RECORD OF DECISION
SITE 180 (PICA 093) WASTE BURIAL AREA
FINAL

PICATINNY
NEW JERSEY

FINAL **SEPTEMBER 2007**

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

4,4-DDD	1,1-dichloro-2,2-bis(*p*-chlorophenyl) ethane
4,4-DDE	1,1-dichloro-2,2-bis(*p*-chlorophenyl) ethylene
4,4-DDT	1,1,1-trichloro-2,2-bis(*p*-chlorophenyl) ethane
AA	Area of Attainment
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
ARDEC	Armament Research *Development and Engineering*
AST	Above-Ground Storage Tank
bgs	Below Ground Surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CEA	Classification Exception Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CY	Cubic yards
DRMO	Defense Reutilization Marketing Office
DSERTS	Defense Site Environmental Restoration Tracking System
EAO	Environmental Affairs Office
ecoCOC	Ecological Contaminants of Concern
ELCR	Excess Lifetime Cancer Risk
EOD	Explosive Ordnance Disposal
ERA	Ecological Risk Assessment
ER,A	Environmental Restoration, Army
FS	Feasibility Study
FFS	Focused Feasibility Study
ft	Feet
GIS	Geographic Information System
GPB	Green Pond Brook
gpm	Gallons per minute
GSD	Geometric Standard Deviations
HA	Hunting Area
HHRA	Human Health Risk Assessment
HI	Hazard Index
HpCDD	1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin
HpCDF	1,2,3,4,6,7,8-heptafuran
HxCDD	Hexachlorodibenzo-P-Dioxin
HQ	Hazard Quotient
IC	Institutional Control
IGW	Impact to Groundwater
IRBC	Industrial Risk-Based Concentrations
LOC	Level of Concern
LUC	Land Use Control
LUCRD	Land Use Control Remedial Design
MEC	Munitions and Explosives of Concern
µg/L	*microgram per liter*
MMRP	Military Munitions Response Program
msl	Mean Sea Level
mg/kg	Milligrams per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NJAC	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NRDCSCC	Non-Residential Direct Contact Soil Cleanup Criteria
OCDD	Octachlorodibenzo-p-dioxin
OCDF	Octachlorodibenzofuran
O&M	Operation and Maintenance
PAERAB	Picatinny Arsenal Environmental Restoration Advisory Board
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
pCi/g	picoCuries per gram
PeCDD	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
PeCDF	2,3,4,7,8-pentachlorodibenzofuran
pg/g	picograms per gram
pg/ml	picograms per milliliter
PICA	Picatinny Arsenal Sites
PP	Proposed Plan
PRG	Preliminary Remediation Goal
RA	Remedial Alternative
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RDA	Recommended Daily Allowance
RDX	Cyclotrimethylenetrinitramine
RI	Remedial Investigation
ROD	Record of Decision
RPM	Regional Project Manager

SARA	Superfund Amendments and Reauthorization Act
SCC	Soil Cleanup Criteria
SCL	Site Cleanup Level
SSL	Soil Screening Level
TAL	Target Analyte List
TBC	To Be Considered
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	2,3,7,8-tetrachlorodibenzofuran
TCLP	Toxicity Characteristic Leaching Procedure
TEC	Toxic Equivalency Concentrations
TEF	Toxic Equivalency Factor
THQ	Target Hazard Quotient
TPH	Total petroleum hydrocarbons
TSCA	Toxic Substances Control Act
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USTs	Underground Storage Tanks
UXO	Unexploded Ordnance
WWI	World War I
WWII	World War II

1.0 PART 1: DECLARATION

1.1 SITE NAME AND LOCATION

Picatinny Arsenal is formally designated as U.S. Department of the Army (Army), Installation Management Agency, Northeast Regional Garrison Office. It is located in north central New Jersey (NJ) in Morris County near the city of Dover. The facility was included on the National Priorities List (NPL) in March of 1990 and assigned a Comprehensive Environmental Response, Compensation and Liability Identification System (CERCLIS) number of NJ3210020704.

This Record of Decision (ROD) specifically addresses soil, sediment, and surface water at Site 180 (PICA 093), Waste Burial Area [herein referred to as Site 180 (PICA 093)] at Picatinny Arsenal (Picatinny), which is located in Rockaway Township, Morris County, New Jersey (see Figure 1). Groundwater issues at the site are being addressed separately under the Area C Groundwater Operable Unit. For this reason, remedial alternatives for groundwater are not discussed herein; however, the soil to groundwater migration pathway is evaluated. Munitions and Explosives of Concern (MEC) at the site will be addressed under the Military Munitions Response Program (MMRP).

Site 180 (PICA 093) is located in the north central portion of Area C at Picatinny (see Figure 1) and consists of approximately 6.8 acres on the eastern side of Green Pond Brook (GPB).

1.2 STATEMENT OF BASIS AND PURPOSE

This ROD presents the Selected Remedy for Site 180 (PICA 093) located at Picatinny Arsenal in Rockaway Township, NJ. The remedial action is selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the greatest extent possible, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The information supporting the decisions on the selected remedial action is contained in the administrative record file for the site. These decisions have been made by the Army and the U.S. Environmental Protection Agency (USEPA). Comments received from the NJ Department of Environmental Protection (NJDEP) were evaluated and considered in selecting the final remedy. NJDEP concurs with the selected remedy.

1.3 ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect public health and welfare and the environment from actual or threatened releases of hazardous substances in the environment

1.4 DESCRIPTION OF THE SELECTED REMEDY – INSTITUTIONAL CONTROLS AND LAND-USE RESTRICTIONS

The remedy for Site 180 (PICA 093), pursuant to this ROD, is part of a comprehensive environmental investigation and remediation process currently being performed at Picatinny. The remaining areas in Picatinny are being considered separately and remedies for these areas are presented in separate documents. A site layout map for Picatinny is presented as Figure 1.

The Selected Remedy for Site 180 (PICA 093) consists of enforcing permanent institutional controls (ICs) and implementation of land use restrictions, collectively referred to herein as land use controls (LUCs), to control disturbance of the site and to prevent any non-industrial use of the site. The Selected Remedy was chosen based on 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.

At the request of NJDEP and the Biological Technical Assistance Group (BTAG), sampling was conducted in the wetlands area to the south and east of the site. Details on this sampling event and subsequent removal action are summarized in Section 2.5.2.1. Based on the results of the wetlands sampling, NJDEP requested additional delineation in the area of sample 180SS-15, which exceeded the limit of concern (LOC) for lead. The sample location lies outside the formal boundary of Site 180 (PICA 093). The source area for the impacted soils represented by this sample will be determined and those impacted soils

will be addressed as another site by the Army Therefore, the impacted soils in this area will be fully characterized, delineated, and addressed as part of a yet to be defined site by Picatinny.

The U.S. Army will be responsible for maintaining the effectiveness of LUCs. The specific design features of the LUCs and the specifics of reporting on, and enforcing, the LUCs will be described in the Remedial Design (RD).

In addition to the LUCs selected for the majority of this site (6.8 acres), a cover system will be constructed over the eastern 1.6-acre (approximately) portion of Site 180 (PICA 093). The cover system, which was selected as the preferred remedy for the adjacent site, the Burning Ground [herein referred to as Site 34 (PICA 002)], will extend from Site 34 (PICA 002) and will be designed to include the waste piles and buried debris areas in this part of Site 180 (PICA 093). The actual area of the cover system will be determined during the Remedial Design phase of the Site 34 (PICA 002) remediation. Details regarding the cover system extension will not be addressed as part of this ROD which focuses on the LUCs selected for the majority of Site 180 (PICA 093). Additional information concerning the Selected Remedy for Site 34 (PICA 002) can be referenced in the Final Site 34 Record of Decision, dated January 2005 (Shaw, 2005).

1.5 STATUTORY DETERMINATIONS

The Selected Remedy is protective of human health and the environment and complies with Federal and State laws and regulations that are applicable or relevant and appropriate requirements (ARARs) to the remedial action. Further the Selected Remedy is minimally intrusive in the presence of high-value wetlands; effective at maintaining long-term protectiveness of human health and the environment; has a short completion time; and is more cost effective.

The Selected Remedy does not address Site 180 (PICA 093) through the use of active treatment technologies. As concluded in the Risk Assessment, none of the contaminants that exceeded LOCs at Site 180 (PICA 093) meet the criteria of principal threat waste or pose an unacceptable risk to human health and the environment under the current and reasonably anticipated future use. In addition, groundwater itself is not a principal threat because it is considered a non-source material. Additionally the Selected Remedy provides an optimal balance of controlling human health and ecological risks at an acceptable level with minimal intrusive activities and an effective use of funding. Therefore, the Selected Remedy is less harmful to ecological receptors and is much more cost effective than technologies that do utilize treatment.

Because this remedy will result in contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, five-year reviews will be conducted in compliance with CERCLA and NCP to ensure that the remedy is and will be protective of human health and the environment.

1.6 DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary (Part 2) of this ROD. Additional information can be found in the Administrative Record for this site.

Criterion	Section	Page No.
Contaminants of concern and their respective concentrations	Table 5	NA
Baseline risk represented by the contaminants of concern	2.7	2-10
Cleanup levels established for contaminants of concern and the basis for these levels	Table 5, 2.7.4	2-15
How source materials constituting principal threats will be addressed	2.11	2-23
Current and reasonably anticipated future land use assumptions used in baseline risk assessment and ROD	2.6	2-9
Potential land and groundwater use available as a result of the Selected Remedy	2.12.1	2-23
Estimated capital, annual operation and maintenance (O&M) and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected	2.12.3	2-24
Key factors leading to selection of Selected Remedy	2.12.1	2-23

NA – Not Applicable

1.7 AUTHORIZING SIGNATURE

John P. Stack
Lieutenant Colonel, U.S. Army
Garrison Commander

17 Sept 07
Date

George Pavlou, Director
Emergency and Remedial Response Division
United States Environmental Protection Agency, Region 2

9/28/07
Date

2.0 PART 2: DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

This ROD describes the Selected Remedy at Site 180 (PICA 093) located at the Picatinny Arsenal in Rockaway Township, Morris County, New Jersey. Picatinny is a National Priorities List (NPL) site and is registered under the Comprehensive Environmental Compensation, Response, and Liability Information System number NJ3210020704. The Army is the lead agency for CERCLA actions at these sites, and USEPA Region 2 is the support agency with oversight responsibilities. Plans and activities are also being coordinated with appropriate state agencies including the New Jersey Department of Environmental Protection (NJDEP). The funding for this action will be provided by the Environmental Restoration, Army (ER, A) account.

Picatinny Arsenal is a 6,500-acre government-operated munitions research and development facility located in Morris County, New Jersey, approximately 40 miles west of New York City and 4 miles northeast of Dover, New Jersey. The Arsenal sits in the Highlands of the state of New Jersey (Figure 1).

Site 180 (PICA 093) is located in the north central portion of Area C at Picatinny (Figure 1) and consists of approximately 6.8 acres on the eastern side of GPB. 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.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 Picatinny Arsenal Background

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 maximite (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 take on expansion in mission.

2.2.2 Site 180 (PICA 093) Background

According to the Phase I Remedial Investigation (RI) Report, it is believed that Site 180 (PICA 093) was used as an unregulated landfill in the 1960s and 1970s. Items that may have been deposited in the landfill include miscellaneous drums, debris, possible unexploded ordnance, railroad ties, telephone poles, concrete rubble, crushed steel drums, and miscellaneous building materials. Large portions of the southern end of Picatinny were subject to filling activities to increase the amount of usable land.

The original boundaries of Site 180 (PICA 093) included several piles of debris containing railroad ties, concrete rubble, scrap metal, and tires (Dames and Moore, 1998). The lateral extent of Site 180 (PICA 093) was increased since the completion of the Phase I RI Report to include additional piles of debris and waste material in the vicinity of the original site boundaries. The limits of Site 180 (PICA 093) are presented in Figure 2.

During the Phase I RI, propellant canisters and empty projectile bodies were discovered in three piles at Site 180 (PICA 093). The Picatinny Environmental Affairs Office (EAO) instituted removal of this material in Spring 1997. The objective of the action was to enable sampling under the piles and to mitigate safety concerns regarding the propellant canisters.

Four previous environmental investigations have been conducted at Site 180 (PICA 093):

- Phase I RI conducted by Dames and Moore in 1994 (included in the 1998 RI Report);
- Additional Sampling Investigation conducted by ICF Kaiser in 1998;
- Exploratory Trench Investigation conducted by International Technology Corporation (IT) from 1998 to 1999; and,
- Additional sampling conducted in November 2005 and April 2006 to address potential wetland impacts as a result of comments from NJDEP, USEPA, and Biological Technical Assistance Group (BTAG) on the Feasibility Study (FS) and Proposed Plan (PP) for this site.

During the exploratory trench investigation many of the suspected deposits in the landfill, including reports of a railroad car, were not found, for the most part only building debris and asbestos were discovered and subsequently removed. The results from these sampling events are summarized in Section 2.5.2.

Following completion of the Phase I RI in 1998, a Final Feasibility Study, dated August 2004, and a Final Proposed Plan, dated December 2006, were prepared by Shaw Environmental and ARCADIS.

Site 180 (PICA 093) is currently part of Hunting Area (HA) 18 and is used for small game (primarily pheasant) and deer hunting. Access for hunting is controlled by Picatinny. Because the site is used primarily for pheasant hunting, hunting occurs at Site 180 (PICA 093) for only a few days each year. Use of the area for hunting is expected to continue. With the exception of the cover system [from the Site 34 (PICA 002) remediation] that will cover a portion of Site 180 (PICA 093), no plans exist for changing Site 180 (PICA 093) land use at this time.

2.2.3 Enforcement Activities

No formal enforcement activities have occurred at Site 180 (PICA 093). Picatinny is working in cooperation with the USEPA and NJDEP to apply appropriate remedies that will preclude the necessity of formalized enforcement actions, such as Notices of Violation.

2.3 COMMUNITY PARTICIPATION

Site 180 (PICA 093) has been the topic of presentations at the Picatinny Arsenal Environmental Restoration Advisory Board (PAERAB). PAERAB members have provided comments regarding the proposed remedial alternative. A courtesy copy of the Proposed Plan was given to the PAERAB's co-chair and a complimentary copy was offered to any PAERAB member who requested it. A final Proposed Plan for Site 180 (PICA 093) was completed and released to the public on February 22, 2007 at the information repositories listed below:

Installation Restoration Program Office
Building 319
Picatinny Arsenal, New Jersey 07806

Rockaway Township Library
61 Mount Hope Road
Rockaway Township, New Jersey 07866

Morris County Library
30 East Hanover Avenue
Whippany, New Jersey 07981

Multiple newspaper notifications were made to inform the public of the start of the Proposed Plan comment period, solicit comments from the public, and announce the public meeting. The notification was run in the Star Ledger on February 24, 2007 and in the Daily Record on February 22, 2007. Copies of the certificates of publication are provided in Appendix A. A public comment period was held from March 8, 2007 to April 8, 2007 during which comments from the public were received. A public meeting was held on March 8, 2007 to inform the public about the Selected Remedy for Site 180 (PICA 093) and to seek public comments. At this meeting, representatives from the U.S. Army, NJDEP, USEPA, and the Army's

contractor, ARCADIS U.S., Inc., were present to answer questions about the site and alternatives under consideration.

2.4 SCOPE AND ROLE OF RESPONSE ACTION

This ROD addresses the selection of the remedial alternative for soil, sediment, and surface water at Site 180 (PICA 093). Based on the results of the site investigations and the human health and ecological risk assessments, contaminants of concern (COCs) were not identified for subsurface soil and sediment; therefore, subsurface soil and sediment do not pose unacceptable risks to human health and the environment and do not require remedial action. Consequently, the Selected Remedy will address the contaminants of concern (COCs), which were identified in surface soils and surface water only. The COCs are discussed in further detail in Section 2.7.3. Groundwater in Area C is being addressed under a separate action, and is not included in this ROD. The selected remedial action for Site 180 (PICA 093) is designed to provide protection to human health and the environment.

The remedial action for the site consists of enforcing permanent ICs and implementing land use restrictions to protect any land users from potential exposure to the Site 180 (PICA 093) contaminants that pose an unacceptable risk. Because contamination would remain in place under this remedial action, LUCs to ensure human health protectiveness are required. LUCs will be maintained until such time as contaminant levels allow for unrestricted use and exposure. The property will be subject to access restrictions designed to prevent disturbance of the existing soil cover and ensure no residential use of the property that results in unacceptable risk. Land use would be restricted to use by hunters under controlled conditions or other authorized personnel. The land use control objectives are:

- To maintain a land use that is consistent with the risk assessment; that is, current outdoor maintenance workers and hunters, future industry/research workers, and future construction/excavation workers;
- Prohibit the development and use of property for residential housing, elementary and secondary schools, child care facilities and playgrounds that result in unacceptable risk; and,
- Maintain the integrity of the cover system.

The remedy also involves performing any site maintenance required to maintain the protectiveness of the remedy. Also, it provides a contingency plan should development of the site be desired by the Army in the future. The LUCs and any maintenance that will be implemented by the Army will be detailed in the Remedial Design.

Picatinny has many existing ICs in place. Elements of ICs in place at Picatinny include: Site Clearance and Soil Management Procedures; Unexploded Ordnance Procedures (UXO) Clearance Procedures; Master Plan Regulations; Picatinny Base Access Restrictions; Picatinny Safety Program; Army Military Construction Program; and a facility-wide Classification Exception Area (CEA). A Land Use Control Implementation Plan will be prepared to formalize many of these ICs.

2.5 SITE CHARACTERISTICS

2.5.1 Physical Characteristics

2.5.1.1 Topography and Surface Water Hydrology

Site 180 (PICA 093) consists of approximately 6.8 acres and is generally flat and poorly drained, as is typical of the southern end of Picatinny. Extensive filling activities at the site have resulted in a hummocky appearance, with overgrown piles of debris forming the majority of the topographic relief. Other man-made features at the site include a dirt access road and a drainage ditch that formerly discharged to GPB. The ditch currently ends at the northeast end of the site and forms a low lying swampy or ponded area. Due to the lack of topographic relief, there is little surface water flow from the site. Precipitation generally ponds in the lower areas and either infiltrates into the ground or is evapotranspirated into the atmosphere.

Site 180 (PICA 093) is located on the 100-year flood plain for GPB.

A site location plan is provided as Figure 1 and an existing site conditions plan showing the existing topography and land cover is provided as Figure 2.

2.5.1.2 Geology and Hydrogeology

Geologic and hydrogeologic information was obtained from the boring logs of six pre-existing wells in the vicinity of the site and from the description provided during the trenching operations at five trenches conducted as part of the 1999 Exploratory Trenching Investigation (IT, 2000). The Exploratory Trenching Investigation was terminated after the exploratory trenching operations encountered buried munitions. Fill material, ranging from nonexistent to 10 feet in thickness, underlies much of Site 180 (PICA 093). The fill is described as brown fine to medium sand and gravel containing various types of debris including scrap metal, lumber, and other types of construction material. The fill appears to increase in thickness toward the north end of the site (Dames and Moore, 1998). A dark gray organic-rich clay or peat underlies the fill materials in most locations, and trenching activities during the Exploratory Trenching Investigation were discontinued when this clay, considered native soil, was encountered. Two sand units, a fine to medium sand overlying a coarse sand, form the unconfined aquifer under Site 180 (PICA 093). The two units are approximately 20 feet thick and appear to be fairly uniform across the site. Based on the area-wide interpretations in the Phase I RI, the unconfined aquifer overlies the upper semi-confined aquifer in this area, which is interpreted to be approximately 50 feet thick (Dames and Moore, 1998). A total of nine groundwater monitoring wells are located within Site 180 (PICA 093).

Three rounds of water level data collected as part of the Phase I indicate that the groundwater in the unconfined aquifer is flowing to the west-southwest towards GPB (Dames and Moore, 1998). The horizontal hydraulic gradient across the site is approximately 6.67×10^{-03} feet per foot, with a head change of 3.5 feet from the eastern end of the site to the western edge of the site.

Groundwater at the site is being addressed separately under the Area C Groundwater Operable Unit.

2.5.1.3 Wetlands

The largest wetland area, the GPB floodplain, encompasses Site 180 (PICA 093). This area is disturbed due to the network of man-made drainage ditches created using fill to support activities adjacent to Site 34 (PICA 002). The wetland adjacent to Site 180 (PICA 093) can be classified as a seasonally flooded, palustrine emergent wetland. Observation of the adjacent wetland areas suggests that the area was once a forested wetland. Lands to the north, east, and west are also classified as palustrine emergent wetlands. Wetlands to the south are classified as palustrine forested systems.

2.5.1.4 Climate

Northern New Jersey has a continental temperate climate controlled by weather patterns from the continental interior. Prevailing winds blow from the northwest from October to April and from the southwest from May to September. The average monthly temperature ranges from a high of about 72°F in July to a low of about 27°F in January and February. The average date of the last freeze is May 2, and the first freeze is October 8. Average annual precipitation at the Boonton monitoring station located approximately 5 miles east of Picatinny is 48 inches and is evenly distributed throughout the year.

2.5.2 Summary and Findings of Site Investigations

Table 1 summarizes the environmental investigations and reporting that have been conducted at Site 180 (PICA 093). The extent of contamination in surface soil, subsurface soil, groundwater, surface water, and sediment are summarized below.

