



**RECORD OF DECISION  
FOR GROUNDWATER & SURFACE WATER  
SITE 78 (PICA 013)**

**PICATINNY ARSENAL  
NEW JERSEY**

**FINAL**

**MARCH 2011**

## TABLE OF CONTENTS

<b>Section</b>	<b>Page</b>
<b>1.0</b>	<b>PART 1: DECLARATION..... 1-1</b>
1.1	SITE NAME AND LOCATION ..... 1-1
1.2	STATEMENT OF BASIS AND PURPOSE ..... 1-1
1.3	ASSESSMENT OF THE SITE ..... 1-1
1.4	DESCRIPTION OF THE SELECTED RESPONSE ACTION – MONITORED NATURAL ATTENUATION AND LAND USE CONTROLS..... 1-1
1.5	STATUTORY DETERMINATIONS..... 1-1
1.6	DATA CERTIFICATION CHECKLIST ..... 1-2
1.7	AUTHORIZING SIGNATURE ..... 1-3
<b>2.0</b>	<b>PART 2: DECISION SUMMARY..... 2-1</b>
2.1	SITE NAME, LOCATION, AND DESCRIPTION..... 2-1
2.2	SITE HISTORY AND ENFORCEMENT ACTIVITIES..... 2-1
2.2.1	Picatinny Arsenal Background ..... 2-1
2.2.2	Site 78 (PICA 013) Background ..... 2-1
2.2.3	Enforcement Activities ..... 2-2
2.3	COMMUNITY PARTICIPATION ..... 2-2
2.4	SCOPE AND ROLE OF RESPONSE ACTION ..... 2-3
2.5	DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED RESPONSE ACTION FROM PROPOSED PLAN..... 2-3
2.6	SITE CHARACTERISTICS..... 2-3
2.6.1	Physical Characteristics ..... 2-3
2.6.2	Summary and Findings of Site Investigations ..... 2-4
2.7	CURRENT AND POTENTIAL FUTURE LAND USE..... 2-6
2.8	SUMMARY OF SITE RISKS..... 2-6
2.8.1	Human Health Risk Assessment..... 2-7
2.8.1.1	Contaminants of Potential Concern..... 2-7
2.8.1.2	Exposure Assessment..... 2-8
2.8.1.3	Risk Characterization ..... 2-8
2.8.2	Ecological Risk Assessment ..... 2-9
2.8.3	Unexploded Ordnance..... 2-10
2.8.4	Contaminants of Concern and Site Cleanup Levels ..... 2-10
2.9	REMEDIAL ACTION OBJECTIVES ..... 2-10
2.10	DESCRIPTION OF RESPONSE ACTIONS ..... 2-11
2.10.1	Response Action GW-1: No Action ..... 2-11
2.10.2	Response Action GW-2: Monitored Natural Attenuation and Land Use Controls ..... 2-11

2.10.3	Response Action GW-3: Enhanced Reductive Dechlorination, Post-Remedial Monitoring and LUCs.....	2-13
2.10.4	Response Action GW-4: <i>In Situ</i> Chemical Treatment (Potassium Permanganate), Post-Remedial Monitoring and LUCs .....	2-13
2.10.5	Response Action GW-5: <i>In Situ</i> Chemical Treatment (Zero Valent Iron), Post-Remedial Monitoring and LUCs .....	2-14
2.11	COMPARATIVE ANALYSIS OF RESPONSE ACTIONS.....	2-15
2.11.1	Protection of Human Health and the Environment.....	2-15
2.11.2	Compliance with Applicable or Relevant and Appropriate Requirements..	2-15
2.11.3	Long-term Effectiveness and Permanence .....	2-15
2.11.4	Reduction in Toxicity, Mobility, or Volume through Treatment.....	2-15
2.11.5	Short-term Effectiveness .....	2-16
2.11.6	Implementability.....	2-16
2.11.7	Cost .....	2-16
2.12	MODIFYING CRITERIA.....	2-16
2.12.1	State/Support Agency Acceptance.....	2-16
2.12.2	Community Acceptance.....	2-16
2.13	PRINCIPAL THREAT WASTE.....	2-16
2.14	SELECTED RESPONSE ACTION .....	2-17
2.14.1	Summary of the Rationale for the Selected Response Action .....	2-17
2.14.2	Detailed Description of the Selected Response Action.....	2-17
2.14.3	Land Use Controls.....	2-17
2.14.4	Summary of Expected Response Action Costs .....	2-18
2.14.5	Expected Outcomes of the Selected Response Action.....	2-19
2.15	STATUTORY DETERMINATIONS.....	2-19
2.15.1	Protection of Human Health and the Environment.....	2-19
2.15.2	Compliance with Applicable or Relevant and Appropriate Requirements..	2-19
2.15.3	Cost Effectiveness.....	2-19
2.15.4	Utilization of Permanent Solutions and Response Action Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Possible .....	2-19
2.15.5	Preference for Treatment as a Principal Element .....	2-19
2.15.6	Five-Year Review Requirements.....	2-20
<b>3.0</b>	<b>PART 3: RESPONSIVENESS SUMMARY .....</b>	<b>3-1</b>
3.1	PUBLIC ISSUES AND LEAD AGENCY RESPONSES.....	3-1
3.1.1	Summary of Written Comments Received during the Public Comment Period .....	3-1
3.1.2	Summary of Comments Received during the Public Meeting on the Proposed Plan and Agency Responses.....	3-3

