIS, 2010. 1Q10 Quarterly Data Report Area B (PICA205) Groundwater. Picatinny Arsenal, New Jersey. June.

ARCADIS, 2010. 2Q10 Quarterly Data Report Area B (PICA205) Groundwater. Picatinny Arsenal, New Jersey. August.

ARCADIS, 2011. 2010 Annual Groundwater Report Area B (PICA 205) Groundwater. Picatinny Arsenal, New Jersey. March.

Dames and Moore, 1998. Phase I Remedial Investigation Report. Prepared for Army Total Environmental Program Support, Delivery Order No. 0005, Draft Final. May.

U.S. Army, 2009. Record of Decision, Area B Groundwater – Picatinny Arsenal, New Jersey. April.

#### **13.4 Data Review and Evaluation**

The injection well network was installed in a series of three injection lines that are perpendicular to the groundwater flow. The basis for the design of the injection well network is presented in the RD included in the Administrative Record in **Appendix A**, and the injection network is depicted on **Figure 13-2**. An adaptive design approach was used to determine the frequency and dosage requirements of each injection event. Two injection events were completed in 2008 and 2009. One injection event was completed in 2010. The ultimate necessity for an additional injection is based on TOC and pH levels observed both in the injection lines and the downgradient performance monitoring wells. A typical injection includes injecting approximately 15,000 gallons of a 2.8 percent (by weight) molasses solution. The molasses solution is injected into 14 injection wells simultaneously. TOC and pH data currently are collected bi-monthly and presented in semi-annual and annual reports.

The data discussed herein are from the monitoring wells located downgradient of each of the injection lines. The following data trend analysis is based on the data collected from the baseline sampling event conducted on September 12, 2008 through the most

recent data collected on September 10, 2010. The VOC data trends discussed below are useful in understanding the rate and effectiveness of enhanced bioremediation. The VOC data trends are discussed for each set of performance monitoring wells downgradient of the injection lines and trend charts depicting: groundwater VOC concentration versus time; surface water VOC concentrations versus time. , TOC, pH, , methane, and VOC molarity are included in Appendix D, E, and F of the 2010 Annual Groundwater Report for Area B (PICA 205) Groundwater included in the Administrative Record found in **Appendix A**.

### **Injection Line 1**

The performance monitoring wells downgradient of injection line 1 are 20/24MW-16 and 20/24MW-17, where performance monitoring well 20/24MW-16 is hydraulically downgradient of 20/24MW-17. The following observations were noted:

- In general, VOC concentrations are decreasing when compared from the initial baseline sampling conducted during September 2008 through September 2010. Most notably, cis-1,2-DCE within both performance monitoring wells exhibits a strongly declining trend from initial observed concentrations of 340 µg/L and 270 µg/L to 0.653 µg/L and 0.364 µg/L (20/24MW-16 and 20/24MW-17, respectively). Concentrations of cis-1,2-DCE have been below the SCL in both performance monitoring wells since November 2009.
- PCE has been below the SCL since performance monitoring was initiated. Similarly, concentrations of TCE declined from their initial baseline and have been below the SCL since March 2009.
- Concentrations of VC increased in both performance monitoring wells above their baseline concentrations. The increase in VC is expected as it is indicative of daughter product formation from reductive dechlorination of parent compounds. VC concentrations will begin to decrease with depletion of parent VOCs and with sustained TOC levels.

### **Injection Line 2**

The performance monitoring wells downgradient of injection line 2 are 20/24MW-15 and 20/24IW-03. The following observations were noted:

- PCE has historically not been detected at either of these locations during any of the sampling events.
- TCE within 20/24MW-15 was initially 32.5 µg/L which subsequently decreased to below the detection limit. TCE at 20/24MW-15 has been below the SCL since November 2009. The TCE concentration within 20/24MW-15 has been below the SCL since performance monitoring was initiated.
- cis-1,2-DCE decreased from 224 µg/L to 1.43 µg/L at 20/24MW-15. cis-1,2-DCE has been below the SCL of 70 µg/L since November 2009 at 20/24MW-15. Concentrations of cis-1,2-DCE within 20/24IW-03 have also been below the SCL since performance monitoring was initiated.
- Concentrations of 1,1-DCE have either been below the detection limit during all sampling events (20/24IW-03) or have been decreasing and are below the detection limit (as in the case of 20/24MW-15).
- Concentrations of VC within 20/24MW-15 increased from the baseline sampling event (49.2 µg/L during September 2008) to a peak concentration of 191 µg/L (March 2009) and then have been steadily declining. Concentrations of VC within 20/24IW-3 have typically been non-detect, but the most recent sampling result (September 2009) indicates the VC concentration is 2.74 µg/L. The increase in VC is expected as it is indicative of daughter product formation from reductive dechlorination of parent compounds. VC concentrations will begin to decrease with depletion of parent VOCs and sustained TOC levels.

### **Injection Line 3**

The performance monitoring wells downgradient of injection line 3 consist of 20/24MW-06, 20/24MW-6B and 20/24MW-08. All of these performance monitoring wells are screened in the unconfined aquifer except 20/24MW-6B, which is screened in the upper semi-confined aquifer. The following observations are noted:

- In general, VOC concentrations within 20/24MW-6 have exhibited a strong decreasing trend for all analytes. There was a slight increase of cis-1,2-DCE and VC peaking during March 2009, however concentrations subsequently decreased to their current levels which are non-detect for all VOCs.

- VOC concentrations within 20/24MW-8 increased with a peak concentration of VC occurring during March 2009. Peak concentrations of cis-1,2-DCE were observed during March 2010, lagging behind the VC peak. This increase is an indication of enhanced dissolution of adsorbed phase mass, which will facilitate contaminant degradation. It appears that concentrations for both cis-1,2-DCE and VC are starting to decline as evidenced by the June 2010 and September 2010 sampling events.
- VOCs were not detected at 20/24MW-6B during the September 2008 baseline sampling, but concentrations of the VOCs were detected during subsequent sampling events in 2008, 2009, and 2010. Initial pilot scale tracer testing has indicated amendments injected into the unconfined aquifer will migrate under natural flow into the semi-confined aquifer. The most recent (September 2010) analytical data indicate VOC concentrations at 20/24MW-6B have steadily decreased since December 2008, and none of the COCs are above the SCL. Sustained TOC levels and elevated methane concentrations indicate that methanogenic conditions are present at 20/24MW-6B. Decreasing total molar concentrations at this location also indicate that complete reductive dechlorination is occurring.

### **13.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. The data presented in the 2008, 2009, and 2010 performance monitoring reports indicated reductive dechlorination of the chlorinated solvent plume is occurring as anticipated. The ROD included a stipulation that cleanup levels be achieved within seven years (by September 2015). PCE and TCE are currently below cleanup levels at all performance monitoring wells. cis-1,2-DCE is currently below cleanup level at six of seven performance wells. VC is currently below its cleanup level at just one of the seven performance wells but continued degradation is expected to occur over the next four years with the depletion of parent VOCs essentially complete.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Yes. There have been no changes in the physical conditions of the site or the land use at Picatinny Arsenal since USEPA's last Five-Year Review that would affect the routes of exposure and the protectiveness of the remedy. The groundwater standards

identified in the ROD are based on the lower of the Federal Drinking Water Standards MCLs and New Jersey Groundwater Quality Standard MCLs and are still valid. A comparison of SCLs established in the decision documents and current LOCs is provided in **Table 1**.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

### **13.6 Issues and Discussions**

Since implementation of the remedy in 2008, no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Discussions with USEPA and NJDEP about this site have focused on the ongoing injections and performance monitoring data.

Quarterly and Annual Reports are consistently reviewed and approved by USEPA and NJDEP. However, following review of the Q12010 Data Report, NJDEP requested that the downgradient unconfined monitoring well IW-10 be sampled for TCE and degradation products. Monitoring well IW-10 is further downgradient of MW-08 which has historically had the highest concentrations of TCE, cis-1,2-DCE, and VC. The sampling of IW-10 was already included in the annual sampling requirements, and this sampling was performed in September 2010. VOCs were not detected at IW-10.

### **13.7 Recommendations**

None.

### **13.8 Protectiveness Statement**

The remedy for Area B (PICA 205) Groundwater is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

#### **14. Site 31/101 (PICA 072)**

Site 31/101 (PICA 072) is located in Area G adjacent to GPB. Site 31, the former DRMO yard, is located along Eleventh Avenue, south of the intersection of Sixth Street and Reilly Road (**Figure 14-1**). Site 31 is a fenced-in area that currently contains five buildings. While operational, all five of these buildings were associated with the DRMO operation. Currently all five of the buildings are in relatively good condition, and some of the buildings are used for inert storage. Much of the area within the fence line is paved.

Site 101, located immediately north of Site 31, encompasses former Building 311 (Gas Station), Building 319 (currently known as Safety, Surety, and Environmental Office), and the paved area to the south of these buildings. Former Building 311 and Building 319 are located between Eleventh Avenue and GPB, in the northeastern portion of Area G. Building 311 was built in 1941 and used as a gasoline station until December 1991. The gasoline station consisted of several gasoline pumps and a computer-operated dispensing unit. The gasoline pumps were removed from service in June 1991.

#### **14.1 Remedial Actions**

##### 14.1.1 Basis for Taking Action

COCs were identified for Site 31/101 (PICA 072) surface and subsurface soil based on contribution to the majority of site-specific human health risk or exceedance of NJNRDCSCC. The 19 surface soil COCs, as identified in the ROD, include:

- PCBs (Aroclor-1248, Aroclor-1254, Aroclor-1260);
- antimony (surface soil only);
- arsenic;
- cadmium (subsurface soil only);
- copper;
- lead;
- mercury (surface soil only);
- thallium (surface soil only);

- zinc;
- benz(a)anthracene;
- benzo(a)pyrene;
- benzo(b)fluoranthene;
- benzo(k)fluoranthene;
- chrysene (surface soil only);
- dibenzo(a,h)anthracene;
- indeno(1,2,3-cd)pyrene;
- pyrene (surface soil only);
- 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (surface soil only); and
- 2,4-dinitrotoluene (subsurface soil only).

The HHRA (Dames and Moore, 1998) for Site 31/101 (PICA 72) was conducted during the Phase I RA. Because a significant amount of new data was collected at Site 31/101 (PICA 72) after the Phase I RI, the baseline HHRA was updated, and the results of this HHRA were reported in the Final RI Report for Sites 3, 31, 192, and 199 (Shaw, 2004). This HHRA included exposure scenarios for the current/future industrial research workers, future construction/excavation workers, and current/future on-site youth visitor. The results of the HHRA indicated that under the current and hypothetical exposure scenarios, the excess lifetime carcinogenic risk posed by contaminants exceeded the NCP target range of  $1 \times 10^{-04}$  to  $1 \times 10^{-06}$ , and the HI is above 1 for the current land use. A remedial action was required to mitigate this unacceptable risk.

An ERA was not performed specifically at Site 31 due to limited habitat at Site 31 and a lack of samples collected during the Phase I RI; therefore a portion of Site 31 was subsequently included in the assessment area for an ERA performed at adjacent Site 101 (Dames and Moore 1998). Results of the ERA are summarized in the ROD for Site 30/101 (PICA 072)

#### 14.1.2 Remedy Selection

The ROD authorizing this response action was signed by the U.S. Army on December 5, 2008 and by the USEPA on June 9, 2009. The RAOs, as developed in the ROD, are as follows:

- Prevent exposure to surface and subsurface soils which results in unacceptable risk to human and ecological receptors;
- Prevent migration of COCs above SCLs in site soil to Green Pond Brook sediment; and,
- Prevent impact to groundwater by all site COCs above SCLs.

The selected response actions included:

- Excavation and off-site disposal of soil with PCB concentrations greater than 160 mg/kg;
- Excavation and off-site disposal of lead-contaminated soil adjacent to GPB;
- Installation of an asphalt cap; and,
- Implementation of LUCs.

#### 14.1.3 Remedy Implementation

In August 2008, pre-excavation confirmatory and waste characterization sampling activities were conducted at Site 31/101 (PICA 072). This sampling event was halted due to the discovery of suspected Improved Conventional Munitions (ICMs) disposed of on the surface at the site. Approximately half an acre within the six-acre Former DRMO Yard was designated as an ICM Site due to the discovery of 192 ICMs scattered about the surface of the site. Starting in June 2009, the surface and near surface ICMs, conventional munitions and munitions debris were removed and disposed of by detonation as part of a Time Critical Removal Action under the Army's Military Munitions Response Program (MMRP). All items were determined to be inert practice rounds.

Upon removal of the ICMs, remedial activities were conducted at Site 31/101 (PICA 072) and included the following actions:

- 852 CY of hazardous soil was excavated and disposed at an off-site facility;

- 3,529 CY of soil, spanning a 41,856 SF area, was excavated and consolidated on site;
- Approximately 4,600 CY of clean soil was imported to the site and used to backfill the excavations;
- A soil cover (31,683 sf) was constructed in addition to an asphalt cap (19,713 sf); and,
- Repair or improvement of 6,569 sf of existing asphalt.

In addition to these remedial actions, LUCs were implemented at the site in accordance with the approved RD. Remedy implementation included conducting a baseline site inspection and installing five signs along the boundary of the site prohibiting uncontrolled digging. A site map with the LUC area of applicability is included as **Figure 14-1**.

#### 14.1.4 Systems Operations/O&M Requirements

Annual site inspections were initiated in December 2009 and continue to be completed on an annual basis. The presence of LUCs and the condition of the engineering controls (soil cover, asphalt caps, Building 314D) and signs are also verified during the inspection and subsequently certified in Annual Land Use Certification Reports.

## **14.2 Progress Since Last Review**

### 14.2.1 Recommendations from the Third Five-Year Review

Site 31/101 (PICA 072) was not included in the third Five-Year Review; therefore, this section is not applicable.

### 14.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the ROD was approved and signed, the RD was completed, and the remedial action was implemented at Site 31/101 (PICA 072). The RAR has been approved and two consecutive years of annual inspections and LUC Certifications have been completed.

### **14.3 Document Review**

Relevant and appropriate documents associated with Site 31/101 (PICA 072) investigations, remedy development, and operations were reviewed for this fourth Five-Year Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS, 2007. Final Proposed Plan, PICA 072 (Site 31/101), Former DRMO Yard and Former Gas Station. Picatinny Arsenal, New Jersey. September.

ARCADIS, 2009, Remedial Action Work Plan Site 31/101(PICA 072) Former DRMO Yard and Former Gas Station. June.

ARCADIS, 2009, Final Time Critical Removal Action Work Plan, Former DRMO Improved Conventional Munitions Site. June.

ARCADIS, 2010. Final Remedial Action Report, Site 31/101 (PICA 072) Former DRMO Yard and Former Gas Station. Picatinny Arsenal, New Jersey. October.

ARCADIS. 2011. 2010 Annual Land Use Certification. Picatinny Arsenal, New Jersey. April.

Dames and Moore, 1998. Phase I Remedial Investigation Report. Prepared for Army Total Environmental Program Support, Delivery Order No. 0005, Draft Final. May.

USEPA, 2009. Draft Recommended Interim Preliminary Remediation Goals for Dioxin in Soil at CERCLA and RCRA Sites. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. OSWER 9200.3-56. December 2009.

Shaw. 2004. Additional Site Investigations Remedial Investigation Report, Sites 3, 32, 192, & 199. Prepared for the U.S. Army Corps of Engineers – Baltimore District. Contract No. DACA31-95-D-0083. July 2004. Final.

Shaw. 2005. Site 31/101 (PICA 072) Feasibility Study. Prepared for Army Total Environmental Program Support, Deliver Order No. 0017, November 2005. Final.

U.S. Army, 2008. Record of Decision, Site 31/101(PICA 072). November.

#### **14.4 Data Review and Evaluation**

Chemical data is not collected as part of the remedy. The first annual certification that site specific LUCs for the PICA 072 sites are in effect and are protective of human health and the environment was completed in 2010.

#### **14.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. The RAR documented the complete removal and/or consolidation of impacted soils with COC concentrations above the SCLs. Engineering controls such as the vegetative cover, asphalt cover, and Building 314D remain in place and eliminate exposure to contaminated subsurface soils. Residential use of the site is prohibited, and the site land use continues to be industrial research. Both the controls and land use are inspected annually, and the findings are documented in the Annual Land Use Certification Report.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Yes. There have been no changes to site conditions, land use, or exposure assumptions. The NJNRDCSCC used to establish SCLs were replaced with the NJNRDCSRS in June 2008. SCLs were established for all 19 COCs listed above using the NJNRDCSCC. A comparison of the NJNRDCSRS versus the NJNRDCSCC for the 19 COCs indicates that standards for nine of the COCs increased and standards for seven of the COCs decreased. A comparison of SCLs established in the decision documents and current LOCs is provided in **Table 1**. Per CERCLA Five-Year Review guidance, cleanup standards are typically frozen at the time of ROD signing unless a new or modified requirement calls into question the protectiveness of the selected remedy. Revisions to direct contact standards will have little to no effect on the protectiveness of the remedy as the cover systems and LUCs prevent direct contact with the soils on-site. Additionally, a review of USEPA's IRIS Database confirmed that the toxicity values for these compounds have not been revised since the time of ROD signature. Therefore, it can be concluded that this revision of a dermal contact standard does not call into question the overall protectiveness of the implemented remedy, and the SCLs established in the ROD and RD remain valid.

Dioxins were identified as a COC at Site 31/101 (PICA 072). The ROD and subsequent RD established a SCL of 1,900 nanograms per kilogram (ng/kg). All surface soils impacted with dioxins above this level were excavated and disposed on-site beneath a soil and asphalt cover. Confirmatory sampling documented dioxin concentration (2,3,7,8-TCDD toxicity equivalent [TEQ]) below the SCL, and a review of this confirmatory sampling data finds the highest concentration of dioxins remaining is 184 ng/kg. USEPA is currently reviewing a draft interim soil dioxin Preliminary Remediation Goal (PRG). The guidance on this PRG is not yet finalized; however, the draft interim soil dioxin PRG guidance document states that “once finalized Regions performing five year reviews of CERCLA remedial sites where soil contaminated with dioxins...should consider this guidance...when evaluating whether the original remedies...remain protective of the contaminated areas” (USEPA, 2009).

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

#### **14.6 Issues and Discussions**

Since implementation of the remedy in 2009, no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Discussions with USEPA and NJDEP about this site have focused on the implementation of the remedy and the Annual Land Use Certifications.

#### **14.7 Recommendations**

None.

#### **14.8 Protectiveness Statement**

The remedy for Site 31/101 (PICA 72) is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **15. Area C (PICA 206) Groundwater**

Area C is approximately 126 acres in size and is located in the southwestern corner of Picatinny near the ridge that forms the eastern boundary of the arsenal. **Figure 1-1** depicts the location of Area C (PICA 206) Groundwater. The area is bounded by GPB and Area B to the northwest, Route 15 to the southwest, and the steep hillside running adjacent to Parker Road to the east (**Figure 15-1**). The five sites in Area C include Sites 19 and 163 (PICA-020); Site 25/26 (PICA-067); Site 163 (Baseball Fields); and Site 180 (PICA-093). Groundwater at these sites is considered part of the Area C operable unit. Site 34 (PICA-002) is geographically located in Area C. However, Site 34 is not part of the Area C Groundwater operable unit and has its own groundwater monitoring plan. The decision to group groundwater from all Area C sites with the exception of the Burning Ground was made with the agreement of the regulatory community. Area C groundwater once included Site 23, the Post Farm Landfill, which is located on the southeast ridge of Picatinny Arsenal. Site 23 was removed from the Area C designation, and groundwater at Site 23 is being addressed by the approved remedy at that site.

### **15.1 Remedial Actions**

#### 15.1.1 Basis for Taking Action

Numerous environmental investigations and extensive groundwater monitoring have been conducted within Area C and along the southern boundary of the facility to evaluate whether past activities may have affected the groundwater in the area. Results of the prior investigations were used during the FS phase to develop RAOs and identify COCs. COCs identified at Area C (PICA 206) Groundwater include arsenic and lead.

The HHRA (Dames and Moore, 1998) for Area C (PICA 206) Groundwater included groundwater uses for: drinking water by Picatinny workers, child/adult residents, and on-site child residents; and showering water by child/adult residents and on-site child residents. Groundwater contact through any of these pathways is not expected to occur because of the facility-wide CEA and LUCs that are in place. Risk assessments for Area C (PICA 206) Groundwater identified a cancer risk above the USEPA's target risk range of  $1 \times 10^{-06}$  to  $1 \times 10^{-04}$  for potential future exposure scenarios. Unacceptable human health risks are only associated with Area C groundwater exposure via the ingestion and inhalation pathways. The non-cancer HI exceeded the target HI of 1 for the exposure scenarios. A remedial action was required to address this unacceptable

risk to human health and restore the groundwater to its beneficial use as a drinking water aquifer.

#### 15.1.2 Remedy Selection

The Final ROD for Area C (PICA 206) Groundwater was signed by USEPA on September 1, 2009. The RAOs for Area C Groundwater are as follows:

- Prevent exposure to contaminated groundwater;
- Protect uncontaminated groundwater for designated uses; and,
- Attain SCLs in Area C groundwater.

The selected remedy for Area C (PICA 206) Groundwater included LTM and LUCs. A site map is included as **Figure 15-1**.

#### 15.1.3 Remedy Implementation

The LTM sampling program was implemented in January and February 2010. Groundwater samples were collected from the 32 monitoring wells. A well-specific analyte list was developed for each well and is presented in the RD. Field parameters (temperature, pH, ORP, specific conductance, dissolved oxygen, and turbidity) were recorded during sampling.

#### 15.1.4 Systems Operations/O&M Requirements

In accordance with the approved RD, groundwater samples will be collected for chemical analysis semi-annually, for a minimum of two years. In order to evaluate temporal changes or seasonal fluctuations in water level and groundwater flow regimes, the first four semi-annual sampling events will be conducted seasonally. For example, during year one, the sampling events were conducted in January/February (winter) and in July/August (summer). If concentrations of the analytes in any well have not increased or have remained consistent over a span of four semi-annual sampling events, the sampling frequency will be reduced to annual, per the Exit Strategy presented in the RD.

## **15.2 Progress Since Last Review**

### 15.2.1 Recommendations from the Third Five-Year Review

Area C (PICA 206) Groundwater was not included in the third Five-Year Review Report.

### 15.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review Report, the PP, ROD, and RD for Area C (PICA 206) Groundwater were completed and approved. The selected remedy was implemented at the site.

## **15.3 Document Review**

Relevant and appropriate documents associated with the Area C (PICA 206) Groundwater investigations, remedy development, and operations were reviewed for this fourth Five-Year Review Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS. 2011. 2010 Annual Land Use Certification. Picatinny Arsenal, New Jersey. April.

Dames and Moore, 1998. Phase I Remedial Investigation Report. Prepared for Army Total Environmental Program Support, Delivery Order No. 0005, Draft Final. May.

Shaw Environmental, Inc. (Shaw). 2005. Area C Groundwater Feasibility Study. Final. Prepared for U.S. Army Corps of Engineers, Baltimore District. November.

Shaw. 2009. Long Term Monitoring Plan and Land Use Control Remedial Design for Area C Groundwater. Final. Prepared for U.S. Army Corps of Engineers, Baltimore District. November.

U.S. Army, 2009. Record of Decision, Area C Groundwater. Final. Prepared for U.S. Army Corps of Engineers, Baltimore District. June.

#### **15.4 Data Review and Evaluation**

The two semi-annual monitoring events were conducted in January/February (winter) and in July/August (summer) of 2010. Groundwater data from these events is consistent with prior site data. Metals, anions, and explosives were detected above comparison criteria at a majority of the wells. VOCs were detected above comparison criteria at DM-19-1, DM-25-2, and DM25-3. Only two semi-annual events have been conducted as of the end of 2010; thus, further trend analysis and MNA evaluation is not possible at this time. Trend analysis and a MNA analysis will be performed during the next five year review period.

#### **15.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. Groundwater monitoring data confirms that current contamination levels are consistent with prior site data. Future groundwater use that could result in unacceptable risks to human health is controlled through the CEA and LUCs. The CEA is updated every two years and the LUCs are certified annually.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAO used at the time of the remedy selection still valid?*

Yes. There have been no changes in the physical conditions of the site or the land use at Picatinny Arsenal since implementing the selected remedy. The NJGWQS (NJAC 7:9C) were used as the cleanup level for the COCs identified in the FS (arsenic and lead) were established at New Jersey Practical Quantitation Limit (PQL). There have been no revisions to these standards.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

#### **15.6 Issues and Discussions**

Since implementation of the remedy in 2009, no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Discussions with USEPA and

NJDEP about this site have focused on the ongoing groundwater monitoring and the chemical results.

**15.7 Recommendations**

None.

**15.8 Protectiveness Statement**

The remedy for Area C (PICA 206) Groundwater is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **16. Group 3 Sites (PICA 008) Groundwater**

Group 3 Sites (PICA 008) is located along the unnamed ridge that trends from the northeast to the southwest along the southeast side of the installation (**Figure 16-1**). The area is transected by a small valley that trends from northwest to southeast, perpendicular to the direction of the axis of the ridge on which it is located. Elevations within this valley range from 800 to 900 ft above msl. Group 3 Sites (PICA 008) occupies approximately 40 acres in the northeastern portion of the Arsenal and encompasses three study sites: Sites 1, 2, and 4. Site 2 is located in this valley, with Site 1 on the ridge to the northeast, and Site 4 on the ridge to the southwest. Sites 1 and 4 were formerly used as a Naval Air Rocket Test Station (NARTS) area. Site 2 was a test area for rocket engines, a photographic lab, a passivation house, and a sewage treatment facility. The G-2 Pond and Stillwell Pond are both located within Site 2 as well.

### **16.1 Remedial Actions**

#### 16.1.1 Basis for Taking Action

Based on the results of previous site investigations, COCs were identified for groundwater and surface water. COCs were not identified for soil because soil contamination at this site is being addressed in a separate FS. The COCs in groundwater and surface water include:

- 1,1-DCE;
- Carbon Tetrachloride (CT);
- PCE; and
- TCE.

The HHRA (IT, 2000) and supplemental assessments evaluated the current/future outdoor maintenance worker; current/future industrial/research worker; future construction worker; and, future on-site youth visitor. Groundwater uses evaluated dermal absorption by construction workers and ingestion/inhalation of drinking water by Picatinny workers. These studies found the groundwater COCs at Site 2 pose an unacceptable risk to human health for the hypothetical future industrial worker via the ingestion and inhalation groundwater pathways. Groundwater contact through any of these pathways is not expected to occur because of the facility-wide CEA and LUCs that are in place. Groundwater COCs also exceed applicable drinking water

standards. A remedial action was required to address this unacceptable risk to human health and restore the groundwater to its beneficial use as a drinking water aquifer.

#### 16.1.2 Remedy Selection

The Final ROD for Group 3 Sites (PICA 008) was signed by the U.S. Army on July 8, 2010 and by the USEPA on August 2, 2010. The RAOs as listed in the ROD are as follows:

- To prevent human exposure to contaminated groundwater that would cause unacceptable risk over the duration of the response action;
- To achieve the more stringent of the Federal MCLs or NJGWQS for the identified contaminants of concern in a reasonable timeframe, thereby restoring groundwater to its beneficial use as a drinking water source;
- To achieve NJSWQC through remediation of groundwater for the identified contaminants of concern to ensure that groundwater remediation mitigates potential surface water impacts; and,
- To maintain current land-use (industrial) and current institutional controls at the Group 3 Sites (PICA 008).

The selected remedy included in-situ enhanced bioremediation, implementation of land use controls, and long-term groundwater monitoring.

#### 16.1.3 Remedy Implementation

Activities to fully implement the selected Response Action spanned two months, from August 2010 to September 2010. Well installation was conducted in August and consisted of the installation of six injection wells and three monitoring wells, as proposed within the Remedial Design (U.S. Army, 2010). Baseline sampling was conducted in August, following well installation, to document site conditions prior to the injection event. The Response Action concluded with the injection of 1,600 gallons of a dilute Emulsified Vegetable Oil (EVO) solution (approximately 4% to 9% by volume) during the week of September 6, 2010. The solution was injected into the unconfined aquifer at Site 2 via eight injection wells - six in the southern plume area and two in the northern plume area. A site map with the LUC area of applicability is included as **Figure 16-1**.

#### 16.1.4 Systems Operations/O&M Requirements

The basis for the design of the injection well network is presented in the RD and is included in the Administrative Record in **Appendix A**. An adaptive design approach was used to determine the frequency and dosage requirements of each injection event. EVO was selected as the amendment because a slower acting agent was needed given the groundwater velocities at the site. To date, one EVO injection event has been completed. The ultimate necessity for an additional injection is based on TOC and pH levels observed both in the injection lines and the downgradient performance monitoring wells. A typical injection includes injecting approximately 8,000 gallons of a 3.9% (by volume) EVO solution. The EVO solution is injected into eight injection wells simultaneously. Currently TOC and pH data are collected semi-annually and presented in semi-annual and annual reports. The monitoring program for Group 3 Sites (PICA 008) Groundwater includes performance monitoring of seven wells within the treatment area, surface water monitoring at five locations within adjacent surface water bodies, and routine groundwater monitoring at nine wells located within and around the treatment area. Performance monitoring will be conducted biannually for seven years following remedy implementation. Surface water monitoring and routine groundwater monitoring will be conducted quarterly for the first year after remedy implementation, biannually for the next two years, and annually for the remainder of the monitoring program.

Combined plume monitoring and Remedial Action Operation data reports will be prepared and submitted after each routine monitoring event. These reports were initiated on completion of the injection event in September 2010. The first monitoring event was completed in December 2010, and a subsequent data report was prepared and submitted. The reports provide tabulated performance and compliance monitoring data and summarize operational issues.

The MNA program will help to verify that a permanent reduction in the groundwater VOC concentrations occurs in the surficial and bedrock aquifers and will continue until SCLs are met.

### **16.2 Progress Since Last Review**

#### 16.2.1 Recommendations from the Third Five-Year Review

Group 3 Sites (PICA 008) was not included in the third Five-Year Review.

#### 16.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the ROD and RD for the Group 3 Sites (PICA 008) Groundwater and Surface Water were completed and approved, and the selected final remedy was implemented at the site.

#### 16.3 Document Review

Relevant and appropriate documents associated with the Group 3 Sites (PICA 008) investigations, remedy development, and operations were reviewed for this fourth Five-Year Review Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS, 2009. Pre-Design Technical Memorandum for Groundwater and Sediment, Group 3, Sites 1, 2, and 4 (PICA 008), Picatinny Arsenal, New Jersey. July 2009. Final.

ARCADIS, 2010. Remedial Design for Groundwater and Surface Water, Group 3 Sites 1, 2 and 4 (PICA 008), Picatinny Arsenal, New Jersey. December 2010. Final.

ARCADIS. 2011. Interim Remedial Action Report. Group 3 Sites (PICA 008), Picatinny Arsenal, New Jersey. February.

ARCADIS. 2011. 2010 Annual Land Use Certification. Picatinny Arsenal, New Jersey. April.

ARCADIS. 2011. 2010 Annual Groundwater Data Report. Group 3 Sites (PICA 008), Picatinny Arsenal, New Jersey. May.

IT Corporation (IT). 2000. Phase II Ecological Risk Assessment, RI/FS, Picatinny Arsenal, New Jersey, 3 volumes. Prepared for U.S. Army Corps of Engineers – Baltimore District. Contract No. DACA-31-95-D-0083. February 2000.

Shaw Environmental, Inc. (Shaw). 2005. Group 3 Sites Feasibility Study. August 2005. Final.

U.S. Army. 2010. Record of Decision for Groundwater and Surface Water at Group 3 Sites (PICA 008), Picatinny Arsenal, New Jersey. June 2010. Final.

#### **16.4 Data Review and Evaluation**

The first quarterly monitoring event was conducted in December 2010. Because limited post-remedy implementation sampling data exists at this time, future Five-Year Reviews will contain an exit strategy outlining decision logic for the reduction in the number of samples and the cessation of sampling.

#### **16.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. Groundwater monitoring data confirms that current contamination levels are consistent with prior site data. The first injection has been completed, and operation data presented in the 2010 Annual Report indicate that an in-situ reactive zone is forming at monitoring wells downgradient of EVO injection wells as evidenced by dissolved organic carbon detections above background concentrations (maximum concentration of 39 mg/L in December 2010), the production of methane, as well as the presence of daughter products ethene and ethane. Future groundwater use that could result in unacceptable risks to human health is prohibited and controlled through the CEA and LUCs. The CEA is updated every two years and the LUCs are certified annually.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Yes. There have been no changes in the physical conditions of the site or the land use at Picatinny Arsenal since the USEPA's last Five-Year Review that would affect the routes of exposure and the protectiveness of the remedy.

The groundwater standards identified in the ROD are based on the lower of the Federal Drinking Water Standards MCLs and New Jersey Groundwater Quality Standard MCLs.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

#### **16.6 Issues and Discussions**

Since implementation of the remedy in 2010, no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Discussions with USEPA and NJDEP about this site have focused on the remedy implementation, ongoing groundwater monitoring, and the chemical results.

#### **16.7 Recommendations**

None.

#### **16.8 Protectiveness Statement**

The remedy for Group 3 Sites (PICA 008) Groundwater is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **17. Group 1 Sites (PICA 079)**

Group 1 is approximately four acres in size and encompasses four sites: 40, 93, 156, and 157 (**Figure 17-1**). Site 40 consists of Buildings 809 and 810; Building 809 was originally constructed for use as a large-caliber projectile washout facility, and Building 810 was originally intended as an operating facility. Currently the Buildings are used as an explosives wastewater treatment plant and a melt-pour research facility.

Site 93 used to consist of both Buildings 800 and 807; however, Building 800, first built as a loading facility for loading submissiles into warheads, has since been demolished. The only building currently standing at Site 93 is Building 807. Building 807 was originally constructed as a receiving, cleaning and inspection facility, but is currently used for cold storage and for staging packing materials for Building 820 (Site 157).

Site 156 consists of Buildings 813, 816, and 816-B. Originally, Building 813 was constructed for use as a production facility for large-caliber projectiles. Currently, this building is utilized as a remote automated control facility for Building 810 (Site 40). Building 816 was constructed as an assembly facility for primer, propellant, and cartridge cases.

Site 157 consists of Buildings 820, 823, and 824. Both Building 820 and Building 823 were constructed to be used as large-caliber projectile loading plants. Building 824 is ancillary to Building 823. Building 820 has since been reactivated as an ammunition repack and surveillance facility.

### **17.1 Remedial Actions**

#### **17.1.1 Basis for Taking Action**

Based on the results of previous site investigations, COCs were identified for surface soil, subsurface soil and groundwater. The COCs in surface soil and subsurface soil include:

- arsenic;
- barium (surface soil only);
- lead;
- benz(a)anthracene (surface soil only);

- benzo(a)pyrene;
- benzo(b)fluoranthene;
- benzo(k)fluoranthene (surface soil only);
- dibenz(a,h)anthracene;
- indeno(1,2,3-cd)pyrene (surface soil only);
- PCBs (Aroclor 1260);
- Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) (surface soil only);
- Pentaerythritol tetranitrate (PETN) (surface soil only);
- Picric acid (surface soil only);
- Cyclotrimethylenetrinitramine (RDX);
- Tetryl;
- 1,3,5-trinitrobenzene (surface soil only);
- 2,4-dinitrotoluene; and
- 2,4,6-trinitrotoluene (TNT).

The COCs in groundwater include:

- 2-amino-4,6-dinitrotoluene;
- 4-amino-2,6-dinitrotoluene;
- Amino dinitrotoluene (DNT);
- RDX; and
- TNT.

The HHRA (IT, 2002) evaluated the current/future outdoor maintenance worker, current/future industrial/research worker, current site workers, current/future construction worker, and, future on-site youth visitor. The HHRA concluded contaminants (primarily RDX and TNT) in soil and groundwater at the Group 1 Sites (PICA 079) pose an unacceptable risk to humans for the current and reasonably anticipated future users. Risk characterization is summarized separately for each site in the ROD for Group 1 Sites (PICA 079). A remedial action for soil was required to

mitigate this unacceptable risk posed by explosives. Groundwater pathways evaluated dermal absorption by construction workers and ingestion/inhalation by drinking water by Picatinny workers. These studies found the groundwater COCs at Sites 40, 156, and 157 pose an unacceptable risk to human health for the hypothetical future industrial worker via the ingestion and inhalation groundwater pathways. Groundwater contact through any of these pathways is not expected to occur because of the facility-wide CEA and LUCs that are in place. Groundwater COCs also exceed applicable drinking water standards. A remedial action was required to address this unacceptable risk to human health and restore the groundwater to its beneficial use as a drinking water aquifer.

A BERA was conducted at the Group 1 Sites as part of the Phase II RI (IT, 2000). The purpose of the BERA was to evaluate the potential risk to aquatic, benthic, and terrestrial receptors associated with exposure to chemicals in the environmental media under current conditions at each site. With the exception of Site 40 and Building 823 of Site 157, all of the Group 1 Sites were characterized as non-forested lands with little suitable habitat to attract wildlife in the sample areas. Thus, ecological assessments of these areas were not warranted and were eliminated from consideration in the Phase II ERA. Results of the ERA for Site 40 and 157 are summarized in the ROD for Group 1 Sites (PICA 079).

#### 17.1.2 Remedy Selection

The Final ROD for Group 1 Sites (PICA 079) was signed by the U.S. Army on July 28, 2010 and by the USEPA on September 16, 2010. The RAOs as listed in the ROD for Group 1 Sites (PICA 079) are as follows:

- To prevent human exposure to contaminated groundwater that would cause unacceptable risk over the duration of the response action;
- To achieve the more stringent of the Federal MCLs or NJGWQS for the identified contaminants of concern in a reasonable timeframe, thereby restoring groundwater to its beneficial use as a drinking water source. For RDX and TNT, which have no established MCL or NJGWQS, the Health Advisory Level (HAL) will be used as the cleanup goal;
- To address soils with contaminants driving risk for the sites greater than  $1 \times 10^{-4}$  or HIs greater than 1; and,

- To manage soils with calculated risk in the risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  following NCP guidance.

The selected remedy included excavation and off-site disposal of explosive-impacted soils, implementation of land use controls, and MNA of explosives in groundwater.

#### 17.1.3 Remedy Implementation

In September 2010, a total of 405 tons of non-hazardous, explosives-impacted soil was excavated from an area comprising approximately 4,290 sf and disposed of at an off-site facility. Confirmatory samples were collected and excavations were backfilled to original elevations and vegetated. Implementation of LUCs was conducted subsequent to excavation activities and will be maintained until contaminant levels allow for unrestricted use and unlimited exposure.

To implement the selected response action for groundwater, MNA sampling was conducted in accordance with the monitoring program specified within the Remedial Action Work Plan. Thus far, MNA sampling has been conducted in September and December 2010 and included the collection of groundwater samples using Hydrasleeves™ from ten monitoring wells and a sediment and a surface water sample was collected from one sediment/surface water location. A site map with the LUC area of applicability is included as **Figure 17-1**.

#### 17.1.4 Systems Operations/O&M Requirements

The monitoring program for Group 1 Sites (PICA 079) groundwater includes ten primary monitoring wells and one surface water/sediment sampling location. Monitoring of natural attenuation will be conducted quarterly for the first two years after remedy implementation, semi-annually for the next two years, and annually for the remainder of the remedy, with adjustments (greater or lesser) in frequency to be considered during each Five-Year Review.

MNA reports will be prepared and submitted after each routine monitoring event. These reports were initiated on completion of the injection event in December 2010 (as the September 2010 event was documented in the IRAR) and provide tabulated performance and compliance monitoring data and summarize operational issues. Furthermore, site inspections will continue because residual contamination in excess of established unrestricted use cleanup criteria will remain on-site.

## **17.2 Progress Since Last Review**

### 17.2.1 Recommendations from the Third Five-Year Review

Group 1 Sites (PICA 079) was not included in the third Five-Year Review Report.

### 17.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, the ROD and RD were submitted and approved, and the remedial action was completed at the Group 1 Sites (PICA 079). The IRAR has been submitted, and the first annual inspection and LUC Certification has been completed.

## **17.3 Document Review**

Relevant and appropriate documents associated with the Group 1 Sites (PICA 079) investigations, remedy development, and operations were reviewed for this fourth Five-Year Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS U.S., Inc. (ARCADIS). 2009. Pre-Design Technical Memorandum, Group 1 Sites (PICA 079), Picatinny Arsenal, New Jersey. April 2009. Final.

ARCADIS. 2010. Remedial Action Work Plan. Group 1 Sites (PICA 079), Picatinny Arsenal, New Jersey. December 2010. Final.

ARCADIS. 2011. Interim Remedial Action Report. Group 1 Sites (PICA 079), Picatinny Arsenal, New Jersey. April

ARCADIS. 2011. 2010 Annual Land Use Certification. Picatinny Arsenal, New Jersey. April.

ARCADIS. 2011. 2010 Annual Groundwater Data Report. Group 1 Sites (PICA 079), Picatinny Arsenal, New Jersey. April.

IT. 2002. Picatinny Arsenal Task Order 5, Phase II Group 1 Sites Remedial Investigation Report, Sites 40, 93, 156, & 157, Prepared for U.S. Army Corps of Engineers – Baltimore District, Contract No. DACA-31-95-D-0083, Final, June.

Shaw Environmental, Inc. (Shaw). 2005. Group 1 Sites Feasibility Study. August 2005. Final.

U.S. Army. 2010. Record of Decision Group 1 Sites (PICA 079), Picatinny Arsenal, New Jersey. July 2010. Final.

#### **17.4 Data Review and Evaluation**

Two quarterly monitoring events were conducted in September and December 2010. Eight quarterly monitoring events will be performed between September 2010 and June 2012, before transitioning to semi-annual monitoring events in September 2012 and 2013. Groundwater data from September 2010 and December 2010 is consistent with prior site data. A maximum concentration of RDX (89.9 µg/L) and a maximum concentration of TNT (221 µg/L) was reported at I-40-MW002. Only two quarterly events have been conducted as of the end of 2010; thus, further trend analysis and MNA evaluation are not possible at this time.

#### **17.5 Summary of Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes. The remedy for explosives in soil was implemented in 2010, and the IRAR documents the removal of all explosives impacted surface soils which were above the established SCLs. LUCs and engineering controls are in place and inspected and certified annually. Groundwater monitoring data confirms that current contamination levels are consistent with prior site data. Future groundwater use that could result in unacceptable risks to human health is controlled through the CEA and LUCs. The CEA is updated every two years and the LUCs are certified annually.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Yes. There have been no changes in the physical conditions of the site or the land use at Picatinny Arsenal since implementing the selected remedy. The groundwater standards identified in the ROD are based on the lower of the Federal Drinking Water Standards MCLs, New Jersey Groundwater Quality Standard MCLs and the HAL.

*Question C: Has any other information come to light that could call into question the protectiveness of the remedy?*

No.

**17.6 Issues and Discussions**

Since implementation of the remedy in 2010 no significant issues have been brought to the U.S. Army's attention by either USEPA or NJDEP during regularly held technical meetings or during review of the annual data reports. Discussions with USEPA and NJDEP about this site have focused on the remedy implementation, ongoing groundwater monitoring and the chemical results.

**17.7 Recommendations**

None.

**17.8 Protectiveness Statement**

The remedy for Group 1 Sites (PICA 079) is functioning as intended and is protective of human health and the environment. Currently there is no unacceptable exposure to human health or environmental receptors from site contaminants, and no unacceptable exposures are expected over the next five years.

## **18. Site 34 (PICA 002) - Lower Burning Ground**

Site 34 (PICA 002) of the Burning Grounds comprises approximately seven acres and is located near the southern boundary of Picatinny Arsenal along the banks of GPB (**Figure 18-1**). The Burning Grounds have been primarily utilized for the burning of explosive and explosive-contaminated material generated at Picatinny Arsenal. Additionally, the area has been used for landfilling and storage of wastes. The Burning Grounds consists of low-lying swampy areas, with the exception of the Open Burning Area, which is located along the western side of the site. Direct burning on the ground in this area was discontinued in 1985, and wastes have since been placed in large metal pans on concrete supports for ignition, burning, and proper disposal. Operations in the Open Burning Area included the destruction of off-specification explosive constituents and “flashing” of contaminated metal and equipment (the decontamination of surfaces contaminated with explosive residue) within nine metal burning pans. The burning pans are used to dispose of explosives, powder, spent solvents, propellants, dust from wet filtration systems, and explosives-contaminated wastewater treatment sludges and sediment. These operations are regulated under the interim status within a RCRA Part B permit. An incinerator has been constructed at Picatinny Arsenal which will take over most of the functions of the Burning Grounds once permitted and functional. The Army has indicated that open burning will still be required for a small amount of material which the new incinerator will not be able to handle. This open burning will be subject to a RCRA permit and performed at a different location at Picatinny Arsenal other than the current Burning Grounds. However, at this time the Lower Burning Ground remains operational.

### **18.1 Remedial Actions**

#### 18.1.1 Basis for Taking Action

The Army's RI of the Burning Grounds occurred in 1993 and 1994 and indicated contamination of surface and subsurface soil and to a lesser extent, groundwater. Contaminants in surface soil included PAHs, PCBs, metals, dioxins, and furans. These contaminants were detected to a lesser extent in subsurface soils. COCs were not identified for groundwater. COCs in soil, as identified in the ROD, include:

- benz(a)anthracene;
- benzo(a)pyrene;
- benzo(b)fluoranthene;

- dibenzo(a,h)anthracene;
- indeno(1,2,3-cd)pyrene;
- arsenic;
- cadmium;
- copper;
- lead;
- total PCBs; and
- dioxins/furans.

The HHRA (Dames and Moore, 1994 and Dames and Moore, 1998) for Site 34 (PICA 002) included exposure scenarios to soil and groundwater for the current site workers and future commercial/industrial workers. The results of the HHRA indicated that under the current and hypothetical exposure scenarios, the excess lifetime carcinogenic risk posed by contaminants exceeded the NCP target range of  $1 \times 10^{-04}$  to  $1 \times 10^{-06}$ . A remedial action was required to mitigate this unacceptable risk.

Two ERAs were completed at Site 34 to evaluate the potential risks to ecological receptors from estimated exposures to hazardous constituents associated with Site 34. A screening-level ERA was conducted as part of the Picatinny Arsenal Burning Ground Remedial Investigation Report (Dames and Moore, 1994) and a second ERA was completed as part of the Picatinny Arsenal Phase I Risk Assessment (Dames and Moore, 1998). Different contaminant receptors were assessed as part of each ERA. Results of both ERAs are summarized in the ROD for Site 34 (PICA 002).

#### 18.1.2 Remedy Selection

The ROD for the Burning Grounds was signed on September 8, 2005. The RAOs, as developed in the ROD, are as follows:

- Reduce the risk to the future on-site worker from exposure to surface soils with concentrations of the COCs that exceed the respective RGs.
- Reduce the risk to the future on-site worker from exposure to subsurface soils with concentrations of the COCs that exceed the respective RGs.

- Control erosion and transport of sediments from the site to surrounding drainage features.
- Mitigate any potential ecological risk and protect the environment.
- Prevent or mitigate impacts to groundwater that may result from the leaching of contaminants from Burning Ground soil via groundwater infiltration.
- Manage potential groundwater risk at points of compliance.

The selected remedy for Site 34 (PICA 002) includes the following components:

- Installation of an asphalt cap;
- Long-term groundwater and surface water monitoring, including the installation of one monitoring well in the shallow unconfined aquifer; and,
- Implementation of LUCs.

#### 18.1.3 Remedy Implementation

The remedial design has not been developed, and the selected remedy outlined in the ROD has not been implemented at Site 34 (PICA 002) due to the Army's continued use of the Open Burning Ground Area as they work towards obtaining the necessary permits required to replace burning ground activities with an incinerator. Upon the decommissioning of the burning ground area, the RD will be developed and a cap will be constructed to contain contaminated soil.