2.5.2.1 Extent of Surface Soil Contamination

Studies have shown various contaminants present in surface soils at the site above Levels of Concern (LOCs). The LOCs are based on the NJDEP Non-Residential Direct Contact Soil Cleanup Criteria (NRDCSCC). In cases where NJDEP Cleanup Criteria are not available, USEPA Region III Industrial (1×10^{-06}) Risk-Based Concentrations (IRBCs) were selected as LOCs. Polycyclic aromatic hydrocarbons (PAHs), target analyte list (TAL) metals, dioxins/furans, pesticides, and polychlorinated biphenyls (PCBs) were identified in surface soil at concentrations above their respective LOCs.

Figure 2 shows the locations where sample results have indicated LOC exceedances. Surface soil samples have been collected at Site 180 (PICA 093) during the Phase I RI (Dames & Moore, 1994), Additional Sampling Investigation (ICF Kaiser, 1998), and Trenching Investigation (ICF Kaiser, 1998-

1999). Table 2 summarizes the contaminants detected in surface soil samples at Site 180 (PICA 093) which exceeded their respective LOCs.

In 2005 and 2006, additional surface soil sampling in the wetlands area was performed at the request of the USEPA, NJDEP, and BTAG. Results of this wetlands investigation are provided within this section.

Polycyclic Aromatic Hydrocarbons

The maximum concentrations of benz(a)anthracene (153 mg/kg, LOC of 4 mg/kg), benzo(a)pyrene (116 mg/kg, LOC of 0.66 mg/kg), benzo(b)fluoranthene (162 mg/kg, LOC of 4 mg/kg), benzo(k)fluoranthene (71 mg/kg, LOC of 4 mg/kg), chrysene (145 mg/kg, LOC of 40 mg/kg) and dibenz(a,h)anthracene (17.6 mg/kg, LOC of 0.66 mg/kg) were detected in sample 180ET-404A. The maximum concentration of indeno(1,2,3-c,d)pyrene (100.0 mg/kg, LOC of 4 mg/kg) was detected in sample TP180-1A.

Low-level PAH contamination is present throughout surface soils at the site. It is believed that the PAH contamination at Site 180 (PICA 093) is a result of windblown contamination from burning activities at Site 34 (PICA 002), as PAHs are not expected to be a significant result of the buried waste and/or debris piles at Site 180 (PICA 093). PAHs are typically associated with the incomplete combustion of fossil fuels or the burning of wastes, which occurred regularly during normal operations at Site 34 (PICA 002).

Target Analyte List Metals

Five metals (arsenic, cadmium, copper, lead, and zinc) were detected at concentrations that exceeded their LOCs. Arsenic was detected in five surface soil samples above its LOC; the highest number among metals. The highest concentration of arsenic was identified in sample 180ET-503A at a concentration of 50.1 mg/kg (LOC of 20 mg/kg). The maximum concentrations of cadmium (1,780 mg/kg, LOC of 100 mg/kg) and copper (692 mg/kg, LOC of 600 mg/kg) were detected in sample 203A. The maximum concentration of lead (994 mg/kg, LOC of 600 mg/kg) was detected in sample 304A. The maximum concentration of zinc (2,180 mg/kg, LOC of 1,500 mg/kg) was detected in sample 180ET-405A.

Dioxins/Furans

Three dioxins/furans, 1,2,3,4,6,7,8-HpCDD, 2,3,4,7,8-PeCDF, and 2,3,7,8-TCDF, were detected at concentrations that exceed their LOCs. 1,2,3,4,6,7,8-HpCDD and 2,3,7,8-TCDF were detected above their LOC in only one surface soil sample and 2,3,4,7,8-PeCDF was identified in two surface soil samples. The maximum concentrations of 1,2,3,4,6,7,8-HpCDD [2,800 picograms/gram (pg/g), LOC of 1,900 pg/g], 2,3,4,7,8-PeCDF (66 pg/g, LOC of 38 pg/g), and 2,3,7,8-TCDF (210 pg/g, LOC of 190 pg/g) were detected in sample 203A.

Toxic equivalency concentrations (TECs) were calculated for dioxins for eleven surface soil samples at Site 180 (PICA 093) as part of the Site 180 (PICA 093) FS (Shaw, 2004a). Concentrations for all dioxins were normalized to be equivalent to 2,3,7,8-TCDD concentrations using 1998 World Health Organization toxic equivalency factors (TEFs). The total TEC for all dioxins expressed in terms of 2,3,7,8-TCDD ranged from 0.91 pg/g in sample 180ET-403A to 145.64 pg/g in sample 180ET-203A. The IRBC for 2,3,7,8-TCDD is 19 pg/g. The TEC expressed as 2,3,7,8-TCDD exceeded the IRBC in three of the eleven samples.

Pesticides

One pesticide, dieldrin, was detected above the LOC in two of the forty-five surface soil samples analyzed for pesticides. The maximum dieldrin concentration of 0.290 mg/kg was identified in sample TP180-3A. There is no recorded history of pesticide application at Site 180 (PICA 093). Because Site 180 (PICA 093) has been used as a dumping ground, some of the dumping could have included waste materials with pesticide residue. Pesticides were detected in characterization samples collected during the 2006 drum removal event. Therefore, the dieldrin concentrations identified in surface soil are possibly associated with past disposal practices.

Polychlorinated Biphenyls

Two PCBs, Aroclor-1254 and Aroclor-1260, were detected at concentrations exceeding their LOCs. Because no LOCs exist for individual PCB congeners, the concentrations of PCB congeners were compared to the LOC for total PCBs (2 mg/kg). Aroclor-1254 was detected above the LOC in one of the forty-five samples analyzed for PCBs. Aroclor-1254 was detected in sample 180ET-303A at a

concentration of 18.7 mg/kg, which exceeds the LOC of 2 mg/kg for total PCBs. Aroclor-1260 was identified above the LOC in three surface soil samples. The maximum concentration of Aroclor-1260, 4.48 mg/kg (LOC of 2 mg/kg for total PCBs) was detected in sample 180ET-203A..

Additional Wetlands Soils Investigation

Based on comments from NJDEP, USEPA, and BTAG, the Army conducted two rounds of wetlands soil sampling to further characterize the wetlands soils on the southern side of the site. Additionally, all drums, drum carcasses, and scrap metal in the marsh bordering the site were removed.

The additional soil samples were collected in November 2005 to determine if the site-related contamination at Site 180 (PICA 093) has impacted the wetlands at the site. A total of twenty-four surface soil samples were collected from twelve locations along the southern and eastern edge of the site; approximately 10-15 feet from the push-out boundary. Figure 3 depicts the sample locations and the wetlands delineated areas at Site 180 (PICA 093). Soil samples were collected from locations approximately 200 feet apart and from depths of 0 to 1 foot bgs and 1 to 2 feet bgs. Sample locations were biased toward depositional areas and areas adjacent to drums and other debris within the push-out boundary. The samples collected from the initial depth of 0 to 1 foot bgs were analyzed for semivolatile organic compounds (SVOCs), PCBs, TAL metals, total organic carbon (TOC), and grain size. Samples that were collected from beneath partially-buried drums were analyzed for volatile organic compounds (VOCs) in addition to the other parameters. Soil samples collected from 1 to 2 feet bgs were archived by the laboratory and were to only be analyzed if the results of the shallow samples indicated high levels of contamination. The results of the sampling indicated that, with few exceptions, contaminant levels detected ranged from below LOCs to within one order of magnitude above LOCs. Sample 180SS-15 had the greatest number of LOC exceedances as well as the greatest number of concentration maxima. Lead levels at 180SS-14 (145 mg/kg), 180SS-15 (587 mg/kg), and 180SS-19 (150 mg/kg) were an order of magnitude greater than the remaining nine sample locations. Several PAHs exceeded LOCs at sample locations 180SS-15 and 180SS-19, but were determined to not represent an ecological risk. Cadmium, copper, lead, mercury, and zinc at 180SS-15 all exceeded LOCs, but were likewise determined to not be of ecological concern. The primary conclusion of this first round of sampling was that with the exception of sample 180SS-15, no additional investigation was necessary. Additionally, the BTAG indicated that the quantified contamination does not warrant additional remedial action beyond the removal of the drum carcasses.

Based on the regulatory review of the additional sampling results, a second round of soil sampling was conducted to determine the extent of the contamination identified at location 180SS-15. During this second round of sampling, five additional samples were collected. Four samples were collected at a distance of 30 feet north, south, east, and west of the 180SS-15 location, and one sample was obtained in the same location as 180SS-15. Sample locations are presented on Figure 3. For the most part the samples contained similar levels of contamination as seen in 180SS-15. Lead was detected above soil LOCs in two of the samples (2,830 mg/kg in 180SS-15E and 943 mg/kg in 180SS-15S, LOCs of 600 mg/kg). Two PAHs, benzo(a)anthracene and benzo(a)pyrene, were detected above their respective soil LOCs. The only exceedances of benzo(a)anthracene (4.0 mg/kg, LOCs of 4 mg/kg) and benzo(a)pyrene (2.8 mg/kg, LOCs of 0.66 mg/kg) were detected in 180SS-15N.

During the second round of soil sampling, all of the rusted-through drum carcasses in the marsh adjacent to the pushout area were removed and disposed of off-site. One drum was partially intact and only had a few small holes. This drum was approximately 25% full of water and exhibited markings which indicated it contained oil at one time. The liquid in the drum was sampled to characterize it for disposal. The characterization samples indicated levels of diesel-range organics and pesticides. This drum and the liquid contents were disposed of off-site.

The maximum concentration in the 2005/2006 samples for benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, arsenic, and lead exceeded human health-based risk screening values. However, concentrations of all these chemicals, except lead, were within the observed concentrations evaluated in the two previous risk assessments (Section 2.7). Contamination detected during this second round of sampling will be addressed as a new operable unit by Picatinny Arsenal.

2.5.2.2 Extent of Subsurface Soil Contamination

Subsurface soil samples were collected at Site 180 (PICA 093) during the Phase I RI (1994) and the 1998-1999 Trenching investigation. The LOCs for subsurface soil were selected from the NJDEP Impact to Groundwater Criteria. Where these criteria did not exist, the NRDCSCC was selected, and if the NRDCSCC was not available, the Region III IRBC was selected. Only select VOCs, metals, and one dioxin/furan were identified in subsurface soil at concentrations which exceeded LOCs. Table 3 summarizes the contaminants detected in subsurface soil samples with LOC exceedances, and Figure 2 shows the locations of these samples.

Volatile Organic Compounds

Three VOCs, carbon tetrachloride, methylene chloride, and trichloroethene (TCE) were detected at concentrations exceeding their LOC. Carbon tetrachloride and TCE were identified above their LOCs in one of the thirty-six subsurface soil samples analyzed for VOCs. Methylene chloride was identified above the LOC in six soil samples. The maximum concentration of carbon tetrachloride (11.3 mg/kg, LOC of 1 mg/kg) occurred in sample 310B. The maximum concentration of methylene chloride (1.44 mg/kg, LOC of 1 mg/kg) occurred in sample 206C. The maximum concentration of TCE (2.58 mg/kg, LOC of 1 mg/kg) occurred in sample 207B.

TAL Metals

Two metals, arsenic and zinc, were detected at concentrations exceeding their LOCs. The metals were identified in three of the fifty-five subsurface soil samples analyzed for metals. The maximum concentration of arsenic (23.1 mg/kg, LOC of 20 mg/kg) occurred in sample 401B. The maximum concentration of zinc (1,500 mg/kg, LOC of 1,500 mg/kg) occurred in sample 406B.

Dioxins/Furans

Dioxins 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,6,7,8-HpCDD, 1,2,3,6,7,8-HxCDD, OCDD, OCDF, and 2,3,7,8-TCDF were detected at concentrations well below their LOC. Seven other dioxins/furans were detected which do not have established LOCs: HpCDFs (total), HpCDDs (total), HxCDFs (total), HxCDDs (total), PeCDFs (total), peCDDs (total), and TCDFs (total).

TECs were calculated for dioxins for six subsurface soil samples at Site 180 (PICA 093) as part of the Site 180 (PICA 093) FS (Shaw, 2004a). Concentrations for all dioxins were normalized to be equivalent to 2,3,7,8-TCDD concentrations using 1998 World Health Organization TEFs. The total TEC for all dioxins expressed in terms of 2,3,7,8-TCDD ranged from 32.11 pg/g in sample TP180-2C to 157.48 pg/g in sample 180ET-311D. The established IRBC for 2,3,7,8-TCDD in subsurface soil is 19 pg/g. Therefore, the TEC expressed as 2,3,7,8-TCDD exceeded the IRBC in all six subsurface soil samples.

2.5.2.3 Impact to Site 180 (PICA 093) Groundwater

Groundwater at Site 180 (PICA 093) is addressed under the Area C Groundwater Feasibility Study (FS) and a separate ROD for groundwater will be developed. For this reason, remedial alternatives for Site 180 (PICA 093) were not developed in the FS to mitigate impacted groundwater at Site 180 (PICA 093). Remedial alternatives were, however, developed to mitigate any impacts from leaching at Site 180 (PICA 093) to groundwater. Chemicals detected in soil that could potentially prove harmful to groundwater were identified to evaluate the potential for data gaps associated with groundwater protection. These contaminants of potential concern (COPCs) were developed utilizing soil and groundwater data. Due to the significant amount of time since the release of contamination in the Site 180 (PICA 093) area, it was assumed that if groundwater impact from a specific compound was to occur it would already be evident in the groundwater analytical results. Compounds were selected based on results that indicated groundwater had already been impacted. The COPC list was based on the entire Site 180 (PICA 093) groundwater data set, and was screened against relevant criteria such as NJDEP maximum contaminant limits (MCLs) and Quality Criteria. These criteria are included as Picatinny LOCs for groundwater.

Based on the groundwater sampling results, nine contaminants (aluminum, arsenic, beryllium, iron, lead, manganese, 1,3-dinitrobenzene, 1,2,3,4,6,7,8-HpCDD, and OCDD) were selected as having the potential for continued impact to groundwater. However, all contaminants were eliminated because they were

background related, had a low frequency of detection in soil (less than 5 percent), and/or did not show evidence of a presence in a groundwater plume.

2.5.2.4 Extent of Surface Water Contamination

The LOCs for contaminants in surface water were selected from the lowest of the following sets of criteria: NJDEP Surface Water Quality Criteria, USEPA Surface Water Quality Criteria-Chronic, Surface Water Quality Criteria-Acute, Surface Water Quality Criteria- Water and Organisms, or Surface Water Quality Criteria Water. Contaminants identified in surface water at concentrations exceeding their respective LOCs included TAL metals, explosives, pesticides, and dioxins/furans.

TAL Metals

Eleven metals were detected in surface water at concentrations exceeding their LOCs. The maximum concentrations of aluminum (36,700 µg/L, LOC of 87 µg/L), arsenic (27.9 µg/L, LOC of 0.017 µg/L), chromium (68.1 µg/L , LOC of 11.4 µg/L), copper (126 µg/L, LOC of 9.4 µg/L), iron (71, 900 µg/L, LOC of 300 µg/L), lead (490 µg/L, LOC of 3.2 µg/L), manganese (1,010 µg/L, LOC of 50 µg/L), mercury (1.51 µg/L, LOC of 0.144 µg/L), nickel (59.2 µg/L , LOC of 52 µg/L), and zinc (800 µg/L, LOC of 120 µg/L) were all detected in sample SW180-3. The maximum concentration of cadmium (2.9 µg/L, LOC of 0.28 µg/L) was detected in sample SW180-5.

Explosives

One explosive, Cyclotrimethylenetrinitramine (RDX), was detected at a concentration exceeding its LOC. RDX was detected in sample 180SW-5 at a concentration of 1.25 µg/L. The LOC for RDX in surface water is 0.61 µg/L.

Pesticides

Two pesticides, delta-BHC and endrin ketone, were detected at concentrations exceeding their LOCs. The maximum concentration of delta-BHC (0.035 µg/L, LOC of 0.0091 µg/L) was detected in sample 180SW-5. The maximum concentration of endrin ketone (0.003 µg/L, LOC of 0.0023 µg/L) was detected in both samples 180SW-5 and 180SW-6.

Dioxins/Furans

One compound, 1,2,3,4,6,7,8-HpCDD, was detected at a level exceeding its LOC. The maximum concentration of 1,2,3,4,6,7,8-HpCDD (0.000062 µg/L, LOC of 0.000045 µg/L) occurred in sample 180SW-07. Three other dioxins/furans were detected which do not have established LOCs: HpCDFs (total), HpCDDs (total), and TCDFs (total).

TECs were calculated for dioxins for 2 surface water samples at Site 180 (PICA 093) as part of the Site 180 (PICA 093) FS (Shaw, 2004a). Concentrations for all dioxins were normalized to be equivalent to 2,3,7,8-TCDD concentrations using 1998 World Health Organization TEFs. The total TEC for all dioxins expressed in terms of 2,3,7,8-TCDD was 792.94 picograms/milliliter (pg/ml) in sample SW180-3 and 5.90 pg/ml in sample 180SW07. The LOC for 2,3,7,8-TCDD, a USEPA Water Quality Criterion, is 0.0050 pg/ml. Therefore, the TEC expressed as 2,3,7,8-TCDD exceeded the LOC in both surface water samples.

2.5.2.5 Extent of Sediment Contamination

Sediment samples were collected during the Phase I RI (1994), Additional Sampling Investigation (1998), and Trenching Investigation (1998-1999). LOCs for contaminants in sediment were selected from the lowest of the following sets of criteria: Federal Sediment Quality Criteria, threshold effect levels (NOAA, 1991), lowest effect level and sediment quality benchmarks (Ontario Ministry of the Environment, 1991), New York State Sediment Quality Criteria or effect range-low (NOAA, 1991). Concentrations of PAHs, TAL metals, pesticides, dioxins/furans, and radiological contaminants were identified in sediment above their respective LOCs.

PAHs

Twelve PAHs, including anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-

c,d)pyrene, phenanthrene, and pyrene, were detected in sediment samples at concentrations exceeding their LOCs. The maximum concentrations of anthracene (1.1 mg/kg, LOC of 0.22 mg/kg), benz(a)anthracene (4.3 mg/kg, LOC of 0.0317 mg/kg), benzo(a)pyrene (4.1 mg/kg, LOC of 0.0319 mg/kg), benzo(b)fluoranthene (5 mg/kg, LOC of 0.24 mg/kg), benzo(g,h,i)perylene (2.2 mg/kg, LOC of 0.17 mg/kg), benzo(k)fluoranthene (2 mg/kg, LOC of 0.24), chrysene (3.8 mg/kg, LOC of 0.0571), dibenz(a,h)anthracene (0.65 mg/kg, LOC of 0.0571), fluoranthene (8 mg/kg, LOC of 0.111 mg/kg), indeno(1,2,3-c,d)pyrene (2.6 mg/kg, LOC of 0.2 mg/kg), phenanthrene (3.7 mg/kg, LOC of 0.0419 mg/kg), and pyrene (5.9 mg/kg, LOC of 0.053 mg/kg), were all detected in sample 180SD-5.

TAL Metals

Ten metals were detected in sediment at concentrations exceeding their LOCs. The maximum concentrations of arsenic (15 mg/kg, LOC of 5.9 mg/kg), chromium (53.9 mg/kg, LOC of 26 mg/kg), copper (74.8 mg/kg, LOC of 16 mg/kg), iron (122,000 mg/kg, LOC of 20,000 mg/kg), manganese (622 mg/kg, LOC of 460 mg/kg), nickel (26.8 mg/kg, LOC of 16 mg/kg), and zinc (26.8 mg/kg, LOC of 16 mg/kg) were all detected in sample 180SD-4. The maximum concentrations of lead (116 mg/kg, LOC of 31 mg/kg) and mercury (0.345 mg/kg, LOC of 0.174 mg/kg) were detected in sample 180SD-5. The maximum concentration of cadmium (4.5 mg/kg, LOC of 0.596 mg/kg) was detected in sample 180SD-6.

Pesticides

Five pesticides, aldrin, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and methoxychlor, were detected at concentrations exceeding their LOCs. The maximum concentration of aldrin (0.01 mg/kg, LOC of 0.002 mg/kg) was detected in sample SD180-2. The maximum concentrations of 4,4'-DDD (0.071 mg/kg, LOC of 0.00354 mg/kg) 4,4'-DDE (0.019 mg/kg, LOC of 0.00142 mg/kg), and 4,4'-DDT (0.114 mg/kg, LOC of 0.007) were detected in sample 180SD-4. The maximum concentration of methoxychlor 4,4'-DDT (0.0258 mg/kg, LOC of 0.0197 mg/kg) was detected in sample SD180-1.

Dioxins/Furans

Numerous dioxins/furans were detected in sediment, however, some do not have an established LOC. Dioxins/furans detected include 1,2,3,4,6,78-HpCDF, 1,2,3,4,6,7,8-HpCDD, OCDD, OCDF, 2,3,7,8-TCDF, HpCDFs (total), HpCDDs (total), HxCDFs (total), HxCDDs (total), PeCDFs (total), TCDFs (total), and TCDDs (total). There are no established LOCs for HpCDFs (total), HpCDDs (total), HxCDFs (total), HxCDDs (total), PeCDFs (total), TCDFs (total), and TCDDs (total).

TECs were calculated for dioxins for 2 sediment samples at Site 180 (PICA 093) as part of the Site 180 (PICA 093) FS (Shaw, 2004a). Concentrations for all dioxins were normalized to be equivalent to 2,3,7,8-TCDD concentrations using 1998 World Health Organization TEFs. The total TEC for all dioxins expressed in terms of 2,3,7,8-TCDD was 50.48 pg/g in sample SD180-3 and 1.92 pg/g in sample 180SD-07. The LOC for 2,3,7,8-TCDD is 0.85 pg/g, which is an Interim Sediment Quality Guideline. Therefore, the TEC expressed as 2,3,7,8-TCDD exceeded the LOC in both sediment samples.