	3.2	TECHNICAL AND LEGAL ISSUES .....	3-5
<b>4.0</b>		<b>PART 4: REFERENCES .....</b>	<b>4-1</b>

### LIST OF FIGURES

**Figure**

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1	SITE LOCATION MAP
2	PONTENTIOMETRIC SURFACE MAP FOR THE UNCONFINED AQUIFER
3	EXTENT OF CIS-1,2-DICHLOROETHENE AND VINYL CHLORIDE IN GROUNDWATER PRIOR TO SODIUM LACTATE INJECTION
4	HISTORICAL EXCEEDANCES OF LEVELS OF CONCERN IN SURFACE WATER
5	LUC BOUNDARIES MAP

### LIST OF TABLES

**Table**

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1	CHRONOLOGICAL ORDER OF INVESTIGATIONS CONDUCTED AT SITE 78 (PICA 013)
2	CONTAMINANTS DETECTED IN GROUNDWATER SAMPLES THAT EXCEED LOCs
3	CONTAMINANTS DETECTED IN SURFACE WATER SAMPLES THAT EXCEED LOCs
4	CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
5	LOCATION-SPECIFIC ARARs AND TBCs
6	ACTION-SPECIFIC ARARs AND TBCs
7	HUMAN HEALTH RISK ASSESSMENT RESULTS
8	FINAL SITE CLEANUP LEVELS (SCLs) AND DETECTED CONCENTRATIONS FOR SITE 78 (PICA 013) CONTAMINANTS OF CONCERN (COCs)
9	COSTS FOR RESPONSE ACTION GW-2 – MONITORED NATURAL ATTENUATION AND LAND USE CONTROLS

### LIST OF APPENDICES

**Appendix**

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A	CERTIFICATE OF PUBLICATION FOR PUBLIC NOTICES
B	TREND PLOTS OF SELECT VOC AND DISSOLVED GASES DATA
C	COMMENTS SUBMITTED ON BEHALF OF PONDVIEW ESTATES

## LIST OF ACRONYMS AND ABBREVIATIONS

1,1,1-TCA	1,1,1-Trichloroethane	NJSWQC	New Jersey Surface Water Quality Criteria
ARAR	Applicable or Relevant and Appropriate Requirement	NPL	National Priorities List
Army	U.S. Department of the Army	O&M	Operation and Maintenance
bgs	Below Ground Surface	PAERAB	Picatinny Arsenal Environmental Restoration Advisory Board
cDCE	cis-1,2-dichloroethene	PAH	Polycyclic Aromatic Hydrocarbon
CEA	Classification Exception Area	Picatinny	Picatinny Arsenal
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	Pondview	Pondview Estates, Inc.
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System	PP	Proposed Plan
COC	Contaminant of Concern	ppb	Parts Per Billion
COPC	Contaminant of Potential Concern	PQL	Practical Quantitation Limit
COPEC	Chemical of Potential Ecological Concern	RA	Response Action
CVOC	Chlorinated Volatile Organic Compound	RAO	Remedial Action Objective
ELCR	Excess Lifetime Cancer Risk	RBC	Risk-Based Concentration
ERA	Ecological Risk Assessment	RD	Remedial Design
ERD	Enhanced Reductive Dechlorination	RI	Remedial Investigation
FS	Feasibility Study	ROD	Record of Decision
ft	Feet	SARA	Superfund Amendments and Reauthorization Act
GPB	Green Pond Brook	SCL	Site Cleanup Level
HHRA	Human Health Risk Assessment	SDWA	Safe Drinking Water Act
HI	Hazard Index	SGSL	Soil Gas Screening Level
HQ	Hazard Quotient	TBC	To-Be-Considered
IAQ	Indoor Air Quality	TCE	Trichloroethene
IRZ	<i>In Situ</i> Reactive Zone	TOC	Total Organic Carbon
LOC	Level of Concern	TLV-TWA	Threshold Limit Value – Time Weighted Average
LUC	Land Use Control	TRV	Toxicity Reference Value
MCL	Maximum Contaminant Level	TVOC	Total Volatile Organic Compounds
MCLG	Maximum Contaminant Level Goal	USEPA	United States Environmental Protection Agency
µg/L	microgram per liter	UST	Underground Storage Tank
MNA	Monitored Natural Attenuation	UXO	Unexploded Ordnance
NCP	National Oil and Hazardous Substances Pollution Contingency Plan	VC	Vinyl Chloride
NJ	New Jersey	VOCs	Volatile Organic Compounds
NJDEP	New Jersey Department of Environmental Protection	WRA	Well Restriction Area
NJGWQS	New Jersey Groundwater Quality Standard	WWI	World War I
NJMCL	New Jersey Maximum Contaminant Level	WWII	World War II
		ZVI	Zero Valent Iron

## 1.0 PART 1: DECLARATION

### 1.1 SITE NAME AND LOCATION

Picatinny Arsenal (Picatinny) 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.

Site 78 (PICA 013) is located in Area P at Picatinny (see **Figure 1**) and encompasses approximately four acres. This Record of Decision (ROD) addresses groundwater and surface water at Site 78 (PICA 013) at Picatinny, located in Rockaway Township, Morris County, New Jersey (**Figure 1**).