Pursuant to the approved ROD, in January 2010 a well was installed in the shallow unconfined aquifer along GPB. A full round of groundwater sampling was conducted throughout 2009 and 2010 to assess the current quality of groundwater and to support RD phase preparation at Site 34 (PICA 002).

#### 18.1.4 Systems Operations/O&M Requirements

The final remedy has not been implemented at Site 34 (PICA 002); therefore, this section is not applicable.

## **18.2 Progress Since Last Review**

### 18.2.1 Recommendations from the Third Five-Year Review

The primary recommendation specified in the third Five-Year Review stated “Submit the Remedial Design Plan, including the LUCIP and LTMP (Long-Term Monitoring Plan), to EPA as soon as possible. Close the current Burning Ground (Site 35) and implement the remedy.” As detailed above, the remedial design phase has been delayed due to the Army’s continued use of the Burning Ground Area. The status of this site and continued site operation has been regularly discussed with USEPA Region II staff, and the current projected date for ceasing burning operations is May 2011.

### 18.2.2 Actions Taken Since the Third Five-Year Review

Subsequent to the third Five-Year Review, a work plan was developed for the installation of one new well, as required by the ROD. The work plan also included collecting a full round of groundwater sampling to assess the current quality of groundwater and to support RD preparation at Site 34 (PICA 002). In 2010, activities proposed in the aforementioned work plan were successfully completed. A site map depicting the monitoring well network, including the well installed in 2010, is included as **Figure 18-1**.

The following sections of the Five-Year Review process have been omitted because the final remedy has not been implemented at Site 34 (PICA 002):

- Data Review and Evaluations
- Summary of Technical Assessment
- Issues and Discussions
- Recommendations
- Protectiveness Statement

## **18.3 Document Review**

Relevant and appropriate documents associated with the Site 34 (PICA 002) investigations, remedy development, and operations were reviewed for this fourth Five-Year Report. All documents are included in **Appendix A**. Key documents reviewed included:

ARCADIS. 2010. Monitoring Well Installation, Groundwater Sampling, and Analysis Summary Letter. October. 2010. Final.

Dames and Moore, 1998. Phase I Remedial Investigation Report. Prepared for Army Total Environmental Program Support, Delivery Order No. 0005, Draft Final. May.

Dames and Moore, 1994. Burning Ground Remedial Investigation Report, Picatinny Arsenal, New Jersey, submitted to the U.S. Army Environmental Center. Contract No. DACA15-90-D-0015, Delivery Order 8. December 1994. Draft Final

IT Corporation. 2001. Task Order 17 Site 34 Feasibility Study Report. August 2001. Final.

USEPA, 2009. Draft Recommended Interim Preliminary Remediation Goals for Dioxin in Soil at CERCLA and RCRA Sites. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. OSWER 9200.3-56. December 2009.

Shaw. 2005. Record of Decision for Site 34 – the Burning Grounds. February. 2005.

#### **18.4 Protectiveness Statement**

The remedy for Site 34 (PICA 002) has not yet been implemented, and therefore the functionality of the remedy cannot be determined for Site 34 (PICA 002). The HHRA (Dames and Moore, 1994 and Dames and Moore, 1998) determined the risk to the current site worker is  $3.4 \times 10^{-05}$ . Therefore, it can be determined that under the current site use, the site conditions are protective of human health and the environment.

Dioxins were identified as a COC at Site 34 (PICA 002). The ROD established a risk based SCL of 34 ng/kg. USEPA is currently reviewing a draft interim soil dioxin PRG. The guidance on this PRG is not yet finalized; however, the draft interim soil dioxin PRG guidance document states that “once finalized, Regions performing five year reviews of CERCLA remedial sites where soil contaminated with dioxins...should consider this guidance...when evaluating whether the original remedies...remain protective of the contaminated areas” (USEPA, 2009).

**19. Site-wide Protectiveness Statement**

All final site remedy decisions have not been made. Until final remedy decisions are completed, an opinion on site-wide protectiveness cannot be made. The selected remedial actions for those sites detailed herein are found to be functioning as intended and protective of human health and the environment. No deficiencies were noted that detract from the ability of the selected remedies to protect human health and the environment.

## **20. Five-Year Review Process**

The third Five-Year Review for Picatinny Arsenal was completed in 2006, thus creating the trigger for this fourth Five-Year Review to be completed in 2011. This review was comprehensive of all data collected in 2010.

### **20.1 Community Involvement and Notification**

A newspaper notice was placed in The Star Ledger and the Daily Record on May 5, 2011 and May 6, 2011 respectively, to notify the community that the Five-Year Review Process is underway. An additional newspaper notice will be placed when the Five-Year Review is completed. The findings of this Five-Year Review will also be discussed at the Picatinny Arsenal's Environmental Restoration Advisory Board meetings.

### **20.2 Site Inspections and Interviews**

Picatinny has LUCs in place to ensure protection of human health and the environment at sites where unrestricted use and unlimited exposure could result in unacceptable risks to human health and the environment. These controls include a soil clearance policy, munitions and explosives of concern (MEC) policies, master plan regulations, Arsenal-wide engineering controls, and site-specific engineering controls. In addition to these controls, Picatinny maintains a Geographic Information System (GIS) that maps contaminated areas and associated land use restrictions. The GIS is used as a tool to ensure that LUCs are properly maintained and implemented. The Picatinny Environmental Management System (PEMS) and its corresponding database are used to ensure environmental compliance for construction and other projects. Base access regulations and an Army Safety Program provide additional controls. The annual site specific certifications and site specific inspection forms provide the Land Use Control Objectives for each site and document the institutional or engineering controls which have been maintained to ensure each LUC objective is met and the LUCs remain protective of human health and the environment.

In addition to the routine LUC site inspections and remedy maintenance activities at many of the groundwater sites, an additional inspection was performed by Veronica Myers, the on-site coordinator for ARCADIS, in December 2010. Visual inspections were conducted to determine if the land use remains consistent with the selected remedy for each site. The site inspection checklist forms are consistent with the Annual Certification Report and are included in **Appendix B**. Site Photos are included

as **Appendix C**. Based on the site inspections, the institutional controls are being implemented effectively and the land use is consistent with the remedies. USEPA reserves the right to conduct an additional site visit as part of the Five-Year Review Process.

An additional component of the Five-Year Review is the conducting of interviews to aid in the understanding of the site status. Periodic meetings and reviews have been conducted during the previous five years in lieu of a specific one-time five year interview. These periodic meetings encompass discussions with stakeholders (e.g., installation, regulatory, and community) about remedial action progress, efficacy, and provide a greater degree of understanding of the site conditions as opposed to a one-time interview process for the Five-Year Review. These meetings have been memorialized as part of the Administrative Record and are included in **Appendix A** of this report.

**21. Next Five-Year Review**

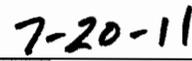
The next Five-Year Review for Picatinny Arsenal should be completed before September 2016.

Approved:



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Herb Koehler  
Lieutenant Colonel, U.S. Army  
Garrison Commander



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Date

## **22. References**

All references for site-specific documents are included within the respective sections. Additional documents referenced in this document include:

United States Environmental Protection Agency, 2001. Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P. June.

## Tables

**Table 1**  
**Site Cleanup Level Comparison Summary Table**  
 Picatinny Five-Year Review  
 Picatinny Arsenal, Rockaway Township, New Jersey

Constituent of Concern	Media	ROD SCL		Current LOC		Source of Current LOC
<b>Site 23 (PICA 065)</b>						
Aluminum	GW	200	µg/l	200	µg/l	NJGWQC/NJPQL
Cadmium	GW	4	µg/l	4	µg/l	NJGWQC
Iron	GW	300	µg/l	300	µg/l	NJGWQC
Lead	GW	10	µg/l	5	µg/l	NJPQL/NJGQQC
Radium	GW	5	µg/l	5	µg/l	MCL/NJMCL
Silver	GW	2	µg/l	40	µg/l	NJGWQC
1,2 - DCE	GW	10	µg/l	10	µg/l	NJGWQC
2,3,7,8-Tetrachlorodibenzo-p-Dioxin (2,3,7,8-TCDD)	GW	0.00003	µg/l	0.00003	µg/l	NJMCL/MCL
Gross Alpha	GW	15	Pci/l	15	Pci/l	MCL
Gross Beta	GW	---	Pci/l	---	Pci/l	
<b>Site 20/24 (PICA 066)</b>						
PCBs	SurS	2	mg/kg	1	mg/kg	NJNR
Lead	SurS	580	mg/kg	800	mg/kg	NJNR
4,4' - dichlorodiphenyltrichloroethane (4,4'-DDT)	SurS	5.1	mg/kg	8	mg/kg	NJNR
<b>Site 25/26 (PICA 067)</b>						
Benzo(a)anthracene	SurS	4	mg/kg	2	mg/kg	NJNR
Benzo(a)pyrene	SurS	0.66	mg/kg	0.2	mg/kg	NJNR
Benzo(b)fluoranthene	SurS	4	mg/kg	2	mg/kg	NJNR
<b>Area D Groundwater PICA 076</b>						
1,1 - Dichloroethene (DCE)	GW	2	µg/l	1	µg/l	NJGWQC
cis-1,2-DCE	GW	10	µg/l	70	µg/l	MCL/NJGWQC
Tetrachloroethene (PCE)	GW	1	µg/l	1	µg/l	NJMCL/NJPQL
Trichloroethene (TCE)	GW	1	µg/l	1	µg/l	NJMCL/NJGWQC/NJPQL
Vinyl Chloride	GW	2	µg/l	1	µg/l	NJPQL
<b>Area E (PICA 077) Groundwater</b>						
1,1- DCE	GW	1	µg/l	1	µg/l	NJQPL/NJGWQC
cis-1,2-DCE	GW	70	µg/l	70	µg/l	MCL/NJGWQC
PCE	GW	1	µg/l	1	µg/l	NJMCL/NJQPL
TCE	GW	1	µg/l	1	µg/l	NJMCL/NJQPL
Vinyl Chloride	GW	1	µg/l	1	µg/l	NJQPL
Beryllium	SubS	2	mg/kg	140	mg/kg	NJNR
Copper	SubS	600	mg/kg	45,000	mg/kg	NJNR
Copper	Se	600	mg/kg	28	mg/kg	SQB
<b>GPB and BSB (PICA 193)</b>						
<b>Region 2</b>						
Benz(a)anthracene	Se	2.2	mg/kg	0.0317	mg/kg	ISQB
Fluoranthene	Se	4	mg/kg	0.06423	mg/kg	SQB
Phenanthrene	Se	5.4	mg/kg	0.0419	mg/kg	ISQB
Pyrene	Se	3.8	mg/kg	0.053	mg/kg	ISQB
4,4'-dichlorodiphenyldichloroethane (4,4' - DDD)	Se	0.00354	mg/kg	0.00354	mg/kg	ISQB
4,4'-dichlorodiphenyldichloroethylene (4,4'-DDE)	Se	0.00142	mg/kg	0.00142	mg/kg	ISQB
4,4'-DDT	Se	0.008	mg/kg	0.00119	mg/kg	ISQB
Copper	Se	16	mg/kg	28	mg/kg	SQB
<b>Region 3</b>						
Cadmium	Se	0.596	mg/kg	1.7	mg/kg	Background Value
Chromium	Se	26	mg/kg	37.3	mg/kg	ISQB
Copper	Se	16	mg/kg	28	mg/kg	SQB
Benz(a)anthracene	Se	0.0307	mg/kg	0.0317	mg/kg	ISQB
Fluoranthene	Se	0.11	mg/kg	0.06423	mg/kg	SQB
Phenanthrene	Se	0.0419	mg/kg	0.0419	mg/kg	ISQB
Pyrene	Se	0.053	mg/kg	0.053	mg/kg	ISQB
Polychlorinated Biphenyls (PCBs) (Aroclor-1248,1254, and 1260)	Se	2	mg/kg	0.0341	mg/kg	ISQG
4,4'-DDE	Se	0.00142	mg/kg	0.00142	mg/kg	ISQB
4,4'-DDT	Se	0.008	mg/kg	0.00119	mg/kg	ISQB
Mercury	Se	0.174	mg/kg	0.249	mg/kg	Background Value
<b>Region 4</b>						
Copper	Se	16	mg/kg	28	mg/kg	SQB
<b>Group of 13 Sites (PICA 020)</b>						
No Clean Up Levels						

\* Notes are provided on Page 4.

**Table 1**  
**Site Cleanup Level Comparison Summary Table**  
 Picatinny Five-Year Review  
 Picatinny Arsenal, Rockaway Township, New Jersey

Constituent of Concern	Media	ROD SCL	Current LOC	Source of Current LOC
<b>Site 180 (PICA 093)</b>				
Benzo(a)anthracene	SurS	4 mg/kg	2 mg/kg	NJNR
Benzo(a)pyrene	SurS	0.66 mg/kg	0.2 mg/kg	NJNR
Benzo(b)fluoranthene	SurS	4 mg/kg	2 mg/kg	NJNR
Benzo(k)fluoranthene	SurS	4 mg/kg	23 mg/kg	NJNR
Chrysene	SurS	40 mg/kg	230 mg/kg	NJNR
Dibenzo(a,h)anthracene	SurS	0.66 mg/kg	0.2 mg/kg	NJNR
Indeno(1,2,3-cd)pyrene	SurS	4 mg/kg	2 mg/kg	NJNR
Arsenic	SurS	20 mg/kg	19 mg/kg	NJNR
Cadmium	SurS	100 mg/kg	78 mg/kg	NJNR
Copper	SurS	600 mg/kg	45,000 mg/kg	NJNR
Lead	SurS	600 mg/kg	800 mg/kg	NJNR
Zinc	SurS	1,500 mg/kg	110,000 mg/kg	NJNR
Dieldrin	SurS	0.18 mg/kg	0.2 mg/kg	NJNR
PCBs (Aroclor-1254 and 1260)	SurS	2 mg/kg	1 mg/kg	NJNR
<b>Site 61/104 (PICA 102)</b>				
<b>Site 61</b>				
Arsenic	SurS	20 mg/kg	19 mg/kg	NJNR
Beryllium	SurS	2 mg/kg	140 mg/kg	NJNR
Thallium	SurS	72 mg/kg	79 mg/kg	NJNR
Benzo(a)anthracene	SurS	4 mg/kg	2 mg/kg	NJNR
Benzo(a)pyrene	SurS	0.66 mg/kg	0.2 mg/kg	NJNR
Benzo(b)fluoranthene	SurS	4 mg/kg	2 mg/kg	NJNR
Benzo(k)fluoranthene	SurS	4 mg/kg	23 mg/kg	NJNR
Dibenzo(a,h)anthracene	SurS	0.66 mg/kg	0.2 mg/kg	NJNR
Indeno(1,2,3-cd)pyrene	SurS	4 mg/kg	2 mg/kg	NJNR
4,4'-DDE	SurS	1.2 mg/kg	9 mg/kg	NJNR
Arsenic	SubS	20 mg/kg	19 mg/kg	NJNR
Thallium	SubS	72 mg/kg	79 mg/kg	NJNR
Benzo(a)anthracene	SubS	4 mg/kg	2 mg/kg	NJNR
Benzo(a)pyrene	SubS	0.66 mg/kg	0.2 mg/kg	NJNR
Benzo(b)fluoranthene	SubS	4 mg/kg	2 mg/kg	NJNR
Dibenzo(a,h)anthracene	SubS	0.66 mg/kg	0.2 mg/kg	NJNR
Indeno(1,2,3-cd)pyrene	SubS	4 mg/kg	2 mg/kg	NJNR
Beryllium	Se	2 mg/kg	140 mg/kg	NJNR
Chromium	Se	72 mg/kg	37.3 mg/kg	SQB
Nickel	Se	4 mg/kg	39.6 mg/kg	SQB
Silver	Se	0.66 mg/kg	1.0 mg/kg	ER-L
Benzo(b)fluoranthene	Se	4 mg/kg	0.0272 mg/kg	ISQG
Benzo(k)fluoranthene	Se	4 mg/kg	0.0272 mg/kg	SQB
Fluoranthene	Se	0.66 mg/kg	0.06423 mg/kg	ISQG
Phenanthrene	Se	4 mg/kg	0.0419 mg/kg	SQB
<b>Site 104</b>				
Arsenic	SurS	20 mg/kg	19 mg/kg	NJNR
Beryllium	SurS	2 mg/kg	140 mg/kg	NJNR
Copper	SurS	600 mg/kg	45,000 mg/kg	NJNR
Lead	SurS	600 mg/kg	800 mg/kg	NJNR
Thallium	SurS	72 mg/kg	79 mg/kg	NJNR
Zinc	SurS	1,500 mg/kg	110,000 mg/kg	NJNR
Beryllium	Se	2 mg/kg	140 mg/kg	NJNR
Chromium	Se	72 mg/kg	37.3 mg/kg	ISQG
Nickel	Se	4 mg/kg	39.6 mg/kg	SQB
Silver	Se	0.66 mg/kg	1.0 mg/kg	ER-L
Benzo(b)fluoranthene	Se	4 mg/kg	0.0272 mg/kg	ISQG
Benzo(k)fluoranthene	Se	4 mg/kg	0.0272 mg/kg	SQB
Fluoranthene	Se	0.66 mg/kg	0.06423 mg/kg	ISQG
Phenanthrene	Se	4 mg/kg	0.0419 mg/kg	SQB

\*Notes are provided on Page 4.

**Table 1**  
**Site Cleanup Level Comparison Summary Table**  
 Picatinny Five-Year Review  
 Picatinny Arsenal, Rockaway Township, New Jersey

Constituent of Concern	Media	ROD SCL	Current LOC	Source of Current LOC
<b>Area B (PICA 205) Groundwater</b>				
PCE	GW	1 µg/l	1 µg/l	NJMCL/NJPQL
TCE	GW	1 µg/l	1 µg/l	NJMCL/ NJGWQC/NJPQL
cis-1,2-DCE	GW	70 µg/l	70 µg/l	MCL/NJGWQC
Vinyl Chloride	GW	1 µg/l	1 µg/l	NJPQL
<b>Site 31/101 (PICA 072)</b>				
PCBs (Aroclor-1248, -1254, -1260)	SubS	2 mg/kg	1 mg/kg	NJNR
2,4- dinitrotoluene	SubS	4.2 mg/kg	4.2 mg/kg	NJNR
Arsenic	SubS	20 mg/kg	19 mg/kg	NJNR
Cadmium	SubS	8 mg/kg	78 mg/kg	NJNR
Copper	SubS	600 mg/kg	45,000 mg/kg	NJNR
Lead	SubS	600 mg/kg	800 mg/kg	NJNR
Zinc	SubS	1,500 mg/kg	110,000 mg/kg	NJNR
Benzo(a)anthracene	SubS	4 mg/kg	2 mg/kg	NJNR
Benzo(a)pyrene	SubS	0.66 mg/kg	0.2 mg/kg	NJNR
Benzo(b)fluoranthene	SubS	4 mg/kg	2 mg/kg	NJNR
Benzo(k)fluoranthene	SubS	4 mg/kg	23 mg/kg	NJNR
Dibenzo(a,h)anthracene	SubS	0.66 mg/kg	0.2 mg/kg	NJNR
Indeno(1,2,3-cd)pyrene	SubS	4 mg/kg	2 mg/kg	NJNR
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HPCDD)	SurS	0.0019 mg/kg	---	mg/kg
PCBs (Aroclor-1248, -1254, -1260)	SurS	2 mg/kg	1 mg/kg	NJNR
Antimony	SurS	340 mg/kg	450 mg/kg	NJNR
Arsenic	SurS	20 mg/kg	19 mg/kg	NJNR
Copper	SurS	600 mg/kg	45,000 mg/kg	NJNR
Lead	SurS	600 mg/kg	800 mg/kg	NJNR
Mercury	SurS	270 mg/kg	65 mg/kg	NJNR
Zinc	SurS	270 mg/kg	110,000 mg/kg	NJNR
Thallium	SurS	72 mg/kg	79 mg/kg	NJNR
Benzo(a)anthracene	SurS	4 mg/kg	2 mg/kg	NJNR
Benzo(a)pyrene	SurS	0.66 mg/kg	0.2 mg/kg	NJNR
Benzo(b)fluoranthene	SurS	4 mg/kg	2 mg/kg	NJNR
Benzo(k)fluoranthene	SurS	4 mg/kg	23 mg/kg	NJNR
Chrysene	SurS	40 mg/kg	230 mg/kg	NJNR
Dibenzo(a,h)anthracene	SurS	0.66 mg/kg	0.2 mg/kg	NJNR
Indeno(1,2,3-cd)pyrene	SurS	4 mg/kg	2 mg/kg	NJNR
Pyrene	SurS	100 mg/kg	18,000 mg/kg	NJNR
<b>Area C Groundwater (PICA 206)</b>				
Arsenic	GW	3 µg/l	2 µg/l	NJPQL
Lead	GW	5 µg/l	5 µg/l	NJQPL/NJGWQC
<b>Group 3 Sites (PICA 008)</b>				
1,1 - DCE	SW	4.7 µg/l	4.7 µg/l	SWQC
Carbon Tetrachloride	SW	0.23 µg/l	0.33 µg/l	SWQC
PCE	SW	0.34 ug/L	0.34 µg/l	SWQC
TCE	SW	1 µg/l	1 µg/l	SWGC
1,1 - DCE	GW	1 µg/l	1 µg/l	NJQPL/NJGWQC
Carbon Tetrachloride	GW	1 µg/l	1 µg/l	NJPQL
PCE	GW	1 µg/l	1 µg/l	NJMCL/NJQPL
TCE	GW	1 µg/l	1 µg/l	NJMCL/NJQPL

\*Notes are provided on Page 4.

**Table 1**  
**Site Cleanup Level Comparison Summary Table**  
 Picatinny Five-Year Review  
 Picatinny Arsenal, Rockaway Township, New Jersey

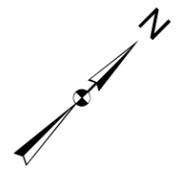
Constituent of Concern	Media	ROD SCL	Current LOC	Source of Current LOC
<b>Group 1 Sites (PICA 079)</b>				
Arsenic	SurS	19 mg/kg	19 mg/kg	NJNR
Barium	SurS	59,000 mg/kg	59,000 mg/kg	NJNR
Lead	SurS	800 mg/kg	800 mg/kg	NJNR
Benzo(a)anthracene	SurS	2 mg/kg	2 mg/kg	NJNR
Benzo(a)pyrene	SurS	0.2 mg/kg	0.2 mg/kg	NJNR
Benzo(k)fluoranthene	SurS	2 mg/kg	2 mg/kg	NJNR
Benzo(k)fluoranthene	SurS	2.3 mg/kg	23 mg/kg	NJNR
Dibenzo(a,h)anthracene	SurS	0.2 mg/kg	0.2 mg/kg	NJNR
Indeno(1,2,3-cd)pyrene	SurS	2 mg/kg	2 mg/kg	NJNR
PCB (Aroclor 1260)	SurS	1 mg/kg	1 mg/kg	NJNR
HMX	SurS	610 mg/kg	10,000 mg/kg	NJNR
PETN	SurS	32 mg/kg	---	mg/kg
Picric acid	SurS	2.3 mg/kg	---	mg/kg
RDX	SurS	26 mg/kg	261 mg/kg	NJNR
Tetryl	SurS	10,000 mg/kg	10,000 mg/kg	NJNR
1,3,5-Trinitrobenzene	SurS	10,000 mg/kg	27,000 mg/kg	RSL
2,4-Dinitrotoluene	SurS	4.2 mg/kg	4.2 mg/kg	NJNR
2,4,6-Trinitrotoluene	SurS	95 mg/kg	95 mg/kg	NJNR
Arsenic	SubS	20 mg/kg	19 mg/kg	NJNR
Lead	SubS	600 mg/kg	800 mg/kg	NJNR
Benzo(a)pyrene	SubS	0.66 mg/kg	0.2 mg/kg	NJNR
Benzo(b)fluoranthene	SubS	4 mg/kg	2 mg/kg	NJNR
Dibenzo(a,h)anthracene	SubS	0.66 mg/kg	0.2 mg/kg	NJNR
PCB (Aroclor 1260)	SubS	2 mg/kg	1 mg/kg	NJNR
RDX	SubS	26 mg/kg	261 mg/kg	NJNR
Tetryl	SubS	10,000 mg/kg	10,000 mg/kg	NJNR
2,4-Dinitrotoluene	SubS	4 mg/kg	4.2 mg/kg	NJNR
2,4,6-Trinitrotoluene	SubS	95 mg/kg	95 mg/kg	NJNR
2-amino-4,6-Dinitrotoluene	GW	73 µg/l	73 µg/l	TWRSL
4-amino-2,6-Dinitrotoluene	GW	73 µg/l	73 µg/l	TWRSL
Amino Dinitrotoluene (DNT)	GW	73 µg/l	---	µg/l
RDX	GW	2 µg/l	2 µg/l	HA
2,4,6-Trinitrotoluene	GW	2 µg/l	2 µg/l	HA
<b>Site 34 (PICA 002)</b>				
Benzo(a)anthracene	SubS	4 mg/kg	2 mg/kg	NJNR
Benzo(a)pyrene	SubS	0.66 mg/kg	0.2 mg/kg	NJNR
Benzo(b)fluoranthene	SubS	4 mg/kg	2 mg/kg	NJNR
Dibenzo(a,h)anthracene	SubS	0.66 mg/kg	0.2 mg/kg	NJNR
Dioxins/Furans	SubS	0.000034 mg/kg	NA mg/kg	mg/kg
Benzo(a)anthracene	SurS	4 mg/kg	2 mg/kg	NJNR
Benzo(a)pyrene	SurS	0.66 mg/kg	0.2 mg/kg	NJNR
Benzo(b)fluoranthene	SurS	4 mg/kg	2 mg/kg	NJNR
Dibenzo(a,h)anthracene	SurS	0.66 mg/kg	0.2 mg/kg	NJNR
Indeno(1,2,3-cd)pyrene	SurS	4 mg/kg	2 mg/kg	NJNR
Arsenic	SurS	20 mg/kg	19 mg/kg	NJNR
Cadmium	SurS	100 mg/kg	78 mg/kg	NJNR
Copper	SurS	600 mg/kg	45,000 mg/kg	NJNR
Lead	SurS	600 mg/kg	800 mg/kg	NJNR
Total PCBs	SurS	2 mg/kg	1 mg/kg	NJNR
Dioxins/Furans	SurS	0.000034 mg/kg	---	mg/kg

**Notes:**

- (1) Current subsurface and surface soil LOCs were obtained from the New Jersey Department of Environmental Protection (NJDEP) Non-Residential (NJNR) soil remediation standard. In the absence of NJNR soil remediation standards, the United States Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs) were used unless site background levels are higher than the RSLs.
- (2) The selection order for the current sediment LOC is as follows 1) the lower of the Interim Sediment Quality Guidelines (ISQG), New York State Department of Environmental Conservation Sediment Criteria (NYSDEC), and Sediment Quality Benchmarks (SQBs) (the lower of the SQBs and threshold effect concentration [TEC] was selected from the ORNL, 1997 publication); 2) in their absence Effect Range-Lows (ER-Ls) from NJDEP, 1998 (Table 2 and 3) were used; 2) in the absence of ER-Ls, the lower of RSL for industrial soil and NJNR soil remediation standards were used.
- (3) Current surface water LOCs were obtained from the New Jersey Surface Water Quality Criteria (SWQC) where applicable. USEPA Water Quality Criteria was adopted only when SWQC are not applicable. Only in the absence of water quality criteria is the USEPA Tap Water Regional Screening Level (TWRSL) selected as the LOC.
- (4) Current groundwater LOCs were obtained from the lower of the following values: (1) Federal Maximum Contaminant Levels (MCLs), (2) New Jersey State MCLs, (3) New Jersey Groundwater Quality Criteria (NJGWQC) or Practical Quantitation Limits (NJPQLs) (whichever is higher), and (4) any non-zero Federal Maximum Contaminant Level Goals (MCLGs). If none of the above criteria are available, the groundwater LOC was based on the lower of the following: Federal Drinking Water Health Advisories (HA) or USEPA TWRSLs.

'---' - No value available  
 µg/l - microgram per liter  
 GW - Groundwater  
 LOC - Level of Concern  
 mg/kg - milligram per kilogram  
 pCi/l - picocuries per liter  
 SCL - Site Cleanup Level  
 Se - Sediment  
 SubS - Subsurface Soil  
 SurS - Surface Soil

## Figures



Green Pond Brook and Bear Swamp Brook  
(PICA 193)

Area D (PICA 076)  
Groundwater

Site 31/101  
(PICA 072)

Area E (PICA 077)  
Groundwater

Area B (PICA 205)  
Groundwater

Site 20/24  
(PICA 066)

Group 1 Sites  
(PICA 079)

Site 34  
(PICA 002)

LAKE  
PICATINNY

LAKE  
DENMARK

Site 61 and 104  
(PICA 102)

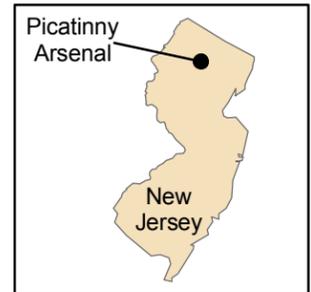
Site 180 (PICA 093)

Group 3 Sites  
(PICA 008)  
Groundwater

Area C (PICA 206)  
Groundwater

Site 23 (PICA 065)

Site 25/26 (PICA 067)

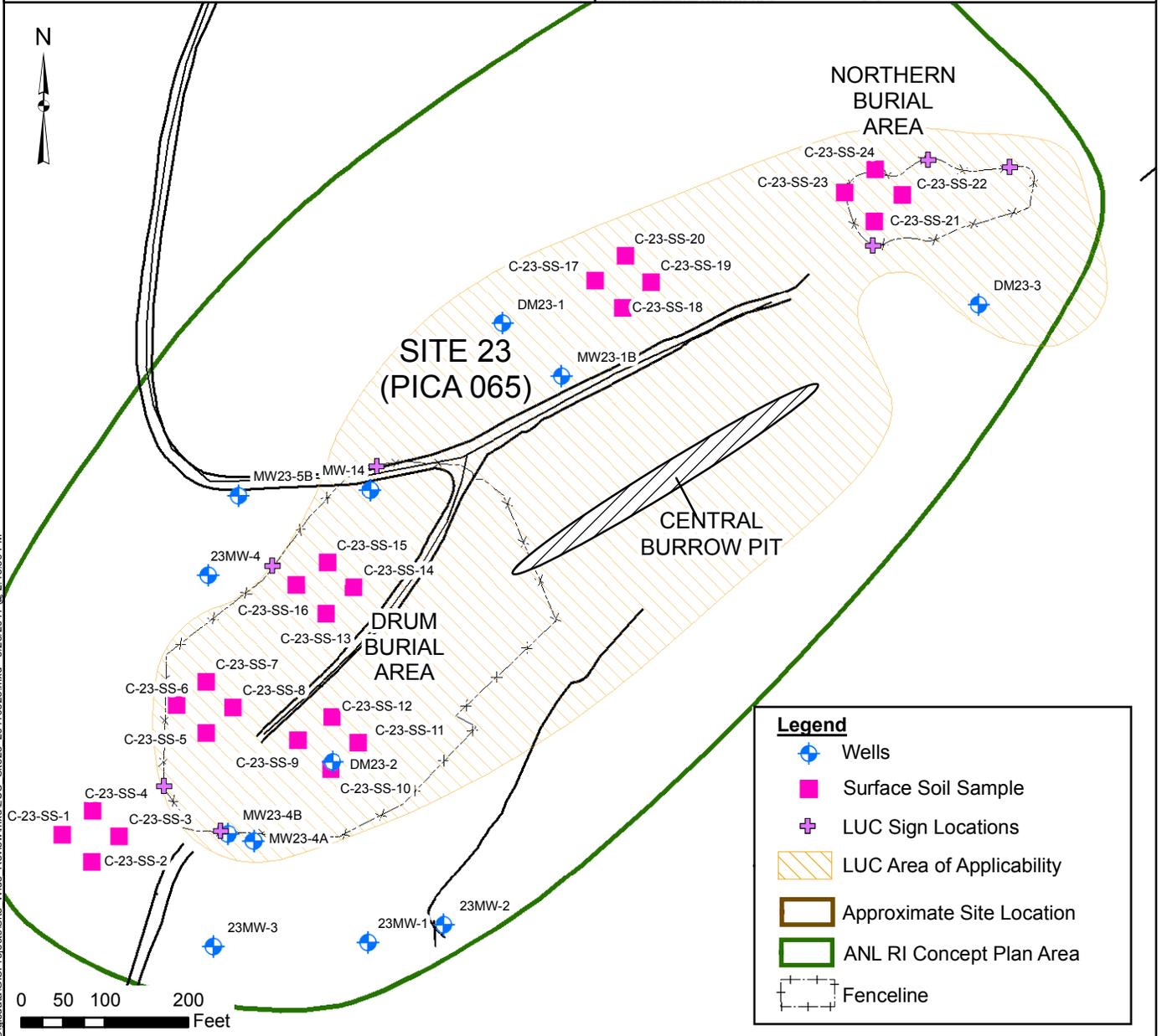
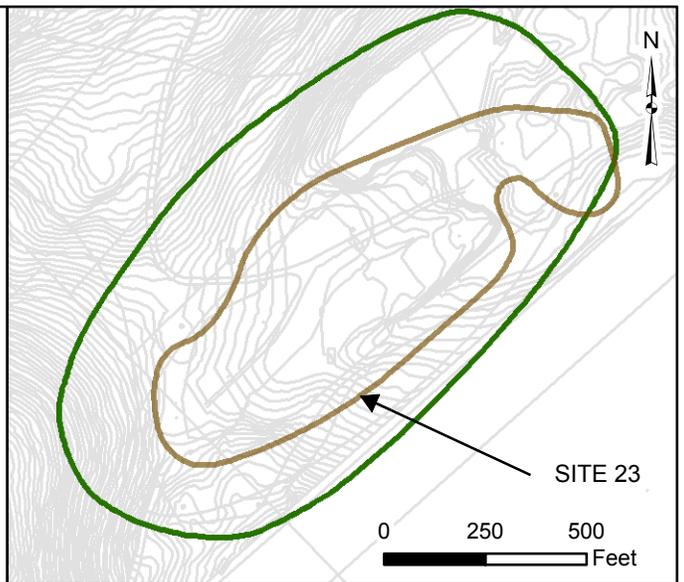
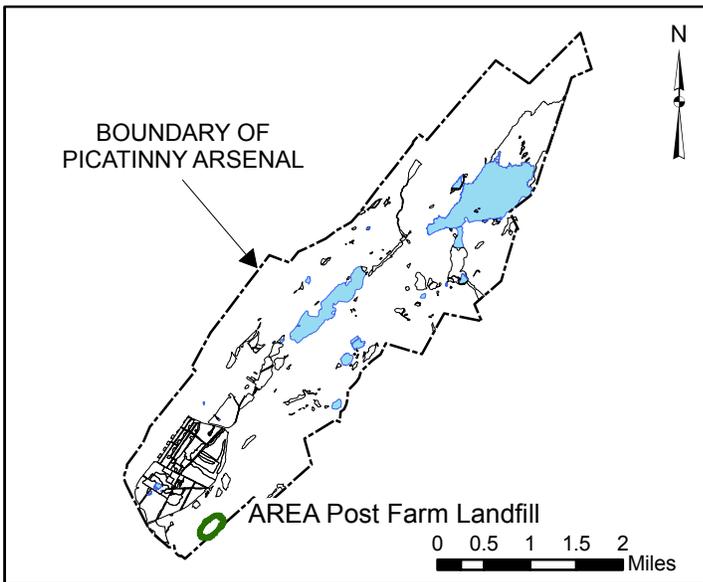


Legend			
	Buildings		Approximate Site Boundary
	Roads		Approximate Area Boundary
	Water		Approximate PICA 020 Site Boundary
	PTA Boundary		



## REMEDIAL LOCATIONS PICATINNY ARSENAL, DOVER, NEW JERSEY

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ARCADIS - Edison, NJ  
 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
 Phone: (732) 225-5061  
 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 SITE 23 (PICA 065)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER  
T. LLEWELLYN

DRAWN  
M. GRESS

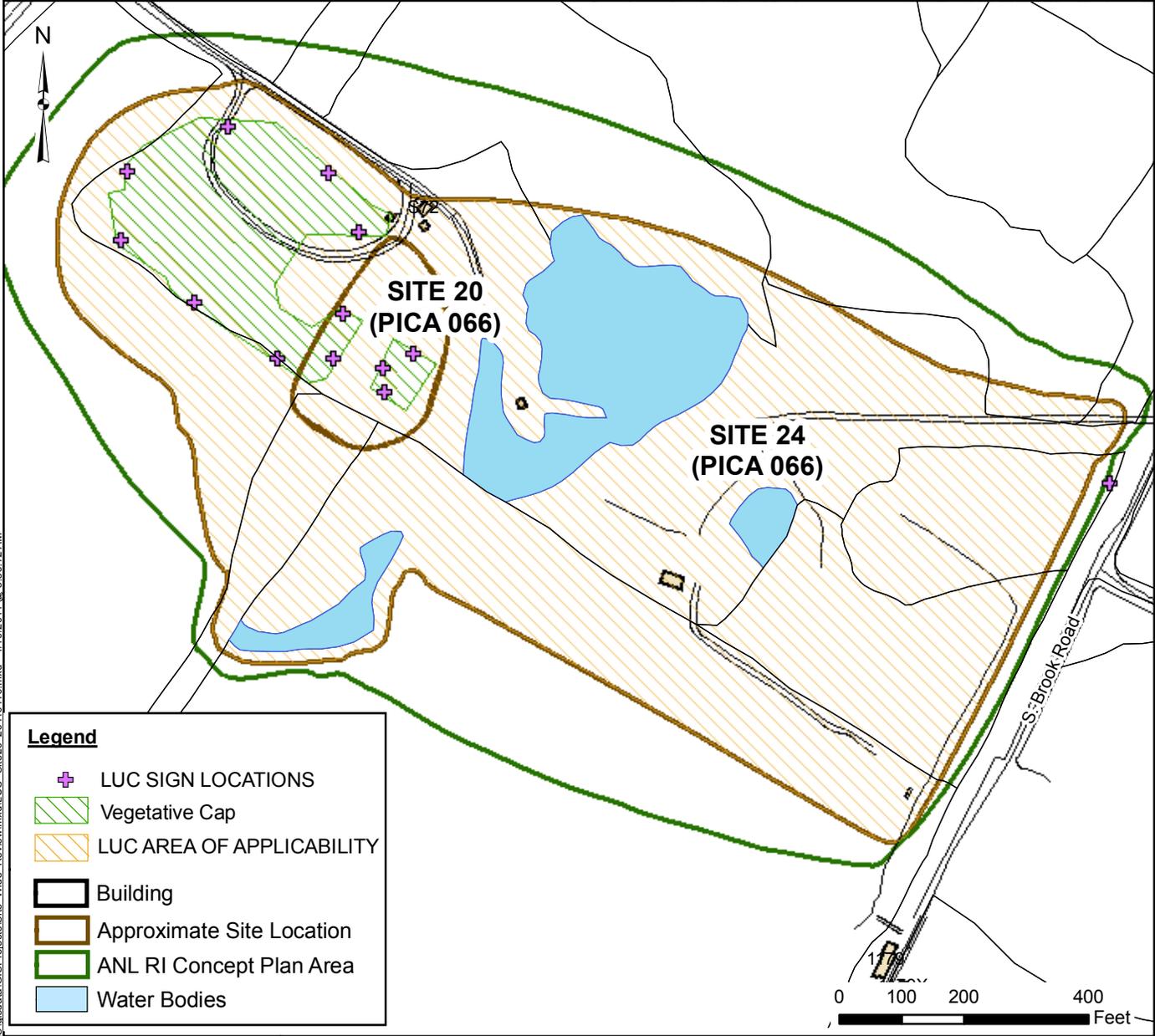
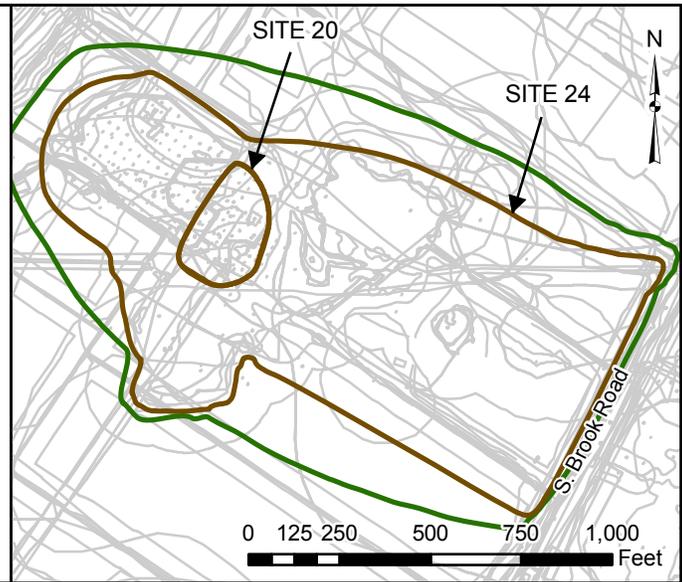
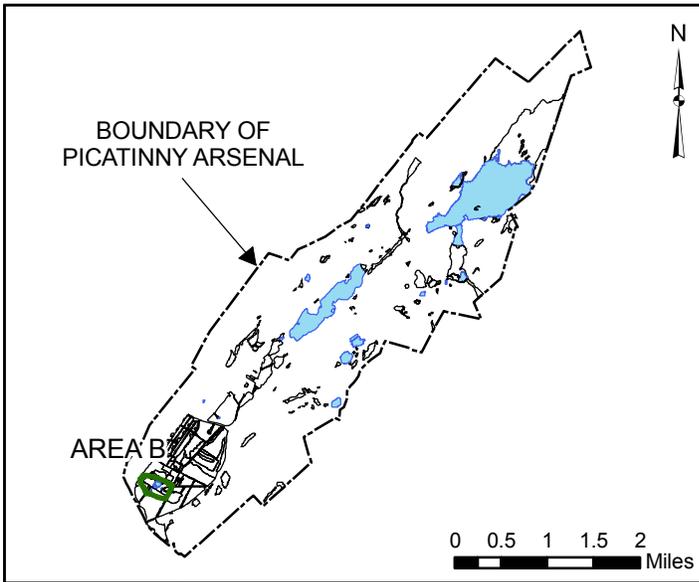
PROJECT NUMBER  
 GP06PICA.P065.KG001

DEPARTMENT MANAGER  
R. KHURI

CHECKED  
K. BEIER

DRAWING NUMBER

**4-1**



**Legend**

- LUC SIGN LOCATIONS
- Vegetative Cap
- LUC AREA OF APPLICABILITY
- Building
- Approximate Site Location
- ANL RI Concept Plan Area
- Water Bodies

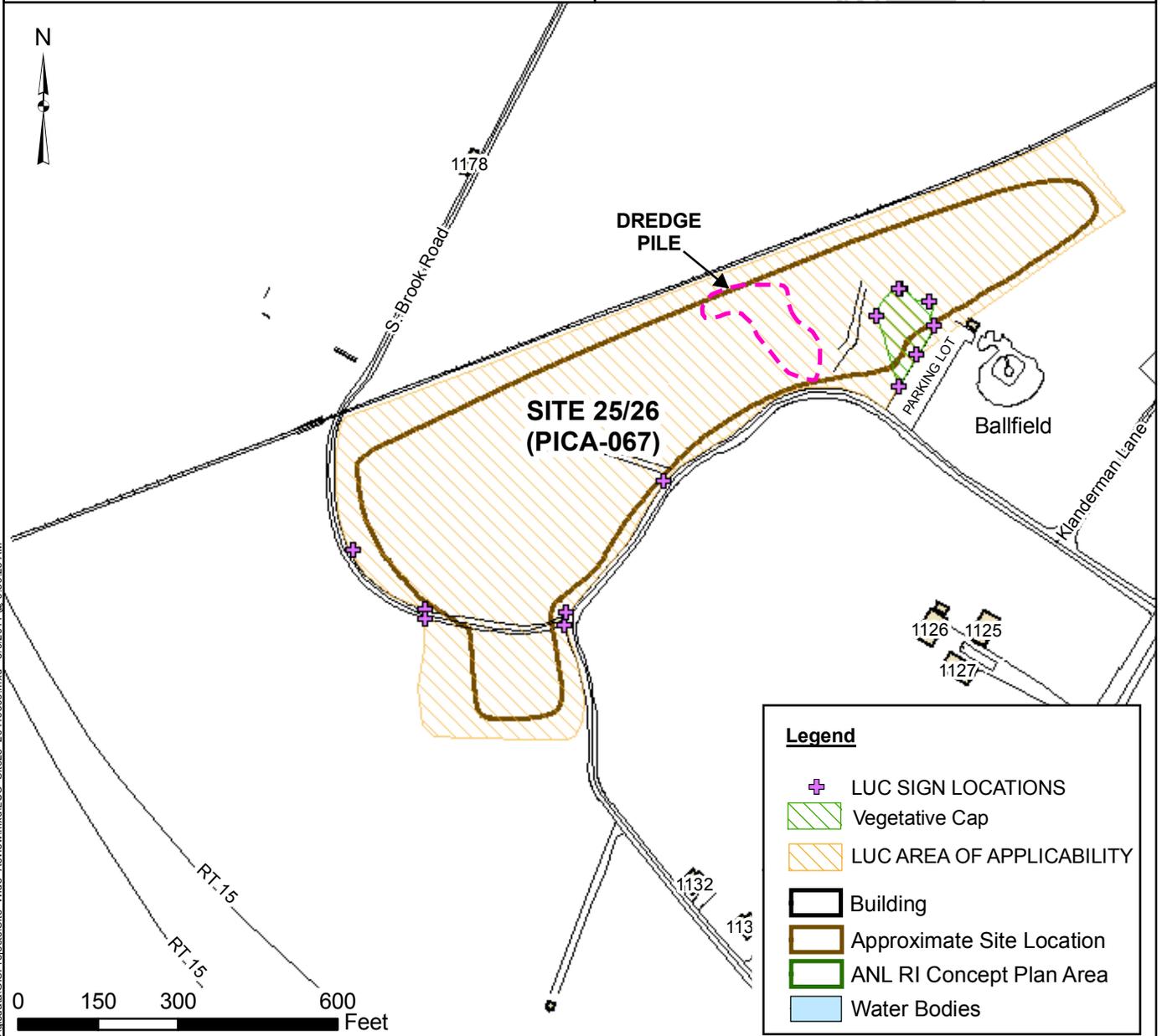
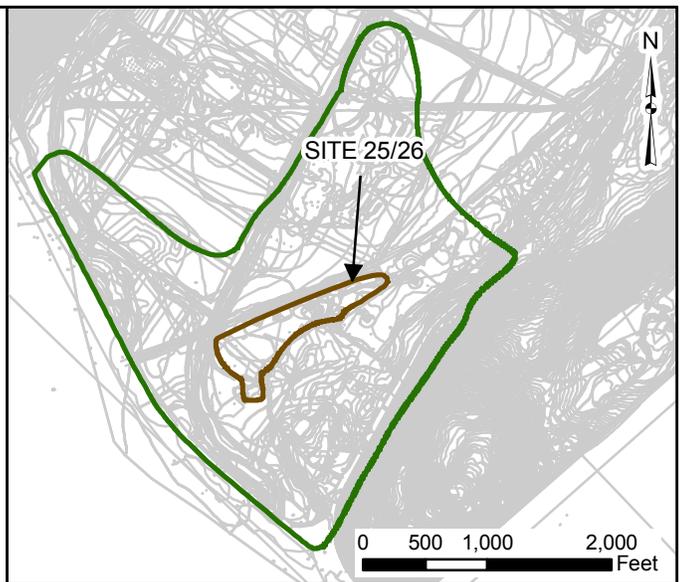
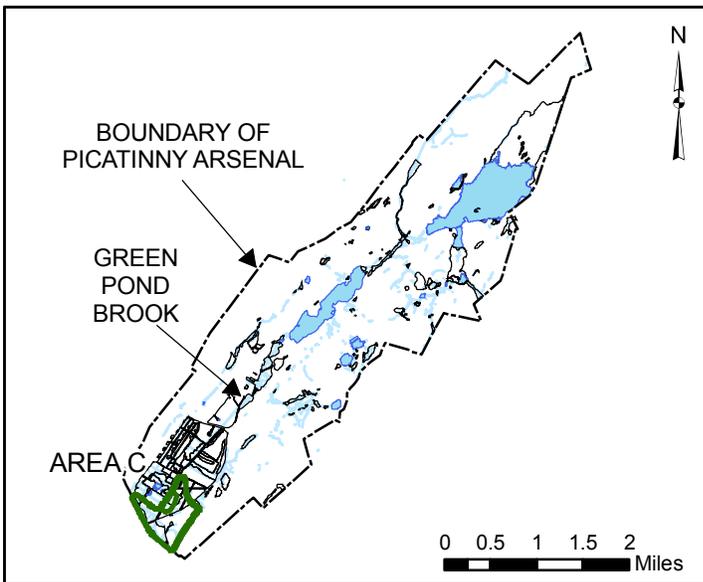
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**LAYOUT OF LUC AREA  
 SITE 20/24 (PICA 066)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER T. LLEWELLYN	DEPARTMENT MANAGER R. KHURI
DRAWN M. GRESS	CHECKED K. BEIER
PROJECT NUMBER GP06PICA.SITE.NB008	DRAWING NUMBER <b>5-1</b>