Radiologicals

Three radiological parameters, alpha (gross), beta (gross), and cesium-137, were detected in sample SD180-3. The concentrations were as follows: alpha (gross), 17 pCi/g; beta (gross), 39 pCi/g; cesium-137, 0.33 pCi/g. The threshold values for alpha (gross), beta (gross), and cesium-137 are 20.0 pCi/g, 30.7 pCi/g, and 0.560 pCi/g, respectively.

2.6 CURRENT AND POTENTIAL FUTURE LAND AND WATER USES

Site 180 (PICA 093) is currently part of HA 18 and is used for small game (primarily pheasant) and deer hunting. Access for hunting is controlled by Picatinny. Because this area is used primarily for pheasant hunting, exposure to Site 180 (PICA 093) contamination occurs only a few days a year. Use of this area for hunting is expected to continue. With the exception of the cover system that will cover a portion of Site 180 (PICA 093), no plans exist for changing Site 180 (PICA 093) land use at this time. There is no current or anticipated future use of groundwater at Site 180 (PICA 093).

2.7 SUMMARY OF SITE RISKS

Site 180 (PICA 093) has been the subject of several investigations including risk assessments designed to evaluate the potential impact to human health and the environment. A summary of the results of the human health and environmental risk assessments is presented in the following sections.

As part of the RI/FS, baseline risk assessments were conducted for Site 180 (PICA 093) to determine the current and future effects of contaminants on human health and the environment. Currently, Site 180 (PICA 093) is only used for access for small game and deer hunting. It is reasonably anticipated that there will be no change in the land use at Site 180 (PICA 093). However, based on established methodologies set in place as part of a negotiation with the USEPA, the risk assessment evaluated the site for industrial land use scenarios. Evaluated exposure scenarios included future industrial/research worker, future construction/excavation worker, and current outdoor maintenance worker. The evaluation of these scenarios overestimates the potential exposure to hunters as hunting at Site 180 (PICA 093) takes place significantly less than the 250-day/year exposure frequency used to assess potential exposure to the industrial/research worker. The baseline risk assessment estimates what risks the site poses if no action were taken. As part of the baseline risk assessment, estimates of excess cancer risk and non-carcinogenic health hazards are calculated.

2.7.1 Human Health Risk Assessment

Several risk assessments have been conducted for Site 180 (PICA 093). The first was conducted by Dames & Moore who prepared independent human health risk assessments (HHRAs) at Site 180 (PICA 093) as part of the Phase I RI. Following the 1998 trenching investigation, ICF Kaiser revised the risk assessments using the additional data and focused on the contaminants posing the greatest threat to human health. The following sections summarize the risk assessment process and results.

2.7.1.1 Contaminants of Potential Concern

COPCs were identified by comparing the maximum detected concentration of an individual contaminant to a risk-based concentration derived for a specific exposure scenario. This comparison, or screening, is a tool used to: 1) identify and define contaminants that require further inspection; 2) focus the scope and scale of future sampling and analysis or remedial activities; and/or 3) focus the risk assessment on specific areas, contaminants, and pathways.

The identification of COPCs is conservatively biased to ensure that the screening process retains all contaminants that might pose an unacceptable risk. However, the identification of a contaminant as a COPC does not indicate that an unacceptable risk actually exists, but only that further analysis is required. Whether or not the COPCs are addressed qualitatively or quantitatively in the risk assessment is dependent on the result of the comparison to background values and the availability of contaminant-specific toxicity information.

The maximum detected contaminant concentration was compared to the USEPA Region III risk-based concentration (RBCs). The USEPA Region III RBCs for non-carcinogenic effects were derived using a target hazard quotient (THQ) of 1. Following USEPA Region III guidance, the RBCs based on non-carcinogenic effects were reduced by a factor of 10 (corresponding to a THQ of 0.1) for use in the screening process. RBCs based on carcinogenic effects (using a target cancer risk of 10^{-06}) were used as the listed value.

COPCs for groundwater and surface water were selected based on a comparison to the USEPA Region III tap water RBCs. Soil and sediment COPCs were selected based on a comparison to the residential soil RBCs. Finally, the fish tissue data were compared to the USEPA Region III fish RBCs.

RBCs were not available for all contaminants. If RBCs were unavailable, screening concentrations were based on ARARs, agency guidance, or regulatory precedent. For inorganics, their maximum detected concentrations were compared to their maximum background concentrations. If present at concentrations less than background, the contaminants were not selected as COPCs. Calcium, iron, magnesium, phosphorus, potassium, and sodium are dietary nutrients with National Research Council recommended daily allowances (RDAs). The RDAs were used to develop screening criteria for these contaminants.

Twenty contaminants were selected as COPCs for total soil. They include PAHs, metals, nitrocellulose, endosulfan sulfate, PCBs, and dioxins/furans. A similar number of contaminants were selected as COPCs for shallow soil. However, more PAHs were selected, and endosulfan sulfate was not selected as a COPC for shallow soil.

2.7.1.2 Munitions and Explosives of Concern

Munitions and Explosives of Concern (MEC) have been discovered at Site 180 (PICA 093). These items included 40 millimeter grenades discovered during the 1999 trenching investigation. The need for any MEC assessment and/or clearance at Site 180 (PICA 093) would be evaluated under the Military Munitions Response Program (MMRP). Recent activities performed in support of the MMRP included the completion of a Historical Records Review and the implementation of a Picatinny Site Inspection which concluded that Site 180 (PICA 093) would proceed to the Remedial Investigation Stage.

Currently, consistent with Army and Picatinny regulations, MEC hazards are controlled by the Picatinny Safety Program. This program includes coordination with the Picatinny Safety Office, soil excavation restrictions, MEC clearance procedures, and hunter MEC identification training. These controls are in place to protect hunters and construction workers.

2.7.1.3 Exposure Assessment

Exposure pathways were identified based on the site characterization information, the fate and transport properties of the COPCs, and likely points where human receptors may come in contact with affected media under current or potential future conditions at the site. An exposure pathway is defined by the following four elements:

1) a source and mechanism of contaminant release to the environment;
2) an environmental transport medium for the released contaminant;
3) a point of potential contact with the contaminated medium (the exposure point); and,
4) an exposure route at the exposure point.

Exposure can occur only when the potential exists for a receptor to contact released contaminants directly, or when there is a mechanism for released contaminants to be transported to a receptor. Without exposure there is no risk; therefore, the exposure assessment is a critical component of the risk assessment. Based on these criteria, the human health risk assessment focused on several current and hypothetical future exposure scenarios.

- Current exposed populations: outdoor maintenance worker
- Future exposed populations: industry/research worker; construction/excavation worker (soil)

Within the risk assessment for Site 180 (PICA 093), exposure to groundwater was not evaluated. Rather, groundwater exposure was evaluated on an area-wide basis in the Area C operable unit. Additionally, surface water exposure was not a relevant exposure pathway for Site 180 (PICA 093).

2.7.1.4 Risk Characterization

Potential risks to human health are evaluated quantitatively by combining calculated exposure levels and toxicity data. A distinction is made between non-carcinogenic and carcinogenic endpoints, and two general criteria are used to describe risk - the hazard quotient (HQ) for non-carcinogenic effects and excess lifetime cancer risk (ELCR) for contaminants evaluated as human carcinogens. The HQs are summed to calculate the hazard index (HI). The regulatory benchmark for non-cancer health effects is 1. An HI less than or equal to 1 indicates that health effects should not occur, an HQ or HI that exceeds 1 does not imply that health effects will occur, but that health effects are possible. The USEPA considers an ELCR within the target risk range of 10^{-06} to 10^{-04} as potentially acceptable cancer risk. If the ELCR exceeds the 10^{-04} target risk level, site-specific remedial goals will be established for the relevant contaminants and exposure scenarios.

Health effects were evaluated for current outdoor maintenance workers, future industry/research workers, and future construction/ excavation workers. Based on HHRA results, the non-carcinogenic hazards did not exceed the HI criterion of 1 for any of the reasonably maximum-exposed individuals. The HI is the

sum of all the HQs for all COPCs that affect the same target organ, or that act through the same mechanism of action within a medium, to which a given individual may reasonably be exposed. An HI of less than 1 indicates that toxic non-carcinogenic effects from all COPCs are unlikely. The HIs for the potential Site 180 (PICA 093) receptors were 0.1, 0.1, and 0.2 for the current outdoor maintenance workers, future industry/research workers, and future construction/ excavation workers, respectively. These levels would not warrant remediation.

The excess lifetime carcinogenic risks fell within the NCP target range of 1×10^{-04} to 1×10^{-06}. Under the NCP, the risk range for the individual is 1×10^{-04} (one in ten thousand) to 1×10^{-06} (one in a million). USEPA uses this target risk range to manage risks as part of the Superfund Cleanup. Furthermore, when excess lifetime cancer risks fall within this range, a decision about whether or not to take action is a site-specific determination (USEPA, 1989).

Using data obtained during the 1994 Phase I RI, excess cancer risks were estimated to be 9×10^{-06}, 9×10^{-05}, and 1×10^{-05} for the outdoor maintenance worker, industry/research worker, and construction/excavation worker, respectively. Human health risk drivers were primarily PAHs, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, and PCBs.

The risk was later recalculated based on data collected during the 1998 Trenching Investigation (ICF Kaiser, 1999). The additional data were merged with the 1994 data to generate revised risks for the six risk drivers and estimate their effect on the most likely receptor populations (industrial/research workers and construction/excavation workers). Initially, only the six contaminants that contributed most significantly to the overall risk from exposure to contaminants were evaluated during the revised risk assessment. Revised risks for compounds other than the six risk drivers were not calculated initially because their contribution to the total risk was thought to be negligible. Revised risks for outdoor maintenance workers were not calculated because the estimated excess risk for this scenario was the lowest. The results of the revised risk assessment were presented in the Risk Management Plan (RMP) (IT, 2000a). The revised cancer risk for the industrial/research workers potentially exposed to surface soil was calculated to be 5×10^{-05} and the revised cancer risk for the construction/excavation worker was calculated to be 4×10^{-06}, which falls within the NCP target range of 1×10^{-04} to 1×10^{-06}. The RMP concluded that the revised human health risks (cancer risks) for Site 180 (PICA 093) were lower than previously determined, and remained within the target risk range of 1×10^{-04} to 1×10^{-06} range.

As stated above, the initial recalculation of risk performed as part of the risk management plan was done using only the six risk drivers. Because there was a large amount of new data, a second calculation was performed to determine if any other compounds were contributing to site risk. Based on additional data collected during the Exploratory Trench Investigation (IT, 2000b), arsenic, benzo(k)fluoranthene, cadmium, chrysene, and dieldrin were added as COCs. The risk assessment for the industrial research worker was revised to include these additional COCs. When this second recalculation was performed it was done with the old PCB slope factor as well as the new PCB slope factor. The calculated risk using the old cancer slope factor is 6×10^{-05}. The revised cancer risk including the additional COCs and the updated slope factor for PCBs for the industrial/research workers potentially exposed to surface soil was calculated to be 5×10^{-05}. Both of these values are similar to the originally recalculated values for only the six risk drivers and are within the NCP target risk range. Benzo(a)pyrene is the most significant contributor to the overall risk.

A similar assessment was performed for noncancer hazard drivers. Noncancer hazard drivers included arsenic, cadmium, copper, dieldrin, PCBs (Aroclor 1254), and zinc. The total revised noncancer hazard was calculated to be 0.6. This is greater than the HI of 0.1 calculated in the original risk assessment, but is still less than the benchmark HI of 1. Cadmium contributes the majority (94%) of the noncancer hazard evaluated for future industrial/research workers.

The revised excess lifetime cancer risks show that the estimated excess lifetime cancer risks for the industrial/research worker were above USEPA's target cancer threshold of 1×10^{-06}, but within the target risk range of 1×10^{-04} and 1×10^{-06}. The risk was primarily due to elevated concentrations of arsenic, PAHs, and, to a lesser extent, PCBs. It should be noted that the arsenic exposure point concentration (EPC) of 12.4 mg/kg is only slightly greater than the site-specific background arsenic concentration of 9.23 mg/kg in surface soil.

The calculated excess lifetime cancer risk of $5x10^{-05}$ overestimates the excess lifetime cancer risk for Site 180 (PICA 093) because the only current land use is hunting as site conditions are not appropriate for daily use by the industrial/research worker receptor. Site 180 (PICA 093) is located within Picatinny Hunting Area (HA) that allows hunting of small game and deer, although most of the hunting within HA 18 is for pheasant, as pheasant are stocked in this area for members of the Picatinny Rod and Gun Club. This type of land use is not expected to change in the future. The exact exposure frequency of hunters at Site 180 (PICA 093) is unknown, but it is expected to be significantly less than the 250-day-per-year-exposure frequency used to assess potential exposure to the industrial/research worker. If the land use were to change in the future, it is not expected that the type of land use would require the industrial/research worker to be on-site daily. The estimated cancer risk of $4.6x10^{-05}$ for the industrial /research worker, based on an exposure frequency of 250 days per year, may be scaled to estimate the cancer risk for the hunter. Unrestricted hunting at Site 180 (PICA 093), based on 365 days per year, would result in an estimated cancer risk of $7x10^{-05}$. This risk level is within the target risk range.

Although surface water and sediment data were collected from Site 180 (PICA 093), Dames and Moore (1998) did not quantify exposure to these media by the trespasser child receptor within the area of the site. Rather, exposure to GPB was quantified using all the samples collected for this surface water body rather than at each particular site. A ROD for PICA 193 (Site 190), Green Pond Brook/Bear Swamp Brook dated December 2004 included a remedial action consisting of chemical and biological monitoring and LUCs at Region 4, which includes Site 180 (PICA 093). Therefore, although surface water and sediment within Site 180 (PICA 093) is not considered to have unacceptable risks to human health due to lack of exposure pathways, any potential migration of contaminants from Site 180 (PICA 093) to GPB is being addressed under Site 190 (PICA 193). A table summarizing the results of the HHRA is provided as Table 4.

2.7.2 Ecological Risk Assessment

The largest wetland area at Picatinny is the GPB floodplain which encompasses Site 180 (PICA 093). The wetland adjacent to Site 180 (PICA 093) can be classified as a seasonally flooded, palustrine emergent wetland. Observation of the adjacent wetland areas suggests that the area was once a forested wetland; lands to the north, east, and west are also classified as palustrine emergent wetlands. Wetlands to the south are classified as palustrine forested systems.

GPB is the only aquatic habitat associated with Site 180 (PICA 093). Although GPB is located outside the boundaries of the site, it is considered a secondary receptor due to the potential transport of eroded soil with surface runoff. The stream bank is steep and is covered by herbaceous and small woody plants that provide limited shading. Fairly dense beds of submerged aquatic vegetation were observed growing in the stretch of GPB adjacent to Site 34 (PICA 002). The bottom substrate in this stream reach was extremely soft and composed primarily of coarse to fine-grained sand and silt in addition to organic material mixed with some larger slag-type material.

Dames & Moore conducted an ecological risk assessment (ERA) at Site 180 (PICA 093) as part of the Phase I RI. The ERA used the veery, the barred owl, and the American woodcock as the study species for which HQs were calculated. The modeled estimated hazards were found to be sufficiently elevated to warrant some form of risk management or monitoring. Site 180 (PICA 093) was determined to have both suitable ecological habitat and elevated concentrations of contaminants of potential ecological concern (COPECs). The Dames and Moore ERA (1998) had the following conclusions for Site 180 (PICA 093):

- No observable impacts to the plant community;
- Plant tissue data suggest moderate bioaccumulation of aluminum and lead;
- Soil slightly toxic to earthworms;
- Small mammal population data suggest no apparent impact; and,
- No meaningful bioaccumulation observed in small mammals.

It should be noted that COPEC bioaccumulation in plants, in and of itself, does not translate into an unacceptable ecological hazard. It should be noted that the "slight toxicity to earthworms" documented at Site 180 (PICA 093) actually represents the following (from Section 13.4.2.1 of the ERA):

- Mean earthworm mortality of 5% for Site 180 (PICA 093) soil samples, which was statistically different from the laboratory control ($p<0.05$), but was not statistically different from the background reference locations ($p>0.05$); and,

- Mean earthworm weight change for the Site 180 (PICA 093) soil samples were not significantly different from either the laboratory control or the background reference locations ($p>0.05$).

The ERA (Dames and Moore, 1998; pg. 13-168) states that although earthworm survival for five Picatinny sites, including Site 180 (PICA 093), was different from laboratory controls, the study only resulted in a decreased survival rate from two sites [PICA 116 (also known as PICA 072) (Site 101), Former Gas Station and Storage Area and PICA 097 (Site 118), Pesticide Storage and Former Oil/Water Separator]. This finding is considered relevant from an ecological standpoint since mortalities from these two sites also were much greater than that observed for local reference sites.

Thus, while it is possible that a 5% reduction in earthworm populations may occur at Site 180 (PICA 093) due to the elevated concentrations of some COPECs in surface soil; this reduction is statistically similar to measurements at Picatinny background reference locations.

IT completed a Phase I RMP report to further evaluate the ecological risks at Site 180 (PICA 093). The RMP, which took into account the development of additional habitat at Site 180 (PICA 093) as a result of wetlands mitigation/restoration conducted as part of the trenching investigation, determined that ecological hazards at Site 180 (PICA 093) are borderline and acceptable for all surface soil COPECs, with the possible exceptions of chromium and selenium. The RMP recommended that it would not be in the best interest of the environment to remediate the site. This conclusion was reached because remediation could result in more damage to the environment than the no-action alternative evaluated in the ERA. Even the placement of a soil cap to limit direct exposure to COCs would likely significantly impact the environment, due to destruction of vegetation and mature trees, construction of access roads in sensitive wetland areas, and alteration of the site hydrology such that wetland species no longer survive.

Surface water and sediment at Site 180 (PICA 093) were evaluated by Dames and Moore during the Green Pond Brook/Bear Swamp Brook RI and by IT during the Green Pond Brook and Bear Swamp Brook FFS. The Dames and Moore (1998) ERA for aquatic environments area focused on those sites along GPB and Bear Swamp Brook that provided adequate aquatic habitat for ecological receptors. The numerous aquatic impact studies that were performed demonstrated that, in general, neither Green Pond Brook nor Bear Swamp Brook within the Phase I area appeared to be greatly impacted by COPECs. As Site 180 (PICA 093) sediment COPEC concentrations were generally lower than concentrations measured in Green Pond Brook and Bear Swamp Brook sediments, the conclusion presented in the Dames and Moore ERA (1998) for aquatic environments (i.e., a finding of no significant impact) also is applicable to the Site 180 (PICA 093) aquatic environment (Shaw, 2004a). Additionally, based on the surface water and sediment samples collected at Site 180 (PICA 093), the aquatic habitat was deemed too limited to be attractive to significant numbers of aquatic receptors. Therefore, aquatic hazards were not quantified (Dames and Moore, 1998). The surface water is intermittent and therefore does not support a viable aquatic community on a year-round basis. Most of the surface water is related to wet weather events and a seasonally high water table. Thus, elevated COPECs in surface water are not a concern as there are few, if any, aquatic receptors that could be adversely impacted.

A focused ecological risk evaluation prepared for the Green Pond Brook and Bear Swamp Brook FFS (IT, 2001a) identified the following COCs in brook sediments: cadmium, chromium, copper, mercury, PCBs, DDT, benzo(a)anthracene, and fluoranthene. Of these contaminants of concern, only fluoranthene has been found to be higher in Site 180 (PICA 093) sediments compared with Green Pond Brook and Bear Swamp Brook (8.0 mg/kg versus 6.7 mg/kg). This finding also supports the conclusion that Site 180 (PICA 093) is not expected to have a significant impact on the aquatic environment.

2.7.3 Contaminants of Concern

As part of the Site 180 (PICA 093) FS, the contaminants detected in surface and subsurface soil, surface water, and sediment were screened to identify COCs. COCs are defined as contaminants that:

1) Contribute to the majority of site-specific human health or ecological risk (Risk-Driver COCs); and,

2) Exceed the NJDEP NRDCSCC, referred to as Non Risk-Driver COCs.

This ROD does not address Site 180 (PICA 093) groundwater; therefore, COCs were not identified for groundwater at Site 180 (PICA 093). However, the soil to groundwater pathway was evaluated.

The starting point for the development of the list of COCs was the entire list of contaminants that were detected in samples collected from Site 180 (PICA 093). Below is a summary of the screening process used to identify COCs in surface soil:

- If the highest concentration detected was above the LOC, then the detected contaminant was included as a chemical of potential concern (COPC). Derived from the HHRA, it was determined which COPCs contributed a major portion of carcinogenic risk of $1x10^{-06}$ (or greater) or a major portion of noncarcinogenic hazard of 1 (or greater); these contaminants were considered Risk-Driver COCs.
- Contaminants identified as COPECs in the ERA were included as Risk-Driver COCs.
- Any contaminants included as COPCs because they exceeded the NJDEP criteria, but did not contribute to a major portion of the risk identified in the site-specific risk assessment, were included as Non Risk-Driver COCs.

COCs for surface water were identified in the Site 180 (PICA 093) FS; they are aluminum, cadmium, chromium, copper, iron, lead, mercury, nickel, and zinc. As stated in the risk assessment section of this ROD (Section 2.7), surface water at the site is intermittent and therefore does not present a likely 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.

The contaminants in surface soil which were identified as COCs are 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, Aroclor-1254, and Aroclor-1260.