### 1.2 STATEMENT OF BASIS AND PURPOSE

This *Record of Decision for Groundwater and Surface Water at Site 78 (PICA 013)* presents the Selected Response Action (RA) for Site 78 (PICA 013). The RA 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 RA 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 New Jersey Department of Environmental Protection (NJDEP) were evaluated and considered in selecting the final RA as well. NJDEP concurs with the Selected RA.

### 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 into the environment at Site 78 (PICA 013).

### 1.4 DESCRIPTION OF THE SELECTED RESPONSE ACTION – MONITORED NATURAL ATTENUATION AND LAND USE CONTROLS

The Response Action for Site 78 (PICA 013), 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.

Studies conducted at Site 78 (PICA 013), presented in **Table 1**, have shown various constituents present in groundwater at concentrations above the levels of concern (LOCs). **Table 2** summarizes the constituents that exceeded LOCs in groundwater samples collected beneath Site 78. **Table 3** summarizes the constituents that exceeded LOCs in surface water samples collected at Site 78 (PICA 013). These samples were collected to characterize surface water impacts as a result of existing groundwater contamination.

The Selected RA for groundwater at Site 78 (PICA 013) consists of the implementation of monitored natural attenuation (MNA) and land use controls (LUCs). Surface water monitoring will be conducted in conjunction with the long-term groundwater monitoring for the duration of the selected groundwater remedy.

The Selected RA was chosen based on protection of human health and the environment and effectively addresses the risk posed by groundwater. In addition, the Selected RA is the most implementable and cost-effective, while satisfying the remaining selection criteria.

### 1.5 STATUTORY DETERMINATIONS

The Selected RA satisfies the chemical-specific cleanup levels and complies with the chemical-, action- and location-specific applicable or relevant and appropriate requirements (ARARs) presented in **Tables**

**4, 5 and 6.** Site Cleanup Levels (SCLs) were selected for groundwater in the Feasibility Study (FS) for Site 78 (PICA 013) based on the lower of the following values: Safe Drinking Water Act (SDWA) Federal Maximum Contaminant Levels (MCLs); New Jersey MCLs (NJMCLs); New Jersey Groundwater Quality Standards (NJGWQSSs) or New Jersey Practical Quantitation Limits (PQLs) (whichever is higher); and, any non-zero Federal Maximum Contaminant Level Goal (MCLG).

As concluded in the Risk Assessment, none of the contaminants that exceeded LOCs at Site 78 (PICA 013) meet the criteria of principal threat waste. The Selected RA was chosen over other response actions which include treatment technologies after considering the prescribed threshold, balancing and modifying criteria such as, overall protection of human health and the environment, compliance with ARARs, reduction of toxicity, mobility, or volume of contaminants through treatment, long and short term effectiveness, implementability, cost, and regulatory and community acceptance.

Because the Selected RA will result in contaminants remaining on site above levels that do not allow for unlimited use and unrestricted exposure, five-year reviews will be conducted in compliance with CERCLA and NCP to ensure that the Selected RA 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 8 2.8.4	2-10
Baseline risk represented by the contaminants of concern	2.8	2-6
Cleanup levels established for contaminants of concern and the basis for these levels	Table 8 2.8.4	2-10
How source materials constituting principal threats will be addressed	2.13	2-16
Current and reasonably anticipated future land use assumptions used in baseline risk assessment and ROD	2.7	2-6
Potential land and groundwater use available as a result of the Selected Response Action	2.14.3	2-17
Estimated capital, annual operation and maintenance (O&M) and total present worth costs, discount rate, and the number of years over which the Response Action cost estimates are projected	2.14.4	2-18
Key factors leading to the selection of the Selected Response Action	2.14.1	2-17

1.7 AUTHORIZING SIGNATURE

*Herb Koehler*

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

*3-23-11*

Date

*Walter E. Mugdan*

Walter E. Mugdan, Director  
Emergency and Remedial Response Division  
United States Environmental Protection Agency, Region 2

*7/5/11*

Date

## **2.0 PART 2: DECISION SUMMARY**

### **2.1 SITE NAME, LOCATION, AND DESCRIPTION**

This ROD describes the Selected RA at Site 78 (PICA 013) located at Picatinny Arsenal in Rockaway Township, Morris County, New Jersey. Picatinny is a NPL site and is registered under the CERLIS 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. In addition, plans and activities also are being coordinated with appropriate state agencies, including NJDEP.

Picatinny Arsenal is a 5,900-acre government-operated munitions research and development facility located in Morris County, New Jersey, approximately 40 miles west of New York City and 4 miles northeast of Dover, New Jersey. The Arsenal sits in the Highlands of the state of New Jersey.

Site 78 (PICA 013) is located in Area P at Picatinny (see **Figure 1**). Area P is located at the southwestern corner of Picatinny Arsenal, with Green Pond Mountain to the northwest and Green Pond Brook (GPB) approximately 450 feet to the southeast. Area P encompasses three areas of concern: Sites 27, 78 and 94. Site 78 was formerly used as an optics laboratory.

### **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 maximate (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 and development, life-cycle engineering, and support of other military weapons and weapon systems. The facility has responsibility for the research and development of armament items. The Base Realignment and Closure process in 2005 resulted in Picatinny being designated to remain open and to expand in mission.