**Legend**

- ✚ LUC SIGN LOCATIONS
- ▨ Vegetative Cap
- ▨ LUC AREA OF APPLICABILITY
- ▭ Building
- ▭ Approximate Site Location
- ▭ ANL RI Concept Plan Area
- ▭ Water Bodies

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 101 Fieldcrest Avenue, Suite 5E  
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**LAYOUT OF LUC AREA  
 SITE 25/26 (PICA 067)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER  
 T. LLEWELLYN

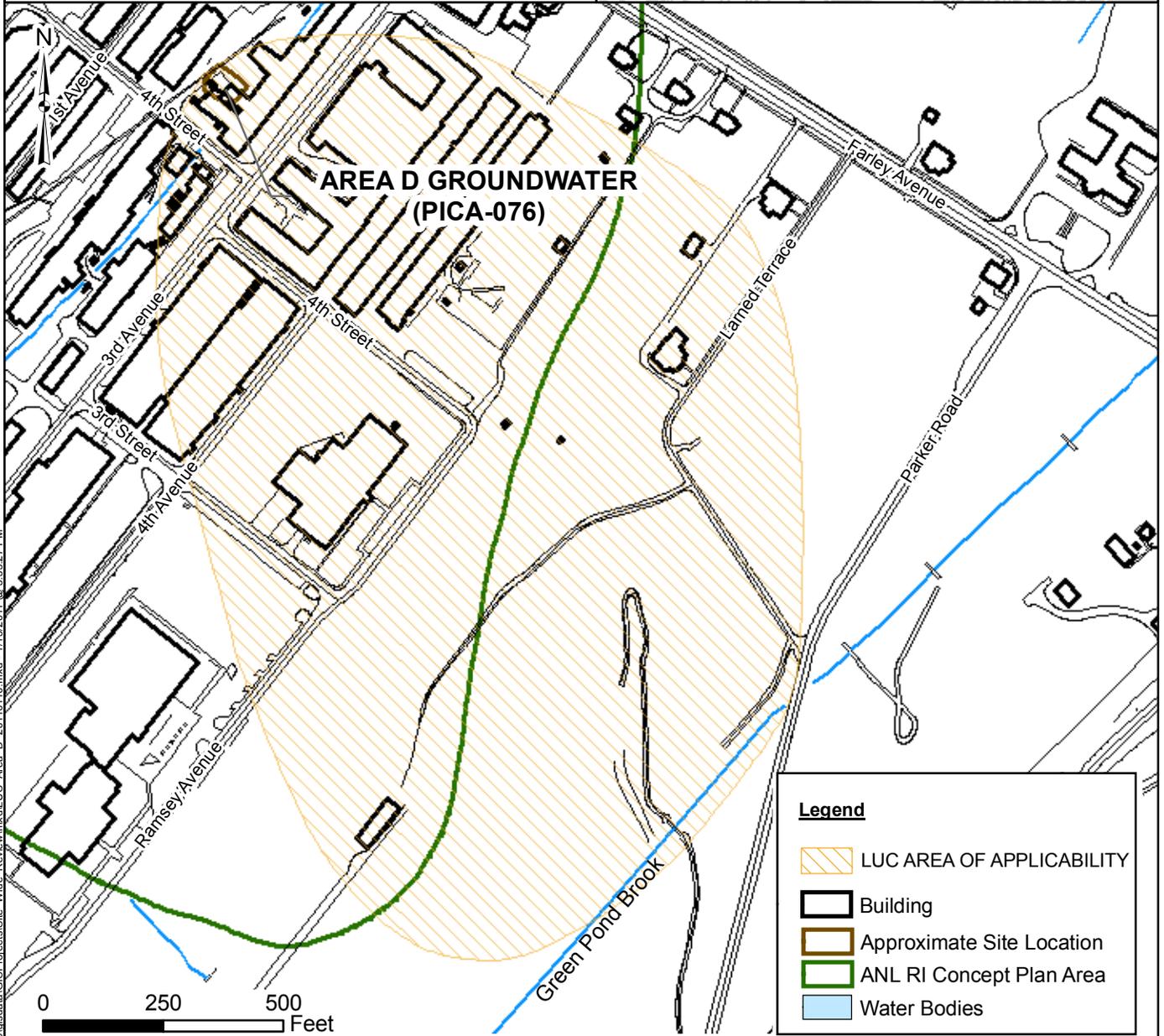
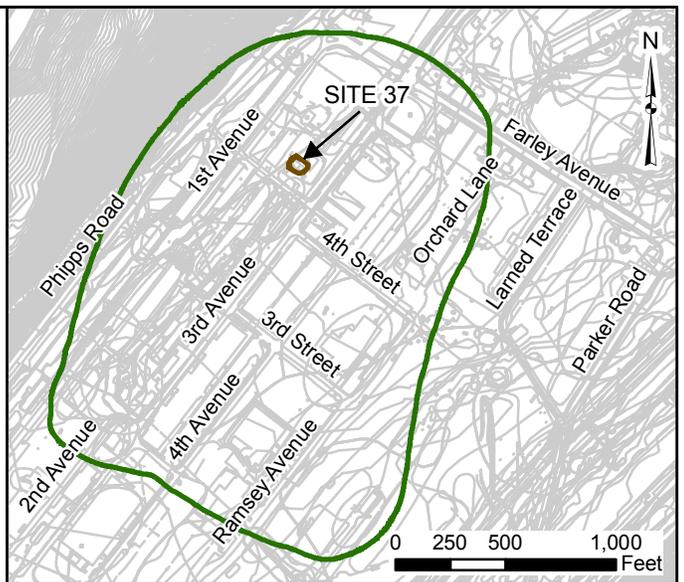
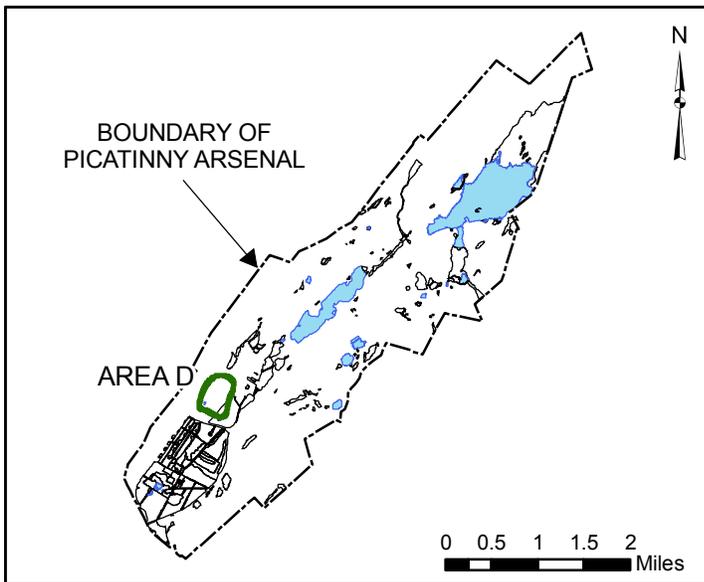
DRAWN  
 M. GRESS

PROJECT NUMBER  
 GP06PICA.P067.KK001

DEPARTMENT MANAGER  
 R. KHURI

CHECKED  
 K. BEIER

DRAWING NUMBER  
**6-1**



**Legend**

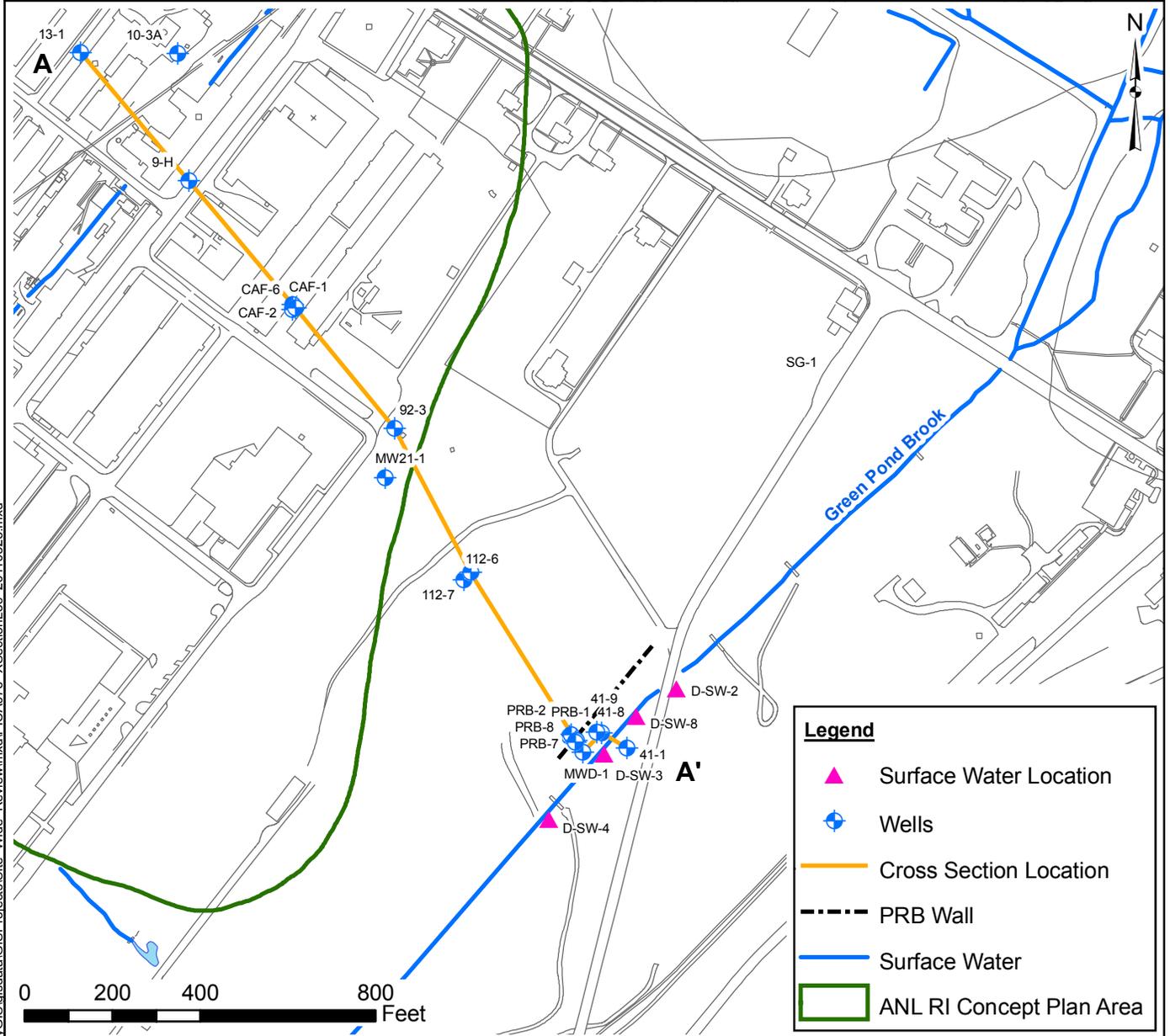
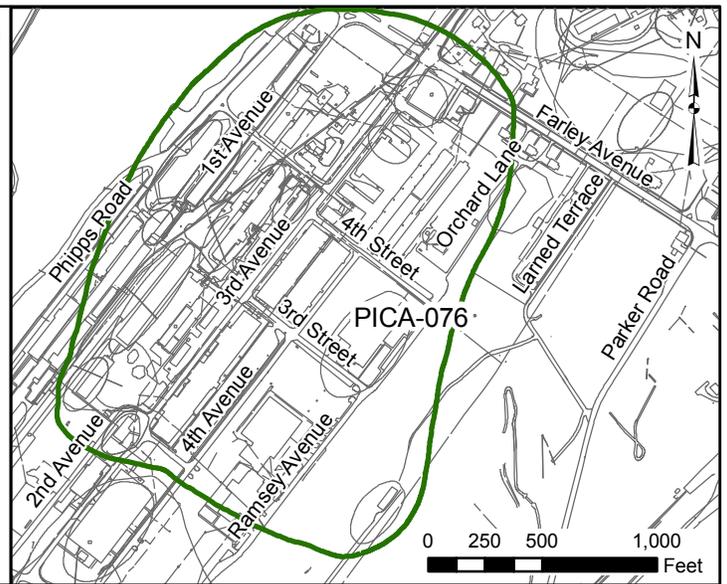
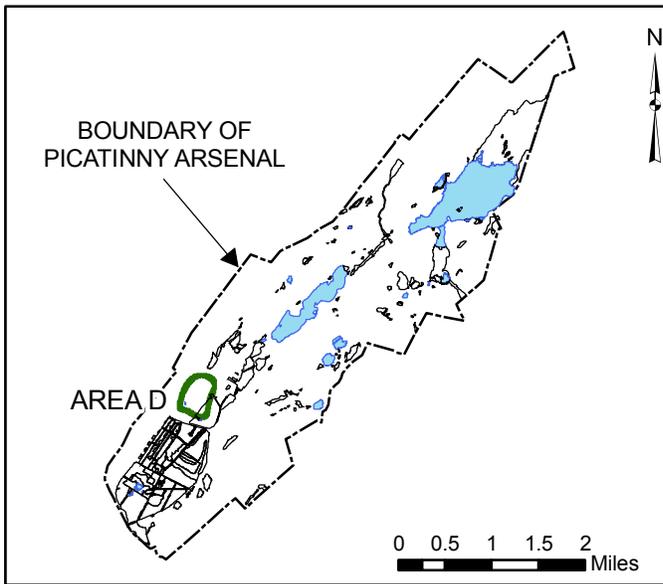
- LUC AREA OF APPLICABILITY
- Building
- Approximate Site Location
- ANL RI Concept Plan Area
- Water Bodies

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**LAYOUT OF LUC AREA  
AREA D (PICA 076) GROUNDWATER  
PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER T. LLEWELLYN	DEPARTMENT MANAGER R. KHURI
DRAWN M. GRESS	CHECKED K. BEIER
PROJECT NUMBER GP06PICA.SITE.NB008	DRAWING NUMBER <b>7-1</b>



**Legend**

- Surface Water Location
- Wells
- Cross Section Location
- PRB Wall
- Surface Water
- ANL RI Concept Plan Area

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1114 Benfield Blvd, Suite A  
Millersville, MD 21108  
Phone: (410) 987-0032  
Fax: (410) 987-4392

**CROSS SECTION LOCATION  
AREA D (PICA 076) GROUNDWATER  
PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER  
T. LLEWELLYN

DRAWN  
M. GRESS

PROJECT NUMBER  
GP06PICA.P076.NJ001

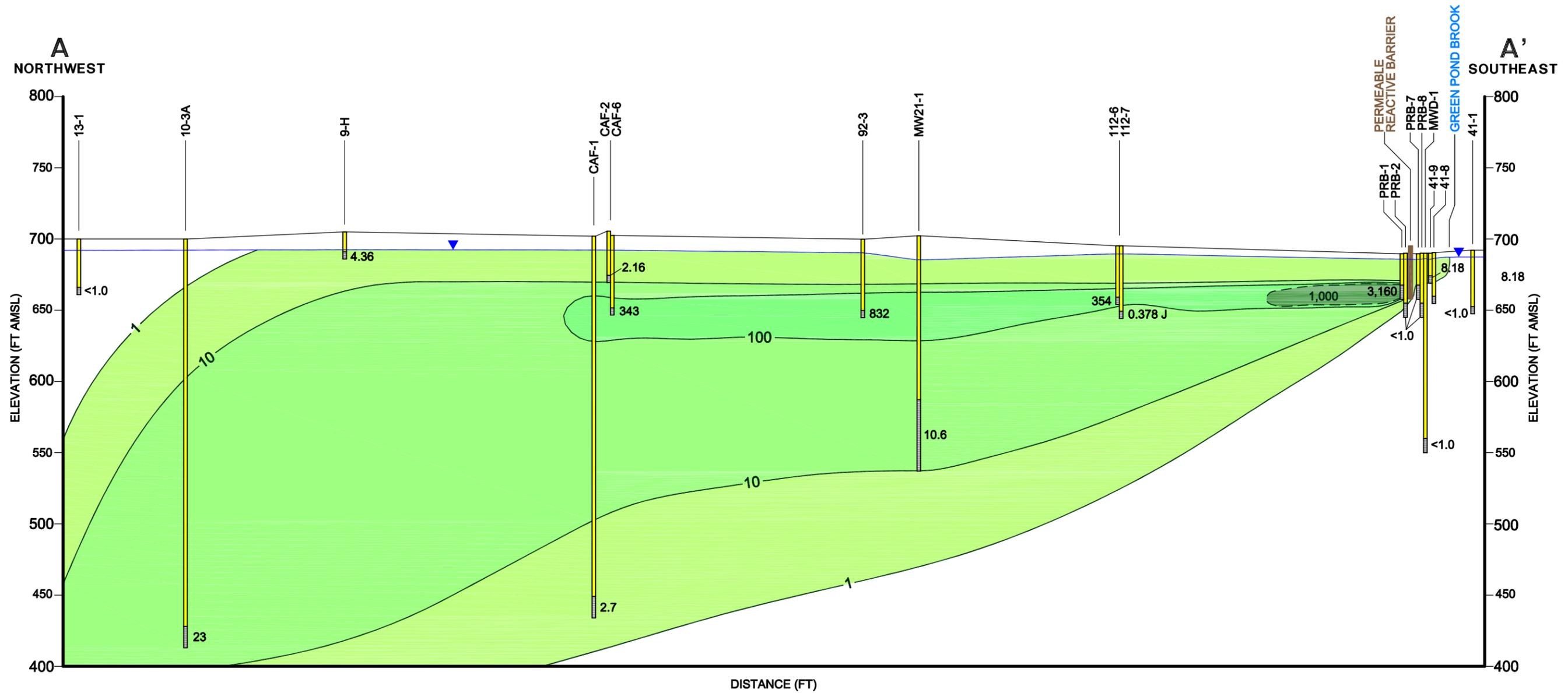
DEPARTMENT MANAGER  
J. CHERRY

CHECKED  
B. HAMILTON

DRAWING NUMBER

**7-2**

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**NOTE:**

1. TCE CONCENTRATIONS REPORTED HEREIN ARE FROM THE THIRD QUARTER 2010 GROUNDWATER SAMPLING EVENT CONDUCTED FROM SEPTEMBER 7, 2010 TO SEPTEMBER 9, 2010, WITH EXCEPTION TO SAMPLING LOCATIONS 10-3A AND CAF-1 WHICH WERE RESPECTIVELY COLLECTED ON JULY 27, 1994 AND DECEMBER 19, 1997. THIS DATA WAS THE MOST RECENT DATA AVAILABLE FOR THESE TWO SAMPLING LOCATIONS.
2. ALL MONITORING WELL LOCATIONS, WITH EXCEPTION OF LOCATIONS 10-3A AND CAF-1, ARE SAMPLED AS PART OF THE CURRENT MNA OR PERFORMANCE MONITORING NETWORKS, AS PROVIDED ON THE MONITORING SCHEDULE OUTLINED IN AREA D (PICA 076) REMEDIAL DESIGN AND REVISED IN THE LETTER DATED JANUARY 14, 2010 (SUBMITTAL OF AREA D SAMPLING REDUCTION).
3. WATER TABLE ELEVATIONS WERE MEASURED ON AUGUST 24, 2010, WITH EXCEPTION TO 13-1, 10-3A, 9-H, CAF-1, CAF-2, CAF-6, 92-3, MW21-1, 112-6 AND 112-7 WHICH WERE MEASURED ON AUGUST 10, 2009.

**LEGEND:**

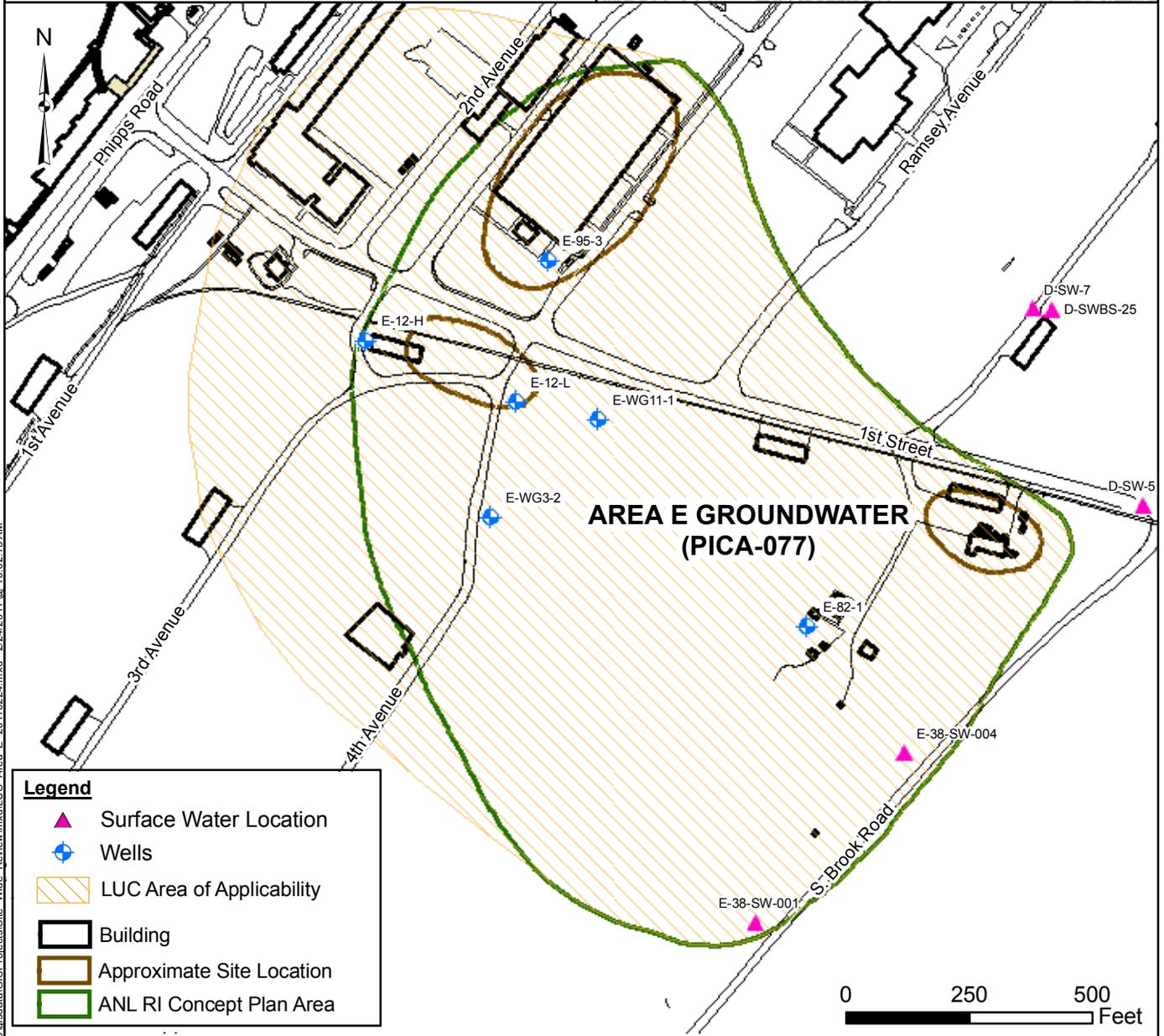
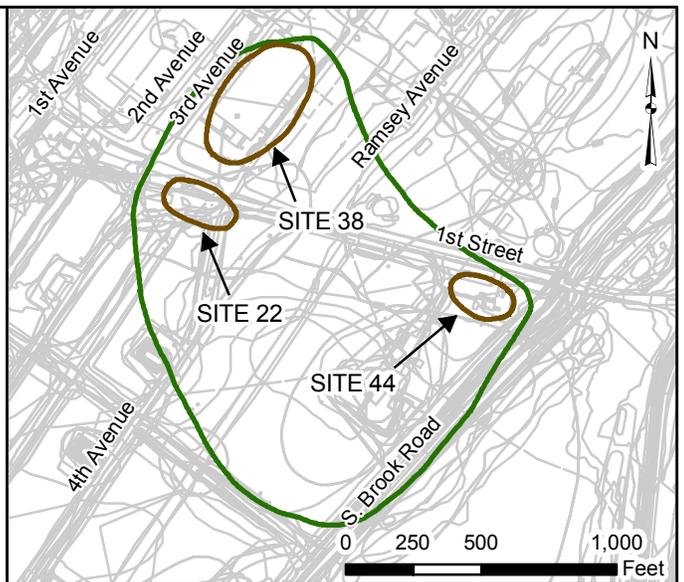
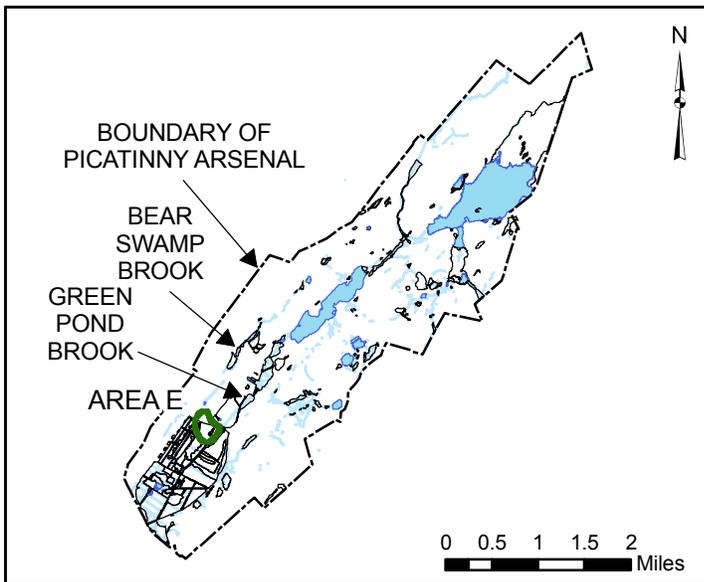
- WELL OR BORING ID
- GROUND SURFACE
- WATER TABLE
- SCREENED INTERVAL
- BOTTOM OF BORING
- TCE CONCENTRATION (µg/L)
- FEET ABOVE MEAN SEA LEVEL



PICATINNY ARSENAL, NEW JERSEY  
**TCE GROUNDWATER CONCENTRATION MAP  
 AREA D (PICA 076) SITE-WIDE NETWORK**

**GEOLOGIC CROSS SECTION A-A'**

FIGURE  
**7-3**



**Legend**

- ▲ Surface Water Location
- ⊕ Wells
- ▨ LUC Area of Applicability
- ▭ Building
- Approximate Site Location
- ▭ ANL RI Concept Plan Area

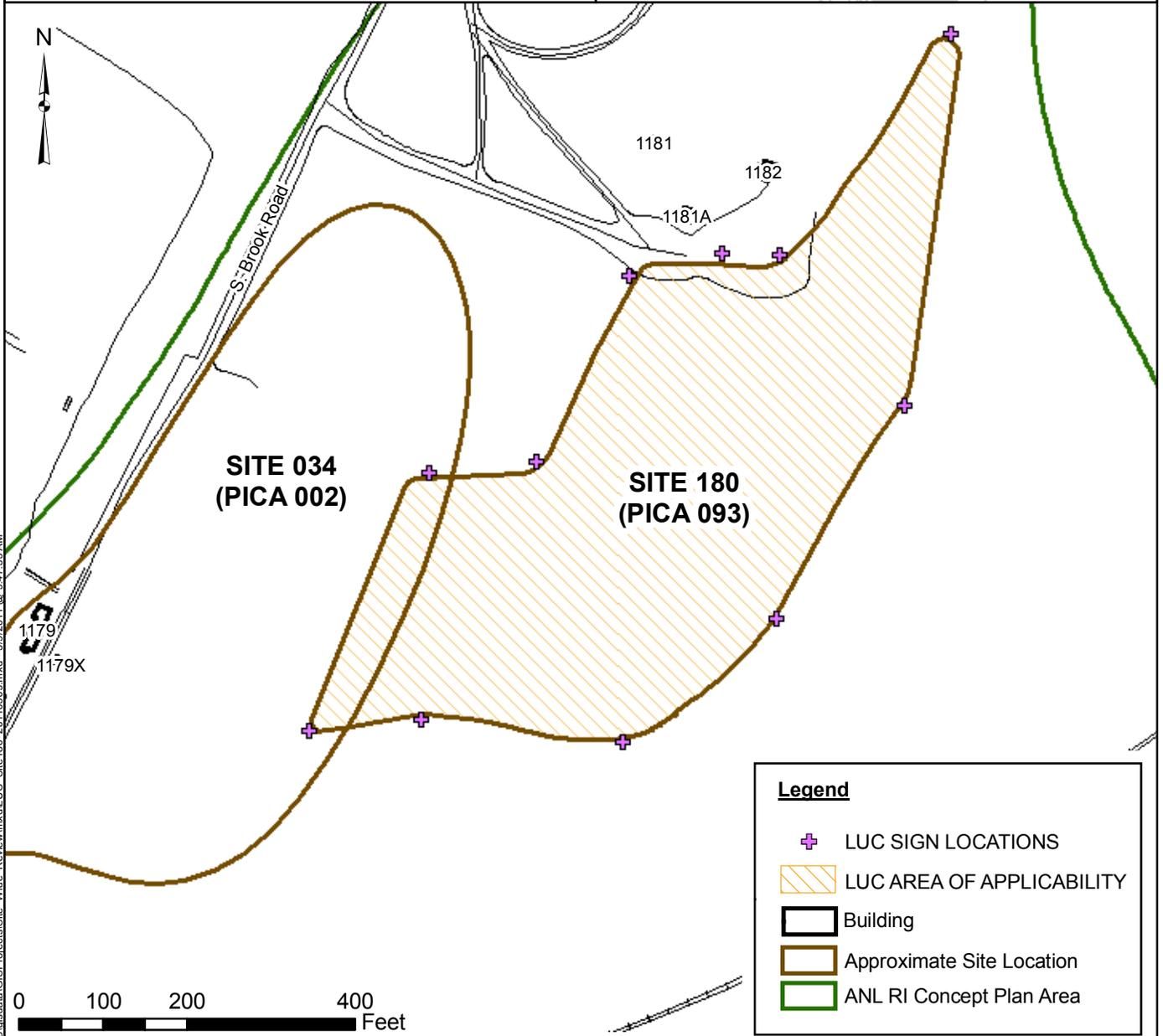
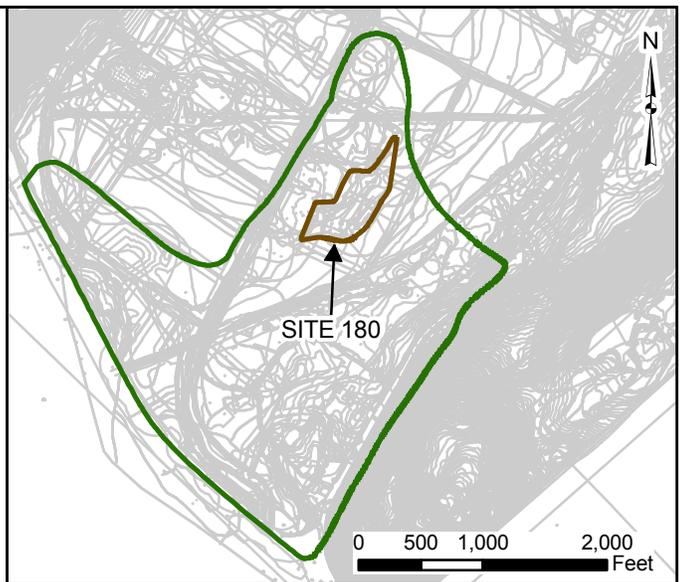
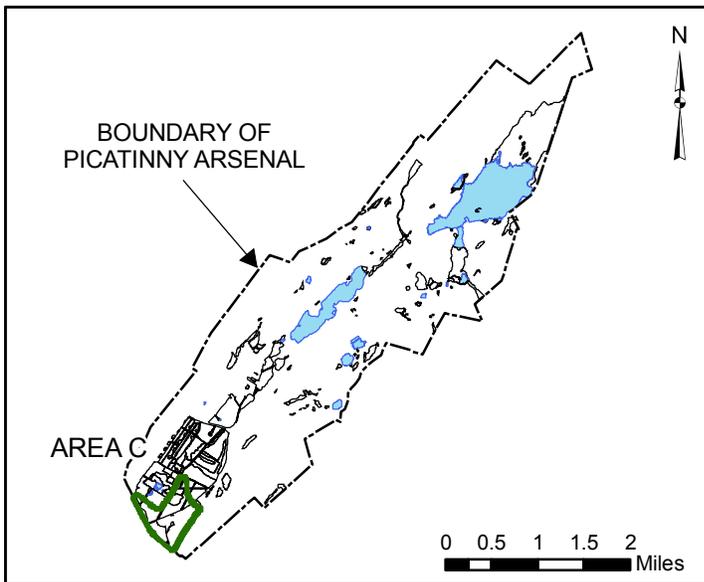
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**LAYOUT OF LUC  
 AREA E (PICA 077) GROUNDWATER  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER T. LLEWELLYN	DEPARTMENT MANAGER R. KHURI
DRAWN M. GRESS	CHECKED K. BEIER
PROJECT NUMBER GP06PICA.SITE.NB008	DRAWING NUMBER <b>8-1</b>



**Legend**

- ⊕ LUC SIGN LOCATIONS
- ▨ LUC AREA OF APPLICABILITY
- ▭ Building
- ▭ Approximate Site Location
- ▭ ANL RI Concept Plan Area

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**LAYOUT OF LUC  
 AREA SITE 180 (PICA 093)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER  
 T. LLEWELLYN

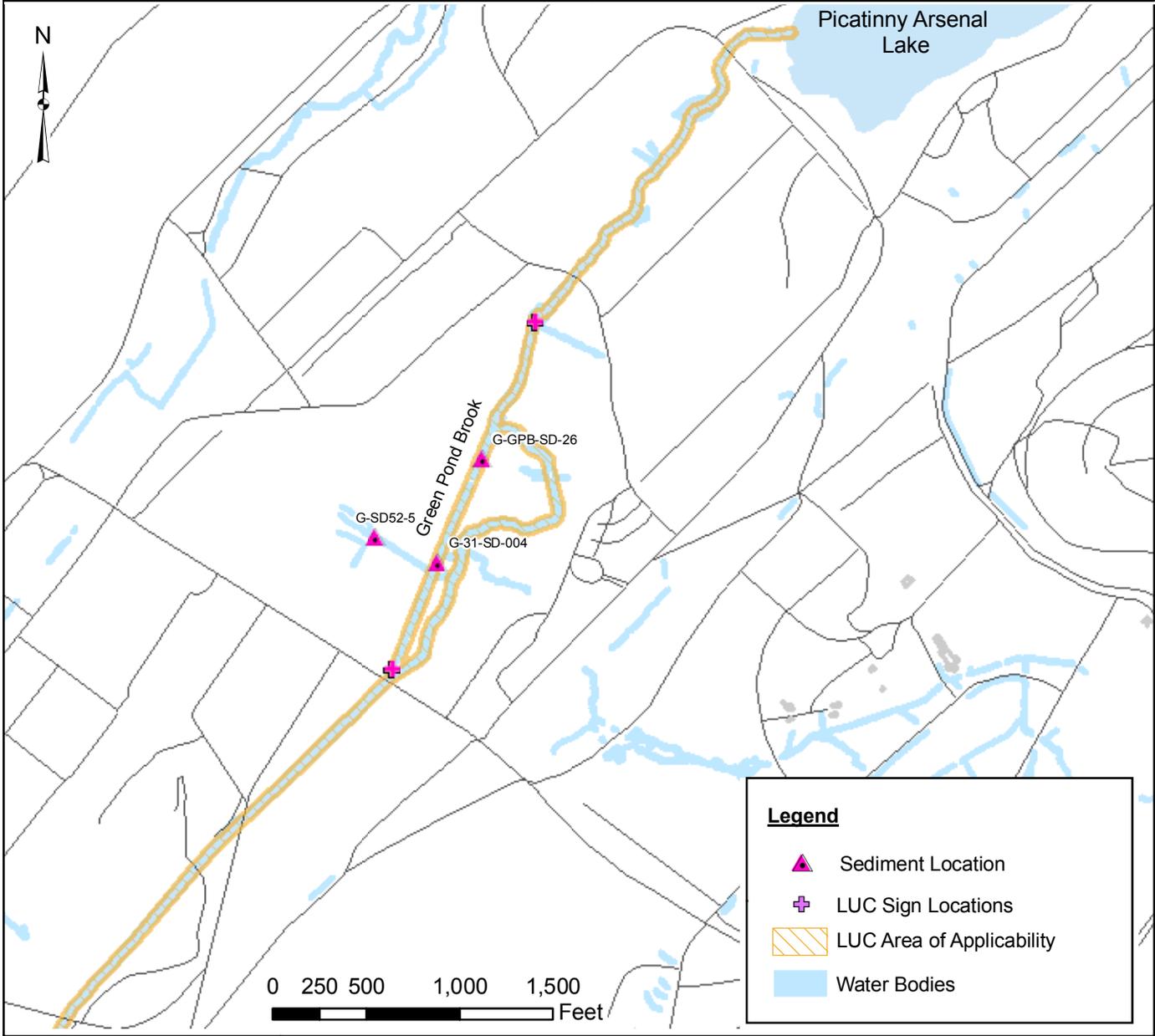
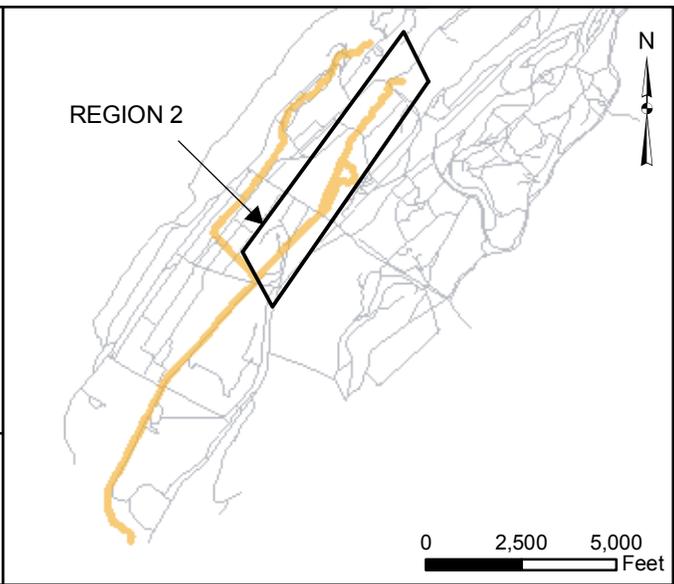
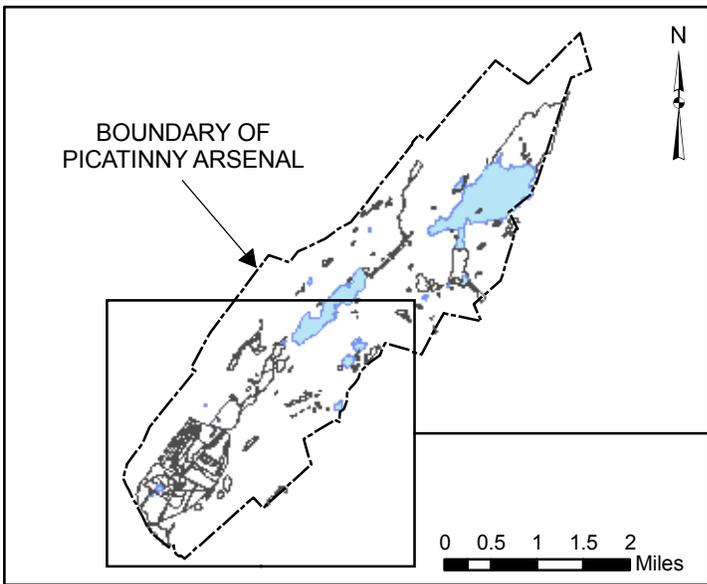
DRAWN  
 M. GRES

PROJECT NUMBER  
 GP06PICA.P093.KK001

DEPARTMENT MANAGER  
 R. KHURI

CHECKED  
 K. BEIER

DRAWING NUMBER  
**9-1**



**Legend**

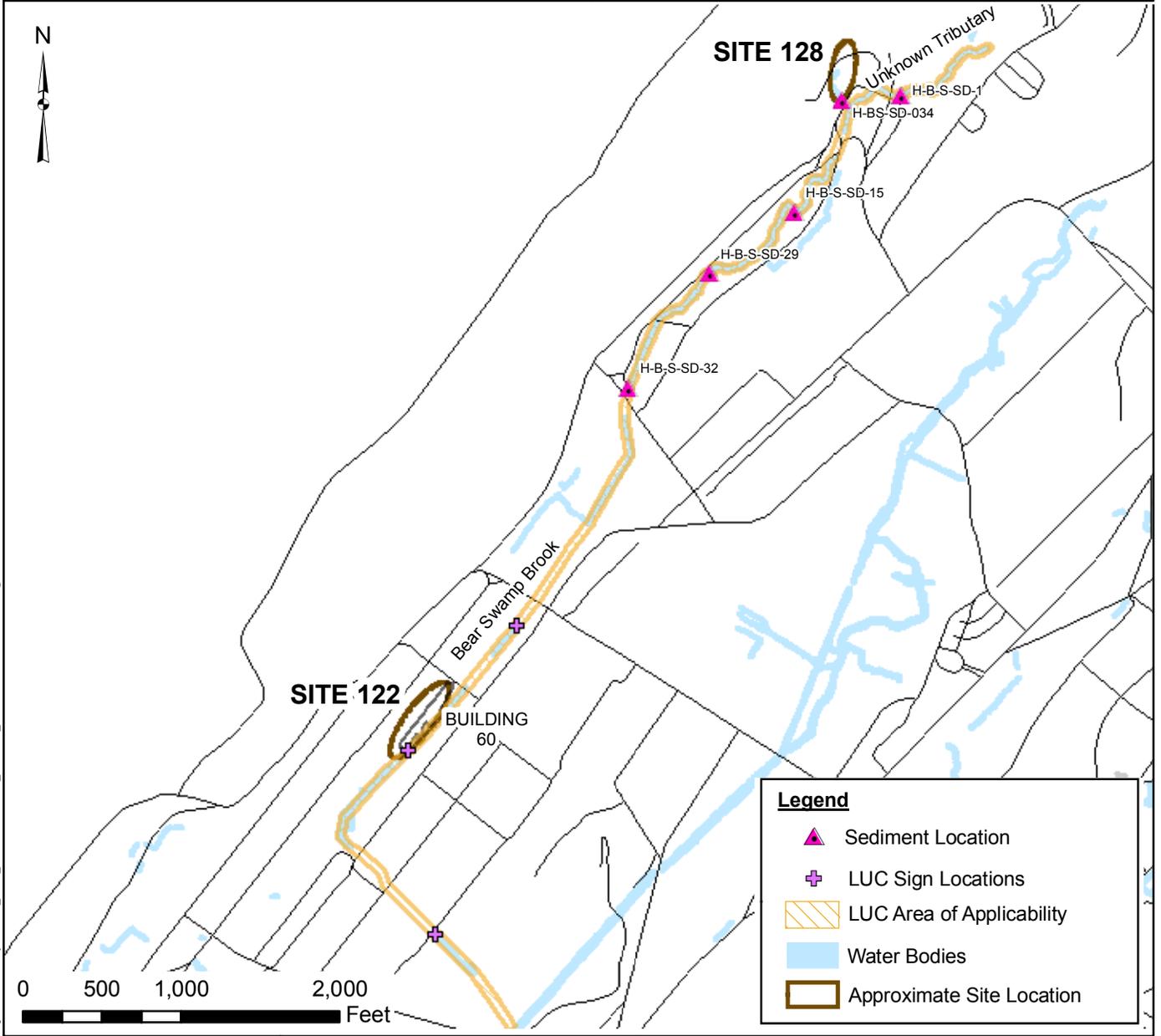
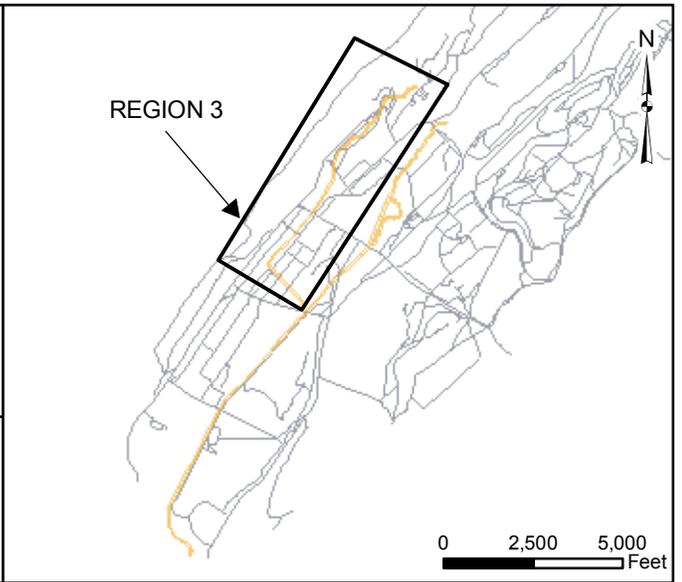
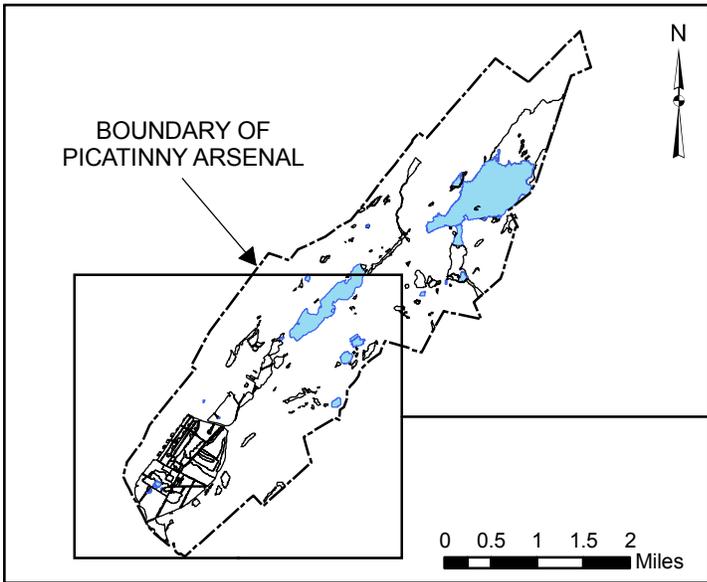
- Sediment Location
- LUC Sign Locations
- LUC Area of Applicability
- Water Bodies