The contaminants in subsurface soil which exceeded chemical-specific criteria are carbon tetrachloride, methylene chloride, trichloroethene, arsenic, and zinc. No contaminants detected in subsurface soil were considered risk drivers; therefore, none of these contaminants are considered COCs.

All subsurface soil data were examined to determine if there was the potential for impact to groundwater from soils contamination. Groundwater and subsurface soil data from the site were examined to determine if there was a link between contaminants seen in subsurface soil and contaminants seen as a plume in groundwater. This examination concluded that no contaminants in subsurface soil were at risk to adversely impact groundwater. Therefore, based on the lack of unacceptable risk seen from subsurface soil and the fact that none of the contamination appears to have the potential for future impact to groundwater, no COCs were developed for subsurface soil.

The COCs are listed in Table 5.

2.7.4 Areas of Concern

An AOC is defined as the area over which remedial action objectives are to be obtained. Because no COCs were identified in subsurface soil or the adjacent sediments and the surface water is intermittent as it is only present on a seasonal basis, the AOC was determined for surface soil only. Surface soil samples were taken at the depth interval of 0 to 2 feet below ground surface (bgs) at Site 180 (PICA 093); therefore, the vertical extent of the AOC is approximately 2 feet bgs. The estimated area of the AOC is 231,731 square feet and the estimated volume is 17,165 cubic yards. Figure 4 presents the AOC for surface soil at Site 180 (PICA 093).

Site cleanup levels (SCLs) were developed for surface soil COCs based on the NJDEP Non-Residential Direct Contact Soil Cleanup Criteria (NRDCSCC). The final SCLs are presented in Table 5.

2.8 REMEDIAL ACTION OBJECTIVES

The remedial action objectives for Site 180 (PICA 093) have been developed in such a way that attainment of these goals will result in the protection of human health, ecological receptors, and the environment. The RAOs are specific to the AOC designated for Site 180 (PICA 093) and are designed to maintain an exposure scenario in which human health is protected.

The RAOs for Site 180 (PICA 093) 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.

2.9 DESCRIPTION OF ALTERNATIVES

Site 180 (PICA 093) has undergone an RI/FS in accordance with the CERCLA process. The RI phase is the mechanism for collecting data to characterize the site and assess potential human health and ecological risk. The RI phase is followed by the FS phase, which involves the development, screening, and detailed evaluation of remedial alternatives.

Technology types and process options appropriate for the COCs were identified and screened based on effectiveness, implementability, and cost. The retained technologies and process options were developed into remedial alternatives. The remedial alternatives are:

- Alternative 1 – No Action;
- Alternative 2 – Institutional Controls and Land Use Restrictions;
- Alternative 3 – Capping with a Multilayer Synthetic Cap, Land Use Restrictions;
- Alternative 4 – Capping with a Pavement (improved Asphalt) Cap, Land Use Restrictions;
- Alternative 5 – Capping with a Soil Cover, Land Use Restrictions;
- Alternative 6 – Excavation and Off-Site Disposal of Soil with COCs above SCLs, Land Use Restrictions; and,
- Alternative 7 – In-Situ Fixation/Stabilization of Soil with COCs above SCLs, Land Use Restrictions.

Alternatives 3 through 7 would be implemented in conjunction with LUCs to ensure protectiveness because the SCLs were developed based on the non-residential use scenario. All of the alternatives, with the exception of Alternative 1 (No Action), require LUCs to limit the use of portions of the property and to ensure protectiveness to human receptors. The provisions and requirements of the LUCs will be detailed in the RD after the ROD is signed. All alternatives, except Alternative 1 (No Action), are expected to attain the RAOs.

The Remedial Alternatives identified in this ROD were described and screened, as appropriate, based on the NCP criteria of effectiveness, implementability, and cost. After this preliminary screening, Alternatives 1 through 7, summarized below, were retained for detailed analysis.

2.9.1 Alternative 1: No Action

Estimated Capital Cost: $0.00
Estimated O&M (Cost over 30 years): $0.00
Estimated Present Worth Cost: $0.00

CERCLA and the NCP require that a No Action alternative be evaluated at every site to establish a baseline for comparison of other remedial alternatives. Under this alternative, all administrative controls would cease, no further site monitoring or oversight would be performed, and no remedial action would take place.

2.9.2 Alternative 2: Institutional Controls and Land Use Restrictions

Estimated Capital Cost: $44,000
Estimated O&M (Cost over 30 years): $328,000
Estimated Present Worth Cost: $372,000

Present worth of the O&M and long-term replacement cost is based on a 30 year project life, calculated using a 7% discount rate.

Alternative 2 involves enforcing permanent LUCs to protect any land users from potential exposure to unacceptable risks. Because contamination would remain in place under this remedial alternative, ICs and land use restrictions to ensure human health protectiveness would be required. Land use would be restricted to use by hunters or other authorized personnel without protective equipment. Modification and implementation of the facility Master Plan would be performed to preclude land uses that might increase

human health or ecological risk. The land use control objectives are To maintain a land use that is consistent with the risk assessment; that is, current outdoor maintenance workers and hunters, future industry/research workers, and future construction/excavation workers; prohibit the development and use of property for residential housing, elementary and secondary schools, child-care facilities and playgrounds that result in unacceptable risk; and maintain the integrity of the cover system. If the land use at Site 180 (PICA 093) would change to an industrial use, engineering controls (ECs) may also be required in addition to the LUCs already existing for the site. Picatinny would notify the regulators, and together the Army and the regulators would develop and implement ECs for the site. Maintenance of the existing vegetative cover at Site 180 (PICA 093) will be maintained as an EC.

Picatinny has many existing ICs in place. Elements of ICs in place at Picatinny include: Site Clearance and Soil Management Procedures; UXO Clearance Procedures; Master Plan Regulations; Picatinny Base Access Restrictions; Picatinny Safety Program; Army Military Construction Program; and a facility wide Classification Exception Area. In addition to these ICs the Army uses a Geographic Information System (GIS) as a tool to document areas of contamination and restricted land use. The existing ICs at Picatinny meet EPA's preference for ICs being used in layers and/or series. All controls and restrictions would remain in place, even if the ownership or site use changes. Additionally, since the Army is the entity that would be instituting land use restrictions at Picatinny, the Army would ensure that the land use restrictions are incorporated into the transfer documents so they remain effective and in place after property transfer. A change in land use would include notifying the regulators and re-evaluating the cleanup requirements. The regulating and enforcing authority for ICs on Picatinny is the Commanding Officer.

Risk from the presence of MEC will be evaluated under the MMRP and Picatinny Arsenal will continue to control the MEC hazards as outlined in Section 2.7.1.2, until a decision document for MEC is finalized.

- The LUCs described under this Alternative would be incorporated into the other five active remedial alternatives (Alternatives 3-7). Alternatives 3-7 specify active remedies that will contain, treat, or remove contamination above industrial SCLs. Consequently, some contamination will remain exposed at the site above residential standards. Due to this contamination above residential standards, LUCs will be required even after completing active remedies.

2.9.3 Alternative 3: Capping with a Multilayer Synthetic Cap, Land Use Restrictions

Estimated Capital Cost: $1,742,000
Estimated O&M (Cost over 30 years): $380,000
Estimated Present Worth Cost: $2,122,000

Present worth of the O&M and long-term replacement cost is based on a 30 year project life, calculated using a 7% discount rate.

This remedial alternative would involve the capping of all impacted soils and debris where contaminants are above SCLs with a multilayer synthetic cap (refer to Figures 5 and 6). Approximately 231,731 square feet would be covered in this remedial option. Soils would be contained under an engineered cap designed to prevent the spread of contaminated soil through erosion or wind dispersion, prevent dermal exposure, and reduce infiltration of surface water runoff. A component of the total cap construction would include an engineered impermeable barrier. The barrier would consist of a synthetic liner residing atop of an appropriately prepared subgrade. A surface drainage net would be installed above the liner and topsoil layers added to promote establishment of natural vegetation and habitat. After completion of the action, the site would be vegetated as appropriate and any impacted or disturbed wetlands would be appropriately restored or mitigated. Maintenance and inspections of the cap would be performed annually to ensure the continued protectiveness of the cap.

Because SCLs are based on non-residential criteria, LUCs would be required to prevent disturbance of the installed cover after remediation as well as preclude unacceptable usage of the site which may lead to unacceptable risk.

2.9.4 Alternative 4: Capping with a Pavement (Improved Asphalt) Cap, Land Use Restrictions

Estimated Capital Cost: $2,008,000
Estimated O&M (Cost over 30 years): $347,000
Estimated Present Worth Cost: $2,355,000

Present worth of the O&M and long-term replacement cost is based on a 30 year project life, calculated using a 7% discount rate.

This containment option would involve the capping of all impacted soils and debris above SCLs with an ultra-low permeability asphalt pavement (refer to Figures 5 and 6). Approximately 231,731 square feet would be covered in this remedial option. Soils would be contained under an engineered rigid cap consisting of ultra-low permeability asphalt designed to prevent surface erosion and dermal exposure as well as reduce infiltration of surface water runoff. The asphalt is blended with a vendor proprietary add-mix, which enhances the performance of the asphalt, reducing permeability to $1x10^{-08}$ cm/sec. The cap design would be optimized to prevent infiltration and enhance surface durability. After completion of the action, the site would be vegetated as appropriate and any impacted or disturbed wetlands would be appropriately restored or mitigated. Maintenance and inspections of the cap would be performed annually to ensure the continued protectiveness of the cap.

Because SCLs are based on non-residential criteria, LUCs would be required to prevent disturbance of the installed cover after remediation as well as preclude unacceptable usage of the site which may lead to unacceptable risk.

2.9.5 Alternative S-5: Capping with a Soil Cover, Land Use Restrictions

Estimated Capital Cost: $1,157,000
Estimated O&M (Cost over 30 years): $380,000
Estimated Present Worth Cost: $1,537,000

Present worth of the O&M and long-term replacement cost is based on a 30 year project life, calculated using a 7% discount rate.

This remedial alternative uses a soil cover to contain all impacted soils and debris where contaminants are found at levels above SCLs (refer to Figures 5 and 6). Approximately 231,731 square feet would be covered in this remedial option. Soils would be contained under an engineered soil cap designed to prevent surface erosion and dermal exposure as well as reduce infiltration of surface water runoff. The barrier would consist of a layer of soil approximately 12 inches thick designed to drain effectively and support the establishment of natural vegetation to prevent erosion. After completion of the action, the site would be vegetated as appropriate, and any impacted or disturbed wetlands would be appropriately restored or mitigated. Maintenance and inspections of the cap would be performed annually to ensure the continued protectiveness of the cap.

Because SCLs are based on non-residential criteria, LUCs would be required to prevent disturbance of the installed cover after remediation as well as preclude unacceptable usage of the site which may lead to unacceptable risk.

2.9.6 Alternative S-6: Excavation and Off-Site Disposal of Soil with COCs above SCLs, Land Use Restrictions

Estimated Capital Cost: $3,040,000
Estimated O&M (Cost over 30 years): $33,000
Estimated Present Worth Cost: $3,073,000

Present worth of the O&M and long-term replacement cost is based on a 30-year project life, calculated using a 7% discount rate.

This remedial alternative would involve the excavation of all soils contaminated at levels above SCLs, to a maximum average depth of approximately two feet (Figure 5). Excavation would be performed using standard earthmoving equipment (tracked excavators, dump trucks, etc.) and techniques. Large debris encountered would be removed and decontaminated using high-pressure water spraying and disposed as non-hazardous municipal waste. Prior to excavation, the necessary erosion and sedimentation controls would be installed and dust control measures (i.e., water sprays) would be implemented. The excavated contaminated soil would be disposed of off-site at a Resource Conservation and Recovery Act (RCRA) Subtitle D or sanitary landfill. After completion of the action, the site would be vegetated as appropriate and any impacted or disturbed wetlands would be appropriately restored or mitigated.

No contamination would remain on site above SCLs once remedial action has been completed. However, because the SCLs were developed for industrial land use, levels of contamination above residential standards would remain at the site. Therefore, LUCs would be necessary to restrict and control land use which may lead to unacceptable risk.

2.9.7 Alternative 7: In-situ Fixation/Stabilization of Soil with COCs above SCLs, Land Use Restrictions

Estimated Capital Cost: $3,019,000
Estimated O&M (Cost over 30 years): $33,000
Estimated Present Worth Cost: $3,052,000

Present worth of the O&M and long-term replacement cost is based on a 30-year project life, calculated using a 7% discount rate.

This remedial alternative would involve the in-situ fixation/stabilization of all soils contaminated at levels above SCLs, to an average depth of approximately two feet (Figure 5). Large debris encountered would be removed and decontaminated using high-pressure water spraying and disposed as non-hazardous municipal waste. Prior to construction activities, the necessary erosion and sedimentation controls would be installed and dust control measures (i.e., water sprays) would be implemented. After completion of the action, the site would be restored/revegetated as appropriate and any impacted or disturbed wetlands would be appropriately restored or mitigated.

Under this alternative, human-health exposure and ecological risk would be controlled by the implementation of the remedy. However, future uses of the site need to accommodate the presence of stabilized/treated soil, which may require removal or other management measures should the use of the site change. Implementation and maintenance of LUCs would be documented on an on-going basis. This remedy includes the treatment of all contamination in excess of industrial standards. Contamination in excess of residential criteria, but below industrial criteria would remain outside of the treated area. LUCs would be necessary to restrict and control land use which may lead to unacceptable risk.

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. These criteria are as follows:

Threshold Criteria – Requirement for Each Alternative

1. Overall Protectiveness of Human Health and the Environment – Determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through LUCs (ICs and/or ECs) or treatment.
2. Compliance with Applicable or Relevant and Appropriate Requirements – Evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

Primary Balancing Criteria – Used to Weigh Major Trade-offs Among Alternatives

1. Long-term Effectiveness and Permanence – Considers the ability of an alternative to maintain protection of human health and the environment over time.
2. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment – Evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
3. Short-term Effectiveness – Considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
4. Implementability – Considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
5. Cost – Includes estimated capital and annual O&M costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of –30 to +50 percent.

Modifying Criteria – Considered after public comment on the Proposed Plan

1. State/Support Agency Acceptance – Considers whether the State agrees with the Army's analysis and recommendations, as described in the RI/FS and Proposed Plan.
2. Community Acceptance – Considers whether the local community agrees with the Army's analysis and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

2.10.1 Protection of Human Health and the Environment

Alternative 1 does not include any additional remedial activity that reduces potential site risks. However, the existing access restrictions and current land use designation help prevent human exposure.

Alternative 2 provides adequate protection to human health assuming land use is primarily utilized for access to hunting. If an industrial use were proposed for Site 180 (PICA 093), the regulators would be notified and ECs would be developed and implemented for the site. However, Alternative 2 would not be effective in reducing the calculated ecological risk and would not prevent the potential migration of contaminants. Although Alternative 2 does not address the potential for contaminant migration to groundwater, previous investigations at Site 180 (PICA 093) indicate that there are no sources to groundwater contamination contributable to surface or subsurface soil at Site 180 (PICA 093).

Alternatives 3, 4, and 5 are protective of human health and ecological receptors. However, the degree of long-term protection is dependent on proper cap maintenance as well as implementation of land use and access restrictions. These alternatives would also be protective of the environment (groundwater, surface water, and air), because it would prevent the migration of the contaminated soil via wind dispersion, surface erosion, runoff, and groundwater infiltration. However, Alternatives 3, 4, and 5 do not provide permanent removal or treatment of the source and would require the destruction of the existing ecological habitat at Site 180 (PICA 093). While there is the potential for some risk under current site conditions, the active remedies would be more damaging than beneficial to ecological receptors.

Alternative 6 would be protective of human health, ecological receptors, and the environment because contaminated soil would be removed and disposed of off-site. However, Alternative 6 would require the destruction of the existing ecological habitat at Site 180 (PICA 093).

Alternative 7 is protective of human health, ecological receptors, and the environment because contaminants in soil would be stabilized and unable to migrate to groundwater and surface water. However, Alternative 7 would require the destruction of existing ecological habitat at the site.

Wildlife habitat at Site 180 (PICA 093) was deemed to be important enough and of high enough value to require restoration after trenching investigations. Given this finding, along with the estimation that implementation of Alternatives 3, 4, 5, 6, or 7 would likely cause more ecological harm than benefit, Alternative 2 (ICs and land use restrictions along with the partial extension of the Site 34 cap) was recommended as the preferred alternative for Site 180 (PICA 093) (Shaw, 2004a). This alternative will provide protection of human health and the environment. Although ICs are not protective of ecological receptors, Alternative 2 provides for an optimum balance between the protection of human health while minimizing the intrusion into the well-established wetland and upland habitats present at and adjacent to Site 180 (PICA 093).

2.10.2 Compliance with Applicable or Relevant and Appropriate Requirements

COCs were identified for soils and surface water at Site 180 (PICA 093). No chemical-specific ARARs exist for soils at Site 180 (PICA 093); however, SCLs were selected for soils in the FS. Alternatives 1 and 2 would not satisfy the chemical-specific cleanup levels. Alternatives 3, 4, 5, 6, and 7 would all satisfy the chemical-specific SCLs.

Chemical-specific ARARs exist for surface water at Site 180 (PICA 093). The chemical specific ARARs consist of the New Jersey Surface Water Quality Standards. None of the remedial alternatives meet chemical-specific ARARs for surface water directly, but rather depend on mitigation of potential sources of surface water contaminants. Alternatives 1 and 2 depend on contaminant sources attenuating over time and thus negating continued surface water impact. Alternatives 3, 4, 5, 6, and 7 would meet surface water

chemical-specific ARARs more quickly by removing or sequestering soils contamination so future impacts to surface water are mitigated.

Alternatives 1 and 2 would satisfy the location-specific ARARs for soils, and Alternative 2 would satisfy the action-specific ARARs; however, action-specific ARARs would not apply to Alternative 1 because no additional action would be taken at the site. Alternatives 3, 4, 5, 6, and 7 would all satisfy the location- and action-specific ARARs with the currently available technologies proposed for each alternative.

2.10.3 Long-term Effectiveness and Permanence

Alternative 1 provides no long-term effectiveness or permanence. Alternative 2 reduces the long-term risks by limiting direct contact human exposure pathways. Permanent reduction of risks for Alternatives 3, 4, and 5 could be accomplished by providing a physical barrier to exposure through proper construction, appropriate and extended maintenance, and LUCs. Alternatives 6 and 7, which involve excavation and in-situ fixation/stabilization, provide source control through removal or treatment. Limited site risks will remain after the completion of Alternatives 6 and 7. Alternative 6 provides the highest level of long-term effectiveness and permanence through the removal of contaminated soils. The capping alternatives provide less long-term permanence than Alternative 6 with regard to UXO. Because UXO could potentially be left under a cap, permanent restrictions on site use would be required.

2.10.4 Reduction in Toxicity, Mobility, or Volume through Treatment

Alternatives 1 and 2 would not actively reduce the toxicity, mobility, or volume of the contaminated soil. Alternatives 3, 4, 5, and 6 would not reduce toxicity or volume through treatment; however, Alternatives 3, 4, and 5 would reduce the mobility of site contaminants through containment and reduce the potential migration of contaminants to groundwater. Alternative 6 would reduce the mobility of the contaminated soil because it would be excavated and disposed off-site in a permitted landfill. Additionally, Alternative 7 would reduce toxicity and mobility through treatment. Alternatives 3 through 7 would likely produce more adverse impacts to both the ecological receptors and the environment than Alternatives 1 and 2.

2.10.5 Short-term Effectiveness

Alternative 1, since there are no actions that would address the contaminated soil, would have no short-term impact on workers. Alternative 2 would not produce any short-term impacts on workers, the surrounding community, or the environment because no construction activities are proposed. Because almost half of the land at Site 180 (PICA 093) consists of wetlands (3 of the 6.8 acres), Alternative 2 would produce no short-term risks to the environment as the wetlands would not be impacted. The wetlands at Site 180 (PICA 093) and the surrounding area would most likely be destroyed by the construction activities proposed as part of Remedial Alternatives 3 through 7. Alternatives 3, 4, 5, and 7 would not produce significant short-term impacts on workers or the surrounding community; these four alternatives would result in minor dust generation, but risks would be controlled through the use of suitable protective equipment by properly trained site workers, real-time air monitoring, and standard dust suppression techniques (i.e., water spray). The risks associated with Alternative 6 would be greater than the other alternatives. In addition to the risks mentioned above, Alternative 6 would take longer to implement than the capping alternatives and there would be additional risks associated with the transportation of contaminated soil on public roadways (i.e., highway accidents). Following appropriate Department of Transportation (DOT), State, and local shipping requirements for all transportation-related activities would minimize the risks associated with waste transportation.

Alternatives 3, 4, 5, 6, and 7 would require UXO screening to mitigate this potential hazard.

2.10.6 Implementability

Alternative 1 would require no actions to implement. Alternatives 2, 3 4, 5, 6, and 7 are readily implementable. The required equipment, services, and materials are readily available, as are the required off-site disposal facilities. No issues are anticipated with the design or permit equivalents required for each alternative. Alternative 2, which involves LUCs, requires minimal resources and effort. Capping under Alternatives 3, 4, and 5 is the most straightforward of the active remedial alternatives to implement. Total excavation (Alternative 6) is a more common remedial action than in-situ fixation/stabilization (Alternative 7); therefore, total excavation is more readily implementable than in-situ fixation/stabilization.

Further, during implementation, Alternatives 3 through 7 would likely produce more adverse impacts to both the ecological receptors and the environment than Alternatives 1 and 2.