#### **2.2.2 Site 78 (PICA 013) Background**

Environmental activities began at Site 78 (PICA 013) when a closure plan for the Building 91 hazardous storage area was submitted in 1990. The NJDEP accepted the plan in 1992; the area was closed and the closure was accepted by NJDEP in the same year. The site was identified for investigation under CERCLA when Picatinny Arsenal was added to the NPL in March 1990.

Environmental impacts at Site 78 (PICA 013) are associated with historical activities conducted at Building 91, located on Fourth Avenue, approximately 450 feet (ft) northwest of GPB. The building was constructed in 1942 as a storehouse and supply building and contained an optics laboratory in which operations were conducted between 1980 and the mid-1990s. Currently, an office space is located within Building 91 and the Building's loading docks still receive materials.

Operations carried out in the former optics laboratory involved the storage and use of aluminum powder, copper powder, phosphoric acid, nitric acid, hydrochloric acid, sulfuric acid, ceric oxide, blasting grit, Freon, epoxy, chrome and acetone. A hazardous waste storage area was located at the north end of the building, in which sodium hydroxide, nitric acid, oil (silicon), machine shop cutting fluids, boric acid, silver-containing photograph development fluid and potassium borate were stored (Shaw, 2005a). Two Number 2 fuel oil underground storage tanks (USTs) were located on the southeast side of Building 91: one 3,000 gallon tank (UST 19) was situated approximately seven feet south of the loading dock area, and one

7,500 gallon tank (UST 81) was located approximately 60 feet east of the new utility room. The tanks were reported active until 1998 with no record of any spills.

The Army has conducted a rigorous investigation of all of the potential sources of contamination from the Site discussed above, including numerous Remedial Investigations (RIs) and supplemental sampling activities, assessment of human health and ecological risks, evaluation of alternatives for site remediation, and performance of pilot-scale treatment studies for groundwater remediation. Based on historical information and environmental data gathered during previous investigations, low level detections of volatile organic compound (VOC) contamination have been identified in groundwater due to historical activities conducted at Site 78, specifically at Building 91. The results of these investigations indicate that a Response Action is required at Site 78 (PICA 013).

To date, remedial activities performed at Site 78 include the removal of all USTs and the performance of a pilot study, during which sodium lactate was injected to assess the feasibility of this remedial technology to address the observed groundwater contamination. Both USTs were removed from the southeast side of Building 91 in 1999 and were replaced by one aboveground storage tank for fuel oil supply (Shaw, 2005a). The pilot study was conducted by Shaw between January 2004 and January 2005 (Shaw, 2005c) and the methodologies and results can be found in the FS (ARCADIS, 2009). In addition, in February 2007 groundwater and surface water samples were collected by ARCADIS from several locations within Site 78 (PICA 013) to assess groundwater and surface water quality prior to conducting the FS.

### **2.2.3 Enforcement Activities**

No formal enforcement activities have occurred at Site 78 (PICA 013). 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 78 (PICA 013) has been the topic of presentations at the Picatinny Arsenal Environmental Restoration Advisory Board (PAERAB). PAERAB members have provided comments regarding the Selected RA. A copy of the Proposed Plan (PP) (ARCADIS, 2010a) was given to the PAERAB's community co-chair and a copy was offered to all PAERAB members. A final PP for Site 78 (PICA 013) was completed and released to the public on April 15, 2010 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 PP comment period, to solicit comments from the public, and to announce the public meeting. The notification was run in the Daily Record on April 5, 2010 and in the Star Ledger on April 7, 2010. Copies of the certificates of publication are provided in **Appendix A**. A public meeting was held on April 15, 2010 to inform the public about the Selected RA for Site 78 (PICA 013) 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 response actions under consideration. Following the public meeting, a public comment period was held from April 15, 2010 to May 14, 2010 during which written comments from the public were received. Public comments and prepared responses are presented in Section 3.0 of this ROD.

## 2.4 SCOPE AND ROLE OF RESPONSE ACTION

This ROD addresses the selection of a RA for groundwater at Site 78 (PICA 013). The Selected RA will address the contaminants of concern (COCs) identified in groundwater during previous investigations at Site 78 (PICA 013). The COCs are discussed in further detail in Section 2.8.4. The Selected RA for Site 78 (PICA 013) is designed to provide protection to human health and the environment.

The Selected RA for remediation of groundwater at Site 78 (PICA 013) consists of MNA and the implementation of LUCs. Surface water at Site 78 will be monitored throughout the duration of groundwater monitoring and will continue for the duration of the groundwater monitoring program. LUCs will be implemented to control current and future activities that could cause exposure to environmental contaminants resulting in unacceptable risk to human health. Soils and sediments at Site 78 (PICA 013) will be addressed in a separate ROD.

The Selected RA also involves performing any site maintenance required to maintain the protectiveness of the RA. The LUCs and any maintenance that will be implemented by the Army will be detailed in the Remedial Design (RD). LUCs for groundwater will be maintained until such time as contaminant levels are sufficiently reduced to allow unrestricted use.

## 2.5 DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED RESPONSE ACTION FROM PROPOSED PLAN

The PP presented the same Selected RA as this ROD. No significant changes have been made.