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 ARCADIS - Edison, NJ  
 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
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 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 GREEN POND BROOK (PICA 193), REGION 2  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER T. LLEWELLYN	DEPARTMENT MANAGER R. KHURI
DRAWN M. GRESS	CHECKED K. BEIER
PROJECT NUMBER GP06PICA.SITE.NB008	DRAWING NUMBER <b>10-1</b>



**Legend**

- Sediment Location
- LUC Sign Locations
- LUC Area of Applicability
- Water Bodies
- Approximate Site Location

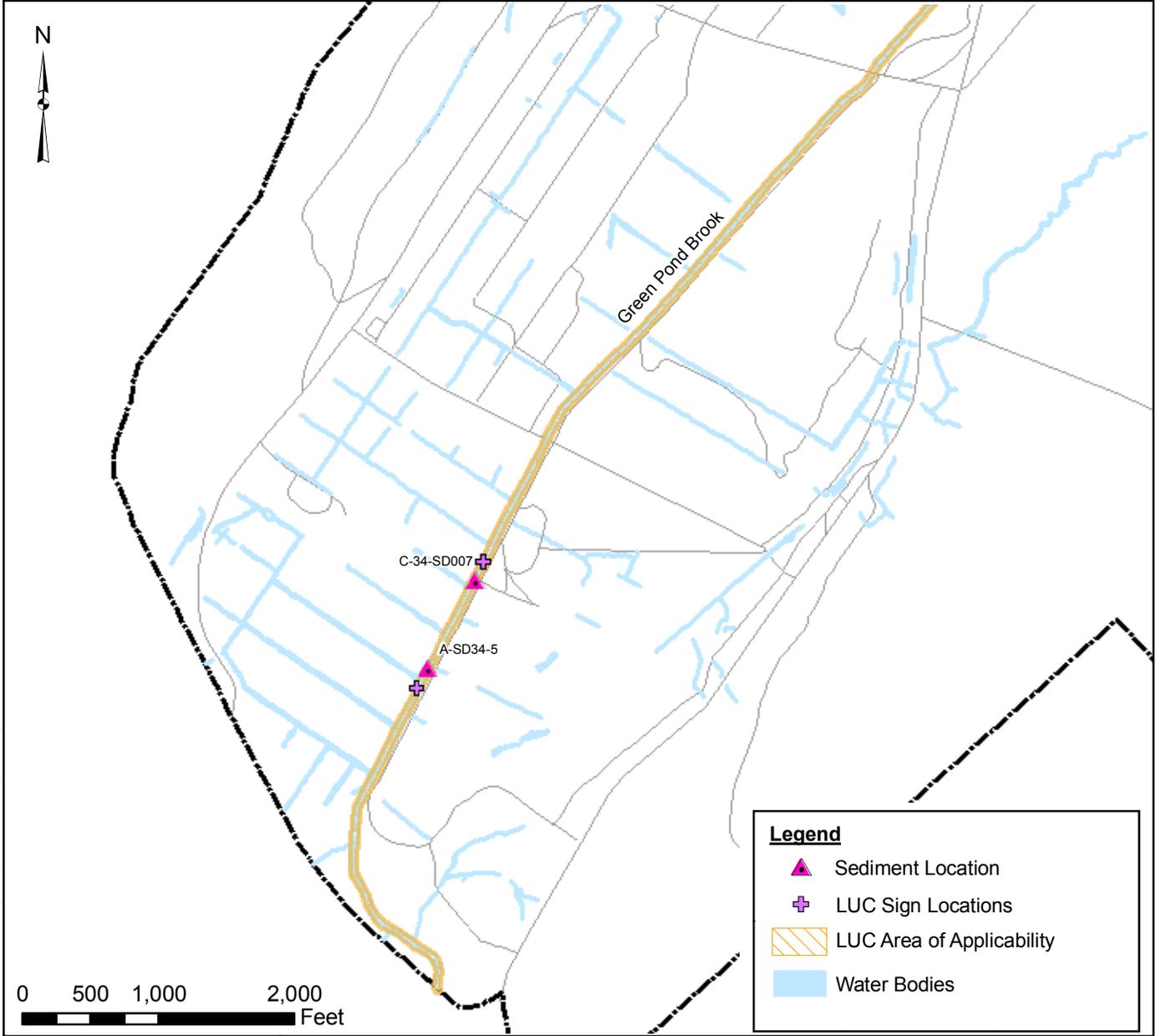
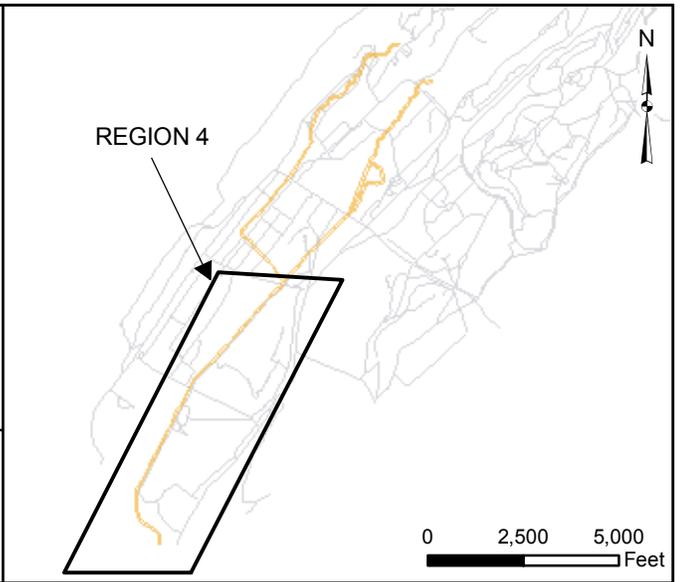
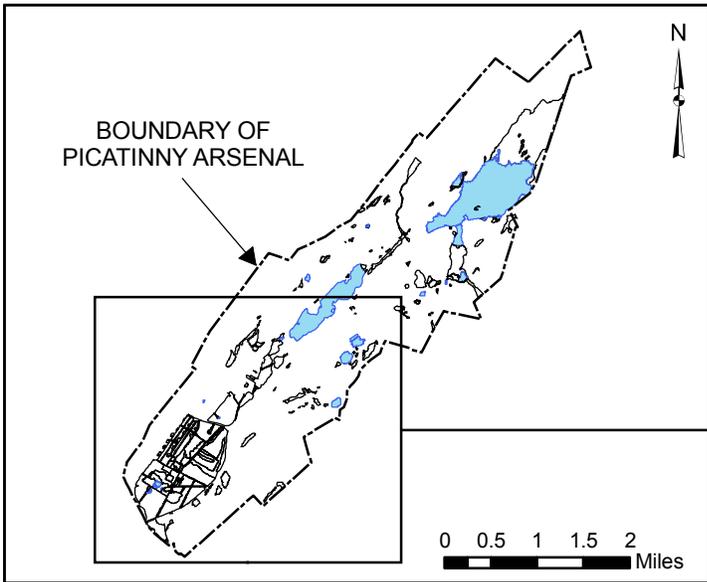
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 101 Fieldcrest Avenue, Suite 5E  
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 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 BEAR SWAMP BROOK (PICA 193), REGION 3  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER <u>T. LLEWELLYN</u>	DEPARTMENT MANAGER <u>R. KHURI</u>
DRAWN <u>M. GRESS</u>	CHECKED <u>K. BEIER</u>
PROJECT NUMBER GP06PICA.SITE.NB008	DRAWING NUMBER <b>10-2</b>



**Legend**

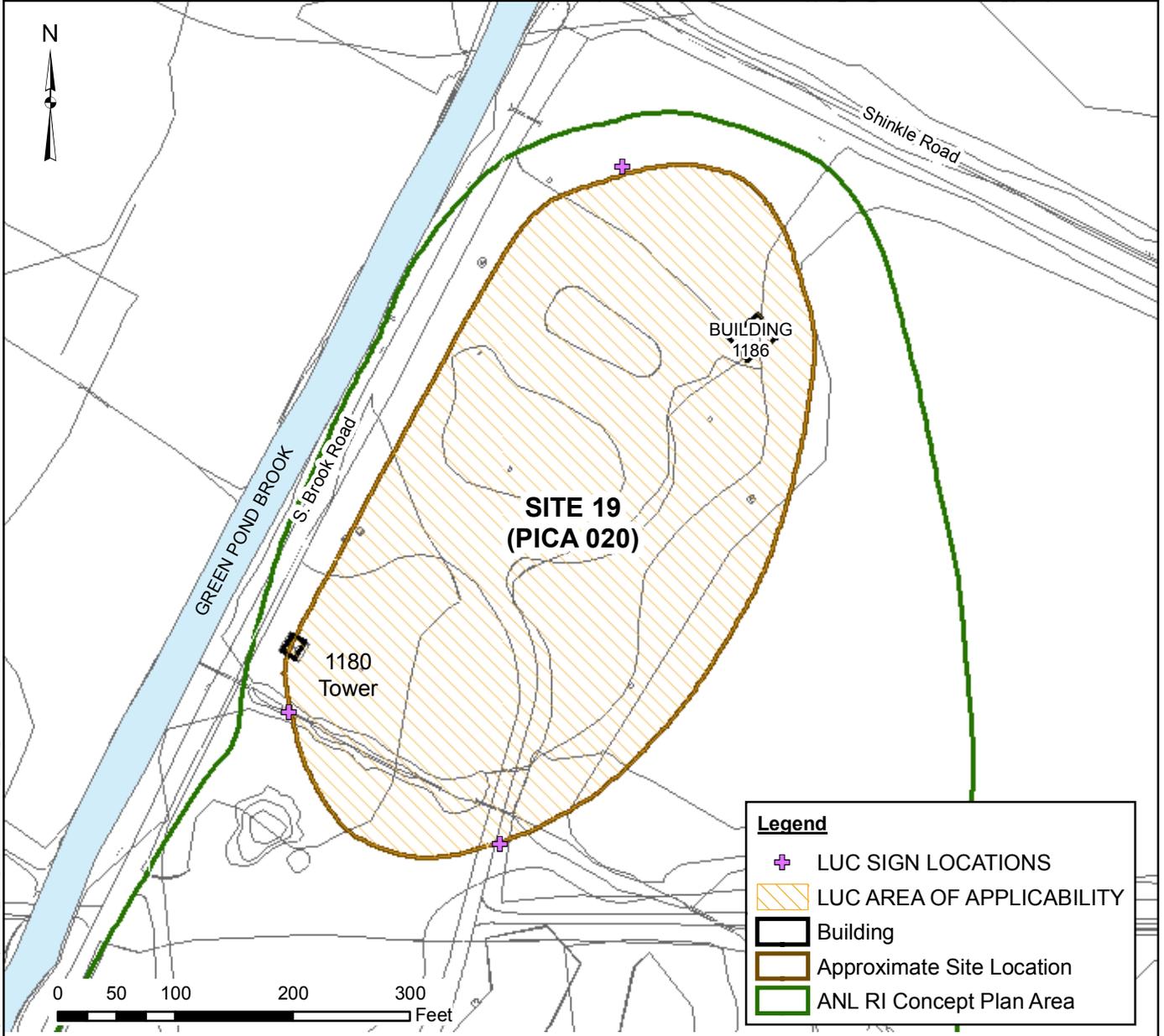
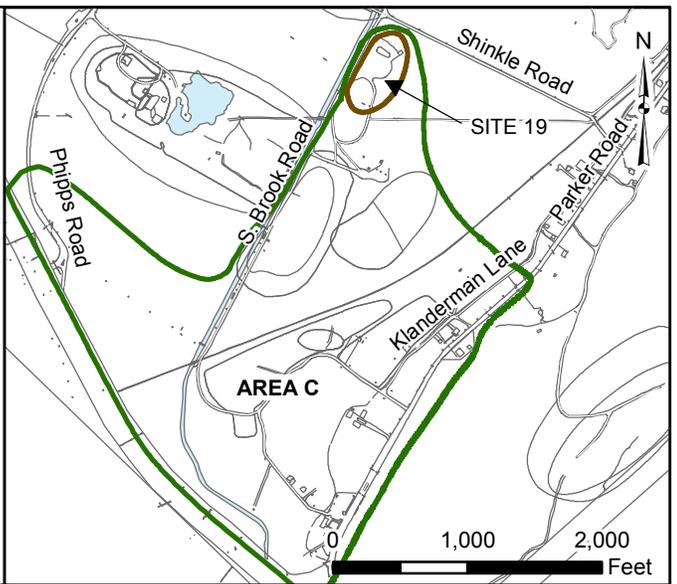
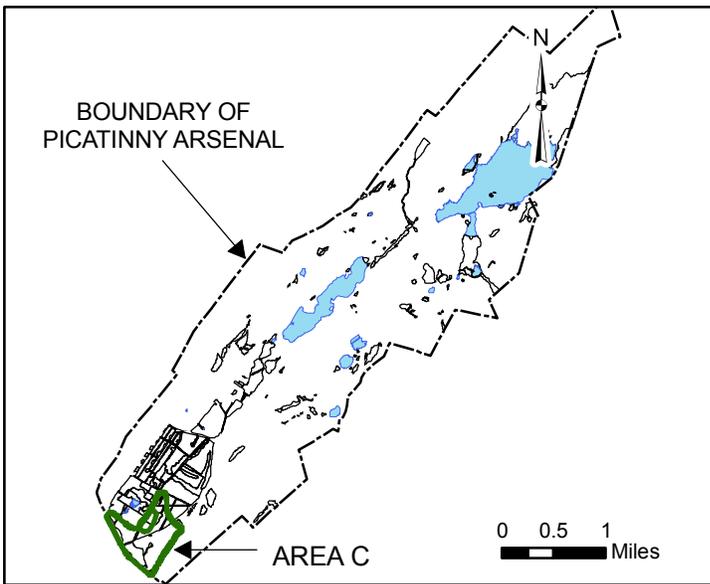
- Sediment Location
- LUC Sign Locations
- LUC Area of Applicability
- Water Bodies

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ARCADIS - Edison, NJ  
101 Fieldcrest Avenue, Suite 5E  
Edison, NJ 08817  
Phone: (732) 225-5061  
Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
GREEN POND BROOK (PICA 193), REGION 4  
PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER <u>T. LEWELLYN</u>	DEPARTMENT MANAGER <u>R. KHURI</u>
DRAWN <u>M. GRESS</u>	CHECKED <u>K. BEIER</u>
PROJECT NUMBER GP06PICA.SITE.NB008	DRAWING NUMBER <b>10-3</b>



**Legend**

- ✚ LUC SIGN LOCATIONS
- ▨ LUC AREA OF APPLICABILITY
- ▭ Building
- ▭ Approximate Site Location
- ▭ ANL RI Concept Plan Area

G:\GIS\Projects\Picatinny\GIS\data\GIS\Projects\Site\_19\Site19\_20110110.mxd - 1/13/2011 @ 3:51:26 PM

**ARCADIS**  
 ARCADIS - Edison, NJ  
 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
 Phone: (732) 225-5061  
 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 GROUP OF 13 SITES (PICA 020), SITE 19 (PICA 020)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER  
T. LLEWELLYN

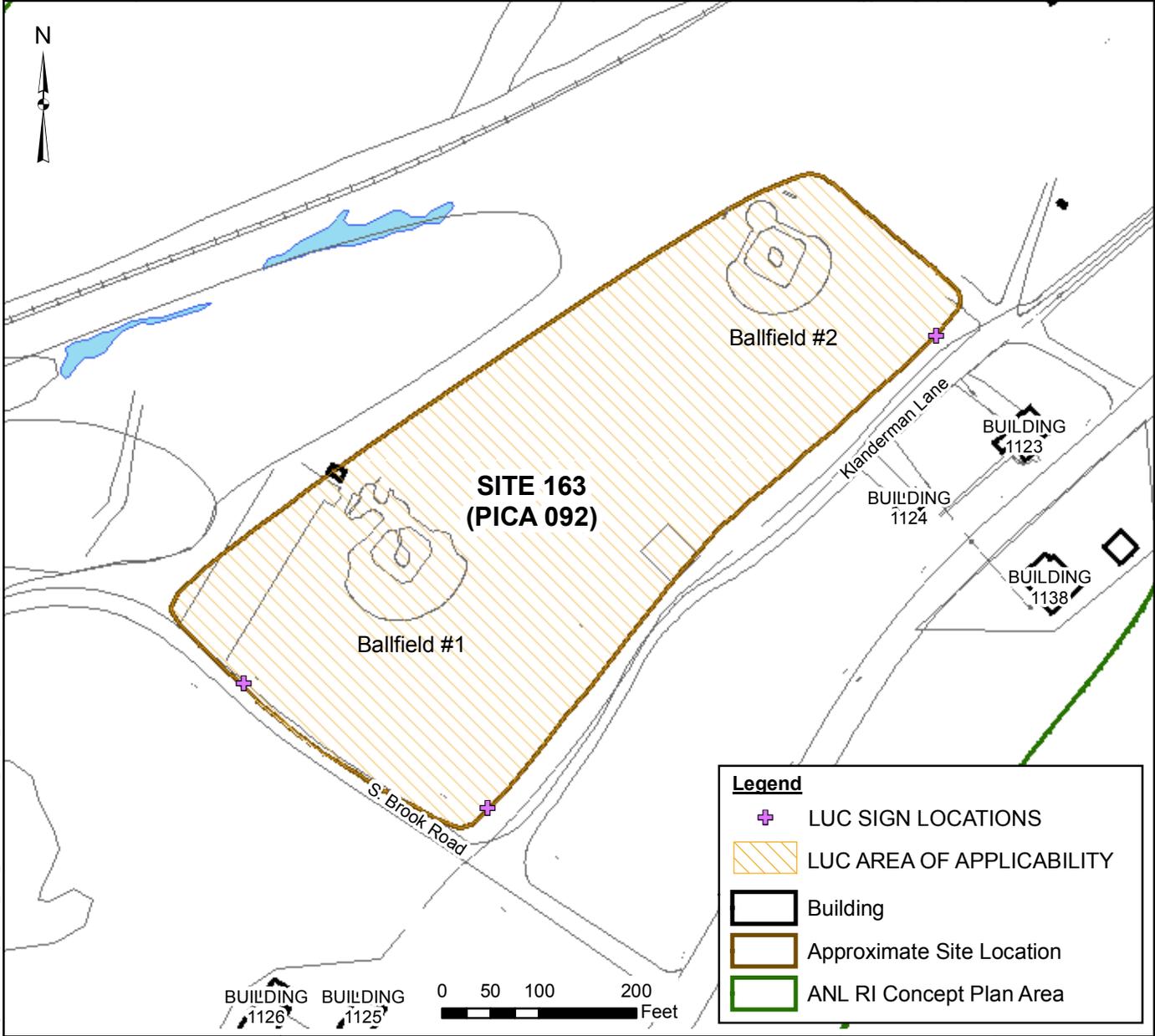
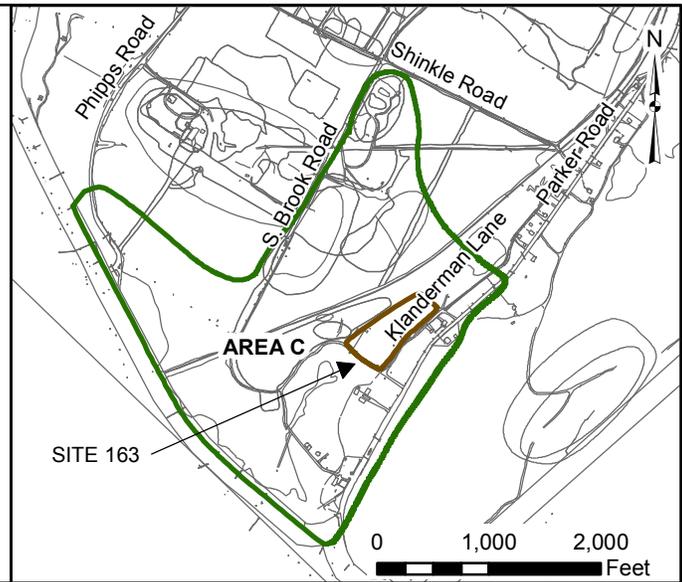
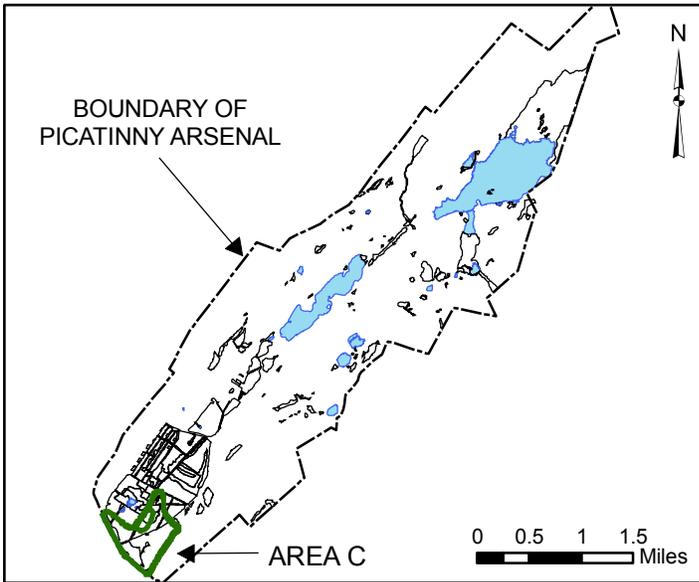
DRAWN  
M. GRESS

PROJECT NUMBER  
 GP06PICA.P020.NJ001

DEPARTMENT MANAGER  
M. MOHIUDDIN

CHECKED  
K. BEIER

DRAWING NUMBER  
**11-1**



**Legend**

- LUC SIGN LOCATIONS
- LUC AREA OF APPLICABILITY
- Building
- Approximate Site Location
- ANL RI Concept Plan Area

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**ARCADIS**  
 ARCADIS - Edison, NJ  
 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
 Phone: (732) 225-5061  
 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 GROUP OF 13 SITES (PICA 020), SITE 163 (PICA 092)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER  
 T. LLEWELLYN

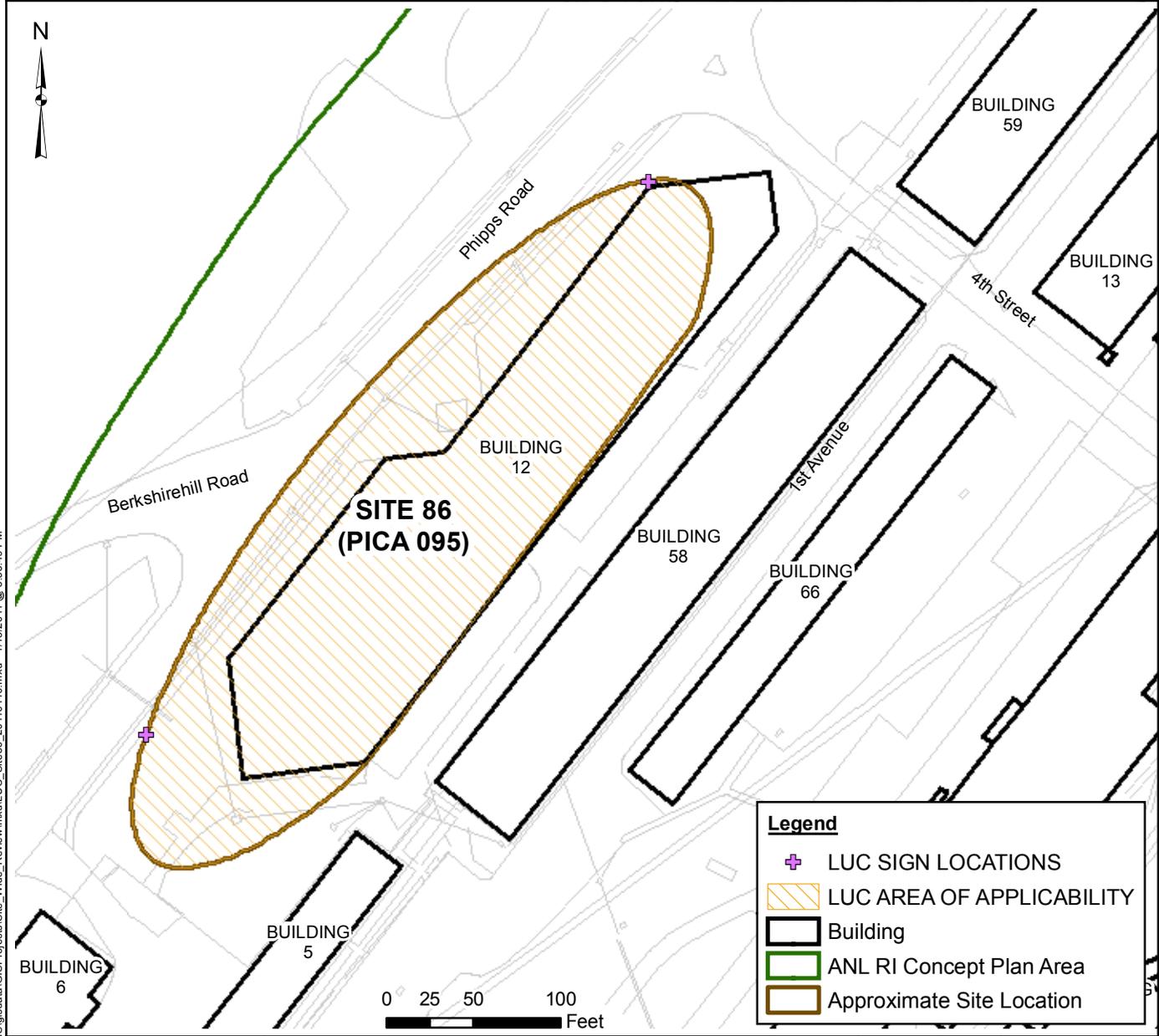
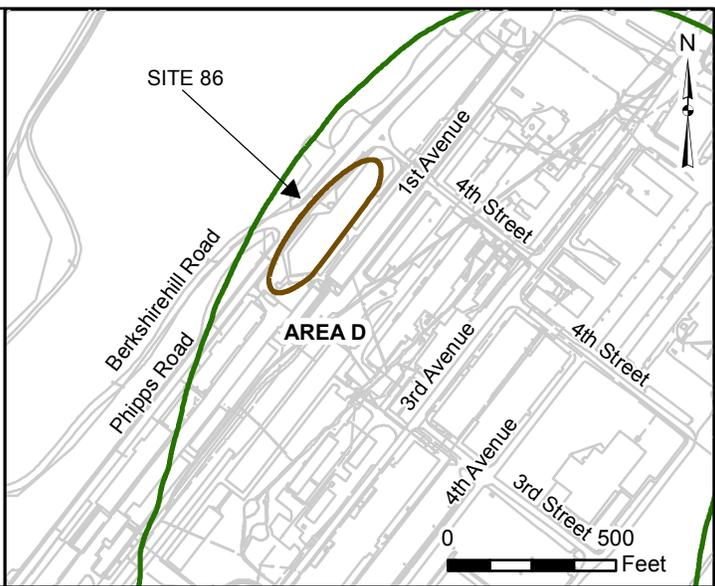
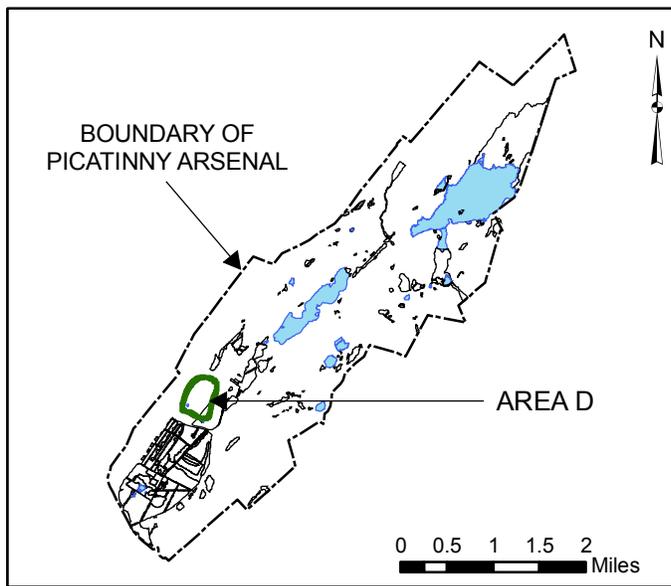
DEPARTMENT MANAGER  
 M. MOHIUDDIN

DRAWN  
 M. GRESS

CHECKED  
 K. BEIER

PROJECT NUMBER  
 GP06PICA.P020.NJ001

DRAWING NUMBER  
**11-2**



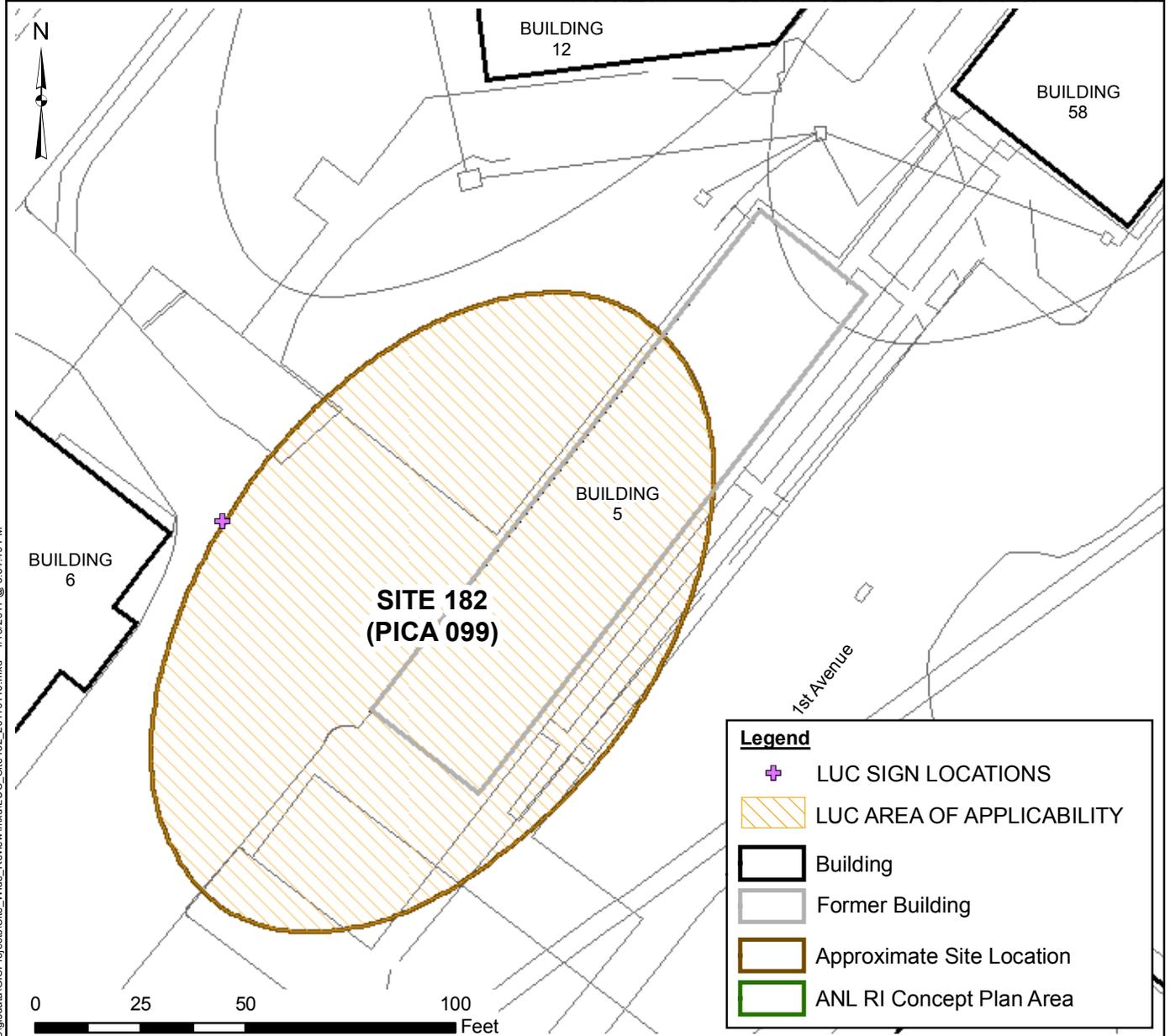
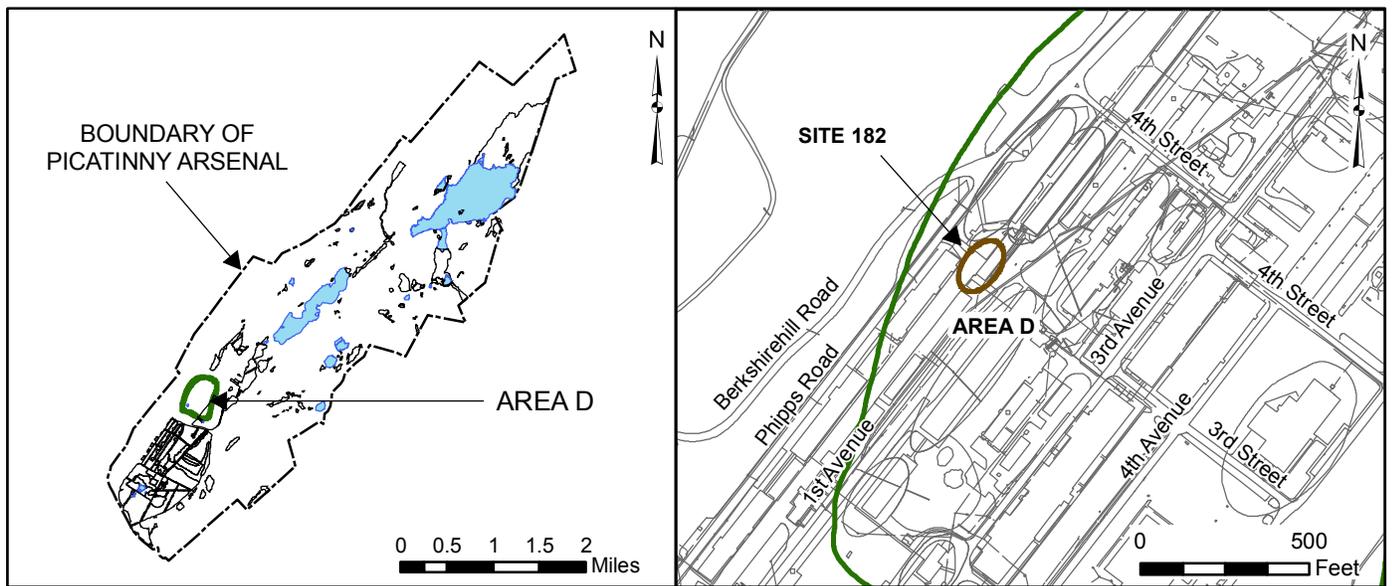
Legend	
	LUC SIGN LOCATIONS
	LUC AREA OF APPLICABILITY
	Building
	ANL RI Concept Plan Area
	Approximate Site Location

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 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
 Phone: (732) 225-5061  
 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 GROUP OF 13 SITES (PICA 020), SITE 86 (PICA 095)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER T.LLEWELLYN	DEPARTMENT MANAGER K.TIPTON
DRAWN M.GRESS	CHECKED K.BEIER
PROJECT NUMBER GP06PICA.P020.NJ001	DRAWING NUMBER <b>11-3</b>



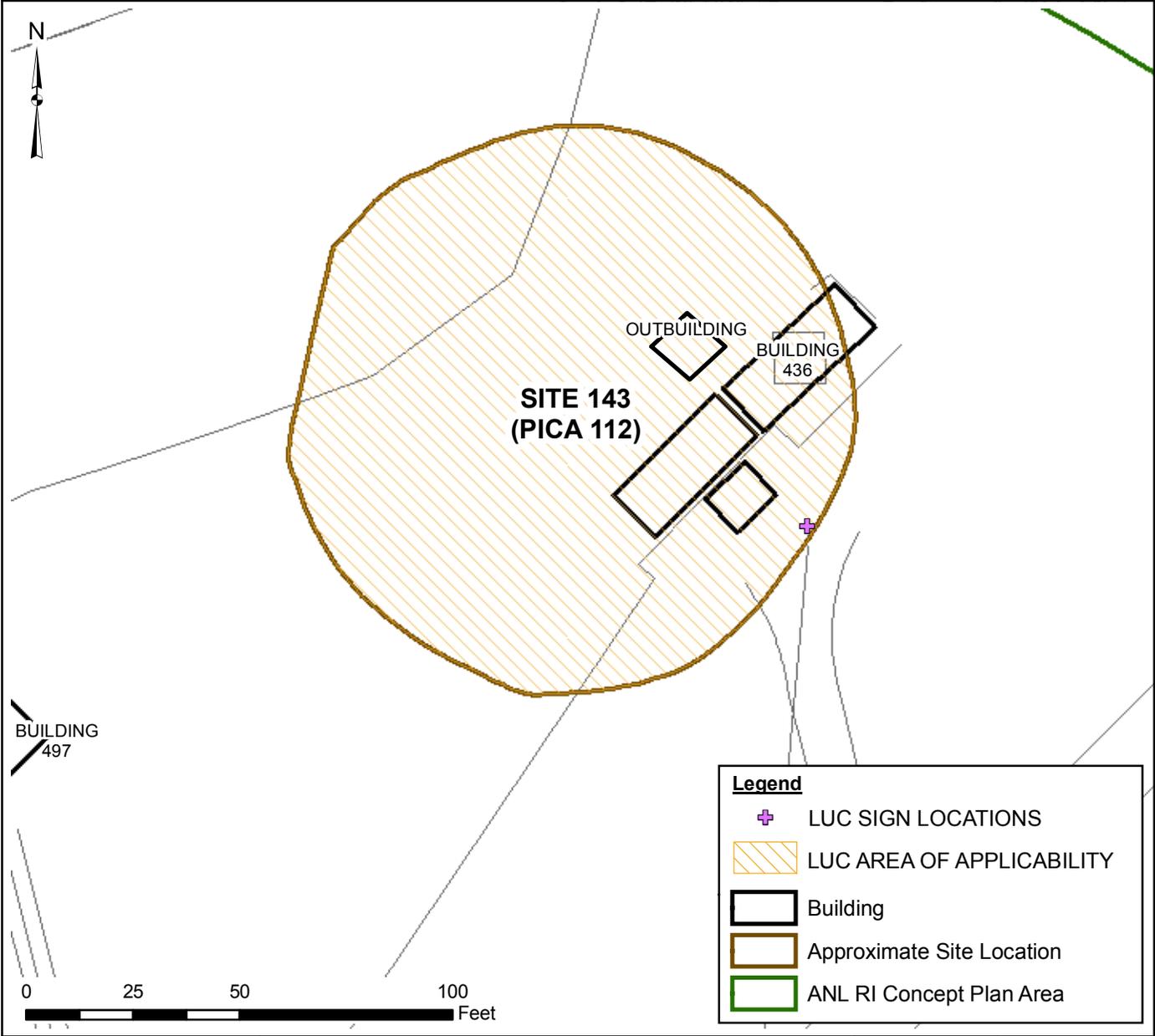
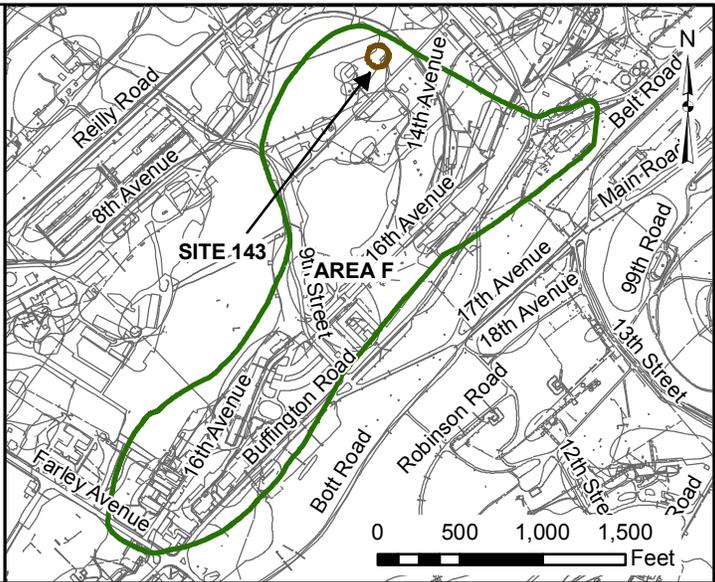
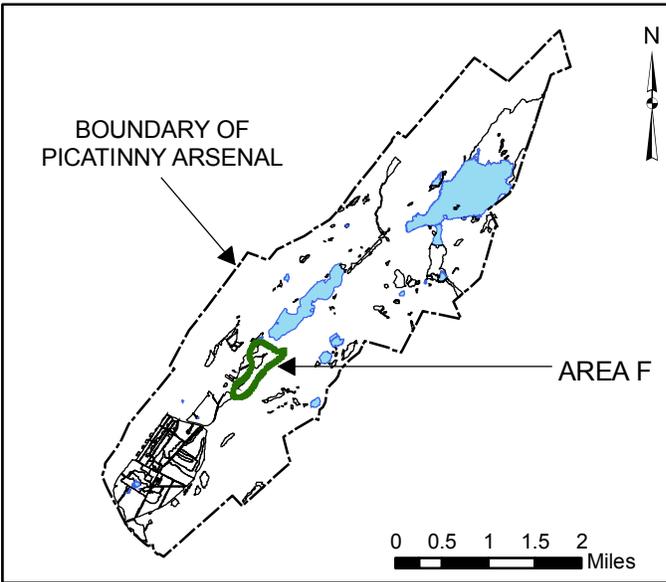
Legend	
	LUC SIGN LOCATIONS
	LUC AREA OF APPLICABILITY
	Building
	Former Building
	Approximate Site Location
	ANL RI Concept Plan Area

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**ARCADIS**  
 ARCADIS - Edison, NJ  
 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
 Phone: (732) 225-5061  
 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 GROUP OF 13 SITES (PICA 020), SITE 182 (PICA 099)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER T. LLEWELLYN	DEPARTMENT MANAGER M. MOHIUDDIN
DRAWN M. GRESS	CHECKED K. BEIER
PROJECT NUMBER GP06PICA.P020.NJ001	DRAWING NUMBER <b>11-4</b>

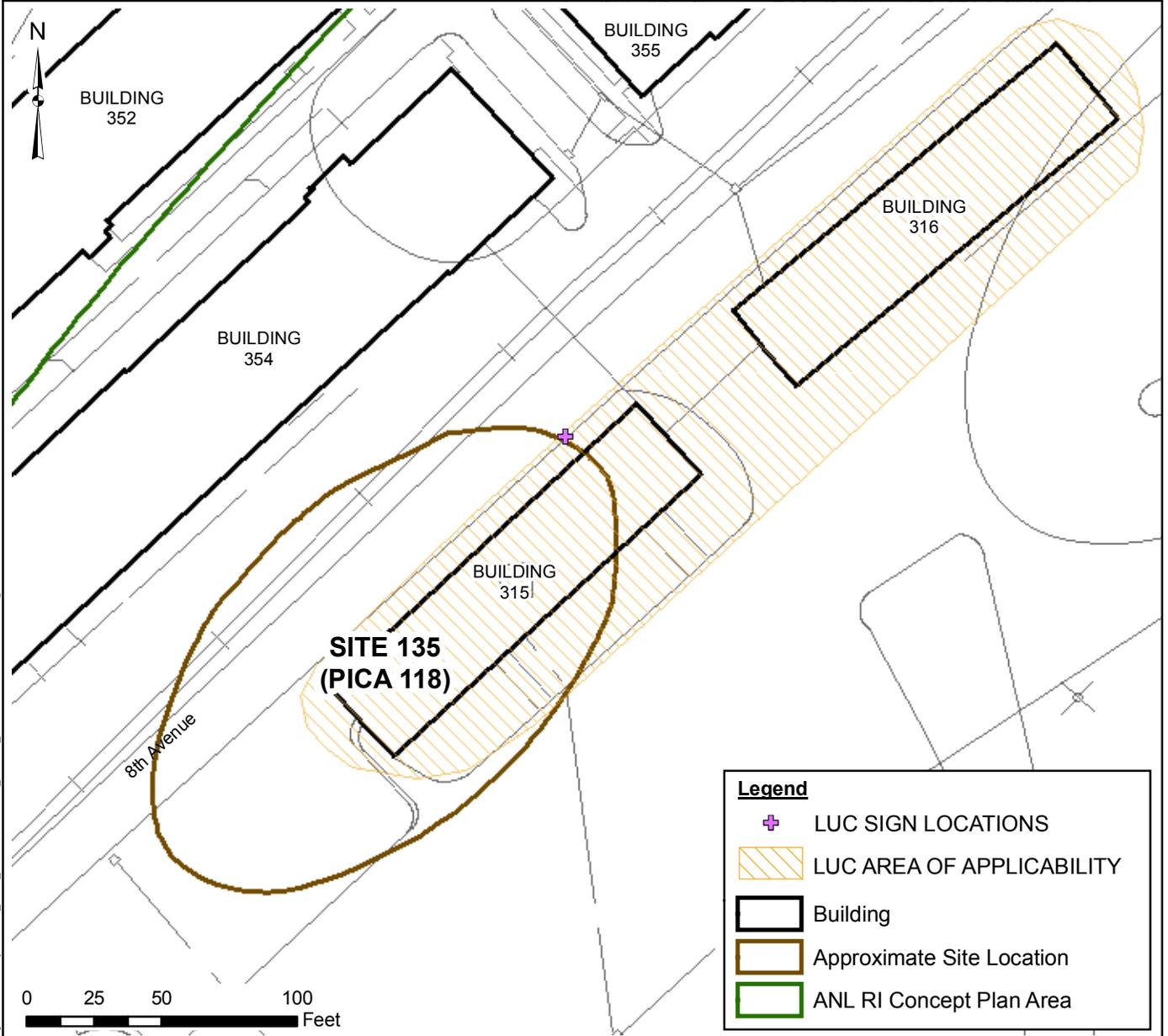
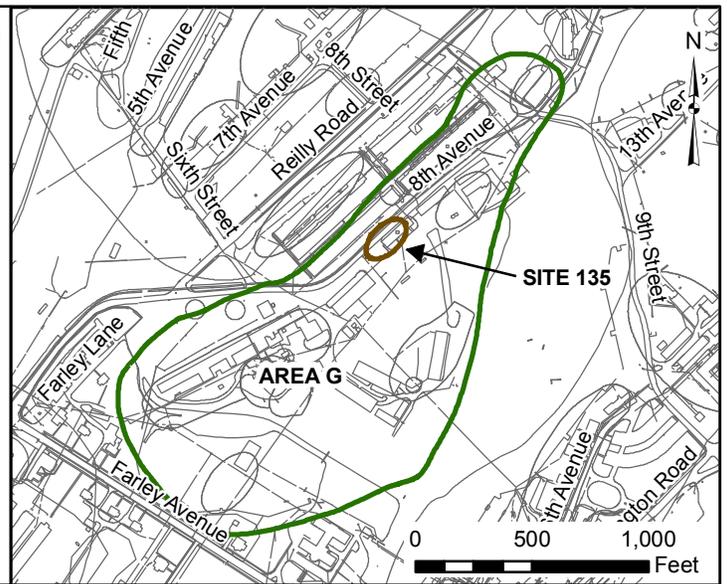
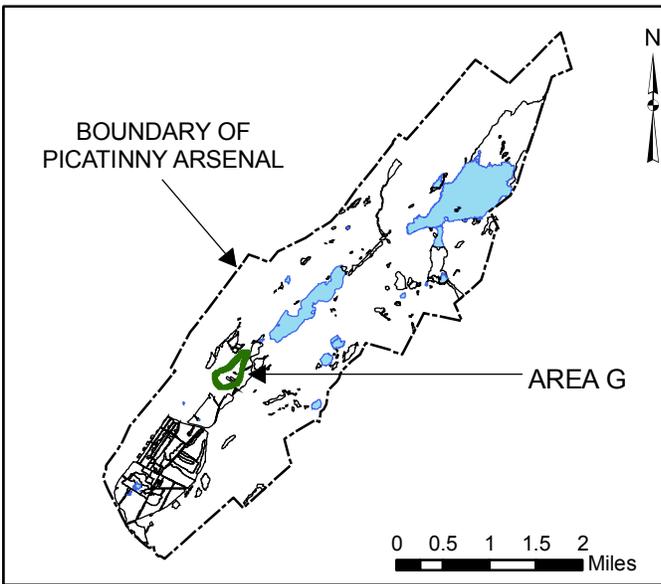