2.10.7 Cost

Remedial Alternative 1

Present Worth:	$0.00
Capital Costs:	$0.00

Remedial Alternative 2

Present Worth:	$372,000
Capital Costs:	$44,000

Remedial Alternative 3

Present Worth:	$2,122,000
Capital Costs:	$1,742,000

Remedial Alternative 4

Present Worth:	$2,355,000
Capital Costs:	$2,008,000

Remedial Alternative 5

Present Worth:	$1,537,000
Capital Costs:	$1,157,000

Remedial Alternative 6

Present Worth:	$3,073,000
Capital Costs:	$3,040,000

Remedial Alternative 7

Present Worth;	$3,052,000
Capital Costs:	$3,019,000

There are no costs associated with Alternative 1. Alternative 2 is the most cost-efficient alternative in terms of the capital and O&M costs. Alternative 6 is the most expensive alternative. Alternative 7 represents the second most expensive alternative, followed by Alternative 4, Alternative 3, and then Alternative 5.

2.10.8 Regulatory Acceptance

During NJDEP's review of the FS, NJDEP stated concerns with the preferred alternative. The primary concern was regarding evaluation of a limited extent soil removal action. Another concern was that the proposed remedy did not afford any additional protection for ecological receptors. BTAG also expressed concern that the preferred alternative (ICs and land use restrictions) did not provide adequate protection for ecological receptors. In response to these concerns, the Army held a site tour so that the issues could be discussed while examining the physical setting of the site. After attending the site tour, the NJDEP and BTAG agreed that removal of soil with elevated contaminant concentrations was impractical and that active remediation of the site was not in the best interest of the ecological receptors at the site. After the site tour, the sole concern voiced by the NJDEP and BTAG was the lack of characterization of the

wetlands sediments adjacent to the soil push out area and the presence of rusted-through 55-gallon drum carcasses present in this marsh area. Based on these concerns, the Army agreed to collect sediment samples in the marsh and remove all derelict drum carcasses present in the marsh. The follow-up sampling and removal has been completed and is summarized in Section 2.5.2.1, Community Acceptance.

Community acceptance is addressed in the Responsiveness Summary (Section 3) of this ROD.

2.11 PRINCIPAL THREAT WASTE

The NCP establishes an expectation that USEPA will use treatment to address the principal threats posed by a site wherever practicable [NCP 300.430(a)(1)(iii)(A)]. Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and would present only a low risk in the event of exposure. In addition, principal threat wastes are identified based upon the results of the quantitative risk assessment, with those compounds that have a value of $1x10^{-03}$ or higher being considered as principal threat waste. As concluded in the Risk Assessment, none of the contaminants in soil and sediment that exceeded LOCs at Site 180 (PICA 093) meet the criteria of principal threat waste. In addition, groundwater itself is not a principal threat because it is considered a non-source material. Therefore, the Selected Remedy does not need to address principal threat waste.

2.12 SELECTED REMEDY

This ROD represents the Selected Remedy for Site 180 (PICA 093) at Picatinny, Rockaway Township, Morris County, New Jersey, developed in accordance with CERCLA as amended and consistent with the NCP. This decision is based on the Administrative Record for the site. The Selected Remedy for this site is Alternative 2 – Institutional Controls and Land Use Restrictions. Alternative 2 is the preferred alternative because it provides the advantages of a minimally intrusive remedial alternative in the presence of high-value wetlands, and because of its effectiveness, short completion time, and low cost. A detailed description of the preferred remedial action is provided in this section.

2.12.1 Summary of the Rationale for the Selected Remedy

Alternative 2 achieves RAOs with the lowest capital and operation and maintenance cost and would remain protective of human health and the environment as long as ICs and land use restrictions remain in place. However, these LUCs are not protective of ecological receptors. Based on the borderline and acceptable risks to ecological receptors (the veery, woodcock, and barred owl) and the presence of wetlands that cover half of Site 180 (PICA 093) and the surrounding area, it is expected that the selection of an active remedial alternative (i.e., Alternatives 3 through 7) would likely produce more adverse impacts to both the ecological receptors and environment than ICs and land use restrictions. The site risk under the range of likely future use scenarios (limited access by hunters) is minimal, and Alternative 2 provides for an optimum balance between the protection of human health and minimizing intrusion into the well-established wetland and upland habitats. If the land use designation at Site 180 (PICA 093) was to change to an industrial use, the regulators would be notified and ECs would be developed and implemented for the site. One of the ECs proposed may include maintenance of the existing vegetative cover currently at the site.

Alternative 2 also satisfies all requirements of the RAOs. This alternative represents the best balance of the evaluation criteria considered in the Feasibility Study and Proposed Plan (Shaw, 2006). Based on currently available information, the Army believes the Selected Remedy meets the threshold criteria and provides the best balance of trade-offs among the other remedial alternatives with respect to the balancing and modifying criteria.

Independent of the Selected Remedy chosen in this ROD, a cover system will be constructed over the southern portion of Site 180 (PICA 093). The cover system was selected as the preferred remedial alternative for Site 34 (PICA 002), which is adjacent to Site 180 (PICA 093). The cap will extend from the Site 34 (PICA 002) and will be designed to include the waste pile and buried debris areas of Site 180 (PICA 093). Figures 3 and 7 illustrate the extent of the cover system in relation to Site 34 (PICA 002) and

Site 180 (PICA 093). The actual area of soil to be covered at Site 180 (PICA 093) has not been determined yet, and will be calculated during the Remedial Design phase of the Site 34 (PICA 002) remediation. The percentage of destroyed wetlands at Site 180 (PICA 093) will be significantly less with partial covering of the site as compared to covering the entire site. Additional information regarding the selected remedy for Site 34 (PICA 002) can be referenced in the Final Site 34 Record of Decision, 2005. The ROD was signed by the USEPA in September 2005.

2.12.2 Detailed Description of Selected Remedy

The Selected Remedy for Site 180 (PICA 093) is enforcement of ICs and implementation of land use restrictions. Based on the site evaluation, it has been determined that the Picatinny LUCs, which will be detailed in the Remedial Design, are protective of human health and the environment at the site. No further remedial activities are proposed for Site 180 (PICA 093) under the current scenario.

The Selected Remedy leaves contaminants in place that pose a potential future risk and will require land use restrictions until no unacceptable risk exists under the unlimited use and unrestricted exposure scenario. The Army is responsible for implementing, maintaining, reporting on, and enforcing land use controls. LUCs will be implemented at the site to prevent uses that are associated with unacceptable risks to human receptors from being implemented in the future. The geographic coverage of LUCs at the site is depicted on Figure 4. Elements of institutional controls at Picatinny including specific land use restriction implementation descriptions will be included as part of the Remedial Design. The LUC objectives are the following:

- To maintain a land use that is consistent with the risk assessment; that is, current outdoor maintenance workers and hunters, future industry/research workers, and future construction/excavation workers;
- Prohibit the development and use of property for residential housing, elementary and secondary schools, child care facilities and playgrounds that result in unacceptable risk; and,
- Maintain the integrity of the cover system.

Requirements of NJDEP Deed Restriction policies will be included in the LUC Remedial Design. Also, it will provide a contingency plan should development of the site be desired by the Army in the future. Many of the exhibits required (maps, engineering drawings, location maps) are already incorporated into the Army's plans. It should be noted that in the event that Picatinny is closed and the land ownership transferred, the LUCs would need to be documented through an appropriate mechanism for privately owned property (i.e. deed notice). Although the Army may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Army shall retain ultimate responsibility for remedy integrity.

A LUC Remedial Design will be prepared as the land use component of the Remedial Design. Within 90 days of ROD signature, the Army shall prepare and submit to EPA for review and approval a LUC Remedial Design that shall contain implementation and maintenance actions, including periodic inspections.

2.12.3 Summary of Expected Remedial Action Costs

The costs associated with the implementation of LUCs are summarized as outlined in the following list:

Capital Costs

• Site Plan Development	$20,000
• Institutional Controls	
– Warning signs (to be posted every 100 feet)	$875
– UXO survey for sign installation	$3,500
– Installation of warning signs	$2,625
– Picatinny Master Planning Office amendments	$5,000

▪ Oversight/QA Costs (10%)	$4,000
▪ Contingency Costs (20%)	$8,000
Total Capital Costs	**$44,000**

O&M Costs (30 Years)

▪ Institutional Controls and Maintenance	$9,000
▪ Site Inspections	$5,120
▪ Warning Sign Replacement	$875
▪ 5-Year Reviews (5 total for 30 years)	$3,000
Total Present Worth O&M Costs (7% Dis.)	**$328,000**
TOTAL PRESENT WORTH	**$372,000**

The costing information in this section is based on the best available information regarding the anticipated scope of the remedial alternative.

2.12.4 Expected Outcomes of the Selected Remedy

It is anticipated that current land use (hunting) will be continued unchanged after implementation of the remedy. It is expected that enforcement of ICs and implementation of land use restrictions will ensure that risks to human and ecological receptors remain within acceptable levels. However, as contaminants will remain in the soil at levels exceeding the remediation goals (RGs), unrestricted use of the site is not provided by completing this action.

2.13 STATUTORY DETERMINATIONS

Under CERCLA § 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, and comply with ARARs (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment and permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

2.13.1 Protection of Human Health and the Environment

The Selected Remedy will protect human health and the environment by maintaining an exposure scenario (such as hunting) that limits exposure. It was determined that unacceptable risks to human health and the environment are not associated with the site under current conditions if current institutional controls are enforced and land use restrictions are implemented.

The Selected Remedy will ensure that risks associated with soil remain below the $1x10^{-04}$ cancer risk level and a Hazard Index of less than 1. This level falls within the USEPA's target risk range of 10^{-04} to 10^{-06}. There are no short-term threats associated with the selected remedy. In addition, no adverse cross-media impacts are expected from the Selected Remedy.

2.13.2 Compliance with Applicable or Relevant and Appropriate Requirements

ARARs were considered as part of the Feasibility Study to develop remedial action cleanup levels, determine the appropriate extent of site cleanup, and govern implementation and operation of the selected remedial action. Three types of ARARs, chemical-specific, location-specific, and action-specific, were considered as part of the Feasibility Study and are summarized in Table 6 (Surface and Subsurface Soil Chemical-Specific TBCs for Selected Remedy), Table 7 (Location-Specific ARARs and TBCs for Selected Remedy), and Table 8 (Action-Specific ARARs and TBCs for Selected Remedy).

COCs were identified for soils and surface water at Site 180 (PICA 093). No chemical-specific ARARs exist for soils at Site 180 (PICA 093); however, SCLs were selected for soils in the Feasibility Study. The Selected Remedy would not satisfy the chemical-specific cleanup levels. Chemical specific ARARs consist of the New Jersey Surface Water Quality Standards. The Selected Remedy will not meet the chemical-specific ARARs for surface water directly, but rather depend on mitigation of potential sources of surface water contaminants. The Selected Remedy depends on contaminant sources attenuating over time and thus negating continued surface water impact. The Selected Remedy satisfies the location-specific ARARs and action-specific ARARs for soils.

The Selected Remedy has been chosen because it mitigates unacceptable risk to human health, meets the ARARs for the site, provides the advantages of a minimally intrusive remedial alternative in the presence of high-value wetlands, is effective, has a short completion time, and a low cost. Additionally, the adverse ecological impacts of an active remediation outweigh the minor benefits associated from an active remediation. Section 2.12 Selected Remedy further discusses the rationale for the Selected Remedy.

2.13.3 Cost Effectiveness

In the lead agency's judgment, the Selected Remedy is cost-effective and represents a reasonable value in the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (NCP §300.430(f)(1)(ii)(D)). This determination was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility and volume through treatment; short-term effectiveness; implementability, and costs). A comparison of the costs to the overall effectiveness was conducted to determine cost effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence this alternative represents a reasonable value for the money to be spent.

The estimated present worth cost of the Selected Remedy is $372,000. Although Alternative 1 is less expensive than Remedial Alternative 2, Alternative 1 does not include any additional remedial activity that reduces potential site risks. Alternatives 3 through 7 would be protective of human health and the environment and meet site ARARs; however, these alternatives would destroy the high-value wetlands and the existing ecological habitat at the site. The Army believes that the Selected Remedy is cost effective and is protective of human health and the environment.

2.13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Possible

Active remediation is not required to achieve the RAOs developed for Site 180 (PICA 093). Consequently, the Selected Remedy does not employ treatment to eliminate contaminants present at the site. The Selected Remedy satisfies the criteria for long-term effectiveness by preventing unacceptable exposures to site soils. In addition, permanent reduction of risks could be accomplished through proper implementation of LUCs. Picatinny is an active military facility and there are currently no plans to change its status. However, should Picatinny ever be closed and the property transferred, the LUCs would need to be documented through an appropriate mechanism for privately owned property (i.e. deed restriction). The Selected Remedy does not reduce toxicity, mobility or volume of contamination. However, a soil to groundwater pathway for contaminants was evaluated and indicated that chemical concentrations in soil have not been found to have potential for continued impact to groundwater. The Selected Remedy does not present short-term risks to workers or the community, and there are no special implementability issues associated with the Selected Remedy.

2.13.5 Preference for Treatment as a Principal Element

The Selected Remedy does not address Site 180 (PICA 093) through the use of active treatment technologies. As concluded in the Risk Assessment, none of the contaminants that exceeded LOCs at Site 180 (PICA 093) meet the criteria of principal threat waste or pose an unacceptable risk to human

health and the environment under the current and reasonably anticipated future use. In addition, groundwater itself is not a principal threat because it is considered a non-source material. Additionally the Selected Remedy provides an optimal balance of controlling human health and ecologically risks at an acceptable level with minimal intrusive activities and an effective use of funding. Therefore the Selected Remedy is less harmful to ecological receptors and is much more cost effective than technologies that do utilize treatment.

2.13.6 Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, statutory reviews will be conducted every five years after remedial action initiation. Five-year reviews will ensure that the remedy is, or will be, protective of human health and the environment.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED ALTERNATIVE FROM PROPOSED PLAN

The Proposed Plan presented the same selected remedial action as this ROD. No significant changes have been made.

3.0 PART 3: RESPONSIVENESS SUMMARY

The final component of this ROD is the Responsiveness Summary. The purpose of the Responsiveness Summary is to provide a summary of the stakeholders' comments, concerns, and questions about the Selected Remedy for Site 180 (PICA 093) and the Army's responses to these concerns.

Site 180 (PICA 093) has been the topic of presentations at the Picatinny Arsenal Environmental Restoration Advisory Board (PAERAB). PAERAB members have provided comments regarding the proposed remedial alternative. A courtesy copy of the Proposed Plan was given to the PAERAB's co-chair and a complimentary copy was offered to any PAERAB member who requested it. A final Proposed Plan for Site 180 (PICA 093) was completed and released to the public on February 22, 2007 at the information repositories listed in Section 2.3.

Multiple newspaper notifications were made to inform the public of the start of the Proposed Plan comment period, solicit comments from the public, and announce the public meeting. The notification was run in the Star Ledger on February 24, 2007 and in the Daily Record on February 22, 2007. Copies of the certificates of publication are provided in Appendix A. A public comment period was held from March 8, 2007 to April 8, 2007 during which comments from the public were received. A public meeting was held on March 8, 2007 to inform the public about the Selected Remedy for Site 180 (PICA 093) and to seek public comments. At this meeting, representatives from the U.S. Army, NJDEP, USEPA, and the Army's contractor, ARCADIS U.S., Inc., were present to answer questions about the site and alternatives under consideration.

In general, the community is accepting of the selected alternative. Some community concern has been expressed because contamination will remain on-site. All comments and concerns summarized below have been considered by the Army, USEPA, and NJDEP in selecting the final cleanup methods for Site 180 (PICA 093) at Picatinny.

3.1 PUBLIC ISSUES AND LEAD AGENCY RESPONSES

As of the date of this ROD, the Army endorses the Selected Remedy for Site 180 (PICA 093) of Institutional Controls and Land Use Controls and Access Restrictions. The USEPA and the NJDEP support the Army's plan. Comments received during the Site 180 (PICA 093) public comment period on the Proposed Plan are summarized below. The comments are categorized by source.

3.1.1 Summary of Written Comments Received during the Public Comment Period

One (1) written comment specific to the Selected Remedy was received from Mr. Gene Feyl, Denville's Mayor. Mr. Feyl agreed with the selection of Alternative 2 as the preferred alternative. Transcripts from the public meeting were completed and submitted into the Administrative Record (located at the information repositories listed in Section 3.2) for the site.

3.1.2 Summary of Comments Received during the Public Meeting on the Proposed Plan and Agency Responses

Transcripts from the public meeting were completed and submitted into the Administrative Record. The comments received on the Selected Remedy during the public meeting on March 8, 2007 are summarized as follows:

Comment 1: The commenter Gregory Zalaskus, is the case manager for NJDEP. He said that DEP concurs with the proposed remedy. He noted that the State does not consider this capping to be a remedy for the MEC [munitions and explosives of concern] at this site.

Response: No response needed. Mr. Zalaskus later noted that he confused Site 180 (PICA 93) with Site 25/26 (PICA 67) and withdrew his comment on the cap. He clarified that NJDEP concurs with the proposed remedy at Site 180.

Comment 2: The commenter, Bill Roach, is with the USEPA. He stated that at this point, EPA has a conditional concurrence. At his level, they have reviewed the RI [remedial investigation] and FS [feasibility study] and approved both documents. He added that final approval of the remedy would not come until the Record of Decision is signed by his Director in Region 2 of the Emergency and Remedial Response Division. He then explained that one of the reasons for the delay of the final approval is that EPA likes to evaluate any public comments and get the State acceptance letter because they are both modifying criteria.

Response: No response needed.

Comment 3: The commenter, Don Costanzo, is concerned with the mention of a railroad car and would like to know whether or not it was removed.

Response: There was hearsay that a railroad car was buried out there but it was never found.

Comment 4: The commenter, Don Costanzo, wanted to know if over the years there has been a partial clean up of the site.

Response: The geophysical investigation completed during the Remedial Investigation Phase of the process identified geophysical anomalies. Those anomalies were addressed by trenching investigation. During this exploratory trench investigation many of the suspected deposits in the landfill, including reports of a railroad car, were not found. Primarily, only building debris and asbestos were discovered. All asbestos-containing materials were subsequently removed by a licensed asbestos contractor. These removal activities are documented in the report entitled *Exploratory Trench Investigation Report, dated 2001.* Picatinny also removed empty casings located adjacent to the burning grounds which also were appropriately removed and disposed. In 2005 all drums, drum carcasses, and scrap metal in the marsh bordering the site were removed and appropriately disposed.

Comment 5: The commenter, Don Costanzo, asked whether Alternative 2 was really a remediation or not.

Response: Remedial actions are usually designed to reduce or eliminate exposure pathways. Whether it is a cap that isolates it from physical contact or land use controls (i.e. institutional controls) that prevent contact, those remedies are driving at eliminating exposure routes. There will be no capping at the site since institutional controls were selected as the remedy.

Comment 6: The commenter, Michael Glaab, is the co-chair of the Picatinny Arsenal Environmental Restoration Advisory Board. He asked how many cubic feet of soil were removed.

Response: During the trenching operation, soil was sampled under any drum or container and none of the samples showed exceedances that warranted removal. These soil samples presented levels similar to those presented by ARCADIS. Debris, drums, propellant canisters, telephone poles were removed; however, no soil was removed. A limited amount of soil was removed when it was attached to some of the debris.

Comment 7: The commenter, Michael Glaab, asked if Green Pond Brook runs through the site.

Response: Green Pond Brook is located on other side of lower Burning Ground. The lower Burning Ground is in between this site and Green Pond Brook. Even if there were runoff from Site 180 (PICA 093) through the Burning Ground or that bypassed the Burning Ground, the Army still has a program to address Green Pond Brook and to assess any impact from any source including Site 180 (PICA 093). There really is no issue regarding surface water. Most of the surface water is ponded surface water, not flowing water, similar to ponds seen near DRMO.

Comment 8: The commenter, Michael Glaab, asked what the level of PCB contamination was detected on site.

Response: PCBs were detected at a maximum concentration of 23 mg/kg. The Army realizes that they are above the State industrial level but these were scattered hits and do not represent an unacceptable risk under EPA and Army guidance.

Comment 9: The commenter, Michael Glaab, asked if the levels were above State's level for industrial standards but not residential standards.

Response: The levels were above both the industrial and residential levels, but do not pose an unacceptable risk to human health and the environment.

Comment 10: The commenter, Michael Glaab, asked if the levels meet the State's industrial standards.

Response: There are four samples of 45 total samples that exceeded the State level of 2 ppm with the highest being 23 ppm.

Comment 11: The commenter, Michael Glaab, asked if the four samples were above the standard in one area and whether a hot spot removal was a possibility.

Response: The four samples were not located in the same vicinity.

Comment 12: The commenter, Michael Glaab, stated that he appreciated the candor of acknowledging the four of 45 samples. He added that something to be aware of and take into consideration was that a hot spot removal if the four samples are in close proximity might be appropriate. He then said that although at this point in time there are very few people actually living on site at Picatinny, there are individuals who do live there. Picatinny is experiencing something of a building boom with building underway and an active effort to bring other businesses onto the base. The site right now is relatively secluded but in four or five years might be surrounded by numerous buildings and people visiting and entering those buildings and walking in the area.

Response: The possibility of future expansion and building is integrated into the alternative.

Comment 13: The commenter, Michael Glaab, asked if the PAHs concentrations onsite exceed State standards for industrial use.

Response: Yes, they do. PAHs were detected in surface soil at two locations ranging from 17 to 153 ppm.

Comment 14: The commenter, Michael Glaab, asked whether the two locations in were close proximity or not.

Response: The two samples were not located in the same vicinity.