## 2.6 SITE CHARACTERISTICS

### 2.6.1 Physical Characteristics

#### Size, Topography, and Surface Water Hydrology

Site 78 (PICA 013) is located in Area P at Picatinny (see **Figure 1**). Area P is located at the southwestern corner of Picatinny Arsenal, with Green Pond Mountain to the northwest and GPB approximately 450 feet to the southeast. Area P encompasses three areas of concern: Sites 27, 78 and 94.

Site 78 is located to the west of Green Pond Brook on the southwest side of the installation. Green Pond Brook is the main surface water drainage pathway within the valley. Two man-made lakes (Lake Denmark and Picatinny Lake) also are present and both are drained by GPB. Two tributaries to GPB, Robinson Run and Bear Swamp Brook, flow from the ridges on the southeast and northwest sides of the valley, respectively. Wetlands and transition zones around the brooks are present throughout Picatinny Arsenal. One of these wetland and transition areas is located at Site 78 between Building 91 and GPB. Surface water bodies within Site 78 (PICA 013) include numerous engineered drainage ditches that direct storm water runoff to nearby GPB (southeast of Site 78).

A site map showing existing site limits for the Site is provided as **Figure 1**.

#### Conceptual Site Model

The geology of Site 78 has been investigated to characterize the subsurface environment. Four major aquifers have been identified at Picatinny Arsenal: the unconfined aquifer, the upper semi-confined aquifer, the lower semi-confined aquifer, and the bedrock aquifer. All of the aquifers, with exception of the bedrock aquifer, have been classified as an unconsolidated, unconfined aquifer. As presented on **Figure 2**, groundwater flow in the unconfined aquifer is generally in the southeastward direction flowing toward GPB. The sediments in the upper semi-confined and unconfined aquifers consist of fine grained sands and silts that coarsen upwards into medium sand and gravel layers, with a few intervening silt layers. Thin layers of organic clay occur in the uppermost sequences and are inferred to be remnant swamp or peat deposits. The fourth major aquifer is the bedrock aquifer. Groundwater flow in the bedrock is generally towards the central valley and surface water features; however, locally the fracturing can alter and control flow directions along fracture planes.

Based on data collected during the installation of monitoring wells at Site 78 (PICA 013), all four aquifers were identified in this region of Picatinny Arsenal; however, investigations have indicated that the groundwater plume is limited to the unconfined aquifer (Shaw, 2005a).

## 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.

### 2.6.2 Summary and Findings of Site Investigations

**Table 1** summarizes environmental investigations and reporting that have been conducted at Site 78 (PICA 013). The extent of contamination in groundwater and surface water is summarized below. In addition to the LOCs described below, all samples were compared to the Picatinny background threshold concentrations, when available.

#### Extent of Groundwater Contamination

Studies have shown various contaminants present in groundwater at the site above LOCs. LOCs for Picatinny groundwater were based on the lower of the following values: SDWA MCLs; NJMCLs; NJGWQSs or PQLs (whichever is higher); and, any non-zero MCLG. If none of the above criteria were available, the groundwater concentrations used for comparison were the lower of the following To-Be-Considered (TBC) criteria: Federal Drinking Water Standards and Health Advisories, or USEPA Region III Tap Water Risk-Based Concentrations (RBCs).

Groundwater samples were collected from Site 78 (PICA 013) during rounds of UST post-closure monitoring, RI monitoring activities (via direct push techniques), and groundwater quality verification sampling (post-RI activities). Data collected during these sampling events was used for evaluations conducted within the RI/FS and the PP developed for Site 78. The following discussion summarizes this data. A list of the constituents detected and the corresponding LOCs is presented in **Table 2**.

#### Chlorinated VOCs (CVOCs)

Following the multiple groundwater sampling programs presented above, it was determined that a localized plume of chlorinated volatile organic compounds (CVOCs) is present in the unconfined aquifer (approximately 2 to 12 feet below ground surface [bgs]). No source was located, however the center of mass of the plume was found to be approximately 350 feet downgradient of Building 91.

During the RI phase, four chlorinated compounds were detected in the unconfined aquifer: 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), and vinyl chloride (VC). cDCE (LOC of 70 micrograms per liter [ $\mu\text{g/L}$ ]) was the principal contaminant detected in groundwater during this phase; it was found in the center of the plume at concentrations of several hundred  $\mu\text{g/L}$  and in two of the three piezometers installed along GPB at approximately 100  $\mu\text{g/L}$ . VC (LOC of 1  $\mu\text{g/L}$ ) was the second most frequently detected compound, typically found at concentrations of 10 to 100  $\mu\text{g/L}$  in samples exhibiting the highest cDCE concentrations. TCE (LOC of 1  $\mu\text{g/L}$ ) was detected only infrequently and mostly at concentrations less than 10  $\mu\text{g/L}$ . 1,1,1-TCA (LOC of 30  $\mu\text{g/L}$ ) was detected in three samples, one of which was a duplicate; only samples from the location at which the duplicate was collected exceeded the respective LOC at concentrations of 100  $\mu\text{g/L}$  and 97  $\mu\text{g/L}$ . The pattern of CVOC occurrence identified during the RI provided significant evidence of ongoing natural degradation of CVOCs in the groundwater. Groundwater discharge to GPB is not expected to result in long-term surface water CVOC concentrations exceeding the applicable LOC levels.