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**ARCADIS**  
 ARCADIS - Edison, NJ  
 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
 Phone: (732) 225-5061  
 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 GROUP OF 13 SITES (PICA 020), SITE 143 (PICA 112)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER T. LLEWELLYN	DEPARTMENT MANAGER M. MOHIUDDIN
DRAWN M. GRESS	CHECKED K. BEIER
PROJECT NUMBER GP06PICA.P020.NJ001	DRAWING NUMBER <b>11-10</b>



**Legend**

- LUC SIGN LOCATIONS
- LUC AREA OF APPLICABILITY
- Building
- Approximate Site Location
- ANL RI Concept Plan Area

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**ARCADIS**  
 ARCADIS - Edison, NJ  
 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
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 Fax: (732) 225-5067

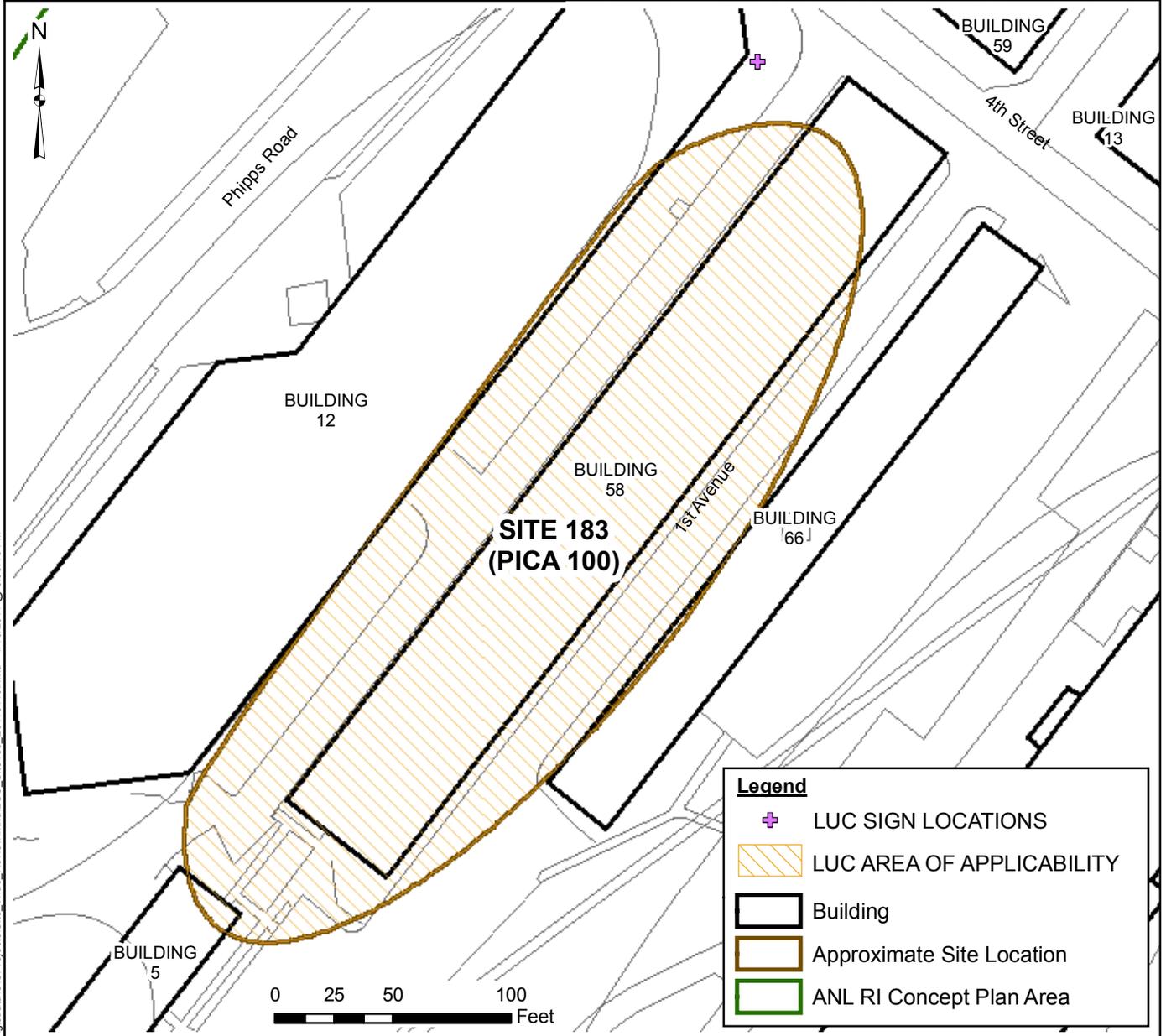
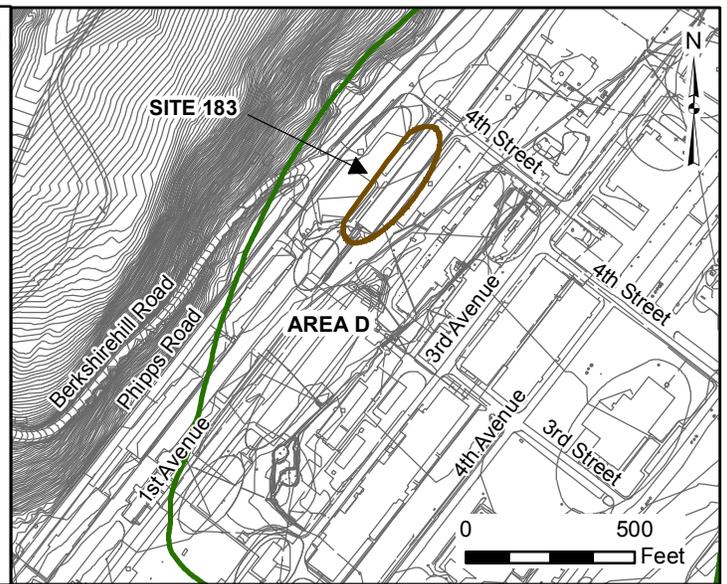
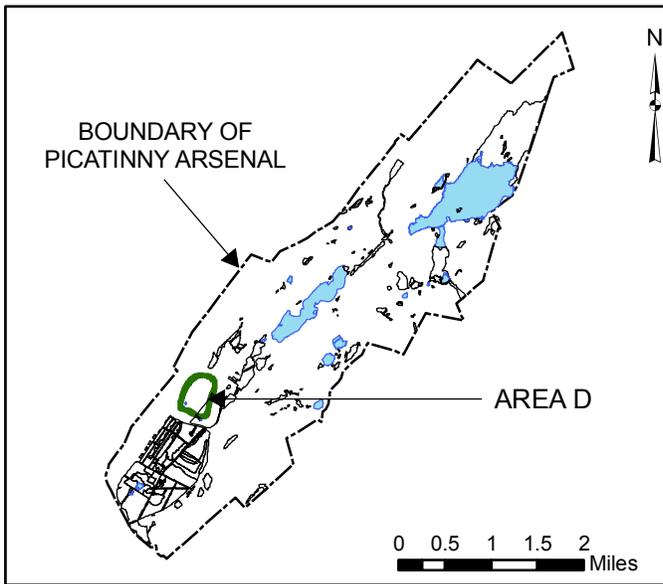
**LAYOUT OF LUC AREA  
 GROUP OF 13 SITES (PICA 020), SITE 135 (PICA 118)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER  
T. LLEWELLYN  
 DRAWN  
M. GRESS

DEPARTMENT MANAGER  
M. MOHIUDDIN  
 CHECKED  
K. BEIER

PROJECT NUMBER  
GP06PICA.P020.NJ001

DRAWING NUMBER  
**11-11**



**Legend**

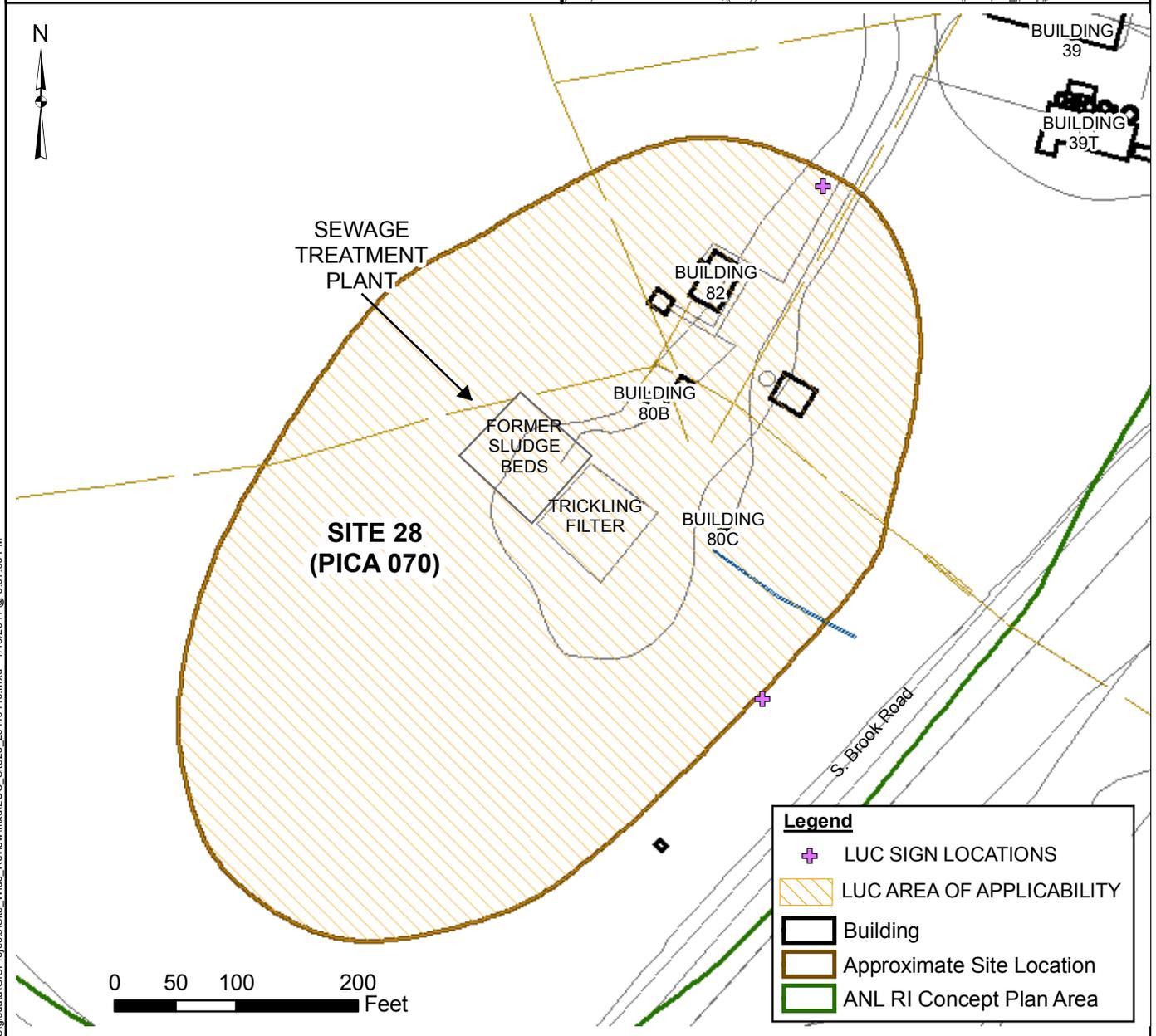
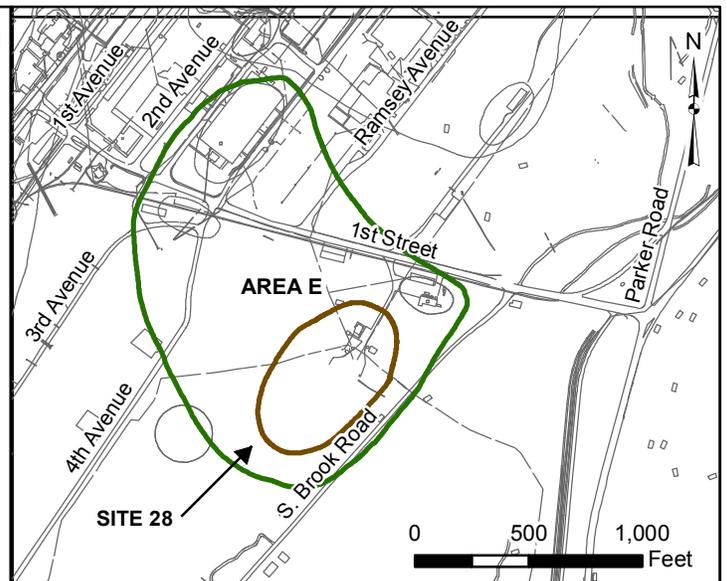
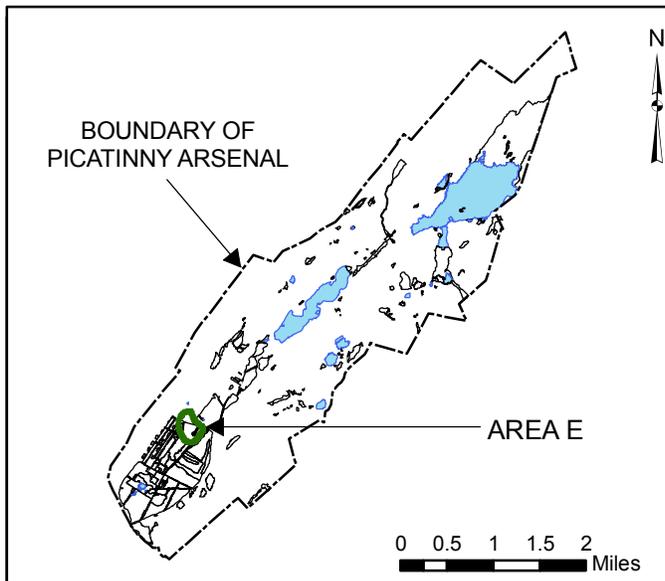
- ✚ LUC SIGN LOCATIONS
- ▨ LUC AREA OF APPLICABILITY
- ▭ Building
- ▭ Approximate Site Location
- ▭ ANL RI Concept Plan Area

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**ARCADIS**  
 ARCADIS - Edison, NJ  
 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
 Phone: (732) 225-5061  
 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 GROUP OF 13 SITES (PICA 020), SITE 183 (PICA 100)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER T. LLEWELLYN	DEPARTMENT MANAGER M. MOHIUDDIN
DRAWN M. GRESS	CHECKED K. BEIER
PROJECT NUMBER GP06PICA.P020.NJ001	DRAWING NUMBER <b>11-5</b>



Legend	
	LUC SIGN LOCATIONS
	LUC AREA OF APPLICABILITY
	Building
	Approximate Site Location
	ANL RI Concept Plan Area

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**ARCADIS**  
 ARCADIS - Edison, NJ  
 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
 Phone: (732) 225-5061  
 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 GROUP OF 13 SITES (PICA 020), SITE 28 (PICA 070)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER  
 T. LLEWELLYN

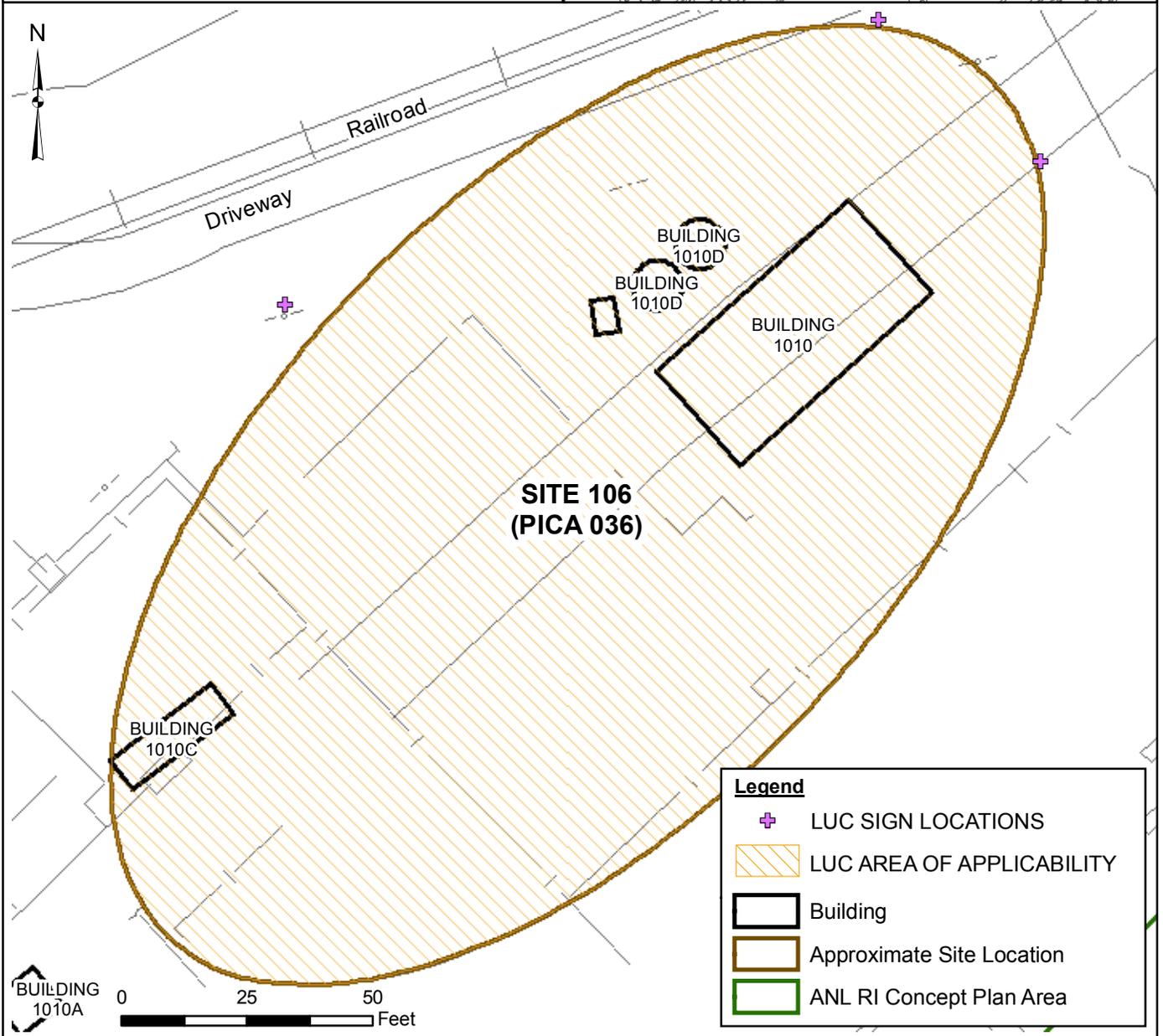
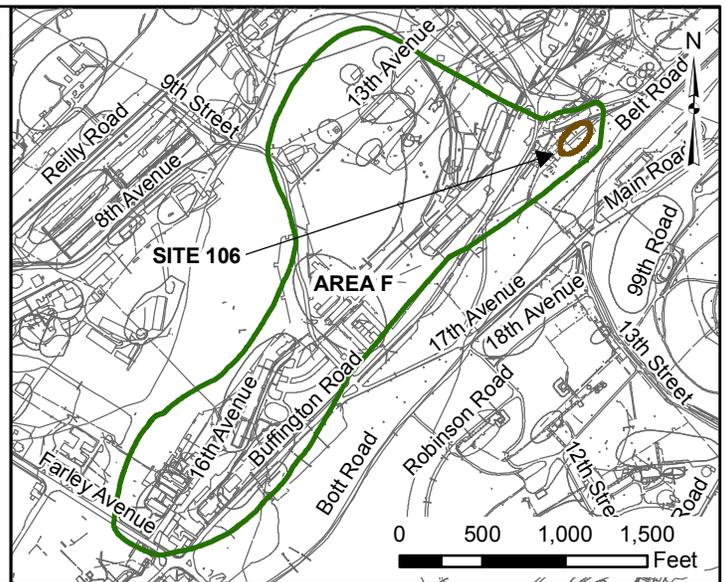
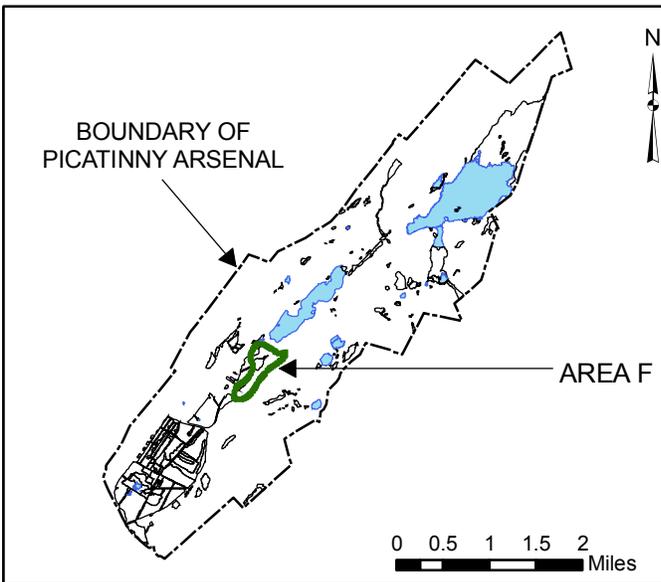
DRAWN  
 M. GRESS

PROJECT NUMBER  
 GO06PICA.P020.NJ001

DEPARTMENT MANAGER  
 M. MOHIUDDIN

CHECKED  
 K. BEIER

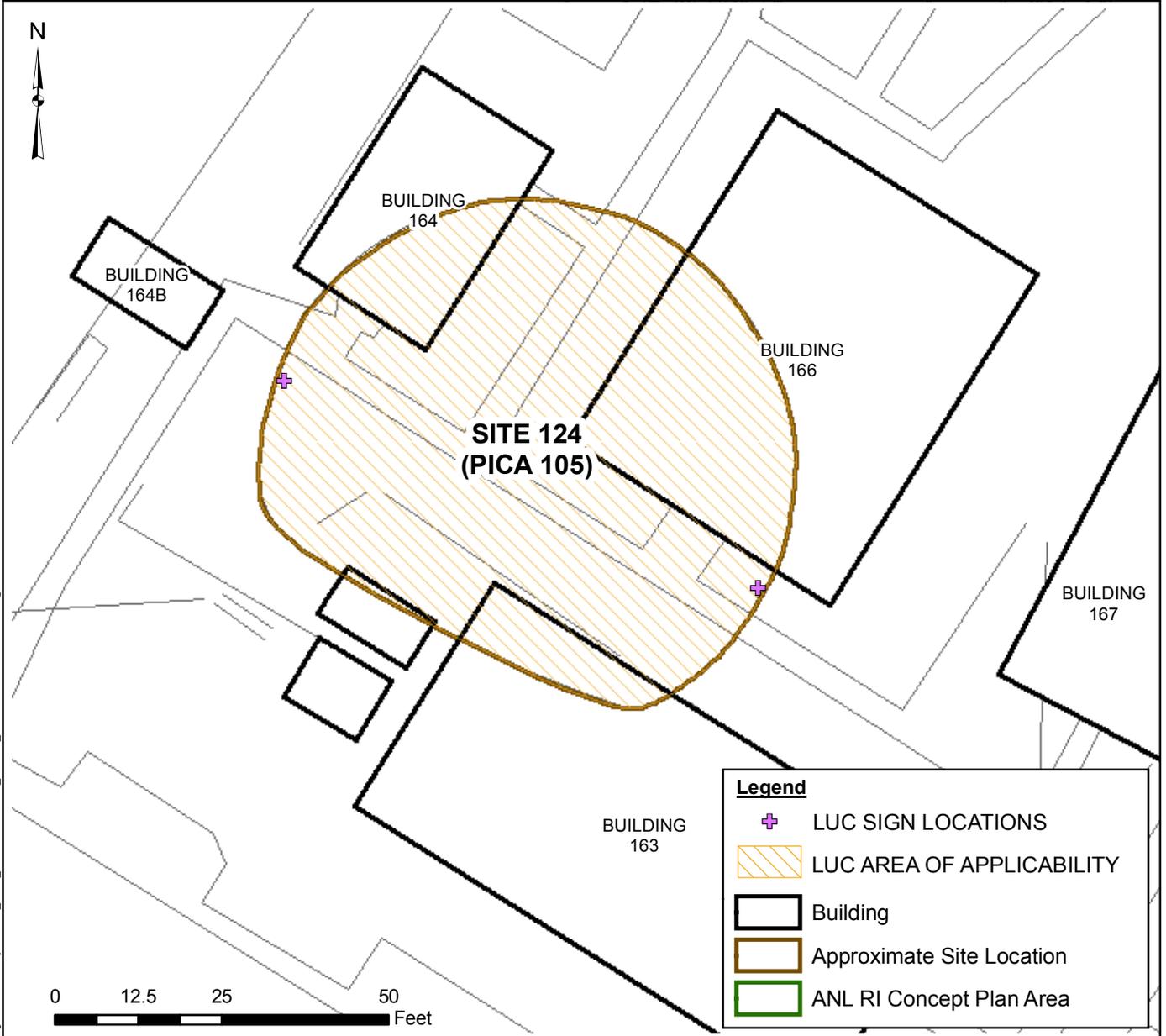
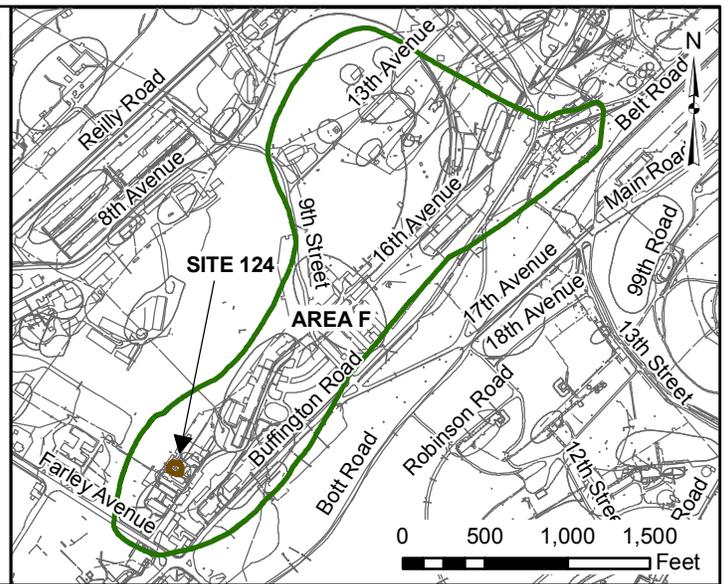
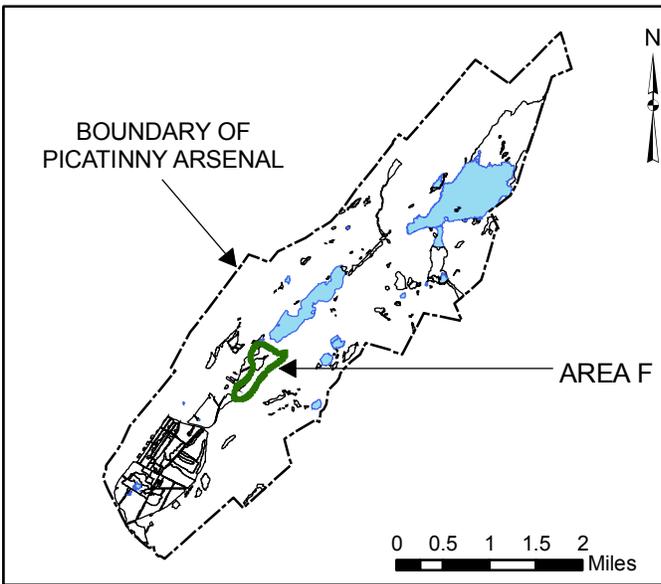
DRAWING NUMBER  
**11-6**



**Legend**

- LUC SIGN LOCATIONS
- LUC AREA OF APPLICABILITY
- Building
- Approximate Site Location
- ANL RI Concept Plan Area

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**ARCADIS**  
 ARCADIS - Edison, NJ  
 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
 Phone: (732) 225-5061  
 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 GROUP OF 13 SITES (PICA 020), SITE 124 (PICA 105)  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER  
 T. LLEWELLYN

DRAWN  
 M. GRESS

PROJECT NUMBER  
 GP06PICA.P020.NJ001

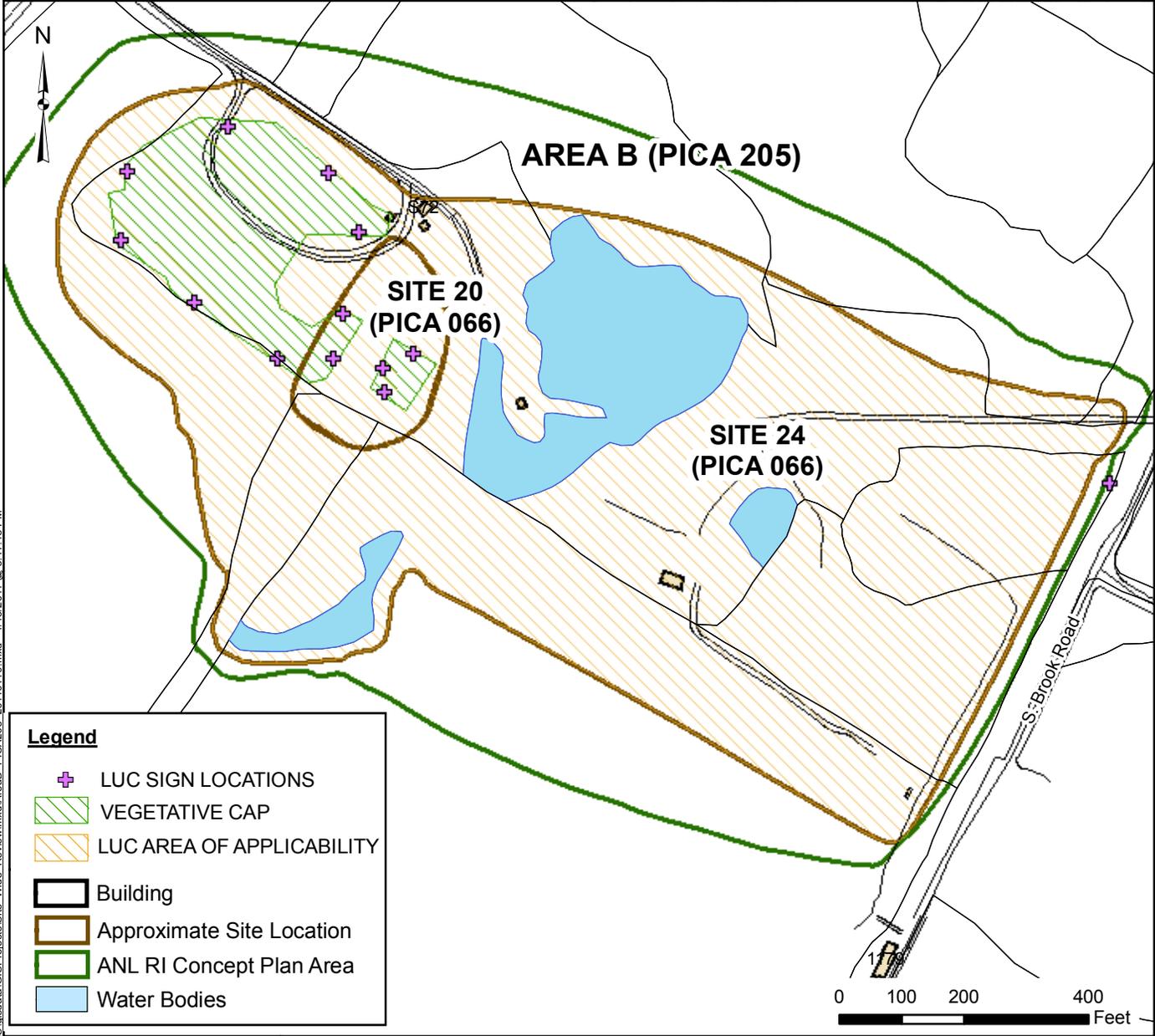
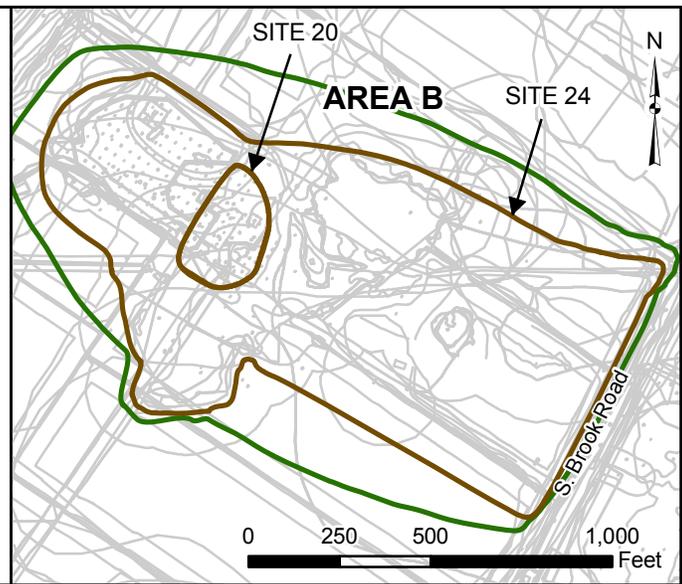
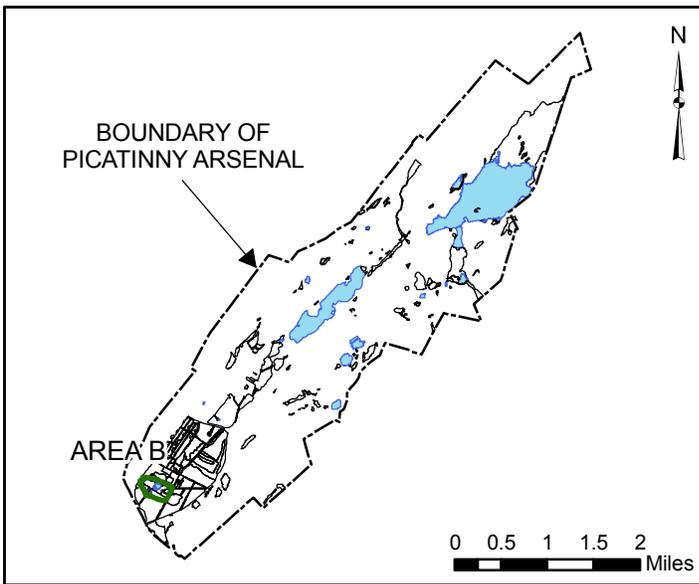
DEPARTMENT MANAGER  
 M. MOHIUDDIN

CHECKED  
 K. BEIER

DRAWING NUMBER  
**11-8**







**Legend**

- LUC SIGN LOCATIONS
- VEGETATIVE CAP
- LUC AREA OF APPLICABILITY
- Building
- Approximate Site Location
- ANL RI Concept Plan Area
- Water Bodies

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**ARCADIS**

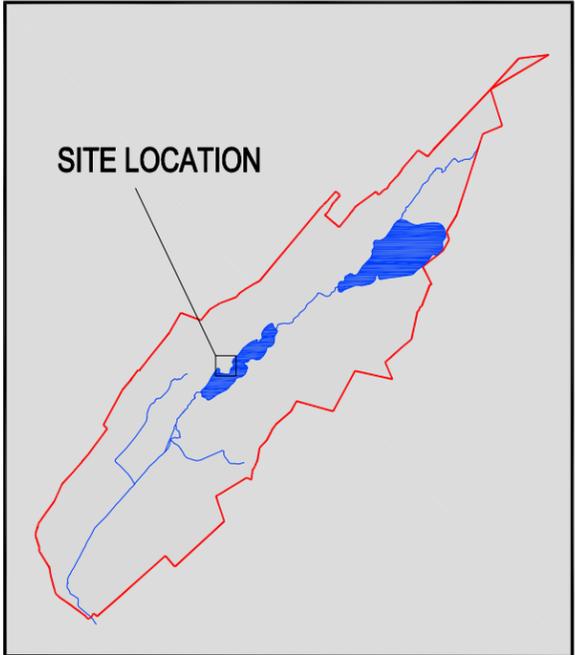
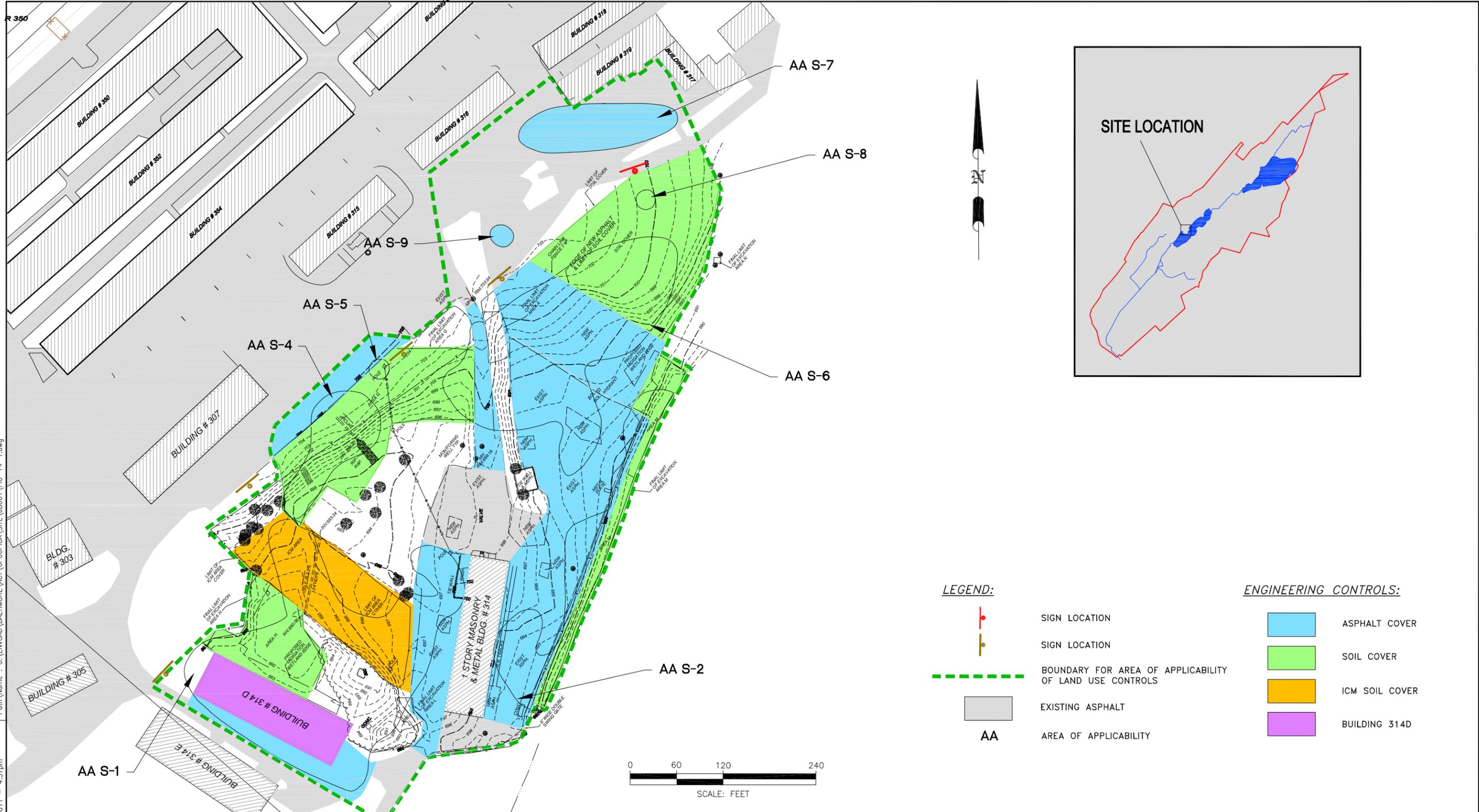
ARCADIS - Edison, NJ  
 101 Fieldcrest Avenue, Suite 5E  
 Edison, NJ 08817  
 Phone: (732) 225-5061  
 Fax: (732) 225-5067

**LAYOUT OF LUC AREA  
 SITE 20/24 (PICA 066)  
 AND AREA B (PICA 205) GROUNDWATER  
 PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER T. LLEWELLYN	DEPARTMENT MANAGER R. KHURI
DRAWN M. GRESS	CHECKED K. BEIER
PROJECT NUMBER GP06PICA.SITE.NB008	DRAWING NUMBER <b>13-1</b>



Path Name : G:\ENVCAD\BALTIMORE\ACT\GPO6PICA\SITE\JB001\FIC-14-1.dwg  
 Date Time : Tue, 24 May 2011 - 4:37pm



**LEGEND:**

-  SIGN LOCATION
-  SIGN LOCATION
-  BOUNDARY FOR AREA OF APPLICABILITY OF LAND USE CONTROLS
-  EXISTING ASPHALT
-  AREA OF APPLICABILITY

**ENGINEERING CONTROLS:**

-  ASPHALT COVER
-  SOIL COVER
-  ICM SOIL COVER
-  BUILDING 314D



**ARCADIS**  
 1114 Benfield Boulevard, Suite A  
 Millersville, Maryland 21108  
 Tel (410) 987-0032 Fax (410) 987-4392

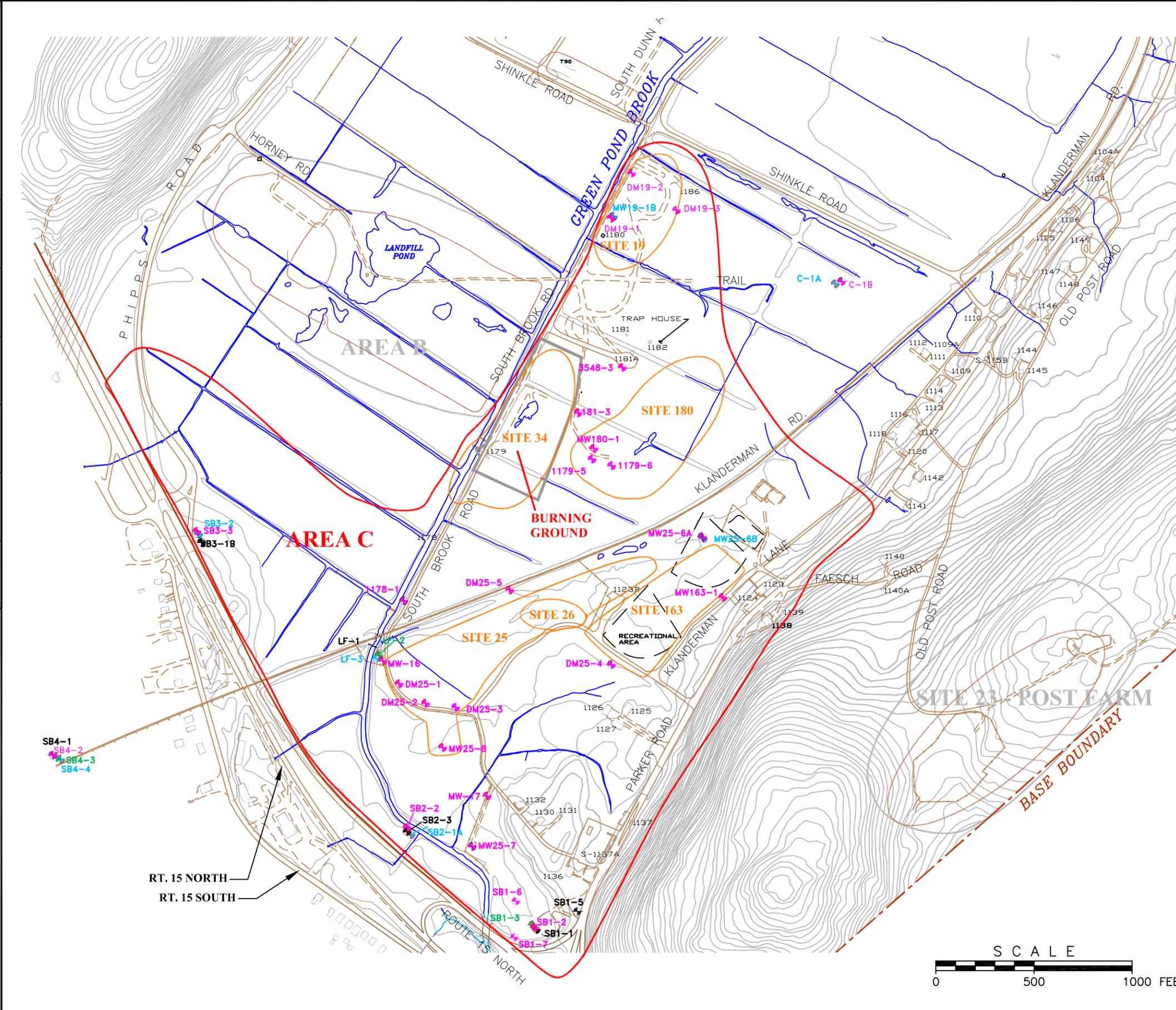
**LAND USE CONTROL PLAN**

**LAYOUT OF LUC AREA  
 GROUP 31/101 (PICA 072)  
 PICATINNY ARSENAL,  
 NEW JERSEY**

PROJECT MANAGER TL	DEPARTMENT MANAGER RK
DRAWN JSG	CHECKED WG
PROJECT NUMBER GPO6PICA.SITE	FIGURE 14-1

DRAWING NUMBER SiteMap013006.dwg  
 APPROVED BY G. Maresca 09/16/08  
 CHECKED BY G. Maresca 11/04/08  
 DRAWN BY S. Wiufe 11/04/08

File: N:\cad\CAD drawings\Picatinny\Area-C\SiteMap013006.dwg  
 Plot Date/Time: Nov 18, 2008 - 2:38pm  
 Plotted By: stephen.wiufe



**MONITORING WELLS**

- WELL SCREENED WITHIN THE UNCONFINED AQUIFER
- WELL SCREENED WITHIN THE LOWER SEMI-CONFINED AQUIFER
- WELL SCREENED WITHIN THE UPPER SEMI-CONFINED AQUIFER
- WELL SCREENED WITHIN THE BEDROCK AQUIFER

**LEGEND**

	RAILROAD		FORMER BUILDING
	TREE LINE		COVERED WALKWAY
	FENCE		SWAMP
	TRANSFORMER		WATER
	BLAST WALL		10' SURFACE CONTOUR
	STORM SEWER		PAVED ROADWAY
	SANITARY SEWER		UNPAVED ROADWAY
	EARTH MOUND		SITE BOUNDARY
	BUILDING		AREA C BOUNDARY

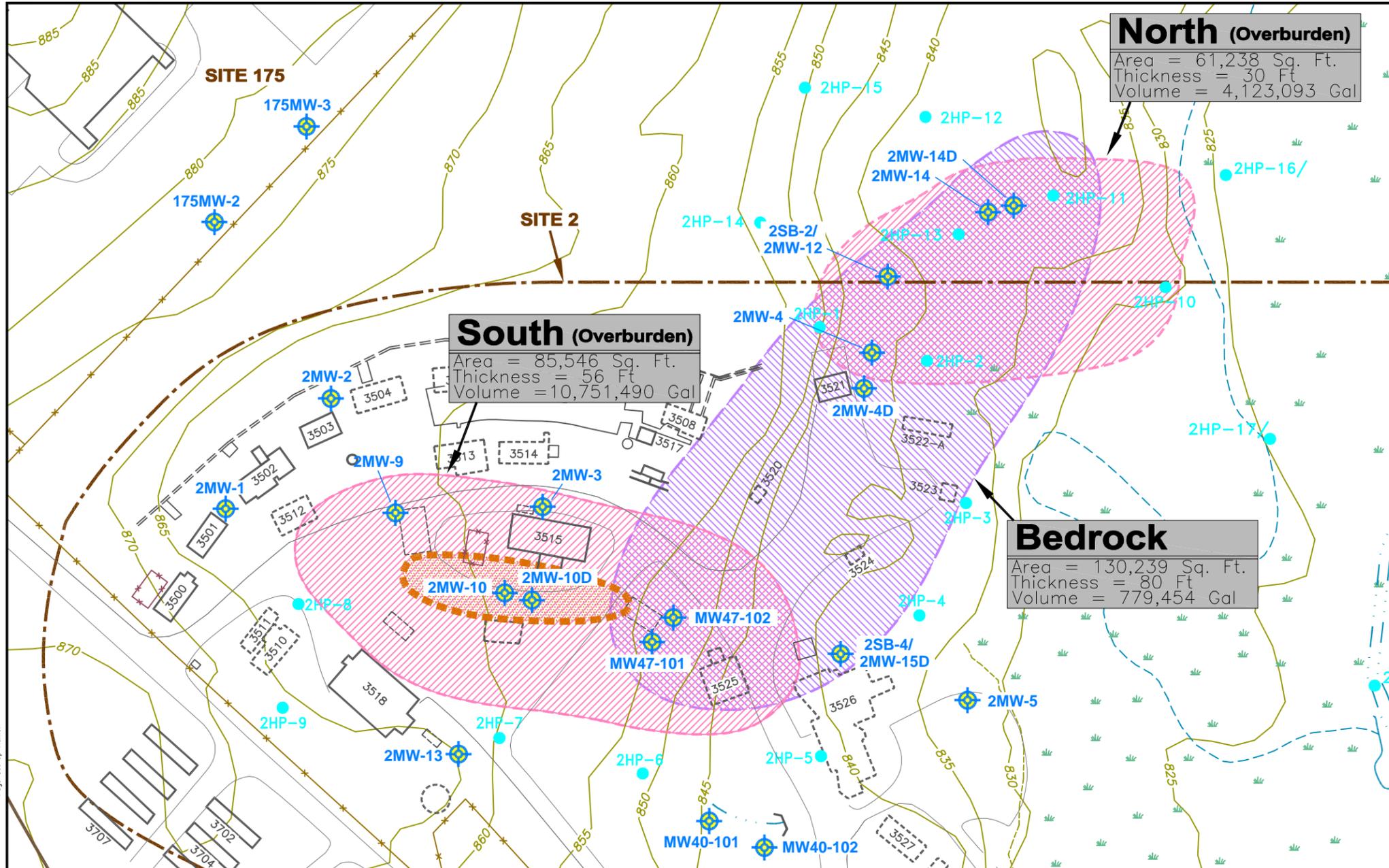
Figure 15-1 was originally prepared by Shaw Environmental, Inc and appeared as Figure 3 in the Final Area C Long Term Monitoring Plan and Land Use Control Remedial Design, dated November 2009.