Comment 15: The commenter, Michael Glaab, stated that what he said earlier with respect PCBs applied also to the PAHs.

Response: The possibility of future expansion and building is integrated into the alternative.

Comment 16: The commenter, Michael Glaab, asked if the carbon tetrachloride detected onsite in the past was above State industrial levels.

Response: Carbon tetrachloride was detected in one of 36 samples at 11.3 ppm.

Comment 17: The commenter, Michael Glaab, asked if there was a database being maintained, if sites samples and detections would be maintained in the database as part of the permanent record, and if that information would be accessed by people at the Arsenal who are responsible for managing site usage?

Response: Yes, that is correct a database of all samples and detections is maintained and is part of the record.

Comment 18: The commenter, Michael Glaab, asked if someone would like to build a building at this site for the Army or a company wanted to establish a research project, whether they would be able to go to the database and access the sampling and what was detected. He also asked if it would be possible someday in the future based on someone's observation to remove the soil with high concentrations in certain areas.

Response: At some point in the future, if the Army or a tenant agency wants to develop on this property, they would have access to all those records and if a decision is made to move forward with the site improvement, the remedy would have to be as protective as this one or more protective and they would have to take actions to protect site workers during that development. Picatinny has done this at sites where buildings are going in at sites that have had environmental investigations.

Comment 19: The commenter, Michael Glaab, stated that only speaking for himself and not the RAB, he would prefer if any portions of the site where contaminants are present to concentrations greater than State standards, definitely industrial standards and preferably residential standards, that those be removed. He added that he appreciated the fact that records were being kept of all these different sites, as well as the sampling and the contaminants detected. He finally said that he hoped that in the future hot spot removals could be taken, and he would encourage any hot spot removal actions now.

Response: As stated during the public meeting, the site contaminants do not pose an unacceptable risk to human health. Focused soil removals were considered, but not chosen as the selected remedy because the removal actions would cause more damage to the ecological receptors than currently posed by the site contaminants.

3.2 TECHNICAL AND LEGAL ISSUES

No technical or legal issues were raised on the Selected Remedy.

4.0 PART 4: REFERENCES

ARCADIS U.S. Inc (ARCADIS), 2007. *Site 180 (PICA 93) Waste Burial Area Proposed Plan, Picatinny Arsenal, New Jersey.* February 2007.

Canadian Council of Ministers of the Environment (CCME), 2002. Interim Sediment Quality Guidelines as presented in the Canadian Environmental Quality Guidelines. 2002.

Dames and Moore, 1988. *Site Investigation of Picatinny Arsenal, New Jersey. Volume 1, Main Report and Appendices A-E.* Prepared for USATHAMA, Aberdeen Proving Ground, Maryland.

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

Gabel, T. "Request Review of Data from PICA 093 Sampling", Letter from Mr. Ted Gabel to Mr. William Roach and Mr. Gregory Zalaskus, January 6, 2006.

Gabel, T. "Request for Review of Data from PICA 093 (PICA-093) Sampling", Letter from Mr. Ted Gabel to Mr. William Roach and Mr. Gregory Zalaskus, February 14, 2006.

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

IT Corporation (IT), 1999. *Phase I Additional RI Sites 22, 44, 61, 104, 122, 135, 141, and 145.* Prepared for Army Total Environmental Program Support, Delivery Order No. 0017, Final. September.

IT, 2000a. *Risk Management Plan for 9 Sites in the Phase I Area, Picatinny Arsenal, New Jersey.* Prepared for Army Total Environmental Program Support, Delivery Order No. 0017, Draft Final. August.

IT, 2000b. *Picatinny Arsenal PICA 093, Exploratory Trench Investigation Report.* Prepared for Army Total Environmental Program Support, Delivery Order No. 0017. October.

IT, 2001a. *Focused Feasibility Study for Green Pond Brook and Bear Swamp Brook, Picatinny Arsenal.* Prepared for Amy Total Environmental Program Support, Delivery Order No. 0017, Final. May.

Jones, D.S. and Suter, G.W., 1997. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects of Sediment-Associated Biota*; 1997 Revision. Prepared for the U.S. Department of Energy by Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-95/R4.

Malcolm Pirnie, Inc, 2006. *Stakeholder Draft Historical Records Review.* September.

Long, E.R. and Morgan, L.G., 1990. *The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program.* National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, Seattle, Washington.

Long, E.R., MacDonald, D.D., Smith, S.L., and Calder, F.D. 1995. *Incidence of adverse biological effects within ranges of chemical concentrations in marine and estuarine sediments.* Environmental Management Vol. 19, No. 1. Pp. 81-97.

New Jersey Department of Environmental Protection (NJDEP), 1996. *New Jersey Surface Water Quality Criteria.* N.J.A.C. 7:9B-1.14. Bureau of National Affairs.

NJDEP, 1998. *Guidance for Sediment Quality Evaluations.* November.

NJDEP, 1999. *Soil Cleanup Criteria.* May.

New York State Department of Environmental Conservation (NYSDEC), 1999. *Technical Guidance for Screening Contaminated Sediments.* Division of Fish and Wildlife.

National Oceanic and Atmospheric Administration (NOAA). 1991. *The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program.*

Ontario Ministry of the Environment, Water Resources Branch, 1991. *The Provincial Sediment Quality Guidelines*. March 1991.

Roach, W. A.. "PICA 093 Additional Sampling Picatinny Arsenal, New Jersey. Letter from Mr. William A. Roach, PE to Mr. Ted Gabel, March 1, 2006.

Shaw, 2004a. *PICA 093 Feasibility Study, Picatinny, New Jersey*. Prepared for Army Total Environmental Program Support, Delivery Order No. 0017, Final. August.

Shaw, 2004b. *Land Use Control Record of Decision for Soils at Sites 19, 28, 44, 49, 86, 106, 124, 135, 141, 143, 163, 182, and 183, Picatinny, New Jersey*. Prepared for Army Total Environmental Program Support, Delivery Order No. 0017, Final Revision 2. December.

Shaw, 2005. *Site 34 Record of Decision, Picatinny, New Jersey*. Prepared for Army Total Environmental Program Support, Delivery Order No. 0017, Final. January.

Shaw, 2005a.. "Minutes from the Meeting on Installation Restoration Ecological Issues, Picatinny Arsenal, NJ, November 1, 2005.

U.S. Environmental Protection Agency (USEPA), 1988. Guidance *for Conducting Remedial Investigations & Feasibility Studies Under CERCLA*, EPA/540/G-89/004. October.

USEPA, 1989. *Risk Assessment Guidance for Superfund, Volume I.* Human Health Evaluation Manual (Part A) (RAGs).

USEPA, 1991. *Risk Assessment Guidance for Superfund, Volume I.* Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Goals).

USEPA, 1993. *Technical Basis for Deriving Sediment Quality Criteria for Nonionic Organic Contaminants for the Protection of Benthic Organisms by Using Equilibrium Partitioning.* EPA/882/R-93/011.

USEPA, 1996. *Soil Screening Guidance: Technical Background Document*, Office of Solid Waste and Emergency Response, Washington, D.C., EPA/540/R-95/128. May.

USEPA, 2002. Region III Risk-Based Concentration Table. April 2, 2002.

Tables

Table 1
Chronological Order of Investigations Conducted
Site 180 (PICA 093)
Picatinny Arsenal, New Jersey

Investigation/Study	Year	Type of Investigation/Study
Dames & Moore Phase I RI	1994	Geophysical Survey, Surface Soil Sampling, Subsurface Soil Sampling, Monitoring Well Installation and Groundwater Sampling, Surface Water Sampling, Sediment Sampling, Test Pit Excavation
ICF Kaiser Engineers (ICFKE) Phase I Additional RI	1997	Surface Soil Sampling, Subsurface Soil Sampling, Surface Water Sampling, Sediment Sampling
IT Corporation (IT) Exploratory Trench Investigation	1998-1999	Trenching, Surface Soil Sampling, Subsurface Soil Sampling, Surface Water Sampling, Sediment Sampling, Groundwater Sampling, UXO screening of trenches
IT Phase I Risk Management Plan (RMP)	2000	Further Evaluation of Human Health and Ecological Risks
Shaw FS	2004	Preliminary Evaluation of Remedial Alternatives
Additional Wetlands Sampling	2005-2006	Wetlands Soils Sampling (2 events)

Table 2
Constituents Detected in Surface Soil Samples that Exceed LOCs
Site 180 (PICA 093)
Picatinny Arsenal, New Jersey

Constituent	Range of Concentration [mg/kg (pg/g) dioxins] Minimum	Maximum	LOC [mg/kg (pg/g) dioxins]	Source of LOC Value	Frequency of Detection	# of Samples Exceeding LOC
Benz(a)anthracene (PAH)	0.18	153	4	NJDEP-NRDCSCC	36/46	5
Benzo(a)pyrene (PAH)	0.12	116	0.66	NJDEP-NRDCSCC	35/46	31
Benzo(b)fluoranthene (PAH)	0.314	162	4	NJDEP-NRDCSCC	36/46	16
Benzo(k)fluoranthene (PAH)	0.12	71	4	NJDEP-NRDCSCC	37/46	7
Chrysene (PAH)	0.228	145	40	NJDEP-NRDCSCC	37/46	2
Dibenz(a,h)anthracene (PAH)	0.1	17.6	0.66	NJDEP-NRDCSCC	21/46	13
Indeno(1,2,3-cd)pyrene (PAH)	10.14	100	4	NJDEP-NRDCSCC	31/46	7
Arsenic (metal)	2.85	50.1	20	NJDEP-NRDCSCC	45/45	5
Cadmium (metal)	0.113	1780	100	NJDEP-NRDCSCC	44/45	3
Copper (metal)	7.42	692	600	NJDEP-NRDCSCC	45/45	1
Lead (metal)	13.6	994	600	NJDEP-NRDCSCC	45/45	1
Zinc (metal)	29.2	2180	1500	NJDEP-NRDCSCC	45/45	2
Dieldrin (pest.)	0.003	0.290	0.18	NJDEP-NRDCSCC	6/45	2
Aroclor-1254 (PCB)	0.0583	18.7	2 (total PCBs)	NJDEP-NRDCSCC	4/45	1
Aroclor-1260 (PCB)	0.0204	4.48	2 (total PCBs)	NJDEP-NRDCSCC	29/45	3
Total PCBs*	0.0787	23.18	2	NJDEP-NRDCSCC	33/45	4
1,2,3,4,6,7,8-HpCDD(dioxin/furan)	8.7	2800	1900	IRBC	9/11	1
2,3,4,7,8-PeCDF (dioxin/furan)	4.9	66	38	IRBC	3/11	2
2,3,7,8-TCDF(dioxin/furan)	1.6	210	190	IRBC	7/11	1
2,3,7,8-TCDD TEC (dioxin/furan)	0.91	145.64	19	IRBC	11/11	3

Notes:
* The range of concentrations for total PCBs was derived by adding the concentrations of the individual detected PCB congeners.

Table 3
Constituents Detected in Subsurface Soil Samples that Exceed LOCs
Site 180 (PICA 093)
Picatinny Arsenal, New Jersey

Constituent	Range of Concentration [mg/kg (pg/g) dioxins] Minimum	Maximum	LOC [mg/kg] (pg/g) dioxins]	Source of LOC Value	Frequency of Detection	# of Samples Exceeding LOC
Carbon tetrachloride (VOC)	11.3	11.3	1	NJDEP-NRDCSCC	1/36	1
Methylene Chloride (VOC)	0.0624	1.44	1	NJDEP-IGW	19/36	6
Trichloroethene (TCE) (VOC)	2.58	2.58	1	NJDEP-NRDCSCC	1/36	1
Arsenic (metal)	0.885	23.1	20	NJDEP-NRDCSCC	55/55	2
Zinc (metal)	19.6	1500	1500	NJDEP-NRDCSCC	51/55	1
2,3,7,8-TCDD TEC (dioxin/furan)	32.11	157.48	19	IRBC	6/6	6

Table 4
Human Health Risk Assessment Results
Site 180 (PICA 093)
Picatinny Arsenal, New Jersey

Receptor	Exposure Medium	ELCR[1]	HI[2]
Current Outdoor Maintenance Workers	Surface and subsurface soil	9×10^{-06}	0.1
Future Industry/Research Workers	Surface and subsurface soil	5×10^{-05}	0.1
Future Construction/ Excavation Workers	Surface and subsurface soil	4×10^{-06}	0.2

1. ELCR - Excess Lifetime Cancer Risk
2. HI - Hazard Index

Table 5
Final Site Cleanup Levels (SCLs) for Surface Soil
Site 180 (PICA 093)
Picatinny Arsenal, New Jersey

Contaminant of Concern (COC)	SCL (mg/kg)	Average Detected Concentration (mg/kg)
Arsenic	20	10.4
Cadmium	100	75.6
Copper	600	94.8
Lead	600	141.6
Zinc	1500	408.7
Benz(a)anthracene	4	8.4
Benzo(a)pyrene	0.66	7.7
Benzo(b)fluoranthene	4	9.7
Benzo(k)fluoranthene	4	4.7
Chrysene	40	8.2
Dibenz(a,h)anthracene	0.66	1.8
Indeno(1,2,3-c,d)pyrene	4	6.3
Aroclor-1254	2 (total PCBs)	0.43
Aroclor-1260	2 (total PCBs)	0.46
Dieldrin	0.18	0.012

Table 6
Surface and Subsurface Soil Chemical-Specific TBCs for Selected Remedy
Site 180 (PICA 093)
Picatinny Arsenal, New Jersey

Law/Regulation	Requirement of Law-Regulation	TBC Status
Soil cleanup criteria NJAC 26:D, Table 3-1 and 7-1 (1)	Proposed rule for residential, nonresidential, and impact to groundwater soil cleanup criteria.	TBC Cleanup criteria for contaminated soils.
Site-specific risk assessment	Site-specific RGs for soils were developed in the HHRA.	TBC RG values from the human health and ecological site-specific risk assessment report.

(1) Tables referenced can be found in the Site 180 Feasibility Study by Shaw dated August 2004

Table 7
Location-Specific ARARs and TBCs for Selected Remedy
Site 180 (PICA 093)
Picatinny Arsenal, New Jersey

Location	Law/Regulation	Requirement of Law-Regulation	ARAR/TBC Status
Wetlands	Presence of wetlands as defined in Executive Order 1100- § 7 (c) and 40 CFR 6, Appendix A § 4 (l)	Whenever possible, federal agency actions must avoid or minimize adverse impacts on wetland and act to preserve and enhance their natural and beneficial values. Agencies should particularly avoid new construction in wetland areas unless there are no practicable alternatives. Federal agencies shall incorporate wetlands protection consideration into planning, regulating, and decision-making processes.	ARAR Potentially applicable to the substantive permit requirements if clearing and/or excavation activities encroach upon stream, wetlands, and/or transition areas.
	Presence of wetlands as defined in the Clean Water Action Section 402 33 CFR 320.4 and NJAC 7:7A (the Freshwater Wetlands Protection Act, P.L. 1987)	To the extent possible, action must be taken to avoid degradation or destruction of wetlands. Discharges for which there are practicable alternatives with less adverse impacts or those that would cause or contribute to significant degradation are prohibited. If adverse impacts are unavoidable, action must be taken to enhance, restore, or create alternative wetlands.	ARAR Potentially applicable to the substantive permit requirements if clearing and/or excavation activities encroach upon stream, wetlands, and/or transition areas.

Table 7
Location-Specific ARARs and TBCs for Selected Remedy
Site 180 (PICA 093)
Picatinny Arsenal, New Jersey

Location	Law/Regulation	Requirement of Law-Regulation	ARAR/TBC Status
Floodplains	Protection of flood plains as defined in Executive Order 11988 ə 6 (c) and 40CFR 6, Appendix A ə4 (i)	Whenever possible, federal agency actions must avoid or minimize adverse impacts on wetlands and act to preserve and enhance their natural and beneficial values. Agencies should particularly avoid new construction in wetland areas unless there are no practical alternatives. Federal agencies shall incorporate wetlands protection consideration into planning, regulating, and decision-making processes.	ARAR Potentially applicable to the substantive permit requirements if clearing and/or excavation activities encroach upon stream, wetlands, and/or transition areas.
	Within 100 year flood plain as defined in 40 CFR 6, Appendix A ə4 (d)	Facility must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by flooding.	ARAR Applicable since PICA 093 is on the 100-year floodplain of Green Pond Brook.
Endangered Species Act (Rare, Threatened, or Endangered Species)	Presence of those species listed in the following acts and regulations: - Endangered Species Act (16 U.S.C. 1531 *et seq*) - Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq*) - 40 CFR 6.302(h) - 50 CFR 402 - CWA § 404 - 40 CFR 231.10(b) - RSN 37-430 to -438 - NJAC 7:25-4 as being rare, threatened, or endangered species.	Whenever possible, federal agency actions must avoid or minimize adverse impacts on rare, threatened, or endangered species and act to preserve and enhance their natural and beneficial values. Agencies should particularly avoid new construction in those areas containing these species unless there are no practical alternatives. Federal agencies shall incorporate rare, threatened, or endangered species protection consideration into planning, regulating, and decision-making processes.	ARAR Potentially applicable since clearing, and/or excavation activities could impact habitat typical of several sensitive species listed within the Endangered Species Act. Protected species which are resident at PTA are the barrel owl, blue heron, bog turtle, timber rattlesnake, and brook trout.

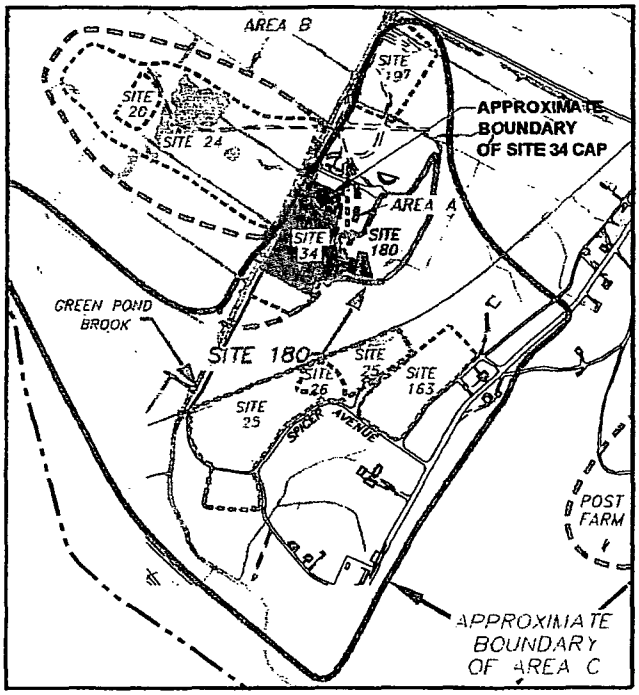
Table 8
Action-Specific ARARs and TBCs for Selected Remedy
Site 180 (PICA 093)
Picatinny Arsenal, New Jersey

Action	Applicable Alternatives	Law/Regulation	Requirements of Law/Regulation	ARAR/TBC Status
Military Munitions Identification, Treatment, and Disposal	2, 3, 4, 5, 6, 7	40 CFR 266,200 – 266,206, Subpart M [reference 40 CFR 260-270]	Regulations which identify when military munitions become a solid waste and if hazardous.	ARAR Potentially applicable if UXOs are discovered during excavation and/or clearing activities at the site. DOD and RPM will be contacted.
	2, 3, 4, 5, 6, 7	40 CFR 300.120	DOD will have removal response authority and Remedial Project Manager (RPM) will be the prime contact for incidents involving military weapons and munitions under control of DOD.	ARAR Potentially applicable if UXOs are discovered during excavation and/or clearing activities at the site. DOD and RPM will be contacted.
	2, 3, 4, 5, 6, 7	ER-1110-1-8153	Defines response actions and roles and responsibilities for UXO removal. Adapts criterion of 10% explosive content as a measure of contaminated soil reactivity to differentiate between hazardous and explosive waste.	ARAR Potentially applicable if UXOs are discovered during excavation and/or any other access of personnel at site. ARAR Applies to explosive content in soil. Not applicable to UXO directly.
	2, 3, 4, 5, 6, 7	EP-1110-1-18	Provides the procedures to implement an UXO removal action.	ARAR Potentially applicable if UXOs are discovered during excavation and/or any other access of personnel at site

Table 8
Action-Specific ARARs and TBCs for Selected Remedy
Site 180 (PICA 093)
Picatinny Arsenal, New Jersey

Military Munitions Identification, Treatment, and Disposal (continued)	2, 3, 4, 5, 6, 7	TM-9-1375-213-12	Defines the minimum safe distance between emitters of electromagnetic radiation in the radio frequency range and UXO clearance/demolition activities.	ARAR Potentially applicable if UXOs are discovered during excavation and/or any other access of personnel at site.
	2, 3, 4, 5, 6, 7	TM-5-855-1	Defines protective measures to be taken to reduce blast shock and fragmentation damage.	ARAR Potentially applicable if UXOs are discovered during excavation and/or any other access of personnel at site.
	2, 3, 4, 5, 6, 7	DA PAM 385-61 DA PAM 385-64	Defines procedures for emergency decontamination of site workers and minimum safe distance for UXO removal.	ARAR Potentially applicable if UXOs are discovered during excavation and/or any other access of personnel at site.
	2, 3, 4, 5, 6, 7	TM60-A-1-1-31	Provides UXO disposal requirements	ARAR Potentially applicable if UXOs are discovered during excavation and/or any other access of personnel at site.
	2, 3, 4, 5, 6, 7	DOD 6055.9-STD	Requires specialized personnel in detection, removal, and disposal of OE; stipulates required safety precautions and procedures for detonation/disposal; establishes depth of remediation based on land use.	ARAR Potentially applicable if UXOs are discovered during excavation and/or any other access of personnel at site.
General Remediation	1, 2, 3, 4, 5, 6, 7	Technical Requirements for Ste Remediation NJAC 7:26E 1, 4-7	Specifies the minimum technical requirements to investigate and remediate contamination on any site.	ARAR Relevant and appropriate for on-site remediation activities.