#### Enhanced Biodegradation Pilot Study

In preparation for the Feasibility Study evaluation, a pilot study was conducted in 2004 to evaluate *in situ* enhanced biodegradation as a remedy for the treatment of chlorinated solvents in groundwater at Site 78 (PICA 013). The study consisted of injecting sodium lactate into the core of the highest groundwater impact around well 78MW-3 and was followed by subsequent groundwater monitoring to measure the effects of the lactate injection. Details of the enhanced biodegradation pilot study are presented in the FS.

In the final pilot study sampling event, TCE concentrations at 78MW-3 (10-feet downgradient) had been reduced below the detection limit and cDCE concentrations at well 78MW-5 (20-feet downgradient) had decreased by approximately 60 percent. In addition, significant reductions in cDCE and VC concentrations were observed downgradient of the injection line at sampling locations 78MW-6 and 78PZ-2 (located 50-feet and 170-feet, respectively) 11 months after the initial injection. These data suggest that the pilot test was successful in reducing the total mass and areal extent of CVOC impacts to groundwater at Site 78 (PICA 013). The remaining CVOC impacts at Site 78 are generally restricted to the shallowest portion of the aquifer to a depth of approximately 15 feet bgs.

#### Plume Delineation

Although there are no continuing sources of contamination to groundwater in soil or sediments at Site 78 (PICA 013), a CVOC groundwater plume still exists. Delineation of the CVOC plumes has been fully completed and is fully discussed in the FS (ARCADIS, 2009) and is summarized below. The distributions of both TCE daughter products, cDCE and VC, are shown on **Figure 3**.

Groundwater data collected in February 2007 suggest that the pilot test was successful in reducing the bulk of the mass present within Site 78 (PICA 013) groundwater and that the remaining low level concentrations are conducive to treatment through natural attenuation processes. As previously stated, groundwater in the unconfined aquifer in the vicinity of Site 78 (PICA 013) flows in a southeasterly direction and eventually discharges to GPB. Surface water data indicate that natural attenuation at the Site appears to be occurring at a rate where the contaminant mass is degrading prior to discharge at GPB and exceedances of applicable LOCs are not occurring. As a result of these processes, the dissolved plume appears to have dissipated in both mass and areal extent.

Calculated natural degradation rates of approximately 1.9 years, 3.2 years, and 3.8 years for TCE, cDCE, and VC, respectively, show that the aquifer is continuing to support ongoing natural contaminant degradation. Additional detailed discussion of the analysis used to estimate natural degradation rates is provided in Appendix C of the Site 78 (PICA 013) Feasibility Study. Additionally, the lack of detected VC concentrations in February 2007 surface water samples indicates that the VC concentrations generated within the plume are not causing concentrations in the stream above the LOC.

#### Subsequent Groundwater Sampling

More recent groundwater monitoring data was collected in 2010, subsequent to the post-RI activities conducted in 2007. This data was not available for inclusion in the RI/FS and PP; however, the data does indicate that over time concentrations continue to decline. These declining trends between the historic and recently collected data are shown on trend graphs provided as **Appendix B**. This data, along with all historic data, also is shown on **Figures 3 and 4**.

#### Vapor Intrusion Evaluation

In response to concerns received during the public comment period, sub-slab soil gas samples were collected consistent with NJDEP (2005) VI Guidance and as detailed in the Work Plan (ARCADIS 2010b). The samples were collected in October and November 2010 and analyzed for the NJDEP VOC list in accordance with USEPA Method TO-15. A total of four constituents were detected in two of the three samples. Carbon disulfide, toluene and 1,2-dichloroethene (trans) were detected in sample SS-01R and tetrachloroethene was detected in sample SS-003. All sub-slab soil gas results were compared to the NJDEP non-residential Soil Gas Screening Levels (SGSLs), and all are below the NJDEP non-residential SGSLs. No further action is required in regard to the vapor intrusion pathway at Building 91.

#### **Extent of Surface Water Contamination**

The Picatinny LOC for a parameter in surface water was selected from the lower of its USEPA Water Quality Criteria or New Jersey Surface Water Quality Criteria (NJSWQC). If neither of these criteria exists, the Region III Tap Water RBC was selected. If the background value was greater than any of these values, it was selected as the LOC. Constituents detected above LOCs in surface water at Site 78 (PICA 013) are presented in **Table 3**, along with the LOC source, and on **Figure 4**.

Fifteen surface water samples were collected from six different locations within Site 78 (PICA 013) between November 1998 and January 2003 as part of the RI sampling activities. Three RI sampling

locations were positioned within the drainage ditches at Site 78, one of which lies to the south and two to the east of Building 91: 78SW-2 and 78SW-1/78SW-3, respectively. The other three locations, 78SW-4, 78SW-5 and 78SW-6, were in GPB adjacent to three piezometers located alongside the brook and coincident to GPB sediment sample locations. 78SW-6 was the most upstream location and may be upstream of any impacts associated with Site 78 (PICA 013) groundwater. 78SW-4 was the most downstream location, and 78SW-5 was intermediate between the two (**Figure 4**). Post-RI sampling of surface water in GPB was conducted during 2005 and 2006. An additional surface water sampling event was conducted again in 2007 to verify the 2006 data.