**Shaw** Shaw Environmental, Inc.  
**Figure 15-1**  
**AREA C/ SOUTH BOUNDARY**  
**MONITORING WELL MAP**  
 PICATINNY ARSENAL, DOVER, NEW JERSEY



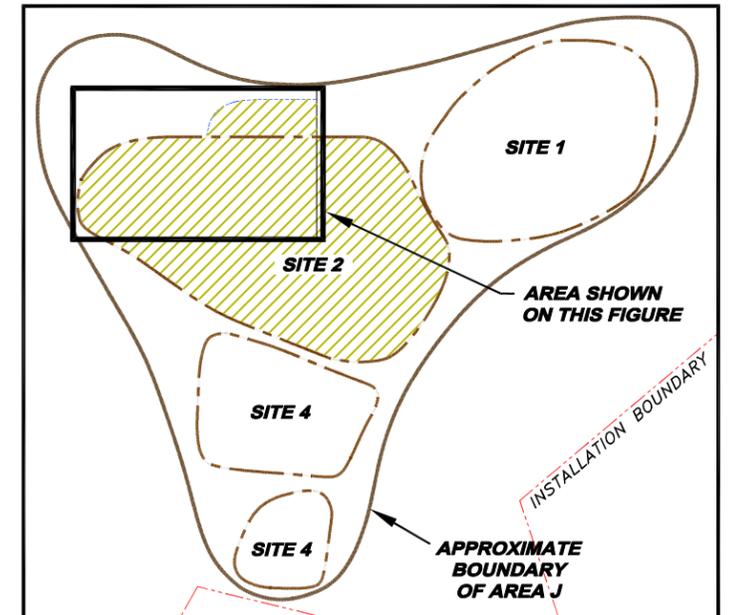
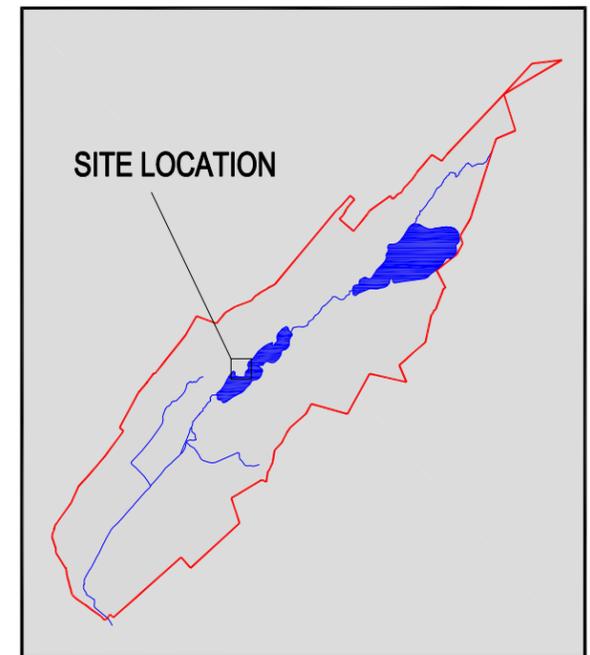
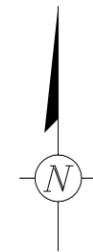
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 Plot Date/Time: 5/24/2011 4:35 PM  
 User Name: Goforth, John



**North (Overburden)**  
 Area = 61,238 Sq. Ft.  
 Thickness = 30 Ft.  
 Volume = 4,123,093 Gal

**South (Overburden)**  
 Area = 85,546 Sq. Ft.  
 Thickness = 56 Ft.  
 Volume = 10,751,490 Gal

**Bedrock**  
 Area = 130,239 Sq. Ft.  
 Thickness = 80 Ft.  
 Volume = 779,454 Gal



- LEGEND:**
- EXISTING MONITORING WELL
  - Hydropunch Locations
  - GROUNDWATER CONTAMINATION IN THE OVERBURDEN
  - GROUNDWATER CONTAMINATION IN THE BEDROCK AQUIFER
  - CARBON TETRACHLORIDE IN GROUNDWATER HOT SPOT (CONCENTRATION EXCEEDING 100 µg/L)
  - AREA OF LUC APPLICABILITY (SHOWN IN KEY PLAN VIEW ONLY)

**NOTES:**

- FOR THIS ALTERNATIVE, PROPOSED REMEDIAL ACTION FOR ALL OVERBURDEN AND BEDROCK PLUMES INCLUDES IMPLEMENTATION OF LUCs.

1114 Benfield Boulevard, Suite A  
 Millersville, Maryland 21108  
 Tel (410) 987-0032 Fax (410) 987-4392

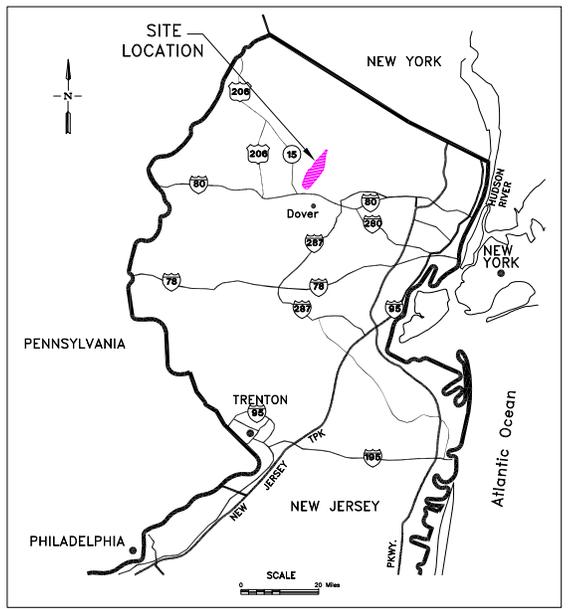
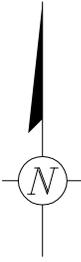
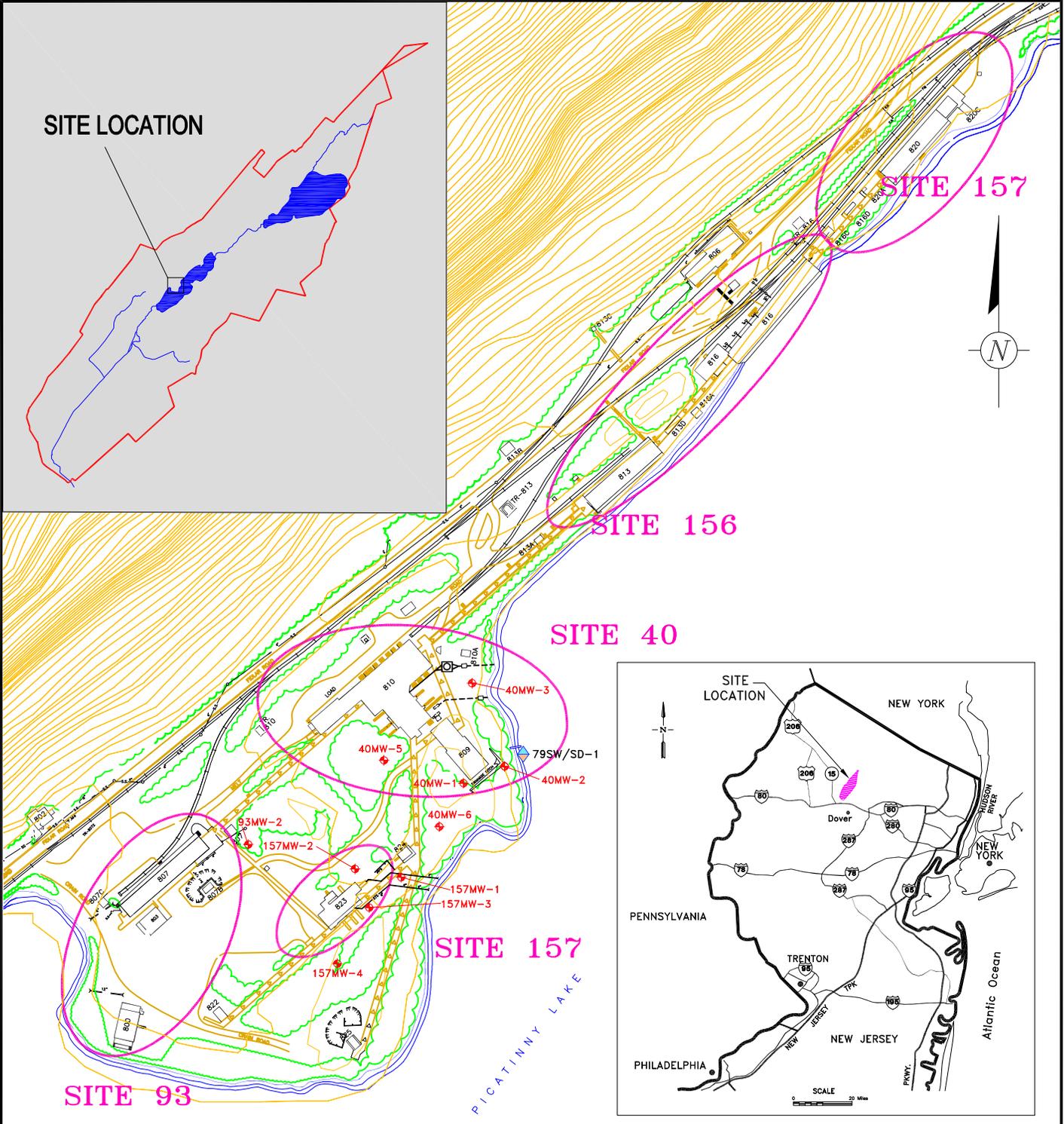
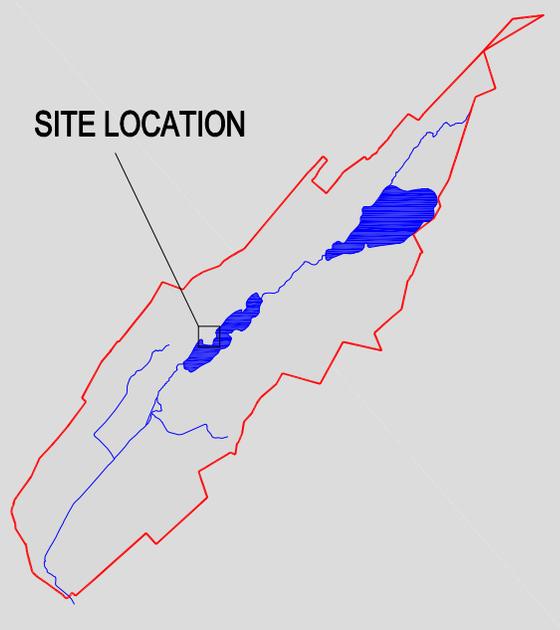
LUC BOUNDARIES MAP

LAYOUT OF LUC AREA  
 GROUP 3 SITES (PICA 008)  
 PICATINNY ARSENAL,  
 NEW JERSEY

PROJECT MANAGER	DEPARTMENT MANAGER
TL	RK
DRAWN	CHECKED
JSG	WG
PROJECT NUMBER	FIGURE
GP06PICA.SITE	16-1

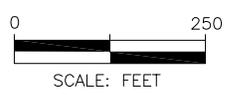
CITY:\(Read) DIV\GROUP\Read) DB\Read) LD\Opt) PIC\Opt) PM\Opt) LVR\Opt\ONL\OFF\REF\ G\ENV\CAD\BALTIMORE\PROJECT\G06\PICA\SITE\SUB001\FIG-17-1.dwg LAYOUT: 17-1 SAVED: 5/24/2011 4:30 PM ACADVER: 18.05 (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 5/24/2011 4:32 PM BY: GOFORTH, JOHN

**SITE LOCATION**



**LEGEND:**

	EARTH MOUND		RAILROAD
	BUILDING		TREE LINE
	FORMER BUILDING		FENCE
	COVERED WALKWAY		TRANSFORMER
	SWAMP		BLAST WALL
	WATER		STORM SEWER
	SITE BOUNDARY		SANITARY SEWER
	SURFACE WATER/SEDIMENT SAMPLING LOCATION		
	SHALLOW MONITORING WELL		



GROUP 1 SITES (PICA 079)  
PICATINNY ARSENAL, DOVER, NEW JERSEY

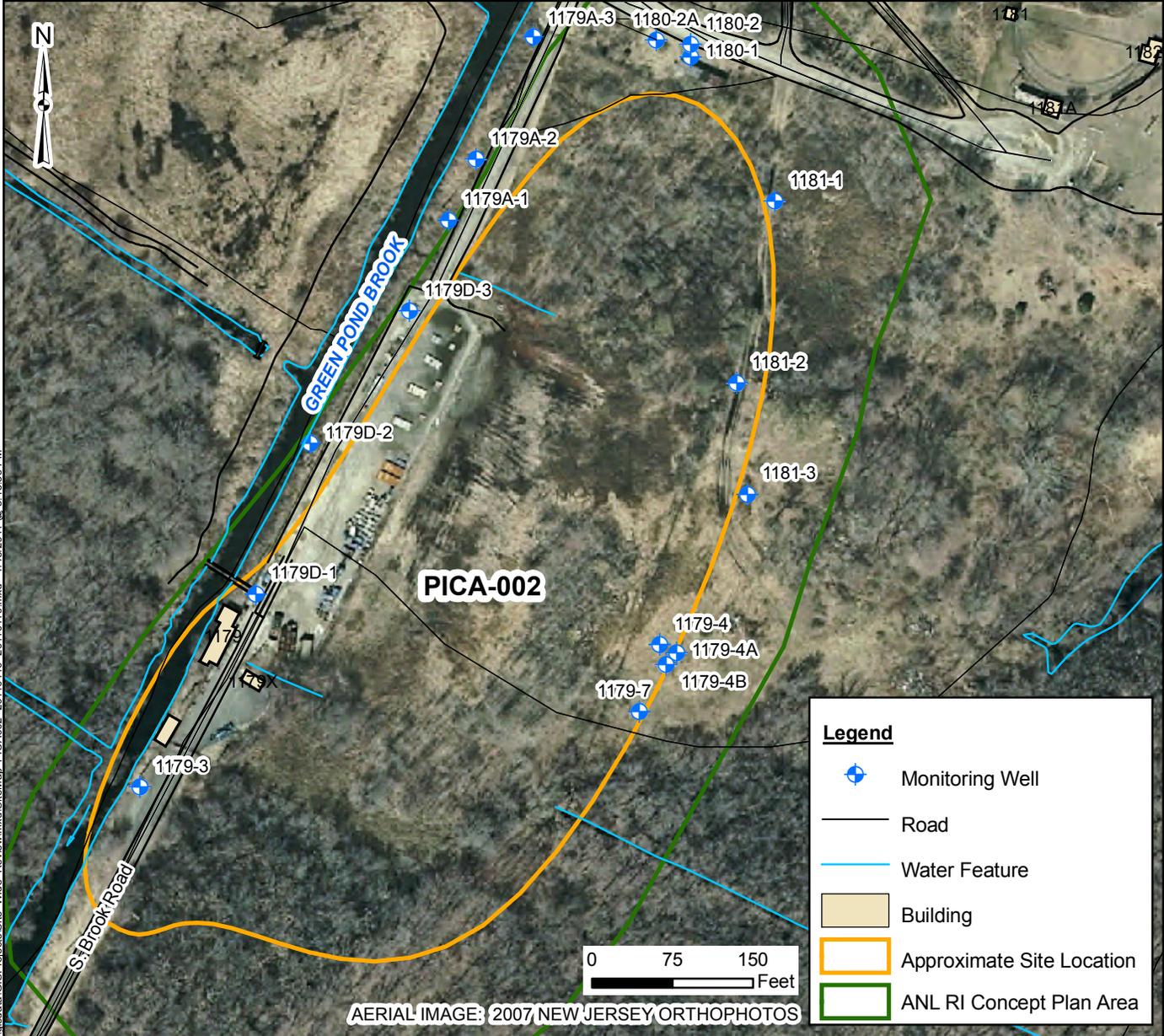
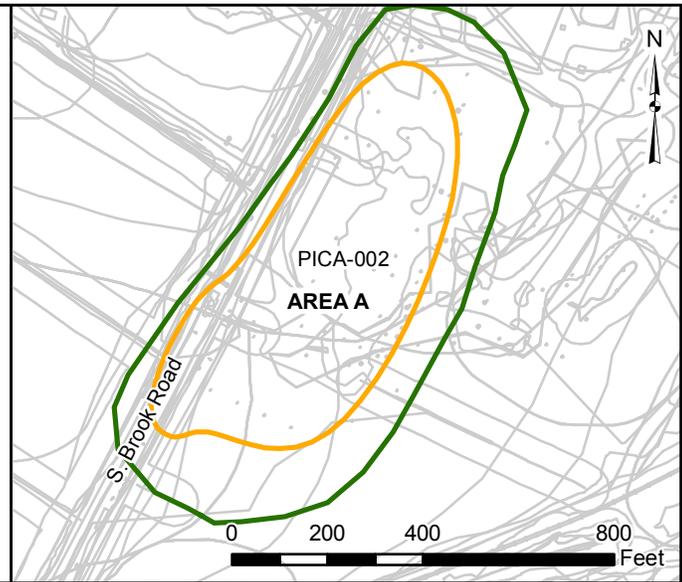
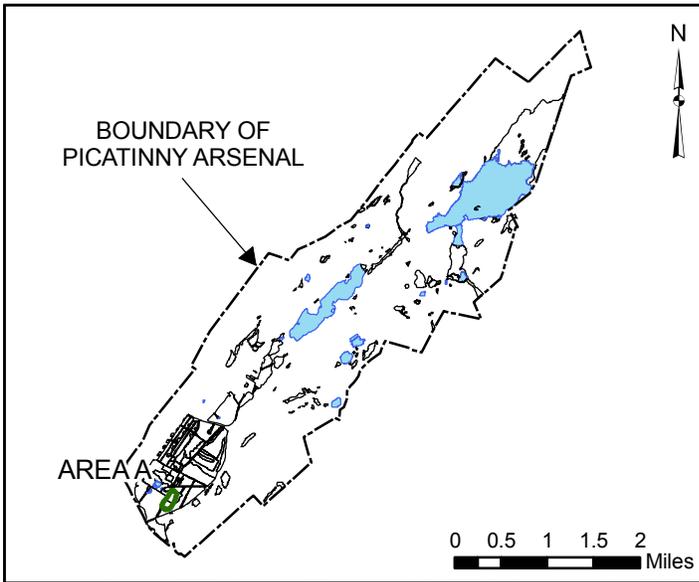
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**SITE LOCATION MAP**

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FIGURE  
**17-1**



**Legend**

- Monitoring Well
- Road
- Water Feature
- Building
- Approximate Site Location
- ANL RI Concept Plan Area

G:\GIS\Projects\Picatinny\GIS\data\GIS\Projects\Site Wide\_Review\mxd\SiteMap\_PICA002\_20110110\_20110110.mxd - 1/13/2011 @ 3:43:56 PM

ARCADIS - Edison, NJ  
101 Fieldcrest Avenue, Suite 5E  
Edison, NJ 08817  
Phone: (732) 225-5061  
Fax: (732) 225-5067

**SITE MAP**  
**SITE 34 (PICA 002) LOWER BURNING GROUND**  
**PICATINNY ARSENAL, NEW JERSEY**

PROJECT MANAGER T. LLEWELLYN	DEPARTMENT MANAGER R. KHURI
DRAWN M. GRESS	CHECKED K. BEIER
PROJECT NUMBER GP06PICA.SITE.NB008	DRAWING NUMBER <b>18-1</b>

## **Appendix A**

Administrative Record

Administrative Record Document List  
 Picatinny Arsenal, New Jersey  
 Disk 1  
 May 26, 2011

Document Control No.	Document Title	Version	Date	PDF Copy	Dominant PICA Sites	All PICA Sites	All RI Sites
PTA.D&M.0001	<a href="#">Site Investigation of Picatinny Arsenal, New Jersey Volume 1, Main Report and Appendices A - E</a>	Draft	Feb-89	Y	8, 50, 162, 53, 54, 55, 182, 58, 59, 60, 61, 6, 1, 20, 23, 65, 66, 67, 68 69, 70, 71, 134, 72, 85, 2, 163	7, 8, 50, 157, 162, 52, 53, 54, 55, 56, 182, 58, 59, 60, 61, 6, 1, 20, 63, 23, 65, 66, 67, 68 69, 70, 71, 18, 72, 73, 74, 2, 21	1, 2, 3, 4, 5, 6, 7, 8, 9,10, 11,12, 13, 14, 15, 16, 17, 18, 19, 20, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
PTA.D&M.0002	<a href="#">Site Investigation of Picatinny Arsenal, New Jersey Vol. 2 Appendix F (Chemical Analysis Results)</a>	Draft	Feb-89	Y	8, 50, 162, 53, 54, 55, 182, 58, 59, 60, 61, 6, 1, 20, 23, 65, 66, 67, 68 69, 70, 71, 134, 72, 85, 2, 163	7, 8, 50, 157, 162, 52, 53, 54, 55, 56, 182, 58, 59, 60, 61, 6, 1, 20, 63, 23, 65, 66, 67, 68 69, 70, 71, 18, 72, 73, 74, 2, 21	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11,12, 13, 14, 15, 16, 17, 18, 19, 20,23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
PTA.D&M.0003	<a href="#">Remedial Investigation Concept Plan for PTA Vol. 1 Environmental Setting, Applicable Regulations, Summaries of Site Sampling Plans, Sampling Priorities, and Supporting Appendices</a>	Final	Mar-91	Y	1, 2, 6, 8, 10, 11, 15, 20, 22, 29,36, 37, 50, 53, 54, 55, 57, 58-61, 63, 65, 66-68, 69-71, 72, 75, 76-79, 84, 85, 88, 91, 92-102, 103, 108, 111, 134, 135, 161, 162, 163, 171, 175, 195	1, 2, 6-8, 10-13, 15, 18, 20-22, 29, 36, 37, 47, 50, 52-61, 63-89, 91-187,195	1-55, 60-66, 69-71, 77-79, 82, 83, 86, 90, 91, 93-98, 100-106, 108-111, 113-115, 117-132, 134-164, 166-178, 180, 182-184
PTA.D&M.0004	<a href="#">Remedial Investigation Concept Plan for PTA Volume 2 Descriptions of and Sampling Plans for RI Sites</a>	Final	Mar-91	Y	1, 2, 6, 8, 10, 11, 15, 20, 22, 29,36, 37, 50, 53, 54, 55, 57, 58-61, 63, 65, 66-68, 69-71, 72, 75, 76-79, 85, 88, 91, 92-102, 103, 108, 111, 134, 135, 161, 162, 163, 171, 175, 195	1, 2, 6-8, 10-13, 15, 18, 20-22, 29, 36, 37, 47, 50, 52-61, 63-89, 91-187,195	1-55, 60-66, 69-71, 77-79, 82, 83, 86, 90, 91, 93-98, 100-106, 108-111, 113-115, 117-132, 134-164, 166-178, 180, 182-184
PTA.D&M.0013	<a href="#">Burning Ground RI Report (RI Concept Plan, Site No. 34 and Area A) Volume I</a>	Draft Final	Dec-94	Y	2	2	34
PTA.D&M.0014A	<a href="#">Burning Ground RI Report (RI Concept Plan, Site No. 34 and Area A) Volume II Appendices A-C</a>			Y	2	2	34
PTA.D&M.0014B	<a href="#">Burning Ground RI Report (RI Concept Plan, Site No. 34 and Area A) Volume III, Appendices D-G</a>	Draft Final	Dec-94	Y	2	2	34
PTA.D&M.0022	<a href="#">Phase I RI Report Vol. 7, Appendix A (Soil Gas, Geophysical, and Radiological Surveys)</a>	Draft	Jul-95	Y	66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 36, 105, 110, 111, 112, 108, 114, 29, 72, 118, 194	63, 66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 29, 116, 117, 118, 119, 194	20, 24, 19, 23, 25, 26, 163, 180, 21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44, 60, 61, 104, 106, 111, 124, 125, 126, 138-146, 31, 52, 95, 96, 101, 134, 135, 136
PTA.D&M.0023	<a href="#">Phase I RI Report Vol. 8, Appendix B (Analytical Chemical Data)</a>	Draft	Jul-95	Y	66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 36, 105, 110, 111, 112, 108, 114, 29, 72, 118, 194	63, 66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 29, 116, 117, 118, 119, 194	20, 24, 19, 23, 25, 26, 163, 180, 21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44, 60, 61, 104, 106, 111, 124, 125, 126, 138-146, 31, 52, 95, 96, 101, 134, 135, 136
PTA.D&M.0024	<a href="#">Phase I RI Report Vol. 9, Appendix B (Analytical Chemical Data; Continued)</a>	Draft	Jul-95	Y	66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 36, 105, 110, 111, 112, 108, 114, 29, 72, 118, 194	63, 66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 29, 116, 117, 118, 119, 194	20, 24, 19, 23, 25, 26, 163, 180, 21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44, 60, 61, 104, 106, 111, 124, 125, 126, 138-146, 31, 52, 95, 96, 101, 134, 135, 136

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Document Control No.	Document Title	Version	Date	PDF Copy	Dominant PICA Sites	All PICA Sites	All RI Sites
PTA.D&M.0025	<a href="#">Phase I RI Report Vol. 10, Appendix B (Analytical Chemical Data: Continued)</a>	Draft	Jul-95	Y	66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 105, 110, 111, 112, 108, 114, 29, 72, 118, 194	63, 66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 29, 116, 117, 118, 119, 194	20, 24, 19, 23, 25, 26, 163, 180, 21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44, 60, 61, 104, 106, 111, 124, 125, 126, 138-146, 31, 52, 95, 96, 101, 134, 135, 136
PTA.D&M.0026	<a href="#">Phase I RI Report Vol. 11, Appendix B (Analytical Chemical Data: Continued)</a>	Draft	Jul-95	Y	66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 36, 105, 110, 111, 112, 108, 114, 29, 72, 118, 194	63, 66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 29, 116, 117, 118, 119, 194	20, 24, 19, 23, 25, 26, 163, 180, 21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44, 60, 61, 104, 106, 111, 124, 125, 126, 138-146, 31, 52, 95, 96, 101, 134, 135, 136
PTA.D&M.0027	<a href="#">Phase I RI Report Vol. 12, Appendix C - E (Hydrogeologic and Physical Testing Data/Data Validation/Physical and Chemical Properties of Contaminants of Concern)</a>	Draft	Jul-95	Y	66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 36, 105, 110, 111, 112, 108, 114, 29, 72, 118, 194	63, 66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 29, 116, 117, 118, 119, 194	20, 24, 19, 23, 25, 26, 163, 180, 21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44, 60, 61, 104, 106, 111, 124, 125, 126, 138-146, 31, 52, 95, 96, 101, 134, 135, 136
PTA.D&M.0028B	<a href="#">Phase I RI Report Vol. 13, Appendices F - G (Ecological Assessment/Risk Assessment Data)</a>	Draft	Jul-95	Y	66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 36, 105, 110, 111, 112, 108, 114, 29, 72, 118, 194	63, 66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 29, 116, 117, 118, 119, 194	20, 24, 19, 23, 25, 26, 163, 180, 21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44, 60, 61, 104, 106, 111, 124, 125, 126, 138-146, 31, 52, 95, 96, 101, 134, 135, 136
PTA.D&M.0035	<a href="#">Phase I RI Report: Historic Aerial Photo-Analysis of Areas B and C</a>	Draft	Feb-98	Y	66, 205, 20, 65, 67, 68, 92, 93, 206	63, 66, 205, 20, 65, 67, 68, 92, 93, 206	20, 24, 19, 23, 25, 26, 163, 180
PTA.D&M.0036	<a href="#">Phase I RI Report Vol. 1, Introduction, Area B</a>	Draft Final	Apr-98	Y	66, 205	63, 66, 205	20, 24
PTA.D&M.0037	<a href="#">Phase I RI Report Vol. 2, Study Area C</a>	Draft Final	Jul-98	Y	20, 65, 67, 68, 92, 93, 206	20, 65, 67, 68, 92, 93, 206	19, 23, 25, 26, 163, 180
PTA.D&M.0038	<a href="#">Phase I RI Report Vol. 3, Study Areas D, and E</a>	Draft Final	Aug-98	Y	120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83	120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83	21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44
PTA.D&M.0039	<a href="#">Phase I RI Report Vol. 4</a>			Y	101, 102, 36, 105, 110, 111, 112, 108, 114	101, 102, 36, 105, 110, 104, 105, 106, 122, 107-115	60, 61, 104, 106, 111, 124, 125, 126, 138-146
PTA.D&M.0040	<a href="#">Phase I RI Report Vol. 5, Section 10, Study Area G</a>	Draft Final	Apr-98	Y	29, 72, 118	72, 89, 121, 29, 116, 117, 118, 119	31, 52, 95, 96, 101, 134, 135, 136
PTA.D&M.0041	<a href="#">Phase I RI Report Vol. 6, Sections 11 &amp; 12, Green Pond Brook Study Area and Fate &amp; Transport</a>	Draft Final	Apr-98	Y	194	194	194
PTA.D&M.0042	<a href="#">Phase I RI Report Vol. 6A, Section 15 (Conclusions and Recommendations)</a>	Draft Final	Dec-97	Y	66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 36, 105, 110, 111, 112, 108, 114, 29, 72, 118, 194	63, 66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 29, 116, 117, 118, 119, 194	20, 24, 19, 23, 25, 26, 163, 180, 21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44, 60, 61, 104, 106, 111, 124, 125, 126, 138-146, 31, 52, 95, 96, 101, 134, 135, 136

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Document Control No.	Document Title	Version	Date	PDF Copy	Dominant PICA Sites	All PICA Sites	All RI Sites
PTA.D&M.0043	<a href="#">Phase I RI Report Vol. 7. Ecological Assessment</a>	Draft Final	Jul-98	Y	66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-77, 83, 101, 102, 36, 105, 110, 111, 112, 108, 114, 29, 72, 118, 194	63, 66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 29, 116, 117, 118, 119, 194	20, 24, 19, 23, 25, 26, 163, 180, 21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44, 60, 61, 104, 106, 111, 124, 125, 126, 138-146, 31, 52, 95, 96, 101, 134, 135, 136
PTA.D&M.0044	<a href="#">Phase I RI Report Vol. 8. Human Health Assessment</a>	Draft Final	May-98	Y	66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 36, 105, 110, 111, 112, 108, 114, 29, 72, 118, 194	63, 66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 29, 116, 117, 118, 119, 194	20, 24, 19, 23, 25, 26, 163, 180, 21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44, 60, 61, 104, 106, 111, 124, 125, 126, 138-146, 31, 52, 95, 96, 101, 134, 135, 136
PTA.D&M.0050	<a href="#">Phase I Remedial Investigation Report Appendix G HHRA Appendices (Methodology of Risk-Based Screening Concentrations)</a>	Revision 1	Sep-97	Y	66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 36, 105, 110, 111, 112, 108, 114, 29, 72, 118, 194	63, 66, 205, 20, 65, 67, 68, 92, 93, 206, 120, 76, 71, 78, 84, 88, 94, 95, 96, 97, 11, 98, 99, 100, 10, 70, 77, 83, 101, 102, 103, 36, 104, 105, 106, 122, 107-115, 72, 89, 121, 29, 116, 117, 118, 119, 194	20, 24, 19, 23, 25, 26, 163, 180, 21, 37, 29, 39, 45, 49, 69, 86, 117, 118, 122, 123, 182, 183, 22, 28, 38, 44, 60, 61, 104, 106, 111, 124, 125, 126, 138-146, 31, 52, 95, 96, 101, 134, 135, 136
OTHFW.0014B	<a href="#">Buildings 31 &amp; 33 Ecological and Human Health Risk Assessment, Picatinny Arsenal, New Jersey</a>	Final	Dec-01	Y	71	71, 84	29, 45
OTHFW.0015	<a href="#">Identification and Analysis of Wetlands, Floodplains Threatened and Endangered Species and Archaeological Geomorphology at Picatinny Arsenal, NJ. Volume I: Text</a>	Draft	Oct-94	Y	facility wide	facility wide	facility wide
OTHFW.0015B	<a href="#">Identification and Analysis of Wetlands, Floodplains Threatened and Endangered Species and Archaeological Geomorphology at Picatinny Arsenal, NJ. Volume II: Plates</a>	Draft Final	Sep-94		facility wide	facility wide	facility wide
OTHFW.0017	<a href="#">Integrated Natural Resources Management Plan</a>	NA	May-01	Y	facility wide	facility wide	facility wide
OTHFW.0022B	<a href="#">Revised Phase I &amp; II RI Report Buildings 31 &amp; 33, PTA New Jersey, Prepared by Environmental Compliance, Inc.</a>		Apr-05	Y	71	71, 84	29, 45
OTHFW.0023	<a href="#">Federal Facility Agreement Under CERCLA Section 120 Between USEPA Region 2 and US Armament Research Development and Engineering Center</a>		1991	Y	facility wide	facility wide	facility wide
OTHFW.0024	<a href="#">Two Letters from Brigadier General Geis to Bruce Venner Regarding Army Policy Towards NJDEP Soil Cleanup Criteria</a>		1999	Y	facility wide	facility wide	facility wide
OTHFW.0025	<a href="#">Soil Management Standard Operating Procedure</a>		Jul-03	Y	facility wide	facility wide	facility wide
OTHFW.0026A	<a href="#">JAN-DEC 2000 Correspondence To EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFW.0026B	<a href="#">JAN-DEC 2001 Correspondence To EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFW.0026C	<a href="#">JAN-DEC 2002 Correspondence To EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFW.0026D	<a href="#">JAN-DEC 2003 Correspondence To EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFW.0026E	<a href="#">JAN-DEC 2004 Correspondence To EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFW.0026F	<a href="#">JAN-DEC 2005 Correspondence To EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFW.0026G	<a href="#">JAN-DEC 2000 Correspondence From EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFW.0026H	<a href="#">JAN-DEC 2001 Correspondence From EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFW.0026I	<a href="#">JAN-DEC 2002 Correspondence From EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide

Administrative Record Document List  
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Document Control No.	Document Title	Version	Date	PDF Copy	Dominant PICA Sites	All PICA Sites	All RI Sites
OTHFw.0026J	<a href="#">JAN-DEC 2003 Correspondence From EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0026K	<a href="#">JAN-DEC 2004 Correspondence From EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0026L	<a href="#">JAN-DEC 2005 Correspondence From EPA</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027A	<a href="#">JAN-DEC 1998 Correspondence From DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027B	<a href="#">JAN-DEC 1999 Correspondence From DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027C	<a href="#">JAN-DEC 2000 Correspondence From DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027D	<a href="#">JAN-DEC 2001 Correspondence From DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027E	<a href="#">JAN-DEC 2002 Correspondence From DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027F	<a href="#">JAN-DEC 2003 Correspondence From DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027G	<a href="#">JAN-DEC 2004 Correspondence From DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027H	<a href="#">JAN-DEC 2000 Correspondence To DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027I	<a href="#">JAN-DEC 2001 Correspondence To DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027J	<a href="#">JAN-DEC 2002 Correspondence To DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027K	<a href="#">JAN-DEC 2003 Correspondence To DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027L	<a href="#">JAN-DEC 2004 Correspondence To DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027M	<a href="#">JAN-DEC 2005 Correspondence To DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0027N	<a href="#">JAN-DEC 2005 Correspondence From DEP</a>		Jun-05	Y	facility wide	facility wide	facility wide
OTHFw.0028	<a href="#">RI Report for LNAPL Area at Well 31-6 Building 31 PTA</a>		Jun-05	Y	71	71, 84	29, 45
OTHFw.0029	<a href="#">Correspondence to Regulators on Site 161 Soil Re-Use and Decentralization Soils Reuse and Time - January 2005</a>		Jan-05	Y	172	161	161
OTHFw.0030	<a href="#">Results for Group 1 ESTCP Demonstration Project, with Correspondence to Regulators</a>		Jul-05	Y	79	79, 139, 151, 152	40, 93, 156, 157
OTHFw.0031	<a href="#">NJDEP Audit in July and October 2004 of Groundwater Sampling for RCRA Units Associated with Former Building 95 Waste Lagoons.</a>		Jul-05	Y	76, 77	76, 77	21, 37, 38
OTHFw.0032	<a href="#">RAB Meeting Minutes 2004/2005</a>		2004/2005	Y	facility wide	facility wide	facility wide
OTHFw.0033	<a href="#">Charter of the U.S. Army Picatinny Arsenal Environmental Restoration Advisory Board (RAB)</a>			Y			
OTHFw.0034	<a href="#">Trichloroethene Treatability Study Demobilization and Final Report For Area D GW, Picatinny Arsenal, NJ - Submitted by PhA-Environmental Restoration</a>	Final	Jul-05	Y	38534		
PTA.TEPS.0005	<a href="#">Coleman Energy and Environmental Systems (CEES) Marine Magnetometer and Bathymetric Survey, PTA</a>	Final	Jun-95	Y	57	57	53
PTA.TEPS.0006	<a href="#">Black Hawk Geosciences - Land Based Surface Geophysical Investigations Conducted at PTA</a>	Final	Jul-95	Y	8, 6, 75, 22, 79, 91, 108, 85, 135, 155	7, 8, 157, 6, 86, 47, 139, 126, 141, 147, 148, 154, 155	1, 2, 4, 16, 47, 63/65, 93, 100, 102, 137, 148, 159, 178
PTA.TEPS.0007	<a href="#">IARGET Environmental Soil Gas Data, PTA</a>		Sep-95	Y	8, 85, 75, 22, 143	7, 8, 157, 73, 85, 86, 47, 141, 143	1, 2, 4, 32, 46, 47, 63/65, 102, 108
PTA.TEPS.0008	<a href="#">Black Hawk Geosciences - Marine Magnetometer and Bathymetric Survey of Picatinny Lake</a>	Final	Sep-95	Y	57	57	53
PTA.TEPS.0009	<a href="#">SEG PTA Scoping Survey Report Vol. 1 of 2</a>	Revision 1	Feb-96	Y	91, 134, 135, 79, 143, 50	91, 123, 128, 134, 137, 12, 139, 143, 154, 50	55, 62, 128, 70, 82, 83, 93, 108, 159, 3
PTA.TEPS.0010	<a href="#">SEG PTA Scoping Survey Report Vol. 2 of 2</a>	Revision 2	Feb-96	Y	91, 134, 135, 79, 143, 50	91, 123, 128, 134, 137, 12, 139, 143, 154, 50	55, 62, 128, 70, 82, 83, 93, 108, 159, 3

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PTA.TO01.0003	<a href="#">Management Plan for PTA PA/SI for Select Phase III RI Concept Plan Defined Sites and other Buildings within the RI Concept Area L</a>	Final	Mar-96	Y	1, 75, 195, 163, 171, 176, 177, 181, 15, 75, 175, 53, 85, 183, 69, 13, 184, 200	1, 75, 80, 81, 37, 163, 164, 165, 166, 172, 173, 174, 168, 169, 170, 171, 176, 177, 191, 175, 178, 179, 180, 53, 15, 183, 69, 13, 184, 185, 186, 187, 200	17, 18, 36, 41, 42, 51, 91, 103, 114, 160, 161, 162, 166, 168, 169, 170, 171, 176, 177, 188, 115, 152, 153, 154, 7, 54, 164, 27, 78, 94, 119, 120, 121, 200
PTA.TO01.0013	<a href="#">PA/SI Report for Non-Evaluated Phase III RI Concept Plan Sites and Additional Sites Within RI Concept Plan Area L Vol. 1 Sites with Recommendations for No Further Action</a>	Draft Final Revision1	Jan-98	Y	75, 195, 176, 177, 200, 175, 53, 183	75, 81, 37, 166, 176, 177, 200, 180, 53, 183	36, 42, 51, 160, 176, 177, 200, 154, 7, 164
PTA.TO01.0014	<a href="#">PTA Phase III PA/SI Vol. 2 Further Action Sites</a>	Draft Final Revision1	Jan-98	Y	1, 163, 171, 181, 15, 75, 85, 69, 13, 184, 200	80, 165, 173, 174, 169, 170, 171, 191, 200, 175, 178, 179, 185, 186, 187	41, 114, 162, 166, 169, 170, 171, 188, 200, 115, 152, 153, 119, 120, 121,
PTA.TO01.0018	<a href="#">PTA Facility-Wide Field Sampling Plan</a>	Final	Sep-98	Y			
PTA.TO01.0020A	<a href="#">PTA Facility Wide Health and Safety Plan, Vol 1 Final, Revision 1</a>	Final Revision 1	Jul-05	Y			
PTA.TO01.0029C	<a href="#">PTA QAPP Main Document and Appendix A</a>	Final Revision 1	May-99	Y			
PTA.TO01.0029D	<a href="#">PTA QAPP Main Document and Appendix B</a>	Final Revision 3	Aug-04	Y			
PTA.TO01.0033C	<a href="#">PTA QAPP Appendix D</a>	Final Revision 3	Jan-03	Y			
PTA TO05.0002A	<a href="#">Draft Phase II Test Pit Results Summaries</a>	Draft	Feb-97	Y	91, 85, 75, 79, 135, 155, 8, 108	126, 74, 86, 139, 141, 154, 155, 7, 8, 157, 147	100, 33, 47, 93, 102, 159, 178, 1, 2, 4, 137
PTA.TO05.0005F	<a href="#">PTA Phase II RI Report Round 1 Vol. 1</a>	Draft Final	Apr-99	Y	NA	NA	NA
PTA.TO05.0005G	<a href="#">PTA Phase II RI Report Round 1, Vol. 1, General Appendices A &amp; B</a>	Draft Final	Apr-99	Y	91, 134, 135, 79, 50, 8, 85, 75, 22, 143	91, 123, 128, 134, 137, 12, 139, 154, 50, 7, 8, 157, 73, 85, 86, 47, 141, 143	55, 62, 128, 70, 82, 83, 93, 159, 1, 2, 3, 4, 32, 46, 47, 63/65, 102, 108
PTA.TO05.0005H	<a href="#">PTA Phase II RI Report Round 1, Vol. 1, General Appendices C, D, &amp; E</a>	Draft Final	Apr-99	Y	8, 6, 75, 22, 79, 91, 108, 85, 135, 155, 57	7, 8, 157, 6, 86, 47, 139, 126, 141, 147, 148, 154, 155, 57	1, 2, 4, 16, 47, 53, 63/65, 93, 100, 102, 137, 148, 159, 178
PTA.TO05.0005I	<a href="#">PTA Phase II RI Report Round 1, Vol. 1, General Appendices F, G, H, I-A &amp; I-B</a>	Draft Final	Apr-99	Y	All Area I Sites	All Area I Sites	All Area I Sites
PTA.TO05.0005J	<a href="#">PTA Phase II RI Report Round 1, Vol. 2 Area H Sites</a>	Draft Final	Apr-99	Y	91, 175, 190	91, 123-133, 193	55, 62, 64, 98, 100, 127-132, 151, 190
PTA.TO05.0005K	<a href="#">PTA Phase II RI Report Round 1, Vol. 2 Area H Specific Appendices</a>	Draft Final	Apr-99	Y	91, 175, 190	91, 123-133, 193	55, 62, 64, 98, 100, 127-132, 151, 190
PTA.TO05.0005L	<a href="#">PTA Phase II RI Report Round 1 Vol. 3 Area I, 1A Sites Recommended for Additional Investigation</a>	Draft Final	Apr-99	Y	6, 134, 79, 85, 75, 22, 136, 143	6, 18, 79, 85, 86, 47, 136, 143, 152	16, 30, 40, 46, 47, 63/65, 79, 108, 157
PTA.TO05.0005M	<a href="#">PTA Phase II RI Report Round 1, Vol. 3 Area I, 2A/3A Sites Recommended for Additional Investigation</a>	Draft Final	Apr-99	Y	22, 108, 79, 75, 85, 144, 135, 155	22, 138, 139, 141, 142, 144, 147-151, 154, 155	50, 90, 93, 102, 105, 109, 137, 148, 149, 150, 156, 159, 178
PTA.TO05.0005N	<a href="#">PTA Phase II RI Report Round 1 Vol. 3, Area I No Further Action Sites</a>	Draft Final	Apr-99	Y	85, 57, 134, 135,	73, 74, 57, 134, 135, 137, 12, 140, 146, 64, 153, 156	32, 33, 53, 70, 71, 82, 83, 97, 113, 147, 158, 184
PTA.TO05.0005O	<a href="#">PTA Phase II RI Report Round 1, Vol. 3, Area I Specific Appendices</a>	Draft Final	Apr-99	Y	6, 134, 79, 85, 75, 22, 136, 143, 22, 108, 144, 135, 155, 57	6, 18, 79, 85, 86, 47, 136, 143, 152, 22, 138, 139, 141, 142, 144, 147-151, 154, 155, 73, 74, 57, 134, 135, 137, 12, 140, 146, 64, 153, 156	16, 30, 40, 46, 47, 63/65, 79, 108, 157, 50, 90, 93, 102, 105, 109, 137, 148, 149, 150, 156, 159, 178, 32, 33, 53, 70, 71, 82, 83, 97, 113, 147, 158, 184
PTA.TO05.0005P	<a href="#">PTA Phase II RI Report Round 1, Vol. 3, Area I Specific Appendices</a>	Draft Final	Apr-99	Y	6, 134, 79, 85, 75, 22, 136, 143, 22, 108, 144, 135, 155, 57	6, 18, 79, 85, 86, 47, 136, 143, 152, 22, 138, 139, 141, 142, 144, 147-151, 154, 155, 73, 74, 57, 134, 135, 137, 12, 140, 146, 64, 153, 156	16, 30, 40, 46, 47, 63/65, 79, 108, 157, 50, 90, 93, 102, 105, 109, 137, 148, 149, 150, 156, 159, 178, 32, 33, 53, 70, 71, 82, 83, 97, 113, 147, 158, 184
PTA.TO05.0005Q	<a href="#">PTA Phase II RI Report Round 1, Vol. 4 Area J Sites</a>	Draft Final	Apr-99	Y	8, 158	7, 8, 157, 158	1, 2, 4, 175