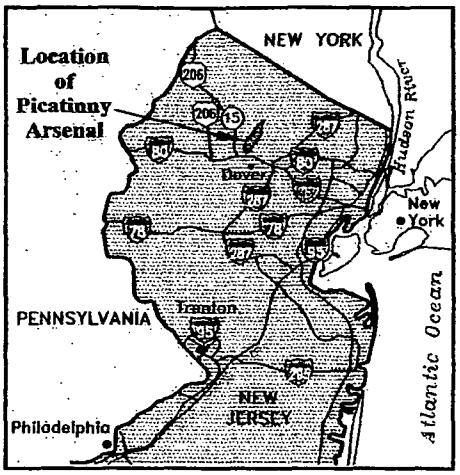
Figures



AREA C SITE PLAN

0 1000

FEET



LOCATION OF PICATINNY

0 50

MILES

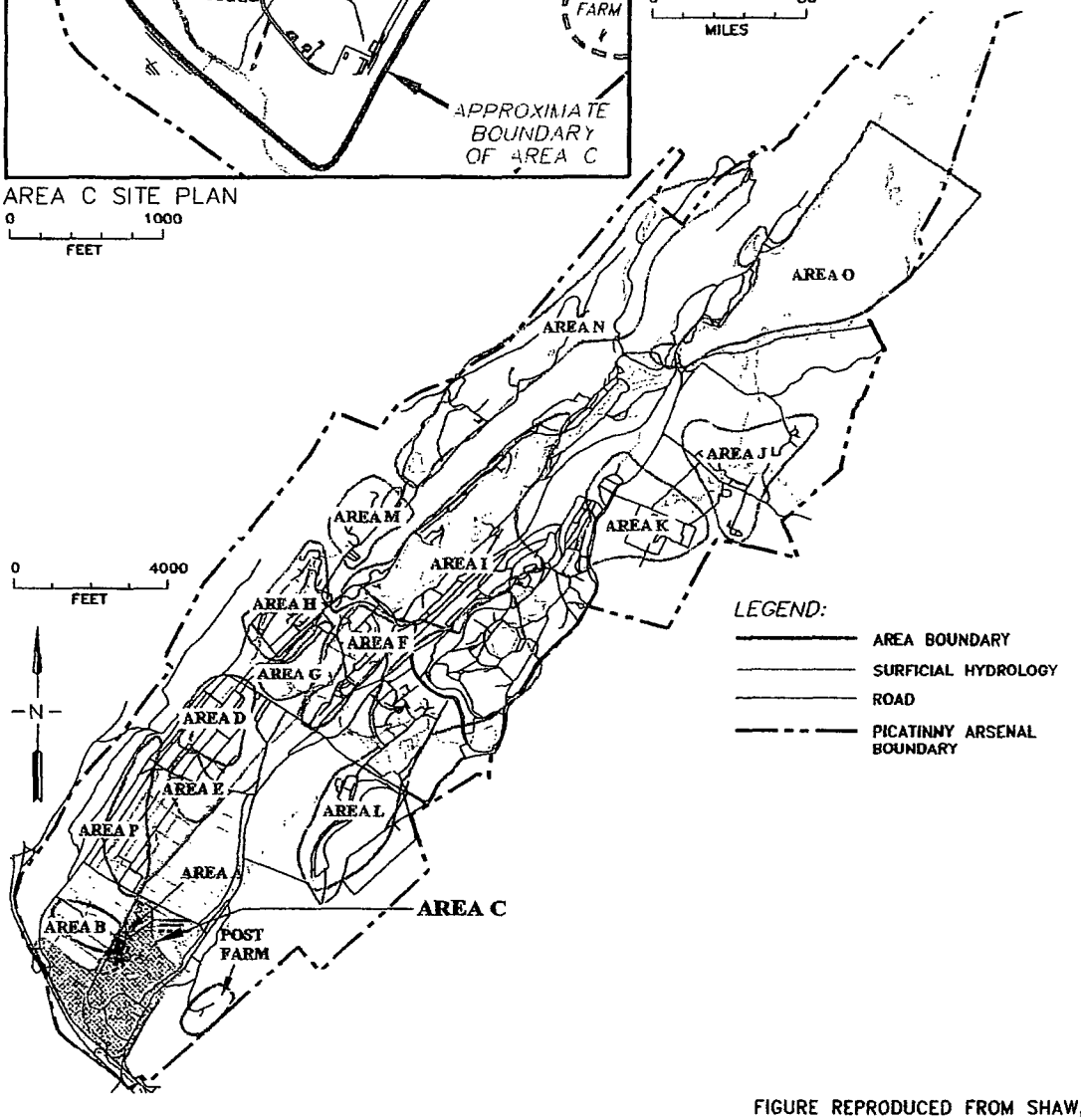


FIGURE REPRODUCED FROM SHAW, 2005

ARCADIS
1114 Benfield Boulevard, Suite A
Millersville, Maryland 21108
Tel (410) 987-0032 Fax (410) 987-4392

PICATINNY LOCATION MAP
REMEDIAL INVESTIGATION CONCEPT PLAN AREAS

PICATINNY ARSENAL
DOVER, NEW JESREY

PROJECT MANAGER	DEPARTMENT MANAGER
T.LLEWELLYN	T.CRONE
DRAFTER	CHECKED
J.GOFORTH	R.SAGANA
PROJECT NUMBER	DRAWING NUMBER
GP06PICA.P093	1

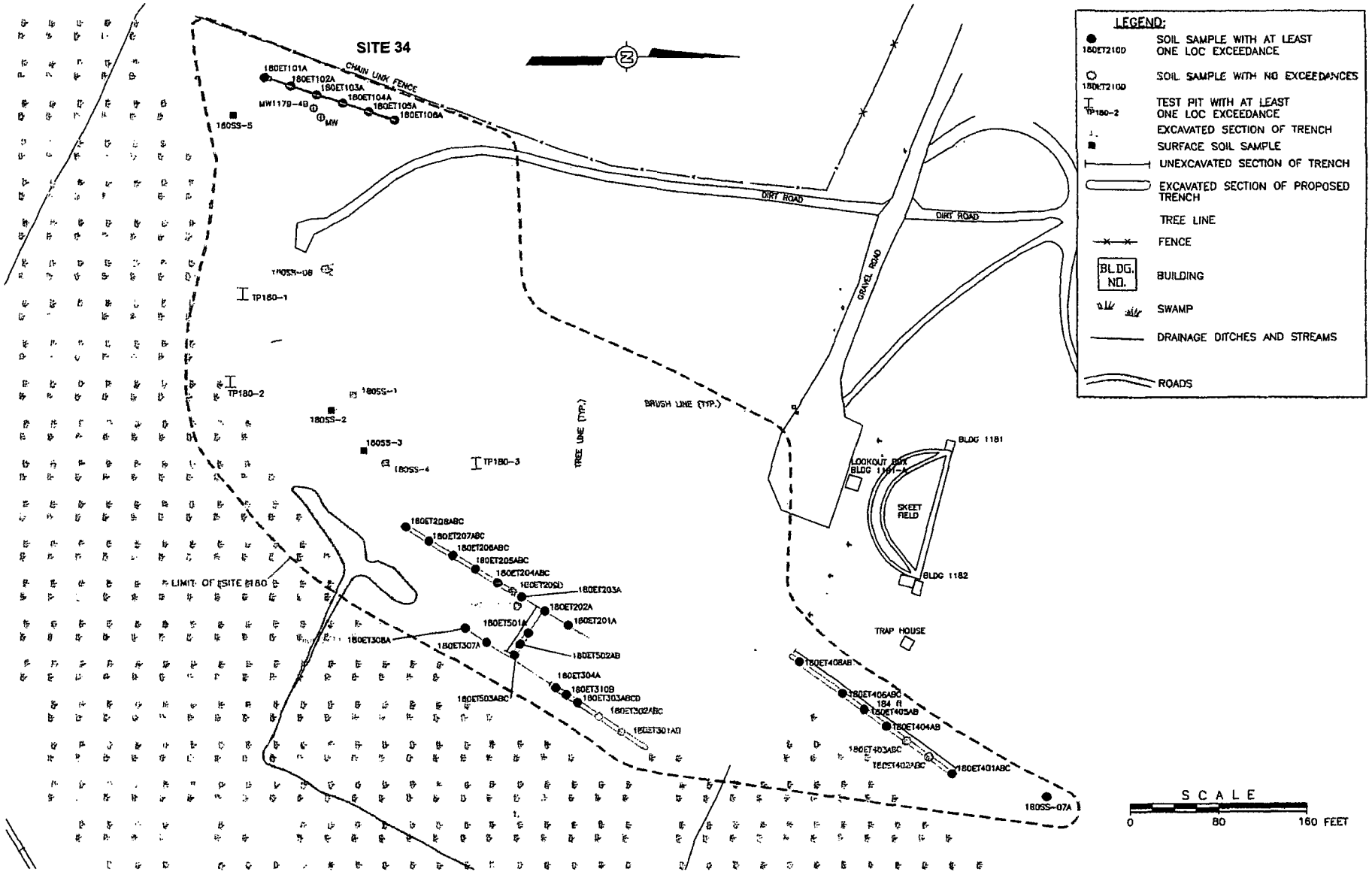


FIGURE REPRODUCED FROM SHAW, 2005

ARCADIS
1114 Benfield Boulevard, Suite A
Millersville, Maryland 21108
Tel (410) 987-0032 Fax (410) 987-4392

LOCATIONS OF LOC EXCEEDANCES IN SURFACE SOIL

PICATINNY ARSENAL
DOVER, NEW JERSEY

PROJECT MANAGER	DEPARTMENT MANAGER
T.LOWCUN	T.CROWE
DRAWN	CHECKED
J.GOFORTH	R.SAGANA
PROJECT NUMBER	DRAWING NUMBER
GP06PICAP093	2

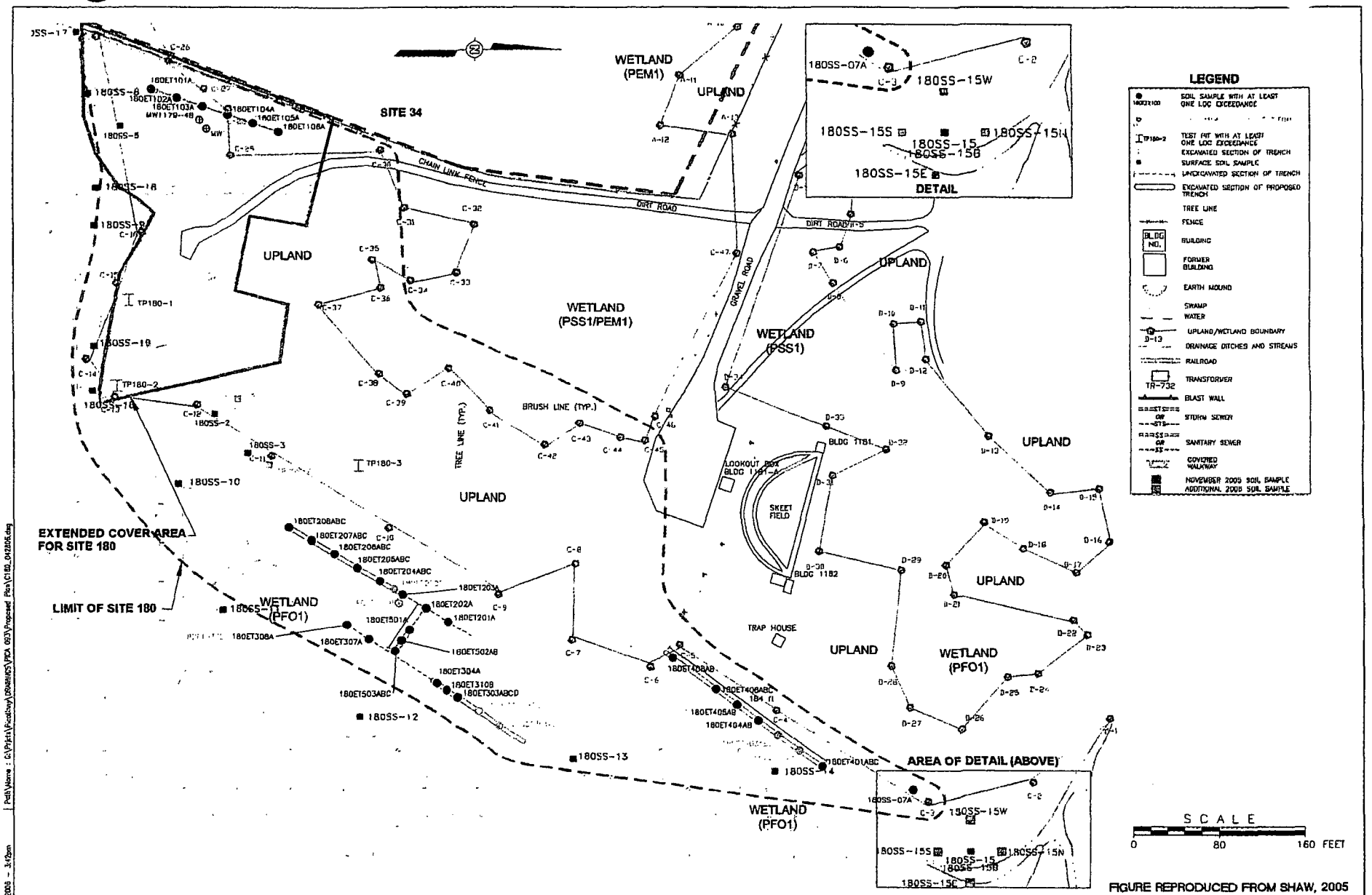


FIGURE REPRODUCED FROM SHAW, 2005

ARCADIS
1114 Benfield Boulevard, Suite A
Millersville, Maryland 21108
Tel (410) 987-0032 Fax (410) 987-4392

WETLANDS DELINEATION AND WETLANDS SAMPLING LOCATIONS

PICATINNY ARSENAL
DOVER, NEW JERSEY

PROJECT MANAGER	DEPARTMENT MANAGER
T.LLEWELLYN	T.CRONE
DRAWN	CHECKED
J.GOODRITH	R.SARDANA
PROJECT NUMBER	DRAWING NUMBER
GP06PICA.P093	3

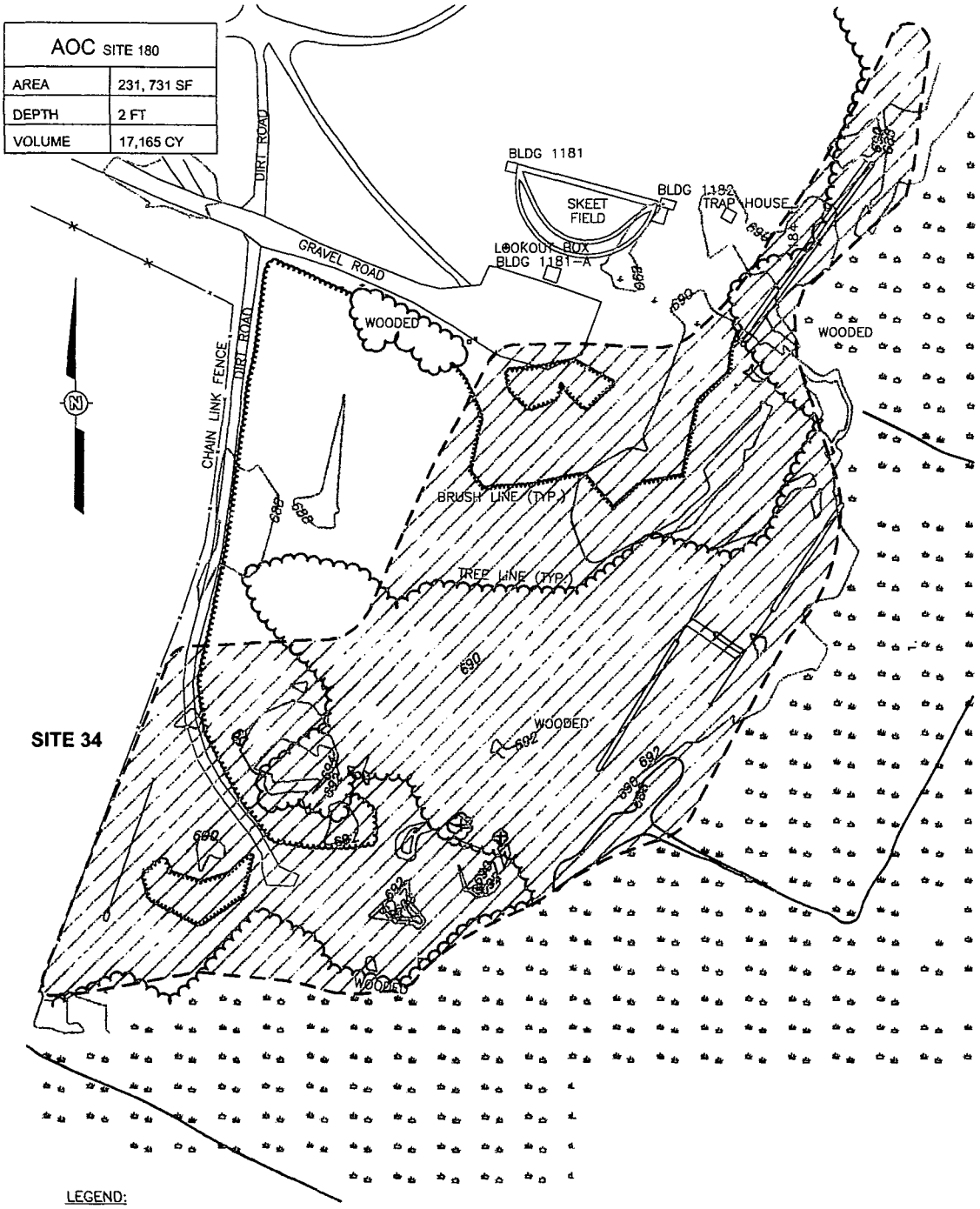


FIGURE REPRODUCED FROM SHAW, 2005

Path\Name : G:\Prjcts\Picatinny\DRAWINGS\PICA 093\Proposed Plan\Fig4.dwg
Date\Time : Sep 2007 - 2:44pm

ARCADIS
1114 Benfield Boulevard, Suite A
Millersville, Maryland 21108
Tel (410) 987-0032 Fax (410) 987-4392

AREA OF CONCERN

PICATINNY ARSENAL
DOVER, NEW JESREY

PROJECT MANAGER	DEPARTMENT MANAGER
T.LLEWELLYN	T.CRONE
DRAFTER	CHECKED
J.GOFORTH	R.SAGANA
PROJECT NUMBER	DRAWING NUMBER
GP06PICA.P093	4