### VOCs

GPB surface water was collected from locations 78SW-4, 78SW-5, and 78SW-6, and analyzed for VOCs numerous times between May 2001 and September 2005. The only VOC detected at a level above its LOC was VC, which was found in only one sample from 78SW-6 (0.26J µg/L in August 2001), one sample from 78SW-5 (0.36J in September 2002), and one sample from 78SW-4 (1.8 µg/L in July 2005). The only analytes detected in 2006 consisted of low concentrations of TCE and cDCE; all concentrations were detected below their respective LOC levels.

Surface water sampling occurred again in 2007 to verify that there were no exceedances of VOCs in GPB in the vicinity of Site 78 (PICA 013), as indicated by earlier data collected during Post-RI sampling activities in 2006. The 2007 data were found to be consistent with 2006 results. The only analyte detections consisted of low concentrations of TCE and cDCE, both of which were observed in all three samples. Maximum detected values of these compounds were 0.448J µg/L and 0.365J µg/L, respectively, which are below the applicable TCE and cDCE LOCs of 1.00 µg/L and 592 µg/L, respectively (NJSWQC). Both compounds exhibited nearly identical concentrations at all three sampling locations, and all detections were estimated (J-flagged) values. This pattern of detections suggests that these results are likely unrelated to Site 78 (PICA 013). While it is noted that VOCs are present in piezometers installed in GPB, no unacceptable risk is posed by potential surface water exposure.

### Metals

As shown in **Table 3**, the following six metals were detected above LOCs in the drainage ditch samples: aluminum, arsenic, iron, lead, manganese and sodium. No other constituents exceeded the Site 78 (PICA 013) LOCs in these locations. Surface water analytical data related to Site 78 (PICA 013) has been compiled in **Table 3**.

## **2.7 CURRENT AND POTENTIAL FUTURE LAND USE**

Current land use within Site 78 (PICA 013) is industrial; an office space is located within Building 91, and the loading docks receive materials, some of which are hazardous. Building 91 was originally constructed in 1942 as a storehouse and supply building, and contained an optics laboratory in which operations were conducted between 1980 and the mid-1990s. The future land uses planned at Site 78 (PICA 013) will ultimately remain as industrial as specified in the most recent Master Plan for Picatinny Arsenal.

Relative to use of groundwater beneath Site 78 (PICA 013), the State of New Jersey has designated all groundwater within the state as a drinking water source. However, Picatinny has a centralized water distribution system, and it has no current or future plans for the use of Site 78 groundwater for any purpose. Moreover, Site 78 is within a NJDEP-approved Classification Exception Area (CEA). As described in a letter dated July 29, 2002 to the NJDEP, the CEA was established for all groundwater beneath Picatinny in both the bedrock aquifers and unconsolidated sediment aquifers (which comprise the lower semi-confined, upper semi-confined and unconfined aquifers as discussed in this document). Thus, the CEA addresses all aquifers and COCs for Site 78 (PICA 013) groundwater. Upon establishment of a CEA, NJDEP identifies the region within the CEA as a well restriction area (WRA). The WRA functions as the institutional control by which potable use restrictions can be effected. As long as the CEA is in place, NJDEP may prohibit the installation and pumping of wells within this area.

## **2.8 SUMMARY OF SITE RISKS**

As part of the RI/FS (Shaw, 2005b), baseline human health and ecological risk assessments were conducted at Site 78 (PICA 013) to evaluate the potential risks to human health and the environment

associated with exposure to site-related chemicals. As previously discussed, these sites are currently used for industrial purposes, and this is not expected to change in the future.

The baseline risk assessments estimate the potential risks and hazards associated with exposure to chemicals at Site 78 (PICA 013) under current conditions—i.e., assuming no response action is taken to address on-site contamination. Through the work conducted at this site under CERCLA, it has been determined that a response action is necessary for groundwater at Site 78 (PICA 013).

Unacceptable risks to human health and the environment, under the current and reasonably anticipated future use, were identified in groundwater at Site 78 (PICA 013) as a result of the existing cancer risks due to VOCs in the groundwater. The results of the human health risk assessment (HHRA) and ecological risk assessment (ERA) are discussed below.

### **2.8.1 Human Health Risk Assessment**

A human health risk assessment was conducted for Site 78 (PICA 013) as part of the RI. Potential risks associated with exposure to chemicals in soil, sediment, groundwater, and surface water were quantified for current/future industrial/research workers, current/future construction/excavation workers, and on-site youth visitors. Note that risks associated with exposure to soil and sediments were included in the evaluation conducted during the HHRA in order to completely assess the cumulative risk to human health at Site 78 (PICA 013). However, this ROD is for groundwater and incidental surface water actions only. Soil and sediment impacts at Site 78 (PICA 013) will be addressed in their entirety in future CERCLA documents.

Although there are no plans for residential use of the land at Site 78 (PICA 013) in the foreseeable future, the risks associated with future potential residential exposure scenarios (ingestion, dermal contact and inhalation) also were quantified.

In addition to the HHRA performed as part of the RI, a supplemental risk assessment was performed subsequent to the sodium lactate pilot study to re-evaluate the risk for an on-site worker associated with exposure to the 2007 concentrations of VC in groundwater via ingestion, dermal contact, and inhalation of indoor air.

Exposure via the vapor intrusion pathway for an industrial worker within Building 91 was not evaluated during the HHRA as the more general evaluation of incidental inhalation of dust particles and volatilization of constituents in soil to ambient air followed by inhalation for current and future industrial research workers located within Site 78 (where Building 91 is located) was included within the assessment.