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PTA.TO05.0005R	<a href="#">PTA Phase II RI Report Round 1, Vol. 5, Area K</a>	Draft Final	Apr-99	Y	50, 87, 161	50, 87, 159-161	3, 48, 172, 173, 174
PTA.TO05.0008C	<a href="#">Ecological Risk Assessment RI/FS PTA Phase II Vol. I (Text &amp; Tables)</a>	Draft Final	Feb-00	Y	91, 193, 6, 85, 79, 57, 22, 135, 75, 143, 161, 8, 50	124, 127, 193, 6, 74, 79, 57, 47, 137, 141, 143, 146, 151-154, 161, 8, 50, 157	64, 127, 190, 16, 33, 40, 53, 63/65, 82, 102, 108, 113, 156, 157, 158, 159, 174, 2, 3, 4
PTA.TO05.0008D	<a href="#">Ecological Risk Assessment RI/FS Draft Phase II Vol. II (Figures)</a>	Draft Final	Feb-00	Y	91, 193, 6, 85, 79, 57, 22, 135, 75, 143, 161, 8, 50	124, 127, 193, 6, 74, 79, 57, 47, 137, 141, 143, 146, 151-154, 161, 8, 50, 157	64, 127, 190, 16, 33, 40, 53, 63/65, 82, 102, 108, 113, 156, 157, 158, 159, 174, 2, 3, 4
PTA.TO05.0008E	<a href="#">Ecological Risk Assessment RI/FS Draft Phase II Vol. III (Appendices)</a>	Draft Final	Feb-00	Y	91, 193, 6, 85, 79, 57, 22, 135, 75, 143, 161, 8, 50	124, 127, 193, 6, 74, 79, 57, 47, 137, 141, 143, 146, 151-154, 161, 8, 50, 157	64, 127, 190, 16, 33, 40, 53, 63/65, 82, 102, 108, 113, 156, 157, 158, 159, 174, 2, 3, 4
PTA TO05.0012C	<a href="#">PTA Phase II Sites SW &amp; Sediment Supplemental Human Health Risk Assessment</a>	Final	Nov-01	Y	85, 79, 22, 135, 143, 111, 8	74, 79, 47, 135, 137, 139, 143, 144, 146, 151-154, 7	33, 40, 63/65, 71, 82, 93, 108, 109, 113, 156, 157, 158, 159, 1
PTA.TO05.0013O	<a href="#">PTA Phase II Group I Sites, RI Report, Sites 40, 93, 156 &amp; 157 Volume 1</a>	Final	Jun-02	Y	79	79, 139, 151, 152	40, 93, 156, 157
PTA.TO05.0013P	<a href="#">PTA Phase II Group I Sites, RI Report, Sites 40, 93, 156 &amp; 157 Volume 2 - Site 40</a>	Final	Jun-02	Y	79	79	40
PTA.TO05.0013Q	<a href="#">PTA Phase II Group I Sites, RI Report, Sites 40, 93, 156 &amp; 157 Volume 3 - Site 93</a>	Final	Jun-02	Y	79	139	93
PTA.TO05.0013R	<a href="#">PTA Phase II Group I Sites, RI Report, Sites 40, 93, 156 &amp; 157 Volume 4 - Site 156</a>	Final	Jun-02	Y	79	151	156
PTA.TO05.0013S	<a href="#">PTA Phase II Group I Sites, RI Report, Sites 40, 93, 156 &amp; 157 Volume 5 - Site 157</a>	Final	Jun-02	Y	79	152	157
PTA.TO05.0013T	<a href="#">PTA Phase II Group I Sites, RI Report, Sites 40, 93, 156 &amp; 157 Volume 6 - Groupwide Groundwater &amp; Data Gap Investigation Work Plan</a>	Final	Jun-02	Y	79	79, 139, 151, 152	40, 93, 156, 157
PTA.TO05.0013U	<a href="#">PTA Phase II Group I Sites, RI Report, Sites 40, 93, 156 &amp; 157 Volume 7 - Appendices</a>	Final	Jun-02	Y	79	79, 139, 151, 152	40, 93, 156, 157
PTA.TO07.0003D	<a href="#">Report for PTA Soil Gas Infiltration Study Buildings within the RI Concept Area D</a>	Final	Nov-97	Y	76	76	37
PTA.TO07.0004C	<a href="#">Site 23-Post Farm Landfill Additional Investigation Data Report -Vol. 2 Appendices</a>	Draft Final	Nov-97	Y	65	65	23
PTA.TO07.0004D	<a href="#">Site 23-Post Farm Landfill Additional Investigation Data Report -Vol. 1 -Data</a>	Draft Final Revision 1	Dec-97	Y	65	65	23
PTA.TO07.0006C	<a href="#">Site 20/24 Data Report and Additional Investigation Workplan - PTA Phase I, Area B</a>	Final	May-98	Y	66	63, 66	20/24
PTA.TO07.0007H	<a href="#">Phase I Additional RI Sites 22, 44, 61, 104, 122, 135, 141 and 145 Volume 1, Report</a>	Final	Sep-99	Y	10, 83, 103, 11, 118, 110, 114	10, 83, 102, 103, 11, 118, 110, 114	22, 44, 61, 104, 122, 135, 141, 145
PTA.TO07.0007I	<a href="#">Phase I Additional RI Sites 22, 44, 61, 104, 122, 135, 141 and 145 Volume 2, Appendices</a>	Final	Sep-99	Y	10, 83, 103, 11, 118, 110, 114	10, 83, 102, 103, 11, 118, 110, 114	22, 44, 61, 104, 122, 135, 141, 145
PTA.TO07.0008K	<a href="#">Area D Groundwater FS</a>	Final	May-03	Y	76	76	37
PTA.TO17.0002C	<a href="#">Work Plan for Areas F &amp; G Groundwater, RI</a>	Final	Dec-98	Y	204	204	204
PTA.TO17.0002F	<a href="#">Results of Geophysical Survey Conducted as Part of the Mid-Valley Groundwater Additional Investigation</a>	NA	Feb-03	Y	204	204	204
PTA.TO17.0003G	<a href="#">Institutional Controls Proposed Plan for Soils at Sites 19, 28, 44, 49, 86, 106, 124, 135, 141, 143, 163, 182 and 183 at PTA</a>	Final Revision 1	Jun-01	Y	20, 70, 83, 88, 95, 36, 105, 118, 110, 112, 92, 99, 100	20, 70, 83, 88, 95, 36, 105, 118, 110, 112, 92, 99, 100	19, 28, 44, 49, 86, 106, 124, 135, 141, 143, 163, 182, 183
PTA.TO17.0009B	<a href="#">PTA Well Maintenance Program Groundwater Well Inspection, Upgrade, and Maintenance Report-1998</a>	Final	Mar-99	Y	Facility-wide	Facility-wide	Facility-wide
PTA.TO17.0009C	<a href="#">PTA Well Maintenance Program Groundwater Well Inspection, Upgrade, and Maintenance Report-1999</a>	Draft	Sep-99	Y	Facility-wide	Facility-wide	Facility-wide
PTA.TO17.0009D	<a href="#">PTA Well Maintenance Program Groundwater Well Inspection, Upgrade, and Maintenance Report-2000</a>	Draft	Dec-00	Y	Facility-wide	Facility-wide	Facility-wide

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PTA.TO17.0009E	<a href="#">PTA Well Maintenance Program Groundwater Well Inspection, Upgrade, and Maintenance Report-2001</a>	Draft	May-01	Y	Facility-wide	Facility-wide	Facility-wide
PTA.TO17.0009F	<a href="#">PTA Well Maintenance Program Groundwater Well Inspection, Upgrade, and Maintenance Report-2002</a>	Draft	Jul-02	Y	Facility-wide	Facility-wide	Facility-wide
PTA.TO17.0009G	<a href="#">PTA Well Maintenance Program Groundwater Well Inspection, Upgrade, and Maintenance Report-2003</a>	Draft	Jul-03	Y	Facility-wide	Facility-wide	Facility-wide
PTA.TO17.0009H	<a href="#">PTA Well Maintenance Program Groundwater Well Inspection, Upgrade, and Maintenance Report - 2004</a>	Draft	Nov-04	Y	Facility-wide	Facility-wide	Facility-wide
PTA.TO17.0011C	<a href="#">PTA Green Pond &amp; Bear Swamp Brooks, FS</a>	Final	May-01	Y	193	193, 194	190
PTA.TO17.0011D	<a href="#">PTA Green Pond &amp; Bear Swamp Brooks, FS - Exhibit Maps</a>	Final	May-01	Y	193	193, 194	190
PTA.TO17.0012D	<a href="#">PTA Site 34 FS Report</a>	Final	Aug-01	Y	2	2	34
PTA.TO17.0014D	<a href="#">Screening-Level Ecological Risk Assessment Site 54 - Lake Denmark RI/FS</a>	Final	May-01	Y	15	15	54
PTA.TO17.0015B	<a href="#">Risk Management Plan for 9 Sites in the Phase I Area, PTA</a>	Draft Final	Aug-00	Y	67, 68, 93, 10, 77, 108, 96, 102, 94	67, 68, 93, 10, 77, 109, 96, 102, 94	25, 26, 180, 22, 38, 140, 117, 61, 69
PTA.TO17.0016DQ	<a href="#">2003 Semi-Annual Groundwater Monitoring Report - 2nd Half</a>		Dec-03	Y	76	76	37
PTA.TO17.0016EL	<a href="#">2004 Semi-Annual Groundwater Monitoring Report</a>		Jun-04	Y	76	76	37
PTA.TO17.0016EM	<a href="#">2004 Semi-Annual Groundwater Monitoring Report</a>		Nov-04	Y	76	76	37
PTA.TO17.0016FJ	<a href="#">Groundwater Pump &amp; Treatment Facility Operations And Maintenance Manual - Volume I</a>	Draft	May-95	Y			
PTA.TO17.0016FK	<a href="#">Final Contingency Plan IGIS</a>	Revised	Jan-99	Y			
PTA.TO17.0016FL	<a href="#">Groundwater Pump &amp; Treatment Facility Operations And Maintenance Manual - Volume II</a>		Mar-96	Y			
PTA.TO17.0016FM	<a href="#">2nd Half 2005 Semi-Annual Groundwater/Surface Water Monitoring Report</a>		Sep-05	Y			
PTA.TO17.0016FT	<a href="#">GWTP 1st Half 2005 Semi-Annual GW/SW Monitoring</a>		Mar-05	Y			
PTA.TO17.0017A	<a href="#">Data Collected at Site 104 to Resolve NJDEP Comments</a>		May-99	Y	102	103	104
PTA.TO17.0018C	<a href="#">Phase III-1A Human Health Risk Assessment (HHRA) Approach</a>	Final	Apr-01	Y	162, 1, 163, 195, 53, 15, 69, 13, 184	162, 52, 1, 21, 167, 82, 163, 164, 172, 168, 56, 15, 69, 13, 184	5, 6, 17, 18, 35, 167, 43, 91, 103, 161, 168, 10, 54, 27, 78, 94
PTA.TO17.0020C	<a href="#">PTA Facility-Wide Background Study</a>	Final	May-02	Y	Facility-wide	Facility-wide	Facility-wide
PTA.TO17.0023D	<a href="#">Area E Groundwater FS</a>	Final	Nov-02	Y	77	77	38
PTA.TO17.0026A	<a href="#">Phase II &amp; III-A Pb, sumps, dry wells, catch tanks, and catch basins summary.</a>		Dec-00	Y	91, 6, 79, 22, 136, 134, 108, 139, 75, 85, 143, 151, 155, 8, 135, 157, 50, 161, 163, 1	132, 6, 79, 22, 136, 12, 138, 139, 141, 142, 143, 64, 150, 151, 155, 7, 154, 157, 50, 161, 163, 1, 21, 172	132, 16, 40, 50, 79, 83, 90, 93, 102, 105, 108, 147, 150, 156, 178, 1, 159, 4, 3, 174, 91, 17, 35, 161
PTA.TO17.0028E	<a href="#">Area B Groundwater FS Volume 1</a>	Final	Apr-02	Y	205	205	Area B GW
PTA.TO17.0028F	<a href="#">Area B Groundwater FS Volume 2 (Appendices)</a>	Final	Apr-02	Y	205	205	Area B GW
PTA.TO17.0039E	<a href="#">Land Use Control Record of Decision For Soils at Sites 19, 28, 44, 49, 86, 106, 124, 135, 141, 143, 163, 182 and 183</a>	Final Revision 2	Dec-04	Y	20, 70, 83, 88, 95, 36, 105, 118, 110, 112, 92, 99, 100	20, 70, 83, 88, 95, 36, 105, 118, 110, 112, 92, 99, 100	19, 28, 44, 49, 86, 106, 124, 135, 141, 143, 163, 182, 183
PTA.TO17.0044D	<a href="#">Proposed Plan for Site 23</a>	Final Revision 1	Dec-03	Y	65	65	23
PTA.TO17.0046A	<a href="#">Facility Wide Land Use Control Assurance Plan (LUCAP) for PTA NJ</a>	Draft	Jan-02	Y	Facility-wide	Facility-wide	Facility-wide
PTA.TO17.0047A	<a href="#">Phase II Group 3 Sites, RI Report, Sites 1, 2 &amp; 4, Volume 1</a>	Final	Oct-01	Y	8	7, 8, 157	1, 2, 4
PTA.TO17.0047B	<a href="#">Phase II Group 3 Sites, RI Report, Sites 1, 2 &amp; 4, Volume 2 – Site 1</a>	Final	Oct-01	Y	8	7	1
PTA.TO17.0047C	<a href="#">Phase II Group 3 Sites, RI Report, Sites 1, 2 &amp; 4, Volume 3 – Site 2</a>	Final	Oct-01	Y	8	8	2
PTA.TO17.0047D	<a href="#">Phase II Group 3 Sites, RI Report, Sites 1, 2 &amp; 4, Volume 4 – Site 4</a>	Final	Oct-01	Y	8	157	4

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PTA.TO17.0047E	<a href="#">Phase II Group 3 Sites, RI Report, Sites 1, 2 &amp; 4, Volume 5 – Groupwide Groundwater</a>	Final	Oct-01	Y	8	7, 8, 157	1, 2, 4
PTA.TO17.0047F	<a href="#">PTA Phase II Group 3 Sites RI Report Sites 1, 2, &amp; 4 Volume 6 - Appendices</a>	Final	Oct-01	Y	8	7, 8, 157	1, 2, 4
PTA.TO17.0047G	<a href="#">Phase II Group 3 Sites, RI Report, Section 7 Revision</a>	Final	Apr-02	Y	8	7, 8, 157	1, 2, 4
PTA.TO17.0048S	<a href="#">Phase III-1A Sites RI Report General Sections Volume 1 Binder 1</a>	Final	Apr-05	Y	162, 1, 163, 195, 53, 15, 69, 13, 184	162, 52, 1, 21, 167, 82, 163, 164, 172, 168, 56, 15, 69, 13, 184	5, 6, 17, 18, 35, 167, 43, 91, 103, 161, 168, 10, 54, 27, 78, 94
PTA.TO17.0048T	<a href="#">Phase III-1A Sites RI Report General Sections Area L Volume 2 Binder 2 Sites 5, 6, 18, 35, 167</a>	Final	Apr-05	Y	162, 1, 163, 195	162, 52, 1, 21, 167	5, 6, 18, 35, 167
PTA.TO17.0048U	<a href="#">Phase III-1A Sites RI Report General Sections Area L Volume 2 Binder 3 Sites 3, 91, 103, 161, 168 Groundwater Assessment</a>	Final	Apr-05	Y	162, 1, 163, 195	162, 52, 1, 21, 167, 82, 163, 164, 172, 168	5, 6, 18, 35, 167, 43, 91, 103, 161, 168
PTA.TO17.0048V	<a href="#">Phase III-1A Sites RI Report General Sections Area N- Site 10 Volume 3 Binder 4</a>	Final	Apr-05	Y	53	56	10
PTA.TO17.0048W	<a href="#">Phase III-1A Sites RI Report General Sections Area O Site 54 Volume 4 Binder 5</a>	Final	Apr-05	Y	15	15	54
PTA.TO17.0048X	<a href="#">Phase III-1A Sites RI Report General Sections Area P Volume 5 Binder 6</a>	Final	Apr-05	Y	69, 184	69, 184	27, 94
PTA.TO17.0048Y	<a href="#">Phase III-1A Sites RI Report Appendices A &amp; B Binder 7</a>	Final	Apr-05	Y	162, 1, 163, 195, 53, 15, 69, 13, 184	162, 52, 1, 21, 167, 82, 163, 164, 172, 168, 56, 15, 69, 13, 184	5, 6, 17, 18, 35, 167, 43, 91, 103, 161, 168, 10, 54, 27, 78, 94
PTA.TO17.0048Z	<a href="#">Phase III-1A Sites RI Report Appendices C &amp; D Binder 8</a>	Final	Apr-05	Y	162, 1, 163, 195, 53, 15, 69, 13, 184	162, 52, 1, 21, 167, 82, 163, 164, 172, 168, 56, 15, 69, 13, 184	5, 6, 17, 18, 35, 167, 43, 91, 103, 161, 168, 10, 54, 27, 78, 94
PTA.TO17.0048AA	<a href="#">Phase III-1A Sites RI Report Appendices E &amp; F Binder 9</a>	Final	Apr-05	Y	162, 1, 163, 195, 53, 15, 69, 13, 184	162, 52, 1, 21, 167, 82, 163, 164, 172, 168, 56, 15, 69, 13, 184	5, 6, 17, 18, 35, 167, 43, 91, 103, 161, 168, 10, 54, 27, 78, 94
PTA.TO17.0048AB	<a href="#">Phase III-1A Sites RI Report Appendices G, H, I, J, K &amp; L Binder 10</a>	Final	Apr-05	Y	162, 1, 163, 195, 53, 15, 69, 13, 184	162, 52, 1, 21, 167, 82, 163, 164, 172, 168, 56, 15, 69, 13, 184	5, 6, 17, 18, 35, 167, 43, 91, 103, 161, 168, 10, 54, 27, 78, 94
PTA.TO17.0048AC	<a href="#">Phase III-1A Sites RI Report Appendices M, N, O, &amp; P Binder 11</a>	Final	Apr-05	Y	162, 1, 163, 195, 53, 15, 69, 13, 184	162, 52, 1, 21, 167, 82, 163, 164, 172, 168, 56, 15, 69, 13, 184	5, 6, 17, 18, 35, 167, 43, 91, 103, 161, 168, 10, 54, 27, 78, 94
PTA.TO17.0048AD	<a href="#">Phase III-1A Sites RI Report Appendices Q, R, &amp; S Binder 12</a>	Final	Apr-05	Y	162, 1, 163, 195, 53, 15, 69, 13, 184	162, 52, 1, 21, 167, 82, 163, 164, 172, 168, 56, 15, 69, 13, 184	5, 6, 17, 18, 35, 167, 43, 91, 103, 161, 168, 10, 54, 27, 78, 94
PTA.TO17.0049C	<a href="#">PTA Mid- Valley Groundwater Investigation Data Gap Work Plan</a>	Final	Sep-03	Y	204	204	Mid-Valley GW
PTA.TO17.0049D	<a href="#">Mid-Valley Data Gap Investigation – 2nd Round Final Delineation, Outline of Additional Work</a>	NA	Jun-05	Y	204	204	Mid-Valley GW
PTA.TO17.0049E	<a href="#">Midvalley Final Delineation Results Presented at October 2004 Partnering Meeting</a>	Final		Y	204	204	204
PTA.TO17.0050D	<a href="#">Proposed Plan Site 22/38 PTA NJ Work Plan Area B Site 20/24 Groundwater HRC/ORC Pilot Study</a>	Final	Jul-03	Y	205	205	205
PTA.TO17.0052D	<a href="#">Area B Site 20/24 Groundwater HRC Pilot Study Preliminary Results Tables</a>		Mar-05	Y	205	205	205
PTA.TO17.0052F	<a href="#">Area B (Site 20/24) HRC and ORC Groundwater Treatment Pilot Study Report</a>	Draft Final	Jul-05	Y	205	205	Area B GW
PTA.TO17.0053C	<a href="#">FS for Site 25/26</a>	Final	Mar-03	Y	67	67, 68	25, 26
PTA.TO17.0055G	<a href="#">PTA Additional Site Investigation RI Report Sites: 3, 31, 192, &amp; 199 Volume 1</a>	Final	Jul-04	Y	50, 72, 192, 199	50, 72, 192, 199	3, 31, 189, NA
PTA.TO17.0055H	<a href="#">PTA Additional Site Investigation Orchard Sites: 3, 31, 192, &amp; 199 RI Report Volume 2 Appendices</a>	Final	Jul-04	Y	50, 72, 192, 199	50, 72, 192, 199	3, 31, 189, NA
PTA.TO17.0055I	<a href="#">PTA Additional Site Investigation Orchard Sites: 3, 31, 192, &amp; 199 RI Report Volume 3 Human Health Risk Assessment Appendix M</a>	Final	Jul-04	Y	50, 72, 192, 199	50, 72, 192, 199	3, 31, 189, NA

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PTA.TO17.0056N	<a href="#">PTA Phase III 2A/3A Sites RI Report Volume 1</a>	Final	Feb-05	Y	75, 195, 171, 163, 176, 177, 75, 200, 69	75, 80, 165, 166, 173, 174, 169, 171, 176, 177, 175, 178, 180, 69, 200	36, 41, 114, 160, 162, 166, 169, 171, 176, 177, 188, 115, 152, 154
PTA.TO17.0056O	<a href="#">PTA Phase III 2A/3A sites RI Report Volume 2 Area L Sites</a>	Final	Feb-05	Y	75, 195, 171, 163, 176, 177, 75, 200	75, 80, 165, 166, 173, 174, 169, 171, 176, 177, 200	36, 41, 114, 160, 162, 166, 169, 171, 176, 177, 188
PTA.TO17.0056P	<a href="#">PTA Phase III 2A/3A Sites RI Report Volume 3- Area M Sites</a>	Final	Feb-05	Y	175	175, 178, 180	115, 152, 154
PTA.TO17.0056Q	<a href="#">PTA Phase III 2A/3A Sites RI Report Volume 4 Area P Sites</a>	Final	Feb-05	Y	69	69	
PTA.TO17.0056R	<a href="#">PTA Phase III 2A/3A Sites RI Report Volume 5 - Appendices</a>	Final	Feb-05	Y	75, 195, 171, 163, 176, 177, 75, 200, 69	75, 80, 165, 166, 173, 174, 169, 171, 176, 177, 175, 178, 180	36, 41, 114, 160, 162, 166, 169, 171, 176, 177, 188, 115, 152, 154
PTA.TO17.0056S	<a href="#">PTA Phase III 2A/3A Sites RI Report Appendix L - Human Health Risk Assessment Volume 6</a>	Final	Feb-05	Y	75, 195, 171, 163, 176, 177, 75, 200, 69	75, 80, 165, 166, 173, 174, 169, 171, 176, 177, 175, 178, 180	36, 41, 114, 160, 162, 166, 169, 171, 176, 177, 188, 115, 152, 154
PTA.TO17.0057C	<a href="#">PTA Site 17 RI Report</a>	Final	Apr-05	Y	1	1	17
PTA.TO17.0058B	<a href="#">PTA Site 78 RI Report &amp; Groundwater Pilot Study Work Plan</a>	Draft Final	Dec-03	Y	13	13	78
PTA.TO17.0058C	<a href="#">Site 78 Groundwater Pilot Study Preliminary Results Tables</a>		Mar-05	Y	13	13	78
PTA.TO17.0058D	<a href="#">PTA Site 78 RI Report &amp; Groundwater Pilot Study Work Plan</a>	Final	Apr-05	Y	13	13	78
PTA.TO17.0059D	<a href="#">PTA Site 34 Proposed Plan</a>	Final Revision 1	Feb-04	Y	2	2	34
PTA.TO17.0060C	<a href="#">Phase II RI Report Rounds 1 and 2 Volume 2 Area H Specific Appendices</a>	Draft Final	Mar-04	Y	91, 175, 193	91, 123-133, 193	55, 62, 64, 98, 100, 127-132, 151, 190
PTA.TO17.0060K	<a href="#">Phase II RI Report, Rounds 1 and 2, Volume 3 - Area I 500 Area Sites</a>	Draft Final	Mar-05	Y	85, 22	73, 74, 85, 140, 142, 146, 64, 148-150, 156, 22, 47	32, 33, 46, 97, 105, 113, 147-150, 184, 50, 63/65
PTA.TO17.0060L	<a href="#">Phase II RI Report, Rounds 1 and 2, Volume 3 - Area I 900 and 3000 Area Sites</a>	Draft Final	Mar-05	Y	134, 75, 135, 136	18, 134, 12, 86, 141, 135, 137, 153, 154, 136	30, 70, 83, 47, 102, 71, 82, 158, 159, 79
PTA.TO17.0060M	<a href="#">Phase II RI Report, Rounds 1 and 2, Volume 3 - Area I Remaining Sites</a>	Draft Final	Mar-05	Y	6, 57, 108, 143, 111, 155	6, 57, 138, 147, 143, 144, 155	16, 53, 90, 137, 108, 109, 178
PTA.TO17.0060N	<a href="#">Phase II RI Report, Rounds 1 and 2, Volume 3 - Area I Specific Appendices Binder 1 of 2</a>	Draft Final	Mar-05	Y	85, 22, 134, 75, 135, 136, 6, 57, 108, 143, 111, 155	73, 74, 85, 140, 142, 146, 64, 148-150, 156, 22, 47, 18, 134, 12, 86, 141, 135, 137, 153, 154, 136, 6, 57, 138, 147, 143, 144, 155	32, 33, 46, 97, 105, 113, 147-150, 184, 50, 63/65, 30, 70, 83, 47, 102, 71, 82, 158, 159, 79, 16, 53, 90, 137, 108, 109, 178
PTA.TO17.0060O	<a href="#">Phase II RI Report, Rounds 1 and 2, Volume 3 - Area I Specific Appendices Binder 2 of 2</a>	Draft Final	Mar-05	Y	85, 22, 134, 75, 135, 136, 6, 57, 108, 143, 111, 155	73, 74, 85, 140, 142, 146, 64, 148-150, 156, 22, 47, 18, 134, 12, 86, 141, 135, 137, 153, 154, 136, 6, 57, 138, 147, 143, 144, 155	32, 33, 46, 97, 105, 113, 147-150, 184, 50, 63/65, 30, 70, 83, 47, 102, 71, 82, 158, 159, 79, 16, 53, 90, 137, 108, 109, 178
PTA.TO17.0060P	<a href="#">Phase II RI Report Rounds 1 and 2 Volume 1</a>	Final	Nov-05	Y	85, 22, 134, 75, 135, 136, 6, 57, 108, 143, 111, 155	73, 74, 85, 140, 142, 146, 64, 148-150, 156, 22, 47, 18, 134, 12, 86, 141, 135, 137, 153, 154, 136, 6, 57, 138, 147, 143, 144, 155	32, 33, 46, 97, 105, 113, 147-150, 184, 50, 63/65, 30, 70, 83, 47, 102, 71, 82, 158, 159, 79, 16, 53, 90, 137, 108, 109, 178
PTA.TO17.0060Q	<a href="#">Phase II RI Report Rounds 1 and 2 Volume 2 Area H sites</a>	Final	Nov-05	Y	91, 175, 193	91, 123-133, 193	55, 62, 64, 98, 100, 127-132, 151, 190
PTA.TO17.0061E	<a href="#">Phase II RI Report rounds 1 and 2 Volume 4- Area J sites</a>	Final	Nov-05	Y	158	158	175
PTA.TO17.0061F	<a href="#">Phase II RI Report rounds 1 and 2 Volume 5 Area K sites</a>	Final	Nov-05	Y	87, 161	87, 159, 160, 161, 189	48, 172, 173, 174, 186
PTA.TO17.0063E	<a href="#">Group 3 Sites FS Volume I Report</a>	Final	Aug-05	Y	8	7, 8, 157	1, 2, 4
PTA.TO17.0063F	<a href="#">Group 3 Sites FS Volume II Appendices</a>	Final	Aug-05	Y	8	7, 8, 157	1, 2, 4
PTA.TO17.0064C	<a href="#">Fish Consumption Human Health Risk Assessment Report</a>	Final	Jul-04	Y	57, 15, 8, 193, 50, 164	57, 15, 8, 193, 50, 164	53, 54, 2, 190, 3, 103,
PTA.TO17.0066A	<a href="#">Wetland Report site 34 Burning Ground PTA</a>	Draft	Aug-03	Y	2	2	34
PTA.TO17.0067C	<a href="#">PTA Area C Groundwater Data Report</a>	Draft Final Revision 1	Jul-02	Y	206	206	Area C GW

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PTA.TO17.0068B	<a href="#">PTA Southern Boundary Fall 2002 Quarterly Groundwater Monitoring Report</a>	Draft Final	Jan-03	Y	206	206	Area C GW
PTA.TO17.0069	<a href="#">PTA Engineering Controls Waiver Document</a>	Draft	Jun-03	Y	69, 108, 96, 97, 29, 91, 135, 111, 161, 13, 134, 85, 195, 175, 163	185, 186, 187, 104, 96, 97, 89, 121, 29, 123, 124, 125, 130, 131, 137, 138, 144, 160, 13, 135, 12, 134, 126, 127, 128, 74, 64, 80, 179, 169, 210	119, 120, 121, 111, 117, 118, 52, 95, 96, 62, 64, 98, 130, 131, 82, 90, 109, 173, 78, 71, 83, 70, 100, 127, 128, 33, 147, 41, 153, 169
PTA.TO17.0070J	<a href="#">Phase 1 2A/3A Sites RI Report Volume 5 Appendices</a>	Final	Jan-05	Y	97, 98, 190, 101, 108, 111, 209, 29, 72	97, 98, 190, 101, 104, 106, 122, 107, 108, 111, 113, 115, 209, 89, 121, 29, 116, 117, 119, 188, 210	118, 123, 187, 60, 111, 125, 126, 138, 139, 142, 144, 146, 52, 95, 96, 101, 134, 136, 185
PTA.TO17.0070K	<a href="#">Phase 1 2A/3A Sites RI Report Volume 1</a>	Final	Jan-05	Y	97, 98, 190, 101, 108, 111, 209, 29, 72	97, 98, 190, 101, 104, 106, 122, 107, 108, 111, 113, 115, 209, 89, 121, 29, 116, 117, 119, 188, 210	118, 123, 187, 60, 111, 125, 126, 138, 139, 142, 144, 146, 52, 95, 96, 101, 134, 136, 185
PTA.TO17.0070L	<a href="#">Phase 1 2A/3A Sites RI Report Volume 2 Area D Sites</a>	Final	Jan-05	Y	97, 98, 190	97, 98, 190	118, 123, 187
PTA.TO17.0070M	<a href="#">Phase 1 2A/3A Sites RI Report Volume 3 Area F Sites</a>	Final	Jan-05	Y	101, 108, 111, 209	101, 104, 106, 122, 107, 108, 111, 113, 115, 209	60, 111, 125, 126, 138, 139, 142, 144, 146, 146
PTA.TO17.0070N	<a href="#">Phase 1 2A/3A Sites RI Report Volume 4 Area G Sites</a>	Final	Jan-05	Y	29, 108, 72	89, 121, 29, 116, 117, 119, 188, 210	52, 95, 96, 101, 134, 136, 185
PTA.TO17.0070O	<a href="#">Phase 1 2A/3A Sites RI Report Volume 5A Appendices</a>	Final	Jan-05	Y	97, 98, 190, 101, 108, 111, 209, 29, 72	97, 98, 190, 101, 104, 106, 122, 107, 108, 111, 113, 115, 209, 89, 121, 29, 116, 117, 119, 188, 210	118, 123, 187, 60, 111, 125, 126, 138, 139, 142, 144, 146, 52, 95, 96, 101, 134, 136, 185
PTA.TO17.0070P	<a href="#">Phase 1 2A/3A Sites RI Report Volume 6 &amp; 7 HHRA Appendices</a>	Final	Jan-05	Y	101, 111, 29, 190, 209, 108, 72, 97, 122	101, 111, 188, 190, 209, 210, 116, 97, 122, 119, 107, 108, 115	60, 142, 185, 187, 101, 118, 126, 136, 138, 139, 146
PTA.TO17.0071F	<a href="#">Area D Groundwater Record of Decision</a>	Final Revision 2.0	Apr-04	Y	76	76	37
PTA.TO17.0072E	<a href="#">Group 1 Sites FS Piscataway - Volume 1 Report</a>	Final	Jul-05	Y	79	79, 139, 151, 152	40, 93, 156, 157
PTA.TO17.0072F	<a href="#">Group 1 Sites FS Piscataway - Volume 2 Appendices</a>	Final	Jul-05	Y	79	79, 139, 151, 152	40, 93, 156, 157
PTA.TO17.0075D	<a href="#">Proposed Plan For Green Pond Brook and Bear Swamp Brooks - PTA NJ</a>	Final Revision 1	Dec-03	Y	193	193, 194	190
PTA.TO17.0076B	<a href="#">Management Plan PTA Installation Restoration Program Geographic Information System</a>	Final	Jul-02	Y	Facility-wide	Facility-wide	Facility-wide
PTA.TO17.0077D	<a href="#">Proposed Plan For Area B Groundwater, PTA NJ</a>	Final, Revision 1	Sep-05	Y	205	205	Area B GW
PTA.TO17.0079C	<a href="#">Indiana Bat Ecological Risk Assessment, PTA NJ</a>	Final	Apr-03	Y	8, 50, 15, 193	8, 50, 157, 15, 193	2, 3, 4, 54, 190
PTA.TO17.0080D	<a href="#">Proposed Plan for Area D Groundwater, PTA NJ</a>	Final Revision 1	Jul-03	Y	76	76	37
PTA.TO17.0082B	<a href="#">FS For Site 22/38, PTA NJ</a>	Final	Feb-04	Y	77	10, 77	22, 38
PTA.TO17.0083C	<a href="#">Area D Groundwater HRC Pilot Study Preliminary Results Tables</a>		Mar-05	Y	76	76	37
PTA.TO17.0083E	<a href="#">Area D HRC Groundwater Pilot Study Report</a>	Draft Final	Jul-05	Y	76	76	37
PTA.TO17.0084D	<a href="#">Proposed Plan For Area E Groundwater, PTA NJ</a>	Final Revision 1	Nov-04	Y	77	77	38
PTA.TO17.0085	<a href="#">Lead EE/CA For Soil Removal At Site 139, 142, 209 (Building 430), 161, and 171, PTA NJ</a>	Draft Final	Jun-03	Y	108, 111, 209, 163, 171	108, 111, 209, 172, 171	139, 142, 209, 161, 171
PTA.TO17.0086D	<a href="#">Proposed Plan For Site 25/26 Soil, PTA NJ</a>	Final Revision 1	Nov-04	Y	67	67, 68	25, 26
PTA.TO17.0087B	<a href="#">Area D Groundwater Permeable Treatment Wall Pre-Design Characterization Study Data Report</a>	Draft Final	Aug-04	Y	76	76	37
PTA.TO17.0087C	<a href="#">Meeting Minutes for the 1/29/04 Piscataway Arsenal Area D Groundwater Remedial Action Planning Meeting</a>	Final	Feb-05	Y	76	76	37
PTA.TO17.0088C	<a href="#">600 Area Groundwater RI Workplan</a>	Final	Apr-04	Y	58	58	12
PTA.TO17.0089C	<a href="#">Record of Decision Green Pond Brook/Bear Swamp Brook, PTA NJ</a>	Final	Dec-04	Y	193	193, 194	190

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PTA.TO17.0090A	<a href="#">Geophysical Report on the VLF (Very Low Frequency) Survey Conducted in Support of the 600 Area Groundwater Investigation</a>	NA	Nov-04	Y	58	58	12
PTA.TO17.0091B	<a href="#">Phase III &amp; Phase I 2A/3A Sites Ecological Risk Assessment Work Plan</a>	Final	Oct-04	Y	97, 98, 190, 101, 108, 122, 111, 29, 72, 162, 1, 21, 75, 195, 163, 171, 176, 177, 175, 53, 69, 13, 184	97, 98, 190, 101, 104, 106, 122, 107, 108, 111, 113, 115, 209, 89, 121, 29, 116, 117, 119, 188, 210, 162, 52, 1, 21, 75, 80, 82, 163, 164, 165, 166, 172, 173, 174, 167-169, 171, 176, 177, 191, 175, 178, 179, 53, 56, 69, 13, 184, 185-187, 208	118, 123, 187, 60, 111, 125, 126, 138, 139, 142, 144, 146, 52, 95, 96, 101, 134, 136, 185, 5, 6, 17, 18, 35, 36, 41, 43, 91, 103, 114, 160, 161, 162, 166, 167, 168, 169, 171, 176, 177, 188, 115, 152, 154, 7, 10, 27, 78, 94, 119, 120, 121
PTA.TO17.0091C	<a href="#">CCPPM Rodent Sperm Analysis W/P</a>			Y			
PTA.TO17.0091D	<a href="#">BTAG Comments on RSA &amp; CHPPM Responses</a>			Y			
PTA.TO17.0092C	<a href="#">Record of Decision Site 23 - The Post Farm Landfill</a>	Final	Aug-04	Y	65	65	23
PTA.TO17.0093C	<a href="#">FS for Sites 61 and 104, PTA NJ</a>	Final	Jun-05	Y	102	102, 103	61, 104
PTA.TO17.0094B	<a href="#">Building 33 Annual Groundwater Monitoring Report for 2003</a>	Draft Final	May-04	Y	84	84	45
PTA.TO17.0095C	<a href="#">Record of Decision Site 34 - The Burning Ground</a>	Final	Jan-05	Y	2	2	34
PTA.TO17.0096B	<a href="#">Bear Swamp Brook Oil/Water Separator and Tributary Stream Sediment Removal Action Work Plan</a>	Draft Final	Apr-06	Y	193	193, 194	190
PTA.TO17.0097B	<a href="#">Record of Decision Area E Groundwater and Site 22, PTA NJ</a>	Draft Final	Apr-05	Y	77	10, 77	22, 38
PTA.TO17.0098B	<a href="#">Proposed Plan for Site 180, PTA NJ</a>	Draft Final	Apr-05	Y	93	93	180
PTA.TO17.0098C	<a href="#">Site 180 -PP</a>			Y			
PTA.TO17.0098D	<a href="#">Site 180 pp.cmt</a>			Y			
PTA.TO17.0098E	<a href="#">Response to Comments On Proposed Plan for Site 180 Draft Final</a>		Jul-05	Y	93	93	180
PTA.TO17.0099C	<a href="#">Supplemental Investigation of the Apple Trees Recreational Area, Site 192</a>	Final	Apr-05	Y	192	192	189
PTA.TO17.0100B	<a href="#">Phase III &amp; Phase I 2A/3A Sites Screening Level Ecological Risk Assessment</a>	Draft Final	Feb-05	Y	97, 98, 190, 101, 108, 122, 111, 29, 72, 162, 1, 21, 75, 195, 163, 171, 176, 177, 175, 53, 69, 13, 184	97, 98, 190, 101, 104, 106, 122, 107, 108, 111, 113, 115, 209, 89, 121, 29, 116, 117, 119, 188, 210, 162, 52, 1, 21, 75, 80, 82, 163, 164, 165, 166, 172, 173, 174, 167-169, 171, 176, 177, 191, 175, 178, 179, 53, 56, 69, 13, 184, 185-187, 208	118, 123, 187, 60, 111, 125, 126, 138, 139, 142, 144, 146, 52, 95, 96, 101, 134, 136, 185, 5, 6, 17, 18, 35, 36, 41, 43, 91, 103, 114, 160, 161, 162, 166, 167, 168, 169, 171, 176, 177, 188, 115, 152, 154, 7, 10, 27, 78, 94, 119, 120, 121
PTA.TO17.0101C	<a href="#">Area C Groundwater FS</a>	Final	Oct-05	Y	206	206	Area C GW
PTA.TO17.0102C	<a href="#">Group 3 Groundwater Pilot Study Preliminary Results Tables</a>		Mar-05	Y	8	7, 8, 157	1, 2, 4
PTA.TO17.0102D	<a href="#">Pilot Study Work Plan For Site 2 Nanoscale Zero Valent Iron Groundwater Treatment Pilot Study, PTA</a>	Final	Jul-04	Y	8	2	2
PTA.TO17.0103B	<a href="#">Building 33 Annual Groundwater Monitoring Report for 2004</a>	Final	Mar-05	Y	71	71, 84	29, 45
PTA.TO17.0104A	<a href="#">25 Sites Land Use Control Table</a>		Nov-04	Y	94, 96, 98, 190, 207, 101, 114, 29, 158, 161, 176, 177, 53, 183, 69	94, 96, 98, 190, 207, 101, 114, 89, 121, 29, 117, 119, 188, 158, 159-161, 189, 176, 177, 53, 56, 183, 69, 185-187, 208	69, 117, 123, 187, 60, 145, 52, 95, 96, 134, 136, 185, 175, 172, 173, 174, 186, 176, 177, 7, 10, 164, 27, 119, 120, 121
PTA.TO17.0104B	<a href="#">EPA Comments on LUC Table</a>			Y	94, 190, 207, 114, 29, 161, 53, 69	94, 190, 207, 114, 89, 121, 29, 117, 119, 188, 159, 161, 189, 53, 185-187	69, 187, 145, 52, 95, 96, 134, 136, 185, 172, 174, 186, 7, 119, 120, 121
PTA.TO17.0105C	<a href="#">Response to NJDEP Comments on the Feasibility Study for Sites 31 and 101, Draft Final, March 2005, Picatinny, New Jersey</a>		Jun-05	Y	72	72, 116	31, 101

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PTA.TO17.0105D	<a href="#">FS for Sites 31 and 101 Volume 1 Report</a>	Final	Nov-05	Y	72	72, 116	31, 101
PTA.TO17.0105E	<a href="#">FS for Sites 31 and 101 Volume 2 Laboratory Results Appendix</a>	Final	Nov-05	Y	72	72, 116	31, 101
PTA.TO17.0106C	<a href="#">Picatinny Site 180 Feasibility Study</a>	Final	Aug-04	Y	93	93	180
PTA.TO17.0107A	<a href="#">Picatinny Installation Restoration Partnering Meeting Minutes February 1997 Through March 2005</a>	NA	Mar-05	Y	Facility-wide	Facility-wide	Facility-wide
PTA.TO17.0108A	<a href="#">Results of 2003 Quarterly Groundwater Monitoring at Site 23</a>	NA	Dec-05	Y	65	65	23
PTA.TO17.0109A	<a href="#">Results of 2003 - 2005 Monitoring of Potable Wells</a>	NA	Feb-05	Y	Facility-wide	Facility-wide	Facility-wide
PTA.TO17.0110A	<a href="#">Results of 2003 Groundwater Monitoring at Site 34</a>	NA	Dec-05	Y	2	2	34
PTA.TO17.0111A	<a href="#">Results of 2003 - 2005 Groundwater Monitoring at Area E</a>	NA	Apr-05	Y	77	77	38
PTA.TO17.0112A	<a href="#">Results of 2002 - 2005 Groundwater Monitoring at Area B</a>	NA	Apr-05	Y	205	205	205
PTA.TO17.0113B	<a href="#">Record of Decision for Site 25/26 Soil, Picatinny, New Jersey</a>	Draft Final	Jun-05	Y	67	67, 68	25, 26
PTA.TO17.0115B	<a href="#">Site 78 Sodium Lactate Groundwater Treatment Pilot Study Report, Picatinny, New Jersey</a>	Draft Final	Jul-05	Y	13	13	78
PTA.TO17.0117C	<a href="#">25 Sites Focused Feasibility Study, Picatinny, New Jersey - Volume 1 Report</a>	Draft Final	Sep-05	Y			
PTA.TO17.0117D	<a href="#">25 Sites Focused Feasibility Study, Picatinny, New Jersey - Volume 2 Appendices</a>	Draft Final	Sep-05	Y			
PTA.TO17.0118C	<a href="#">Mid-Valley Groundwater FS (Report)</a>	Draft Final	Nov-05	Y			
PTA.TO17.0118D	<a href="#">Mid-Valley Groundwater FS (Appendices)</a>	Draft Final	Nov-05	Y			
PTA.TO17.0119A	<a href="#">Long Term Monitoring Plan and Land Use Control Remedial Design for Site 23 - The Post Farm Landfill</a>	Draft	Sep-05	Y			
PTA.TO17.0120A	<a href="#">Proposed Plan for Group 1 Sites</a>	Draft	Sep-05	Y			
PTA.TO17.0121A	<a href="#">Proposed Plan for Sites 61 &amp; 104</a>	Draft	Oct-05	Y			
PTA.TO17.0122	<a href="#">Responses To Comments on the Draft Phase II RI Report Rounds 1 &amp; 2, Volume 3 Area I Report &amp; Data From Sampling at Site 148</a>	NA	Dec-05	Y			
PTA.TO17.0123	<a href="#">Site 180 November 2005 Sampling Results</a>	NA	Jan-06	Y			
PTA.TO17.0124B	<a href="#">Phase III &amp; Phase I 2A/3A Sites Baseline Ecological Risk Assessment</a>	Draft Final	Mar-06	Y			
PTA.TO17.0125A	<a href="#">Proposed Plan for Group 3 Sites</a>	Draft	Feb-06	Y			
PTA.TO17.0126A	<a href="#">Proposed Plan for Sites 31 &amp; 101</a>	Draft	Feb-06	Y		93	180
PTA.TO17.0127A	<a href="#">Record of Decision for Area B Groundwater</a>	Draft	Mar-06	Y			
PTA TO19.0016C	<a href="#">Trenching and Sampling Work Plan Site 180 Waste Burial Area</a>	Final	Sep-98	Y	93	93	180
PTA TO19.0023	<a href="#">Site 23-Post Farm Landfill Fracture Trace Analysis Report</a>	Draft Final	Aug-98	Y	65	65	23
PTA TO19.0029C	<a href="#">PTA Site 16 Guncotton Line Investigation Work Plan</a>	Final	Mar-00	Y	6	6	16
PTA TO19.0030C	<a href="#">PTA FS for Site 20/24</a>	Final	Mar-00	Y	66	63, 66	20/24
PTA.TO19.0032B	<a href="#">PTA Site 180 Exploratory Trench Investigation Data Report</a>	Draft Final	Oct-00	Y	93	93	180
PTA TO19.0033	<a href="#">PTA Site 180 Trenching &amp; Sampling CQC report</a>	Final	Dec-98	Y	93	93	180
PTA TO19.0041C	<a href="#">FS For Site 23 PTA, NJ</a>	Final	Jun-01	Y	65	65	23
PTA TO19.0044D	<a href="#">Proposed Plan for Site 20/24 PTA, NJ</a>	Final Revision 1	Jun-01	Y	66	63, 66	20/24
PTA TO19.0046C	<a href="#">PTA Site 122 PCB Soil &amp; Sediment Removal Action Report</a>	Final	Mar-03	Y	11	11	122
PTA TO19.0048C	<a href="#">Site 20/24 Record of Decision</a>	Final	Nov-01	Y	66	63, 66	20/24
PTA TO19.0049B	<a href="#">Site 16 Guncotton Line Investigation and Remedial Action Report</a>	Draft Final	Jul-01	Y	6	6	16
PTA TO19.0050B	<a href="#">Site 17 - Northern Tetrvl Pits Explosives, Soil Removal and Treatment Action Workplan</a>	Final	Oct-01	Y	1	1	17
PTA TO19.0051C	<a href="#">PTA Work Plan for the Investigation of Sumps and Dry Wells with Previously Identified COC's at Various Sites</a>	Final	May-02	Y	22, 79, 143, 111, 85, 135, 8, 161, 171	22, 139, 143, 144, 150, 154, 007, 157, 50, 161, 163, 173,	50, 93, 108, 109, 150, 159, 1, 4, 3, 174, 91, 162