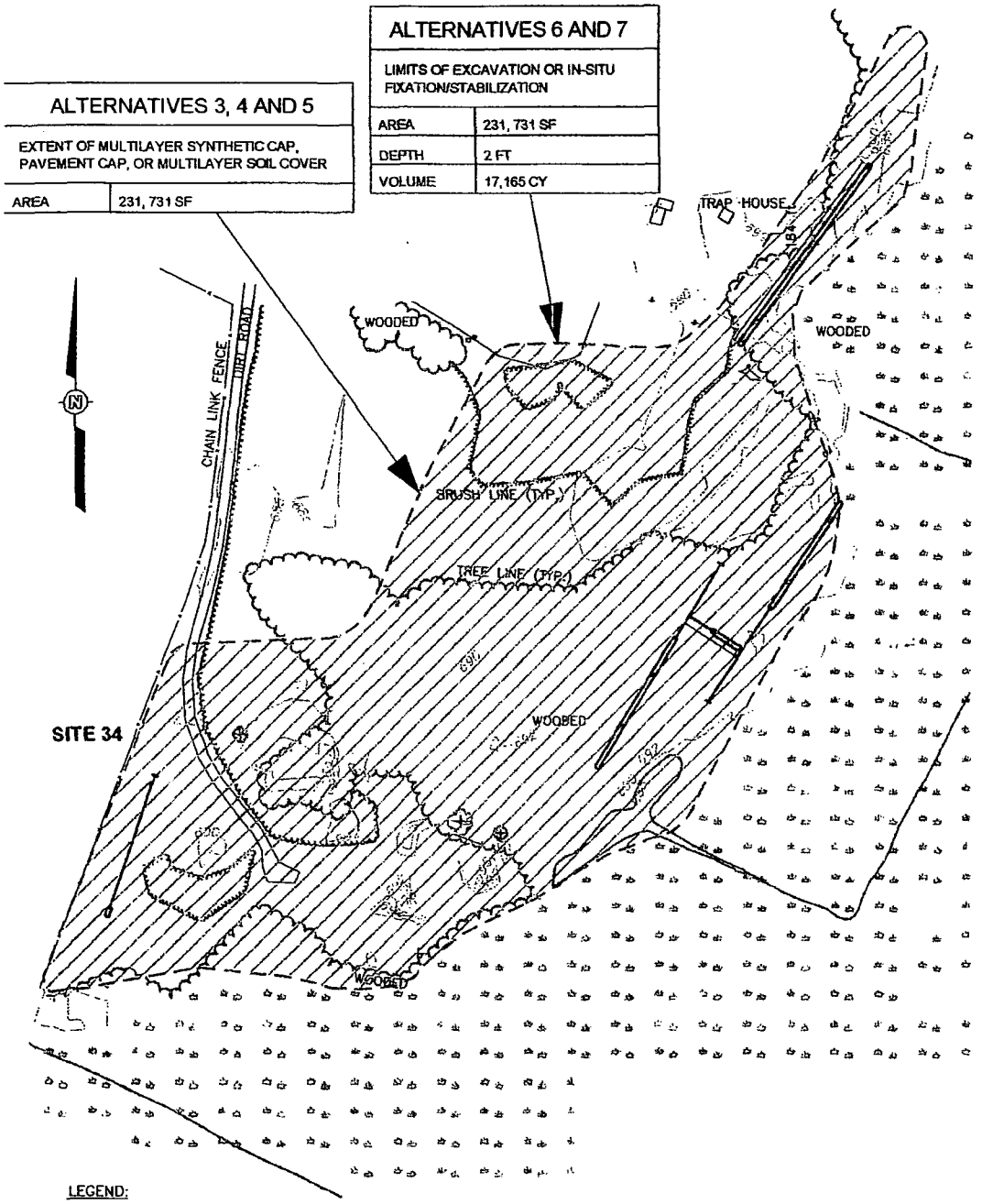


FIGURE REPRODUCED FROM SHAW, 2005

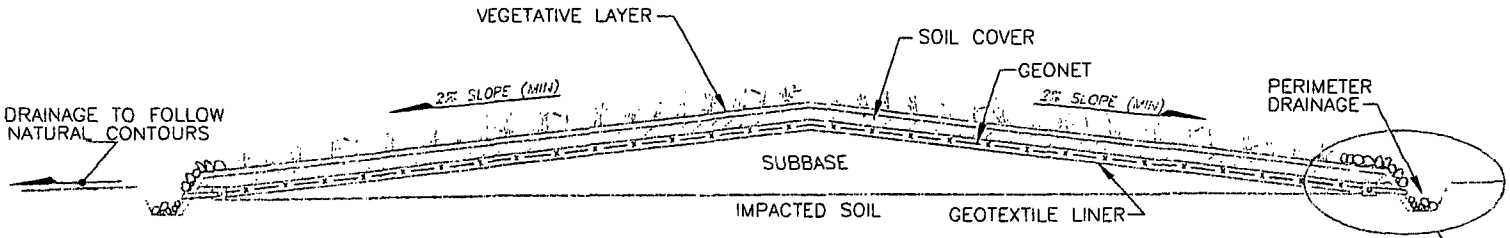
ARCADIS
1114 Benfield Boulevard, Suite A
Millersville, Maryland 21108
Tel (410) 987-0032 Fax (410) 987-4392

ALTERNATIVES 3,4,5,6, AND 7
CONCEPTUAL LAYOUT

PICATINNY ARSENAL
DOVER, NEW JESREY

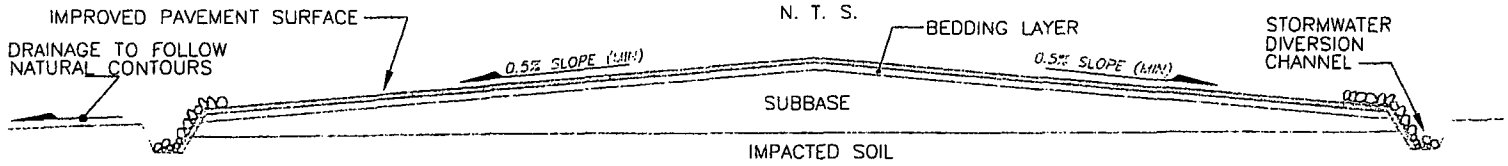
PROJECT MANAGER	DEPARTMENT MANAGER
T.LLEWELLYN	T.CRONE
DRAFTER	CHECKED
J.GOFORTH	R.SAGANA
PROJECT NUMBER	DRAWING NUMBER
GP06PICA.P093	5

Path\Name : G:\Projects\Picatinny\DRAWINGS\PICA 093\Proposed Plan\Fig5.dwg
Date\Time : Tue, 19 Dec 2006 - 3:46pm



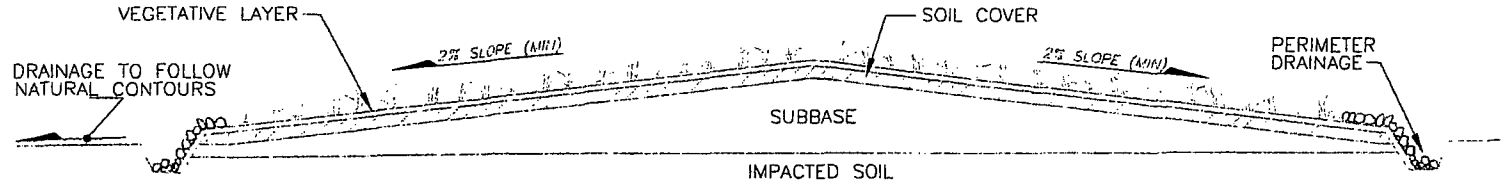
ALTERNATIVE 3 – MULTI LAYER SYNTHETIC CAP

N. T. S.



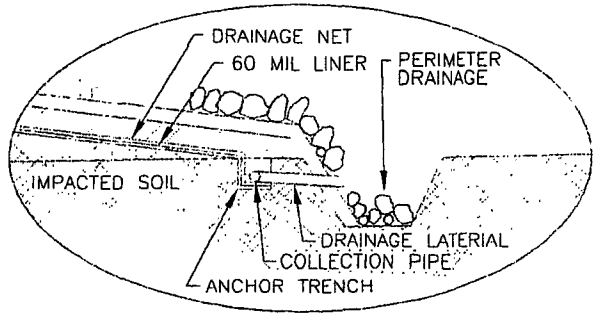
ALTERNATIVE 4 – PAVEMENT (ULTRA-LOW PERMEABILITY ASPHALT) CAP

N. T. S.



ALTERNATIVE 5 – SOIL COVER

N. T. S.



DETAIL

NOTE:

THIS IS A CONCEPTUAL DESIGN. THE DETAILS PROVIDED ARE THE BASIS FOR COST ESTIMATE.

FIGURE REPRODUCED FROM SHAW, 2005

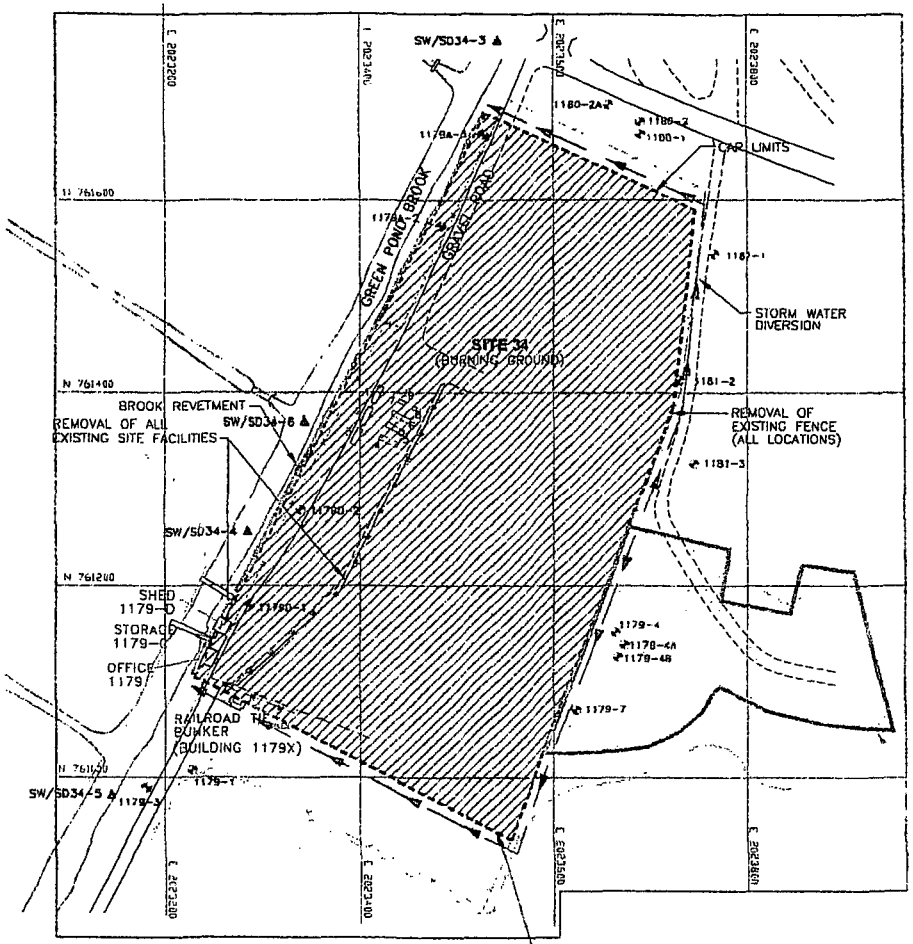
ARCADIS
1114 Benfield Boulevard, Suite A
Millersville, Maryland 21108
Tel (410) 987-0032 Fax (410) 987-4392

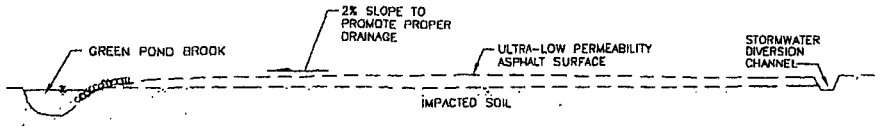
ALTERNATIVES 3,4, AND 5
TYPICAL CAP CROSS-SECTIONS

PICATINNY ARSENAL
DOVER, NEW JERSEY

PROJECT MANAGER	DEPARTMENT MANAGER
T.LLEWELLYN	T.CRONE
DRAWN	CHECKED
J.GOFORTH	R.SAGANA
PROJECT NUMBER	DRAWING NUMBER
GP06PICAP093	6

Date\Time : Tue, 19 Dec 2006 – 3:50pm | Path\Name : G:\Projects\Picatinny\DRAWINGS\PICA 093\Proposed Plan\Fig6.dwg





ALTERNATIVE 4 – ULTRA-LOW PERMEABILITY ASPHALT CAP

N. T. S.

LEGEND:

- 1179-3 — GROUNDWATER MONITORING WELL FOR LONG TERM OPERATION AND MAINTENENCE
- SW/SD34-3 — PROPOSED SURFACE WATER AND SEDIMENT SAMPLING LOCATION
- AREA OF CAP SYSTEMS
- BLDG. NO. — BUILDING
- BLDG. NO. — FORMER BUILDING
- WATER
- ROAD
- UNPAVED ROAD
- FENCE
- TREELINE

N

EXTENDED COVER AREA FOR SITE 180

SCALE
0 120 240 FEET

NOTES:

1. SUPER SILT FENCE TO BE INSTALLED AROUND DISTURBED AREAS DURING CONSTRUCTION IN ACCORDANCE WITH APPLICABLE EROSION AND SEDIMENTATION CONTROL PRACTICES.

NOTE:
THIS IS A CONCEPTUAL DESIGN AND THE DETAILS PROVIDED ARE USED AS THE BASIS FOR THE THE COST ESTIMATE.

FIGURE REPRODUCED FROM SHAW, 2005

ARCADIS
1114 Benfield Boulevard, Suite A
Millersville, Maryland 21108
Tel (410) 987-0032 Fax (410) 987-4392

PICA 093
EXTENDED COVER AREA

PICATINNY ARSENAL
DOVER, NEW JERSEY

PROJECT MANAGER	DEPARTMENT MANAGER
T.LLEWELLYN	T.CROWE
DRAWN	CHECKED
J.GOFORTH	B.SAGANA
PROJECT NUMBER	DRAWING NUMBER
GP06PICAP093	7

Date\Time : Tue, 19 Dec 2006 - 3:53pm | Path\Name : C:\Projects\Picatinny\DRAWINGS\PICA (093)\Proposed Plan\Fig-7.dwg

Appendix A

Certificate of Publication for Public Notices

Daily Record

AN OFFICIAL
AFFIDAVIT (PROOF) OF PUBLICATION
(Cut, stamped and sealed at and by the Daily Record)

STATE OF NEW JERSEY, } ss.

Morris County

PAT YOST

Of full age, being fully sworn according to law, doth depose and say that she is employed in the Advertising Marketing Services Dept. of Morris County's **Daily Record** a newspaper printed and published in Parsippany and circulated in the County of Morris, in this State, and generally circulating in Warren, Sussex, Essex, Union, Passaic and Somerset Counties, in this State, and the notice, of which the annexed is a printed copy, has been published in said newspaper 1 time. Publication being made the 22nd day of February, A.D. 2007.

Pat Yost

Sworn to and subscribed before me

this 22nd day of February, A.D. 2007

Sharon Glover NOTARY PUBLIC

SHARON GLOVER
Notary Public of New Jersey
My Commission Expires Dec. 01, 2009

PUBLIC NOTICE

U.S. ARMY INVITES PUBLIC COMMENT ON A PROPOSED PLAN FOR SITE 180 (PICA 093), WASTE BURIAL AREA

The U.S. Army at Picatinny Arsenal (Picatinny) invites the public to comment on a Proposed Plan for soil, sediment, and surface water at Site 180 (PICA 093), a former waste burial area, on Picatinny Arsenal.

PROPOSED ACTION

Site 180 (PICA 093) consists of approximately 6.8 acres on the eastern side of Green Pond Brook and contains debris piles of railroad ties, concrete rubble, wood, scrap metals, and tires. Site 180 is located in an isolated area of Picatinny and used a few days a year for hunting. Approximately half of the site is wetlands. The Army conducted comprehensive environmental investigations at the site and implemented a removal action in 1997. Various chemicals and metals have been detected at elevated levels in the surface and sub-surface soil and in surface water. Human health and ecological risk assessments showed potential impacts to be minimal. Groundwater at Site 180 (PICA 093) is being addressed under a groundwater investigation, and the potential presence of ordnance is being addressed under a separate Army program.

Site 34 (PICA 002), the burning ground, is located adjacent to Site 180 (PICA 093). Under the Selected Remedy for Site 34 (PICA 002), the Army plans to extend an asphalt pavement cap over the southern portion of Site 180 (PICA 093). Details regarding the cap extension will not be addressed as part of this Proposed Plan. Additional information concerning the Selected Remedy for Site 34 (PICA 002) can be referenced in the Final Site 34 Record of Decision, 2006.

ALTERNATIVES EVALUATED

The Army, the US Environmental Protection Agency, and the New Jersey Department of Environmental Protection evaluated the following alternatives:

Alternative 1: No Action.

Alternative 2: Institutional Controls and Land Use Restrictions.

Alternative 3: Capping with a Multilayer Synthetic Cap and Land Use Restrictions.

Alternative 4: Capping with a Pavement (Improved Asphalt) Cap and Land Use Restrictions.

Alternative 5: Capping with a Soil Cover and Land Use Restrictions

Alternative 6: Excavation and Off-Site Disposal of Soils with Contaminants of Concern Above Site Cleanup Levels.

Alternative 7: In-situ Fixation/Stabilization of Soil with Contaminants of Concern above Site Cleanup Levels and Land Use Restrictions.

PREFERRED ALTERNATIVE

Alternative 2, Institutional Controls and Land Use Restrictions is the preferred alternative. Alternative 2 provides an optimum balance between the protection of human health and minimizing intrusion into the well-established wetlands. The preferred alternative may be modified or a new alternative may be developed based on public input. The final alternative selected will be documented in a Record of Decision that summarizes the decision-making process. The Army will summarize and respond to comments received during the comment period as part of the Record of Decision.

PUBLIC MEETING

The Army invites the public to attend a meeting on **Thursday, March 8, 2007, 6 p.m.**, **Hilton Garden Inn** (near the Rockaway Townsquare Mall), 375 Mt. Hope Avenue, Rockaway, NJ 07866. The meeting location is wheelchair accessible. A meeting of Picatinny's Environmental Restoration Advisory Board will follow the Proposed Plan meeting, and the public is also invited to attend the Board meeting.

WRITTEN COMMENTS

Copies of the Remedial Investigation and Feasibility Study are available for public review at the Environmental Affairs Directorate at Picatinny by contacting Mr. Ted Gabel at (973) 724-6748 in advance. Copies of the Proposed Plan are available for review at the Rockaway Township Library (61 Mount Hope Road) and Morris County Library (30 East Hanover Avenue, Whippany).

The public may submit written comments during the 30-day comment period (March 8 to April 8, 2007). Comments must be postmarked by April 8 and sent to Mr. Ted Gabel, Environmental Affairs Office, U.S. Army Installation Management Agency, Northeast Regional Garrison Office, Building 319, Picatinny, NJ, 07806. Comments can also be sent by e-mail to Mr. Gabel at ted.gabel@us.army.mil. The Picatinny Public Affairs Office can be contacted at (973) 724-6385 during normal business hours for additional information.

P.F.$138.93,1-T,2/22

0100317358

PUBLIC NOTICE

U.S. ARMY INVITES PUBLIC COMMENT ON A PROPOSED PLAN FOR SITE 180 (PICA 093), WASTE BURIAL AREA

The U.S. Army at Picatinny Arsenal (Picatinny) invites the public to comment on a Proposed Plan for soil, sediment, and surface water at Site 180 (PICA 093), a former waste burial area, on Picatinny Arsenal.

PROPOSED ACTION

Site 180 (PICA 093) consists of approximately 6.8 acres on the eastern side of Green Pond Brook and contains debris piles of railroad ties, concrete rubble, wood, scrap metals, and tires. Site 180 is located in an isolated area of Picatinny and used a few days a year for hunting. Approximately half of the site is wetlands. The Army conducted comprehensive environmental investigations at the site and implemented a removal action in 1997. Various chemicals and metals have been detected at elevated levels in the surface and sub-surface soil and in surface water. Human health and ecological risk assessments showed potential impacts to be minimal. Groundwater at Site 180 (PICA 093) is being addressed under a separate broader groundwater investigation, and the potential presence of ordnance is being addressed under a separate Army program.

Site 34 (PICA 002), the burning ground, is located adjacent to Site 180 (PICA 093). Under the Selected Remedy for Site 34 (PICA 002), the Army plans to extend an asphalt pavement cap over the southern portion of Site 180 (PICA 093). Details regarding the cap extension will not be addressed as part of this Proposed Plan. Additional information concerning the Selected Remedy for Site 34 (PICA 002) can be referenced in the Final Site 34 Record of Decision, 2005.

ALTERNATIVES EVALUATED

The Army, the US Environmental Protection Agency, and the New Jersey Department of Environmental Protection evaluated the following alternatives:

Alternative 1: No Action.

Alternative 2: Institutional Controls and Land Use Restrictions.

Alternative 3: Capping with a Multilayer Synthetic Cap and Land Use Restrictions.

Alternative 4: Capping with a Pavement (Improved Asphalt) Cap and Land Use Restrictions.

Alternative 5: Capping with a Soil Cover and Land Use Restrictions

Alternative 6: Excavation and Off-Site Disposal of Soils with Contaminants of Concern Above Site Cleanup Levels.

Alternative 7: In-situ Fixation/Stabilization of Soil with Contaminants of Concern above Site Cleanup Levels and Land Use Restrictions.

PREFERRED ALTERNATIVE

Alternative 2: Institutional Controls and Land Use Restrictions is the preferred alternative. Alternative 2 provides an optimum balance between the protection of human health and minimizing intrusion into the well-established wetlands. The preferred alternative may be modified or a new alternative may be developed based on public input. The final alternative selected will be documented in a Record of Decision that summarizes the decision-making process. The Army will summarize and respond to comments received during the comment period as part of the Record of Decision.

PUBLIC MEETING

The Army invites the public to attend a meeting on **Thursday, March 8, 2007, 6 p.m., Hilton Garden Inn** (near the Rockaway Townsquare Mall), 375 Mt. Hope Avenue, Rockaway, NJ 07866. The meeting location is wheelchair accessible. A meeting of Picatinny's Environmental Restoration Advisory Board will follow the Proposed Plan meeting; and the public is also invited to attend the Board meeting.

WRITTEN COMMENTS

Copies of the Remedial Investigation and Feasibility Study are available for public review at the Environmental Affairs Directorate at Picatinny by contacting Mr. Ted Gabel at (973) 724-6748 in advance. Copies of the Proposed Plan are available for review at the Rockaway Township Library (61 Mount Hope Road) and Morris County Library (30 East Hanover Avenue, Whippany).

The public may submit written comments during the 30-day comment period (March 8 to April 8, 2007). Comments must be postmarked by April 8 and sent to Mr. Ted Gabel, Environmental Affairs Office, U.S. Army Installation Management Agency, Northeast Regional Garrison Office, Building 319, Picatinny, NJ. 07806. Comments can also be sent by e-mail to Mr. Gabel at ted.gabel@us.army.mil. The Picatinny Public Affairs Office can be contacted at (973) 724-6165 during normal business hours for additional information.

STATE OF NEW JERSEY
COUNTY OF ESSEX } SS

Lauren Kincaid

Being duly sworn, according to law, on her oath sayeth that She is Clerk of the Star-Ledger, in said County of Essex, and that the notice, of which the attached is a copy, was published in said paper on the 24th day of February 2007 and continued therein for _____ successively, at least once in each _____ for 1 day

Lauren Kincaid

Sworn to and subscribed before me this 27th day of February, 2007

Kathleen Sconzo

NOTARY PUBLIC of NEW JERSEY

KATHLEEN SCONZO
NOTARY PUBLIC OF NEW JERSEY
MY COMMISSION EXPIRES NOV. 13, 2007