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PTA.TO19.0051F	<a href="#">PTA Addendum to include additional sites in the Work Plan for the Investigation of Sumps and Dry Wells with Previously Identified COC's at Various Sites</a>	Final	Nov-03	Y	190, 122, 108, 111, 114, 209, 29, 210, 1, 63, 195, 163, 171, 200	190, 122, 108, 109, 113, 114, 209, 117, 119, 188, 210, 1, 21, 166, 172, 173, 174, 167, 168, 169, 200	187, 126, 139, 140, 144, 145, 209, 134, 136, 185, 210, 18, 35, 160, 161, 162, 166, 167, 168, 169, 200
PTA.TO19.0052C	<a href="#">PTA Remedial Action Work Plan for the Construction of a Soil CAP at Site 20/24, Pvrotechnic Testing Range</a>	Final	Jul-02	Y	66	63, 66	20/24
PTA.TO19.0053C	<a href="#">Addendum to the Remedial Action Work Plan for the Construction of a Soil CAP at Site 20/24 Pvrotechnic Testing Range</a>	Final	Jun-03	Y	66	63, 66	20/24
PTA.TO19.0054C	<a href="#">Lead Site Removal Action Work Plan Site 20/24 Pvrotechnic Testing Range Annual Landuse Certification</a>	Final	Feb-04	Y	108, 111, 209, 163, 171	108, 111, 209, 172, 171	139, 142, 209, 161, 171
PTA.TO19.0059	<a href="#">Site 20/24 Pvrotechnic Testing Range Annual Landuse Certification</a>	Final	Jan-05	Y	66	63, 66	20/24
PTA.TO19.0059A	<a href="#">Site 20/24 Pvrotechnic Testing Range Annual Landuse Certification</a>	Final	Jan-06	Y	66	63, 66	20/24
PTA.TO19.0060A	<a href="#">Site 20/24 Wetland Mitigation Report, PTA NJ</a>	Draft	Dec-04	Y	66	63, 66	20/24
PTA.TO19.0061	<a href="#">Site 20/24 Pvrotechnic Testing Range Quaterly Inspection Reports</a>	Final	12/03 - 1/05	Y	66	63, 66	20/24
PTA.TO19.0062A	<a href="#">Removal Action Data Report for Sites 139, 142, 161, 171, 209 (Building 430) and Building 303 at Picatinny</a>	Interim Draft	May-05		108, 111, 163, 171, 209	108, 111, 172, 171, 209	139, 142, 161, 171, 209
PTA.TO19.0063C	<a href="#">Report on the Investigation of Sumps and Dry Wells With Previously Identified COCs at Various Sites, Volume 1, Sections 1-7 Figures and Appendice A &amp; B</a>	Draft Final	Jun-05	Y	108, 111, 29, 22, 79, 85, 135, 8, 161, 163, 195, 171	190, 122, 108, 109, 113, 114, 209, 117, 119, 188, 210, 22, 139, 142, 143, 144, 150, 154, 7, 157, 50, 161, 1, 21, 163, 166, 172, 173, 174, 167, 168, 200, 184	187, 126, 139, 140, 144, 145, 134, 136, 50, 93, 105, 108, 109, 150, 159, 1, 4, 3, 174, 18, 35, 91, 160, 161, 162, 166, 167, 168, 94
PTA.TO19.0063D	<a href="#">Report on the Investigation of Sumps and Dry Wells With Previously Identified COCs at Various Sites - Volume 2, Appendices C Through F</a>	Draft Final	Jun-05	Y	108, 111, 29, 22, 79, 85, 135, 8, 161, 163, 195, 171	190, 122, 108, 109, 113, 114, 209, 117, 119, 188, 210, 22, 139, 142, 143, 144, 150, 154, 7, 157, 50, 161, 1, 21, 163, 166, 172, 173, 174, 167, 168, 200, 184	187, 126, 139, 140, 144, 145, 134, 136, 50, 93, 105, 108, 109, 150, 159, 1, 4, 3, 174, 18, 35, 91, 160, 161, 162, 166, 167, 168, 94
PTA.TO19.0064C	<a href="#">Site 20/24 - Site Closure Report</a>	Draft Final	Oct-05	Y	66	63, 66	20/24
PTA.TO19.0064D	<a href="#">Site 20/24 - Site Closure Report - Appendices A through G</a>	Draft Final	Oct-05	Y	66	63, 66	20/24
PTA.TO19.0065B	<a href="#">Lead Site Removal Action Data Report - Appendices A through E</a>	Draft Final	Oct-05	Y			
PTA.DA04.0004A	<a href="#">Site 193 Bear Swamp Brook Sediment Removal Action As-Built Reports</a>	Draft Final	Mar-05	Y	193	193	190
PTA.DA04.0004B	<a href="#">Site 193 Bear Swamp Brook Sediment Removal Action Quality Control Reports</a>	Draft Final	Mar-05	Y	193	193	190
PTA.AE04.0001	<a href="#">600 Area Groundwater Investigation Final Scope of Additional Work</a>	NA	Dec-05	Y			
PTA.AE04.0002	<a href="#">Summary Tables of Detects for 16 Southern Boundary Monitoring Wells Sampled during Late October 2005</a>	Draft	Dec-05	Y			

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Document Control No.	Document Title	Version	Date	PDF Copy	Dominant PICA Sites	All PICA Sites	All RI Sites
	<a href="#">Bear Swamp Brook Oil/Water Separator and Tributary Stream Sediment Removal Action Work Plan</a>	Final	Mar-07	Y	193	193	190
	<a href="#">Final Record of Decision Area E Groundwater and Site 22</a>	Final	Jul-07	Y	77	10, 77	22, 38
	<a href="#">Final Proposed Plan Site 180 (PICA 93) Waste Burial Area Revision 1</a>	Final	Feb-07	Y	93	93	180
	<a href="#">Public Meeting Transcript Site 180 (PICA 93) Waste Burial Area</a>	Final	Nov-07	Y	93	93	180
	<a href="#">Final Record of Decision Site 180 (PICA 93) Waste Burial Area</a>	Final	Sep-07	Y	93	93	180
	<a href="#">Final Remedial Action Work Plan Site 180 (PICA 93) Waste Burial Area</a>	Final	Oct-07	Y	93	93	180
	<a href="#">Final Remedial Action Report, Site 180 (PICA 093) Waste Burial Area</a>	Final	Jul-09	Y	93	93	181
	<a href="#">Proposed Plan Public Meeting Transcript Site 31 and 101 (PICA 72) Former DRMO and Gas Station and Area C Groundwater</a>	Final	Sep-07	Y	72	72, 116	31, 101
	<a href="#">Final Proposed Plan Site 31 and 101 (PICA 72) Former DRMO Yard and Gas Station</a>	Final	Sep-07	Y	72	72, 116	31, 101
	<a href="#">Final Site 31 and 101 (PICA 072) Soil, Record of Decision</a>	Final	Nov-08	Y	72	72, 116	31, 101
	<a href="#">Final Site 31 and 101 (PICA 72) RAWP</a>	Final	Jun-09	Y	72	72, 116	31, 101
	<a href="#">Final Time Critical Removal Action Work Plan and Supporting Documents</a>	Final	Jun-09	Y	72	72, 116	31, 101
	<a href="#">Final Remedial Action Report Site 31/101 (PICA 072)</a>	Final	Oct-10	Y	72	72, 116	31, 101
	<a href="#">Draft Final Interim Remedial Action Report Former DRMO Yard, ICM Site</a>	Draft Final	Sep-10	Y	72	72, 116	31, 101
	<a href="#">Final Remedial Action Work Plan Site 25/26 (PICA 67) Sanitary Landfill and Dredge Pile</a>	Final	Jul-07	Y	67	67, 68	25, 26
	<a href="#">Final Revision 1 Record of Decision Site 25/26 Soil</a>	Final Revision 1	Jan-07	Y	67	67, 68	25, 26
	<a href="#">Final Remedial Action Report, Site 25-26 (PICA 067) Sanitary Landfill and Dredge Pile</a>	Final	Jul-09	Y	67	67, 68	25, 26
	<a href="#">Area E Feb 2007 Groundwater Sampling Report</a>	Final	Jun-07	Y	77	10, 77	22, 38
	<a href="#">Final Facility-Wide Field Sampling Plan</a>	Final	May-07	Y	Facility-wide	Facility-wide	Facility-wide
	<a href="#">Draft Final Focused Feasibility Study PICA 020 Group of Sites</a>	Draft Final	May-07	Y	20	20, 83, 88, 92, 95, 99, 100, 70, 36, 105, 110, 112, 118	19, 44, 49, 163, 86, 182, 183, 28, 106, 124, 141, 143, 135
	<a href="#">Final Site 20/24 Pyrotechnic Testing Range Annual Land Use Certification</a>	Final	Jan-07	Y	66	63, 66	20/24
	<a href="#">IAG Schedule and Final Minutes 2007 Technical Meetings</a>	Final	2007	Y	Facility-wide	Facility-wide	Facility-wide
	<a href="#">Final Minutes 2008 Technical Meetings</a>	Final	2008	Y	Facility-wide	Facility-wide	Facility-wide
	<a href="#">Final Minutes 2009 Technical Meetings</a>	Final	2009	Y	Facility-wide	Facility-wide	Facility-wide
	<a href="#">Final Minutes 2010 Technical Meetings</a>	Final	2010	Y	Facility-wide	Facility-wide	Facility-wide
	<a href="#">Final Proposed Plan Area C Groundwater</a>	Final	Sep-07	Y	206	206, 2, 93, 67, 92	19, 180, 25, 26, 163
	<a href="#">Final Record of Decision Area C Groundwater</a>	Final	Jun-09	Y	206	206, 2, 93, 67, 93	19, 180, 25, 26, 164
	<a href="#">Final LTMP Area C Groundwater Site Specific Final Report Time Critical Removal Action Report</a>	Final	Nov-09	Y	206	206, 2, 93, 67, 94	19, 180, 25, 26, 165
	<a href="#">Final Historical Records Review</a>	Final	Nov-07	Y	Facility-wide	Facility-wide	Facility-wide
	<a href="#">Characterization Survey and Sampling Plans Former Dog Pound Site</a>	Final	Aug-07	Y	208	96, 69	N/A
	<a href="#">Final (PICA 020) Group of Sites Record of Decision</a>	Final	Jun-08	Y	20	20, 83, 88, 92, 95, 99, 100, 70, 36, 105, 110, 112, 118	19, 44, 49, 163, 86, 182, 183, 28, 106, 124, 141, 143, 135

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	<a href="#">Final (PICA 020) Group of Sites Remedial Action Work Plan</a>	Final	Oct-08	Y	20	20, 83, 88, 92, 95, 99, 100, 70, 36, 105, 110, 112, 118	19, 44, 49, 163, 86, 182, 183, 28, 106, 124, 141, 143, 135
	<a href="#">Final Remedial Action Report, Group of Sites, PICA 020</a>	Final	Jul-09	Y	20	20, 83, 88, 92, 95, 99, 100, 70, 36, 105, 110, 112, 118	19, 44, 49, 163, 86, 182, 183, 28, 106, 124, 141, 143, 135
	<a href="#">Final Remedial Design, Area D Groundwater</a>	Final	Jul-08	Y	76	76	37
	<a href="#">Final Remedial Design Addendum 01, Area D Groundwater, Land Use Control Plan</a>	Final	Jul-08	Y	76	76	37
	<a href="#">Draft Final Interim Remedial Action Report, Area D Groundwater</a>	Draft Final	Aug-08	Y	76	76	37
	<a href="#">Draft Final Construction Completion Report, Area D Groundwater</a>	Draft Final	Aug-08	Y	76	76	37
	<a href="#">Draft Final 2Q08 Quarterly MNA and Remedial Action Operation Data Report, Area D (PICA 076) Groundwater</a>	Draft Final	Oct-08	Y	76	76	37
	<a href="#">3Q08 Quarterly MNA and Remedial Action Operation Data Report, Area D (PICA 076) Groundwater</a>	Final	Nov-08	Y	76	76	37
	<a href="#">Final Remedial Design, Area E Groundwater and Site 22</a>	Final	Jun-08	Y	77	10, 77	22, 38
	<a href="#">Draft Final Interim Remedial Action Report, Area E Groundwater</a>	Draft Final	Feb-08	Y	77	10, 77	22, 38
	<a href="#">Draft Final 2Q08 Quarterly MNA and Remedial Action Operation Data Report, Area E (PICA 077) Groundwater</a>	Draft Final	Oct-08	Y	77	10, 77	22, 38
	<a href="#">3Q08 Quarterly Data Report, Area E (PICA 077) Groundwater</a>	Final	Nov-08	Y	77	10, 77	22, 38
	<a href="#">Final Proposed Plan, Site 61 and 104 (PICA 102)</a>	Final	Apr-08	Y	102	102, 109	61, 104
	<a href="#">Final Site 61 and 104 (PICA 102) Record of Decision</a>	Final	Nov-08	Y	102	102, 104	61, 104
	<a href="#">Final Remedial Action Work Plan, Site 61 and 104 (PICA 102)</a>	Final	Nov-08	Y	102	102, 107	61, 104
	<a href="#">Final Remedial Action Report, Site 61 and 104 (PICA 102)</a>	Final	Jul-09	Y	102	102, 103	61, 104
	<a href="#">Final Interim Remedial Action Report, Green Pond Brook/Bear Swamp Brook (PICA 193)</a>	Final	Dec-08	Y	193	193, 194	NA
	<a href="#">Final Feasibility Study, Mid-Valley Groundwater</a>	Final	Dec-08	Y	204	204	NA
	<a href="#">Final Record of Decision Area B (PICA 205)</a>	Final	Feb-09	Y	205	205	NA
	<a href="#">Final Remedial Design, Area B (PICA 205) Groundwater</a>	Final	Oct-08	Y	205	205	NA
	<a href="#">Draft Final Annual Monitoring Report, Site 23 (PICA 065), Post Landfill: Area D (PICA 076) Groundwater; and Area E (PICA 077) Groundwater</a>	Draft Final	Jul-08	Y	65, 76, 77	76, 77	37, 38
	<a href="#">Draft Final 1Q08 Quarterly Data Report, Site 31/101 (PICA 072), Area D (PICA 076), Area E (PICA 077), and Mid-Valley (PICA 204)</a>	Draft Final	Aug-08	Y	72, 76, 77, 204	76, 77	37, 38
	<a href="#">Final 3Q07 and 4Q07 Quarterly Groundwater Report, PICA 065 (Site 23) Post Farm Landfill, PICA 076 (Site 37) Area D, and PICA 077 (Site 38) Area E</a>	Final	Apr-08	Y	65, 76, 77	76, 77	37, 38
	<a href="#">Final Interim Remedial Action Report, (PICA 205) Area B Groundwater</a>	Final	Jul-09	Y	205	205	NA
	<a href="#">Final 1Q09 Quarterly Data Report, Area B (PICA 205) Groundwater</a>	Final	May-09	Y	205	205	NA
	<a href="#">2008 Annual Surface Water and Sediment Monitoring Report, Green Pond Brook and Bear Swamp Brook</a>	Final	Nov-09	Y	193	193, 194	NA
	<a href="#">1Q09 Quarterly MNA and Remedial Action Operation Data Report, Area D (PICA 076) Groundwater</a>	Final	May-09	Y	76	76	37
	<a href="#">Final 2Q09 Quarterly Data Report, Area B (PICA 205) Groundwater</a>	Final	Sep-09	Y	205	205	NA

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	<a href="#">Final 3Q09 Quarterly Data Report, Area B (PICA 205) Groundwater</a>	Final	Oct-09	Y	205	205	NA
	<a href="#">2Q09 Quarterly MNA and Remedial Action Operation Data Report, Area D (PICA 076) Groundwater</a>	Final	Sep-09	Y	76	76	37
	<a href="#">2009 Annual Groundwater Report, Area B (PICA 205) GW</a>	Final	Feb-10	Y	205	205	205
	<a href="#">2009 Annual Land Use Certification</a>	Final	Jun-10	Y	NA	NA	NA
	<a href="#">1Q10 Quarterly Data Report Area B (PICA 205) GW</a>	Final	Jun-10	Y	205	205	205
	<a href="#">2Q10 Quarterly Data Report Area B (PICA 205) GW</a>	Final	Aug-10	Y	205	205	205
	<a href="#">Draft Final Feasibility Study, PICA 011, 085, 091, 097, and 108</a>	Draft Final	Sep-09	Y	11	11, 85 (150), 91 (131, 126), 97, 108	NA
	<a href="#">Draft Final Lakes Feasibility Study, Site 54-PICA 015, Site 53-PICA 057, and Site 103-PICA 195</a>	Draft Final	Nov-09	Y	15, 57, 195	15, 57, 195 (170, 137, 167, 81, 82, 164, 80, 165, 166)	NA
	<a href="#">Final 1Q09 Quarterly Data Report, Area E (PICA 077) Groundwater</a>	Final	Jun-09	Y	77	10, 77	22, 38
	<a href="#">Final 1Q09 Quarterly MNA and Remedial Action Operation Data Report, Area D (PICA 076) Groundwater</a>	Final	Jun-09	Y	76	76	37
	<a href="#">Final 2Q09 Quarterly Data Report, Area E (PICA 077) Groundwater</a>	Final	Sep-09	Y	77	10, 77	22, 38
	<a href="#">Final 2Q09 Quarterly MNA and Remedial Action Operation Data Report, Area D (PICA 076) Groundwater</a>	Final	Sep-09	Y	76	76	37
	<a href="#">Final Remedial Action Report, Site 23 (PICA 065) Post Farm Landfill</a>	Final	Jul-09	Y	65	65	23
	<a href="#">Final 2008 Annual Groundwater Report, Site 23 (PICA 065) Post Farm Landfill</a>	Final	Mar-09	Y	65	65	23
	<a href="#">Final Feasibility Study, PICA 001, 006, 022, 085, 143, 146, 163, 171, 192, and 199</a>	Final	Sep-09	Y	1	1, 6, 22 (47), 85 (64, 73, 140, 142, 146, 148, 149, 150), 143, 146, 163 (21, 168, 169, 172, 174), 171 (173), 192, 199	NA
	<a href="#">Final Pre-Design Technical Memorandum, Group 1 Sites (PICA 079)</a>	Final	Apr-09	Y	79	79, 139, 152, 151	93, 157, 40, 156
	<a href="#">Final Proposed Plan, Group 1 Sites (PICA 079)</a>	Final	Oct-09	Y	79	79, 139, 152, 151	93, 157, 40, 156
	<a href="#">2009 Annual Groundwater Monitoring Report Site 23 (PICA 065) Post Farm Landfill</a>	Final	Feb-10	Y	65	65	23
	<a href="#">Draft Final Supplemental Investigation Work Plan, Mid-Valley (PICA 204) Groundwater</a>	Draft Final	Aug-09	Y	204	204	NA
	<a href="#">2009 Annual Report (PICA 76)</a>	Final	Dec-10	Y	76	76	37
	<a href="#">Source Area Pre-Design Monitoring Well Installation</a>	Final	Mar-10	Y	204	204	NA
	<a href="#">Draft Final 2009 Annual Monitoring Report Area E (PICA 077) Groundwater</a>	Draft Final	Mar-10	Y	77	10, 77	22, 38
	<a href="#">2010 Semi-Annual MNA and Remedial Action Operation Data Report (Area D) (PICA076)</a>	Final	Sep-10	Y	76	76	37
	<a href="#">2010 Semi-Annual Data Report Area E (PICA 077)</a>	Final	Aug-10	Y	77	10, 77	22, 38
	<a href="#">Affidavit of Publication for Group 3 Sites (PICA 008) ROD/Affidavit of Publication for Group 1 Sites (PICA 079) ROD</a>	Final	Jan-11	Y	79	79, 139, 152, 151	93, 157, 40, 156
	<a href="#">Draft Final Proposed Plan 25 Picatinny Sites within (PICA 001,006,022,085,143,146,163,171,192,199)</a>	Draft Final	Feb-10	Y	1	1, 6, 22 (47), 85 (64, 73, 140, 142, 146, 148, 149, 150), 143, 146, 163 (21, 168, 169, 172, 174), 171 (173), 192, 199	NA
	<a href="#">Supplemental Source Area Pre-Design Monitoring Well Installation (PICA 204)</a>	Final	Jul-10	Y	204	204	NA

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	<a href="#">Area D (PICA 076) Groundwater Sampling Reductions for 2010</a>	Final	Jan-10	Y	76	76	37
	<a href="#">Final Remedial Action Work Plan Group 1 Sites (PICA 079)</a>	Final	Sep-10	Y	79	79, 139, 152, 151	93, 157, 40, 156
	<a href="#">Final Feasibility Study, Site 78 (PICA 013)</a>	Final	Aug-09	Y	13	13	78
	<a href="#">Final Site 78 Proposed Plan, Area P (PICA 013)</a>	Final	Feb-10	Y	13	13	78
	<a href="#">Record of Decision For Groundwater &amp; Surface Water Site 78 (PICA 013)</a>	Draft Final	Jul-10	Y	13	13	78
	<a href="#">Final Sub-slab Soil Gas Sampling Work Plan for Bldg 91, Site 78 (PICA 013)</a>	Final	Sep-10	Y	13	13	78
	<a href="#">Draft Final Vapor Intrusion Evaluation Area P-Site 78 (PICA 013) Bldg 91</a>	Draft Final	Dec-10	Y	13	13	78
	<a href="#">Draft Final Remedial Design for Groundwater and Surface Water Area P-Site 78 (PICA 013)</a>	Draft Final	Jul-10	Y	13	13	78
	<a href="#">Draft Pre-Design Technical Memorandum for Groundwater and Sediment, Group 3, Sites 1, 2, and 4 (PICA 008)</a>	Draft	Feb-09	Y	8	8, 7, 157	1, 2, 4
	<a href="#">Final Proposed Plan, Group 3 Sites 1, 2, and 4 (PICA 008)</a>	Final	Oct-09	Y	8	8, 7, 157	1, 2, 4
	<a href="#">Final Record of Decision for GW and SW, at Group 2 sites (PICA 008)</a>	Final	Jun-10	Y	8	8, 7, 157	1, 2, 4
	<a href="#">Final Remedial Design for Groundwater and Surface Water Group 3 Sites 1,2 and 4 (PICA008)</a>	Final	Dec-10	Y	8	8, 7, 157	1, 2, 4
	<a href="#">Monitoring Well Installation, GW Sampling and Analysis Site 34- Lower Bruning Ground (PICA 002)</a>	Final	Oct-10	Y	2	2	34
	<a href="#">Record of Decision Group 1 Sites (PICA 079)</a>	Final	Jul-10	Y	79	79, 139, 152, 151	93, 157, 40, 156
	<a href="#">Final Remedial Action Work Plan Group 1 Sites (PICA 079)</a>	Final	Sep-10	Y	79	79, 139, 152, 151	93, 157, 40, 156
	<a href="#">2009 Annual Surface Water and Sediment Monitoring Report GPB and BSB (PICA 193)</a>	Final	Aug-10	Y	193	193, 194	NA
	<a href="#">Final-TRCA WP Addendum Mount Hope Quarry</a>	Final	Jun-08	Y	NA	NA	NA
	<a href="#">Final-PICA Site Inspection Work Plan</a>	Final	Jun-07	Y	NA	NA	NA
	<a href="#">Final PTA Historical Records Review 2006-11</a>	Final	Nov-06	Y	NA	NA	NA
	<a href="#">Final PTA TCRA Action Report 1018</a>	Final	Oct-07	Y	NA	NA	NA
	<a href="#">Final PTA TCRA Work Plan 02 27 07</a>	Final	Feb-07	Y	NA	NA	NA
	<a href="#">Final RCI EECA Report</a>	Final	Dec-06	Y	NA	NA	NA
	<a href="#">Final SI Report Appendices</a>	Final	Jul-07	Y	NA	NA	NA
	<a href="#">Final SI Report Revised 2008</a>	Final	Apr-08	Y	NA	NA	NA
	<a href="#">Final TCRA Report Addendum to SI, Final Report</a>	Final	Oct-07	Y	NA	NA	NA
	<a href="#">Administrative Record Document List for Shaw Environmental TO17, AE04 and AE06</a>	--	--	Y	206, 111, 600 Hill, 3rd FYR, 2008 CEA, Former Skeet Range	206, 111, 67, 76, 93, 65	109, 125, 142, 144, 146, 203, 23, 25, 26, 37, 180
	<a href="#">Draft Final Well Repair and Abandonment RAR-Phs 1 &amp; 2 Areas, D, E, B and Post Farm</a>	Draft Final	Jan-11	Y	Areas D, E, B and Post Farm	Areas D, E, B and Post Farm	Areas D, E, B and Post Farm
	<a href="#">2009 Area E (PICA 077) Annual Report DEP approval</a>	Final	Jan-11	Y	77	77	77
	<a href="#">Letter to EPA Groundwater Hydrasleeve SOP Area D (PICA 076)</a>	Final	Feb-11	Y	76	76	76
	<a href="#">Final Wetland Mitigation Plan, Former DRMO Yard, ICM Site (PICA 072)</a>	Final	Feb-11	Y	72	72	72
	<a href="#">Final Interim Remedial Action Report Former DRMO Yard, ICM Site (PICA 072)</a>	Final	Feb-11	Y	72	72	72
	<a href="#">Draft Final Remedial Action Report Group 3, Site 2 (PICA 008), Groundwater and Surface Water</a>	Draft Final	Feb-11	Y	8	8	8
	<a href="#">2010 Annual GW Monitoring Report, Area B (PICA 205) GW</a>	Final	Mar-11	Y	205	205	205
	<a href="#">Final ROD Site 78 (PICA 013)</a>	Final	Mar-11	Y	13	13	13
	<a href="#">2010 Annual Report - Area E (PICA 077)</a>	Final	Mar-11	Y	77	77	77

Administrative Record Document List  
 Picatinny Arsenal, New Jersey  
 Disk 2  
 May 26, 2011

Document Control No.	Document Title	Version	Date	PDF Copy	Dominant PICA Sites	All PICA Sites	All RI Sites
	<a href="#">Draft Final 2010 Annual Land Use Controls Report</a>	Draft Final	Apr-11	Y	NA	NA	NA
	<a href="#">2010 Annual Monitoring Report Site 23 (PICA 065)</a>	Final	Apr-11	Y	65	65	65
	<a href="#">Draft Final Interim Remedial Action Report Group 1 Sites (PICA 79)</a>	Draft Final	Apr-11	Y	79	79	79
	<a href="#">2010 Annual Monitoring Report Group 1 Sites (PICA 079)</a>	Final	Apr-11	Y	79	79	79
	<a href="#">Final Wetland Mitigation Plan Revision 1, Former DRMO Yard, ICM Site (PICA 072)</a>	Final	May-11	Y	72	72	72
	<a href="#">2010 Annual Report Area D (PICA 76)</a>	Final	May-11	Y	76	76	76
	<a href="#">2010 Draft Final Annual LUC EPA Response to Comments</a>	Draft Final	May-11	Y	NA	NA	NA
	<a href="#">2010 Annual Report, Group 3, Site 2 (PICA 008) Groundwater and Surface Water.pdf</a>	Final	May-11	Y	8	8	8
	<a href="#">2010 Final Annual Report Green Pond Brook and Bear Swamp Brook (PICA 193) May 2011</a>	Final	May-11	Y	193	193	193
	<a href="#">Shaw January 2011 Picatinny Administrative Record Document List Revision 15</a>	--	--	Y	NA	NA	NA

## **Appendix B**

Site Inspection Forms

**Annual Checklist to Ensure Integrity of Vegetative Cap and Fencing**  
 Section 5.4.3.1 of the Remedial Design Plan for Site 23 (PICA 065)

1. Cap Integrity

Annual Inspection #: \_\_\_\_\_

Date: 12/28/10

1. Inspector walked over entire site.  Yes  No.

Reason why not?

2. Check if any sign of the following conditions - note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown of Attached Map</u>
Cap Deterioration	NO		
Signs of Vegetative Stress	NO		
Penetration due to animal pests	NO		
Signs of Erosion	NO		
Condition of Site Fencing	GOOD		
Other			

3. Are there signs of trespassing  Yes  No

*fence is open; post out along side*

4. Signs appropriately posted  Yes  No

VERONICA L. MYERS / Scientist

Printed Name & Title

Veronica L. Myers

Signature

Date 12/28/10

Photo # 3480 - 3489

**Annual Checklist to Ensure Integrity of Vegetative Cap**  
 Section 5.2 of the Land Use Control Plan for Site 20/24 (PICA 066)

1. Cap Integrity

Annual Inspection No. 2010  
 Date: 12/29/10

1. Inspector walked over entire landfill.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Cap Deterioration	NO		
Signs of Vegetative Stress	NO		
Unwanted Vegetation (such as trees)	NO		
Penetration due to animal pests	NO		
Signs of erosion	NO		
Other			

3. Access Restrictions

Is car gate locked? (Yes/No) yes (East Gate) yes (West Gate) Blocked off

4. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Indicating location of cap (13)	yes (13)	
Restricting excavation (4)	yes (2)	
Unauthorized entry	yes (14)	
Phone numbers of Safety, Security and Installation Restoration	yes (16)	

VERONICA L. MYERS / Scientist  
 Printed Name & Title of Inspector

Veronica L. Myers  
 Signature of Inspector

Date 12/29/10

**Annual Inspection Checklist to Ensure Integrity of Vegetative Soil Cover**  
 Site 25/26 (PICA 067)

1. Cap Integrity

Annual Inspection No. 2010  
 Date: 12/29/10

1. Inspector walked over entire landfill.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Cap Deterioration	NO		
Signs of Vegetative Stress	NO		
Unwanted Vegetation (such as trees)	NO		
Penetration due to animal pests	NO		
Signs of erosion	NO		
Other			

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Indicating Environmentally Restricted Area (6)	yes (5)	
Indicating location of vegetated soil cover (6)	yes (6)	

VERONICA L. MYERS / Scientist  
 Printed Name & Title of Inspector

Veronica L. Myers Date 12/29/10  
 Signature of Inspector

**Annual Inspection Checklist for Land Use Evaluation – Site 37 (PICA 076)**

1. Land Use Evaluation

Date: 12/29/10

1. Inspector observed conditions over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	NO		
Construction activities	NO		
Other	NA		

3. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

4. Other observations:

Photos 3510-3513

VERONICA L. MYERS / Scientist  
Printed Name & Title of Inspector

Veronica L. Myers Date 12/29/10  
Signature of Inspector

**Annual Inspection Checklist for Land Use Evaluation – Site 38 (PICA 077)**

1. Land Use Evaluation

Date: 12/29/10

1. Inspector observed conditions over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	NO		
Construction activities	NO		
Other	<del>NO</del> N/A		

3. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

4. Other observations:

Photo # 3505 - 3508

VERONICA L. MYERS / Scientist  
 Printed Name & Title of Inspector

Veronica L. Myers Date 12/29/10  
 Signature of Inspector

**Annual Inspection Checklist for Land Use Evaluation – Site 180 (PICA 093)**

1. Land Use Evaluation

Date: 12/29/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	no		
Signs of vegetative stress	no		
Construction activities	no		
Signs of erosion	no		
Other			

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (11)	yes (11)	

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

photos # 3522 - 3529

VERONICA L. MYERS / Scientist  
 Printed Name & Title of Inspector

Veronica L. Myers  
 Signature of Inspector

Date 12/29/10

**Annual Checklist to Ensure Proper Land Use**  
Land Use Control Plan for Site 193 (PICA 193)

Proper Land Use

Annual Inspection No. 10  
 Date: 12/29/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
New construction within 25 feet of GPB or BSB	NO		
Industrial Land Use within 25 feet of GPB	NO		
Any signs of fishing activity	NO		
Conditions of "No Fishing" Signs	NO	Photos # 3514-3516	
Signs of Unusual Erosion	NO		
Other			

3. Are there signs of trespassing  Yes  No

4. Signs appropriately posted  Yes  No

VERONICA L. MYERS / Scientist  
 Printed Name & Title of Inspector

Veronica L. Myers Date 12/29/10  
 Signature of Inspector

new pavement on the rear side of building 25

photos 3517 + 3518

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**  
 Including Site 19 (PICA 020), Site 28 (PICA 070), Site 86 (PICA 095), Site 106 (PICA 036), Site 124 (PICA 105), Site 135 (PICA 118), Site 141 (PICA 110), Site 143 (PICA 112), Site 163 (PICA 092), Site 182 (PICA 099), and Site 183 (PICA 100).

**Site 19 (PICA 020)**

1. Land Use Evaluation

Date: 12/29/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	NO		
Signs of vegetative stress	NO		
Construction activities	NO		
Signs of erosion	NO		
Other	N/A		

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (3)	Yes (3)	HAD to hang new sign (2) because sign was missing at designated location

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

Photos # 70-72 (Signs 1 + 2 and grandcave area)

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

Site 28 (PICA 070)

1. Land Use Evaluation

Date: 12/29/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	NO		
Signs of vegetative stress	NO		
Construction activities	NO		
Signs of erosion	NO		
Other			

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (2)	YES (2)	

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

Photo # 3495-3496

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

Site 86 (PICA 095)

1. Land Use Evaluation

Date: 10/29/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	NO		
Signs of vegetative stress	NO		
Construction activities	NO		
Signs of erosion	NO		
Other			

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (2)	NO (2)	

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

Photo # 3497 - 3498 (Sign down next to building)  
3499 (Sign down in back of building)

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

Site 106 (PICA-036)\*

1. Land Use Evaluation

Date: 12/29/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	<b>NO</b>		
Signs of vegetative stress	<b>NO</b>		
Construction activities	<b>YES</b>	<b>Dumping of Rock</b>	
Signs of erosion	<b>NO</b>		
Other			

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (2)	<b>YES (2)</b>	

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

Site 124 (PICA 105)

1. Land Use Evaluation

Date: 12/28/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	NO		
Signs of vegetative stress	NO		
Construction activities	NO		
Signs of erosion	NO		
Other			

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (2)	yes	N/A

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

Building 167, 166, 163 + 197, 178 to be demolished

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

Site 135 (PICA 118)

1. Land Use Evaluation

Date: 12/28/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	NO		
Signs of vegetative stress	NO		
Construction activities	NO		
Signs of erosion	NO		
Other			

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (1)	Yes (1)	

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

Photo # 3481

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

Site 141 (PICA 110)

I. Land Use Evaluation

Date: 1/5/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	<u>NO</u>		
Signs of vegetative stress	<u>NO</u>		
Construction activities	<u>NO</u>		
Signs of erosion	<u>NO</u>		
Other			

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (1)	<u>YES (1)</u>	

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

Photo # 66-67 (Sign and ground coverage)

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

Site 143 (PICA 112)

1. Land Use Evaluation

Date: 1/5/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	NO		
Signs of vegetative stress	NO		
Construction activities	NO		
Signs of erosion	NO		
Other	N/A		

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (1)	yes (1)	

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

Photo # 68-69 (Sign and ground coverage)

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

Site 163 (PICA 092)

1. Land Use Evaluation

Date: 12/29/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	NO		
Signs of vegetative stress	NO		
Construction activities	NO		
Signs of erosion	NO		
Other			

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (3)	Yes (3)	

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

Photos # 3519-3524

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

Site 182 (PICA 099)

1. Land Use Evaluation

Date: 12/29/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	YES		
Signs of vegetative stress	NO		
Construction activities	YES		
Signs of erosion	NO		
Other	NA		

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (1)	NO (0)	

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

Building 5 is demolished and parking lot in its place  
photos # 3502 - 3504

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

Site 183 (PICA 100)

1. Land Use Evaluation

Date: 12/29/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	NO		
Signs of vegetative stress	NO		
Construction activities	yes	PAVED Driveway, planted trees	
Signs of erosion	NO		
Other	NA		

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Sign stating digging not permitted (1)		

4. Has any disturbance of soil taken place over the past year?  Yes  No

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

photo # 3500 - 3501

looks like building soils going to be demolished

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

**Annual Inspection Checklist for Land Use Evaluation – PICA 020 Group of Sites**

(Including PICA 020/Site 19, PICA 092/Site 163, PICA 095/Site 86, PICA 099/Site 182, PICA 100/Site 183, PICA 070, Site 28, PICA 036/Site 106, PICA 105/Site 124, PICA 110/Site 141, PICA 112/Site 143, and PICA 118/Site 135)

VERONICA L. MYERS / Scientist  
Printed Name & Title of Inspector

Veronica L. Myers Date 12/29/12  
Signature of Inspector

**Annual Inspection Checklist to Ensure Integrity of Vegetative Soil Cover**  
Site 61/104 (PICA 102)

1. Cap Integrity

Annual Inspection No. \_\_\_\_\_  
 Date: 12/28/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Cap Deterioration	NO		
Signs of Vegetative Stress	NO		
Unwanted Vegetation (such as trees)	NO		
Penetration due to animal pests	NO		
Signs of erosion	NO		
Other			

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Indicating Environmentally Restricted Area (4)	yes (4)	

VERONICA L. MYERS / Scientist  
 Printed Name & Title of Inspector

Veronica L. Myers Date 12/28/10  
 Signature of Inspector

photo # 3478

**Annual Inspection Checklist to Ensure Integrity of Vegetative Soil Cover and Asphalt Cap  
Site 31/101 (PICA 072)**

1. Cap Integrity

Date: 12/28/10

1. Inspector walked over entire Vegetated Soil Cover and AsphaltCap Area.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/ No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Cap Deterioration Near Building 314D	NO		
Cap Deterioration Near Building 314	NO		
Cap Deterioration Near Building 319 and 320	NO		
Cap Deterioration Near MW 101-2	NO		
Signs of Vegetative Stress	NO		
Unwanted Vegetation (such as trees)	NO		
Penetration due to animal pests	NO		
Signs of erosion	NO		
Other			

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Indicating Environmentally Restricted Area (6)	yes 4	
Indicating location of vegetated soil cover (6)	yes 6	

4. Soil Clearances

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

VERONICA L. MYERS / Scientist  
Printed Name & Title of Inspector

Veronica L. Myers  
Signature of Inspector

Date 12/28/10

**Annual Inspection Checklist to Ensure Integrity of Asphalt Cap and Vegetative Soil Cover**  
 Site 31/101 (PICA 72)

1. Cap Integrity

Annual Inspection No. \_\_\_\_\_  
 Date: 12/28/10

1. Inspector walked over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Cap Deterioration	NO		
Signs of Vegetative Stress	NO		
Unwanted Vegetation (such as trees)	NO		
Penetration due to animal pests	NO		
Signs of erosion	NO		
Other	NO		

3. Signs appropriately posted

<u>Sign noting the following (# of signs installed)</u>	<u>Yes/No/#</u>	<u>Corrective Action Taken</u>
Indicating Environmentally Restricted Area (4)	YES (4)	

VERONICA L. MYERS / Scientist  
 Printed Name & Title of Inspector

Veronica L. Myers \_\_\_\_\_ Date 12/28/10  
 Signature of Inspector

**Annual Inspection Checklist for Land Use Evaluation – Group 3 (PICA 008)**

1. Land Use Evaluation

Date: 12/29/10

1. Inspector observed conditions over entire site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive activities	NO		
Construction activities	NO		
Other	N/A		

3. Has any disturbance of soil taken place over the past year?  Yes  No *new wells installed*

If Yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

4. Other observations:

*monthly*  
Addition of wells ~~25, 26, 27~~  
in summer.

VERONICA L. MYERS / Scientist  
Printed Name & Title of Inspector

Veronica L. Myers  
Signature of Inspector

Date 12/29/10

**Annual Inspection Checklist to Ensure Integrity of Land Use Controls (LUCs)  
Group 1 Sites (PICA 079)**

1. LUCs Integrity

Date: 12/28/10

1. Inspector walked over the entire Site.  Yes  No

Reason why not?

2. Check for any sign of the following conditions – note whether corrective action was taken:

<u>Condition</u>	<u>Yes/No</u>	<u>Corrective Action Taken</u>	<u>Designation of Location Shown on Attached Map</u>
Intrusive Activities	NO		
Construction Activities	NO		
Signs of erosion, or damage to soil cover behind Building 810	NO		
Other			

3. Has any disturbance of soil taken place over the past year?  Yes  No

If yes, describe below:

<u>Soil Clearance #</u>	<u>Date</u>	<u>Approval</u>	<u>Description</u>

5. Other observations:

VERONICA L. MYERS / Scientist  
Printed Name & Title of Inspector

Donnie L. Myers  
Signature of Inspector

Date 12/28/10

**Annual Certification of Land Use  
Controls for Area C (PICA 206) Groundwater  
Picatinny, New Jersey**

This certification is being made in accordance with the Remedial Design (RD) for Area C Groundwater (PICA 206). The RD is in accordance with the Area C Record of Decision (ROD) signed by the Picatinny Arsenal Commander and EPA Region 2 Director of the Emergency and Remedial Response Division on September 17, 2010 and September 23, 2010, respectively.

**1. Certification of LUC objectives outlined in *Long Term Monitoring Plan and Land Use Control Remedial Design for Area C Groundwater*:**

**A. LUC Objective: Prevent access or use of the groundwater until cleanup levels are met**

*i. Inspections:* Annual inspections of land use will be performed to document compliance with the LUC objectives. Area C will be inspected for any signs of land use inconsistent with the LUC objectives. Any land use that could result in groundwater exposure will be prohibited.

*ii. Access Restrictions through Picatinny Base Access Regulations:* Picatinny Security provides 24-hour patrols to enforce any suspected security violations at Area C.

*iii. Certification and Protectiveness Evaluation:* Certification of the CEA will be completed with the next biennial certification. The certification includes inspection and evaluation of (1) changes to laws and regulations, (2) future water uses, (3) changes to current water use (well search), (4) the integrity of monitoring wells associated with the CEA, (5) any land use disturbances within the CEA, and (6) analytical sampling results. Any proposed groundwater use within the CEA will require NJDEP review and approval to ensure that modifications would be protective of any impacts from the identified contaminants for the duration of the CEA.

**B. LUC Objective: Maintain the integrity of any current or future remedial monitoring system, such as monitoring wells**

*i. Well Maintenance Program:* Groundwater monitoring wells will be inspected prior to each round of sampling for general condition and integrity. Well inspections will be documented on EPA Region 2 Superfund Well Inspection Checklists and the LUC certification form. All significant deficiencies in the condition of a well will be corrected prior to the next sampling event.

*ii. Picatinny Master Plan:* The Picatinny Master Plan was approved in July 2007 by the Public Works Office of Picatinny. It references and incorporates Area C Groundwater (PICA 206). The Master Planner is fully cognizant of the restrictions of the LUCIP and would incorporate those in any planned actions at the site.

*iii. Facility-wide Environmental Geographic Information System (GIS):* Picatinny's GIS incorporates the area of applicability of land use controls, sampling results, and other information and is maintained by the Environmental Affairs Directorate's contractor.

**C. LUC Objective: Maintain the existing CEA**

*i. Update CEA:* Upon approval of the RD, the CEA will be reviewed and updated as necessary with current site-specific conditions. Evaluations of the protectiveness of the CEA will be made biennially to NJDEP.

**D. Prohibit excavation without safeguards in all areas below the water table where groundwater contaminants exceed SCLs**

*i. Site Clearance/Soil Management Procedures:* No excavation of soil without approval of the Picatinny Installation Restoration Project Manager; no excavation of soil without the proper safety equipment per a safety permit from the Picatinny Safety Office; No transportation of excavated soils off of Picatinny without written approval from the USEPA Project Manager. This does not include soil samples taken from the site for investigations.

*ii. MEC procedures:* Procedures for PTA areas are coordinated through the PTA Safety Office and EAD, with additional support from the USACE. All intrusive activities (e.g., investigations involving any digging, clearing activities, and construction activities) must be authorized prior to the commencement of work.

*iii. PTA Safety Program:* The Safety Program establishes the Hazard Communication Program and Hazardous Materials Information System, maintains a central Material Safety Data Sheets file in the Installation Safety Office, and provides a safety review of all construction projects. The Safety Program also establishes the appropriate medical surveillance program for personnel working with hazardous materials or otherwise performing hazardous operations. The Installation Safety Office is the point of contact for the Safety Program, and has the authority to stop work where unsafe work conditions are present.

## **Appendix C**

Site Photos

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Area D (PICA 076) Groundwater  
Land Use- Golf Course



Area D (PICA 076) Groundwater  
Golf Course – Toward PRB and  
GPB

Site Photos  
Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 20/24 (PICA 066) Vegetative Cap



Site 20/24 (PICA 066) Vegetative Cap near Landfill Pond

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 23 (PICA 065) Land Use  
Control Site Boundary



Site 23 (PICA 065) Sign and Land  
Use Control Vegetative Cap

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 193 (PICA 193) Sign along  
Green Pond Brook on Golf Course



Site 193 (PICA 193) Green Pond  
Brook on Golf Course

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Area E (PICA 077) Groundwater -  
First Street utility installation



Area E (PICA 077) Groundwater -  
Utility installation in grassy area

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 25/26 (PICA 067) Vegetative  
Cover and LUC Sign



Site 25/26 (PICA 067) LUC Area  
and sign

Site Photos  
Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Area B (PICA 205) Groundwater  
4<sup>th</sup> Quarter 2009 injection event



Area B (PICA 205) Groundwater  
4<sup>th</sup> Quarter 2009 injection manifold

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 180 (PICA 093) Sign 1 at Site Entrance



Site 180 (PICA 093) Former Skeet Range, Signs 3 & 4

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 61/104 (PICA 102) Intrusive Activities near site boundary



Site 61/104 (PICA 102) AA-1 and AA-2 Excavations

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 61/104 (PICA 102) Sign 1 and ground cover



Site 61/104 (PICA 102) Sign 2 and ground cover near Building 178

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



(PICA 79) Restoration at Area A.



(PICA 79) Area A. Looking east towards Picatinny Lake.

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 2 (PICA 008) View of manifold connected to inline mixer with pressure gauges and flow regulators.



Site 2 (PICA 008) Close up view of manifold, including inline flow meter and globe valves.

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 2 (PICA 008) View of Southern Plume injection and monitoring well layout (looking northeast). Hoses were utilized for transport of EVO to injection wells.



Site 2 (PICA 008) View of Northern Plume injection monitoring well layout (looking southeast).

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 19 (PICA 020) Sign 1 and  
ground cover



Site 19 (PICA 020) Ground cover

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 28 (PICA 070) Sign 1 at site entrance



Site 86 (PICA 095) Sign and Ground Cover

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 106 (PICA 036) Soil pile



Site 106 (PICA 036) View towards  
site entrance

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 124 (PICA 105) Signs and ground cover



Site 135 (PICA 118): Sign installed in front of Building 315

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 141 (PICA 110) Sign and ground cover



Site 143 (PICA 112) Sign, ground cover, and new steam line

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 143 (PICA 112) Sign and  
ground cover



Site 163 (PICA 092) Ground cover  
(Recreation fields)

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 163 (PICA 092) Ground cover



Site 182 (PICA 099) Building 5 has been demolished, sign and post have been removed

Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 183: Sign installed on northwest side of Building 58



Site 31/101 (PICA 072) Sign and site boundary fence

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 31/101 (PICA 072) Sign and site boundary fence



Site 31/101 (PICA 072) Asphalt Cap

## Site Photos

Fourth Five – Year Review  
Report  
Picatinny Arsenal, New Jersey



Site 31/101 (PICA 072) Vegetative  
Cap and Sign



Area C (PICA 206) Groundwater  
Vegetation in vicinity of Site 180  
(PICA 093)