However, the vapor intrusion pathway at Building 91 was subsequently evaluated through sub-slab soil gas sampling conducted in December 2010. As described in Section 2.6.2 herein, the results were all below the conservative health-based screening levels (SGSLs), and no further action is required in regard to the vapor intrusion pathway at Building 91.

The following sections summarize the risk assessment process and results.

#### **2.8.1.1 Contaminants of Potential Concern**

Contaminants of Potential Concern (COPCs) were identified by comparing the maximum detected concentration of an individual contaminant to its LOC value. For the purposes of the screening evaluation, groundwater concentrations were compared to Federal MCLs, NJMCLs, NJGWQSs or PQLs (whichever is higher), and, any non-zero Federal MCLG. In the absence of these criteria one of the following TBC criteria were selected as the LOC: Federal Drinking Water Standards and Health Advisories, or USEPA Region III Tap Water RBC. Surface water concentrations were compared to the USEPA Water Quality Criteria and NJSWQC. In the absence of these criteria, the USEPA Region III Tap Water RBC or background threshold levels were selected as the LOC. Chemicals detected at concentrations greater than their respective screening levels were identified as COPCs and were further evaluated in the risk assessment.

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.

COPCs selected for groundwater at Site 78 (PICA 013) include seven VOCs (1,1-dichloroethane, cDCE, trans-1,2-dichloroethene, benzene, chloroform, TCE and VC).

COPCs selected for surface water at Site 78 (PICA 013) included three inorganics (arsenic, chromium and mercury) and one polycyclic aromatic hydrocarbon (PAH) (benzo[a]pyrene).

### 2.8.1.2 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 HHRA focused on several current and hypothetical future exposure scenarios.

Estimated risks and hazards were calculated for the following receptor populations at Site 78 (PICA 013):

- Current exposed populations: industrial/research worker; construction/excavation worker; and,
- Future exposed populations: industrial/research worker; construction/excavation worker; on-site youth visitor; adult resident; child resident; supplemental industrial/research worker.

For purposes of the screening evaluation, soil and sediment concentrations were compared to USEPA Region III RBCs for soil at industrial sites, since the current and future site uses in Site 78 (PICA 013) are likely to be industrial, while groundwater concentrations were compared to the SDWA MCLs and the surface water concentrations were compared to the NJSWQC. A discussion of the methodology used in the screening-level risk assessment is provided in the RI (Shaw, 2005b).

Groundwater beneath the site is not currently used, nor are there any future plans for its use. In addition, Picatinny Arsenal has a potable water system that is not hydraulically connected to this site. However, although exposure to groundwater used as a potable water supply is a hypothetical exposure scenario, the exposure route via ingestion and inhalation was assessed in a supplemental risk assessment conducted by ARCADIS. During this investigation, it was determined that the potential exposure to COPCs in groundwater does pose an unacceptable risk to human health.

### 2.8.1.3 Risk Characterization

Potential risks to human health are evaluated quantitatively by combining calculated exposure levels and toxicity data. A distinction is made between noncarcinogenic and carcinogenic endpoints, and two general criteria are used to describe risk: the hazard quotient (HQ) for noncarcinogenic 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 noncancer 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  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  as generally acceptable cancer risk. If the ELCR exceeds the  $1 \times 10^{-4}$  target risk level, site-specific remedial goal options will be derived for the relevant contaminants and exposure scenarios.

Health effects were evaluated for current/future industrial/research workers, current/future construction/excavation workers, future on-site youth visitors, future adult residents, future child residents and a supplemental evaluation was conducted for future industrial/research workers. 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 noncarcinogenic effects from all COPCs are unlikely. **Table 7** summarizes the results of the HHRA for Site 78 (PICA 013).

#### Site 78

Risks associated with the incidental inhalation of dust particles and volatilization of constituents in soil to ambient air followed by inhalation for current and future industrial research workers located within Site 78 were found to be below the USEPA target risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  and the cumulative HI threshold of 1.

However, risks associated with future potential residential exposure scenarios (ingestion, dermal contact, and inhalation) are above the USEPA target risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  and the HI threshold of 1. Additionally, the revised cumulative ELCR from the supplemental risk assessment for incidental ingestion, dermal contact, and inhalation of VC in groundwater for industrial/research workers also exceeds the acceptable risk range. Although this cumulative cancer risk was calculated to be above the USEPA target risk range, it should be noted this evaluation conservatively assumes that the maximum detected concentration of VC in groundwater throughout the site remains constant over the exposure duration for an industrial worker (25 years). As detailed in the FS, the increase of VC concentrations in groundwater is due to the degradation of the more highly chlorinated VOCs that historically exhibited the highest levels of these constituents. In actuality, over time VC will degrade to carbon dioxide and water.

In summary, the results of the HHRA and the supplemental groundwater evaluation indicate that under the current conditions at Site 78 (PICA 013), constituents in groundwater do pose an unacceptable risk to human health based on existing cancer risks and exceed applicable drinking water standards.

#### **2.8.2 Ecological Risk Assessment**

A baseline ecological risk assessment was conducted at Site 78 (PICA 013) as part of the RI (Shaw, 2005b). The purpose of the baseline ERA was to evaluate the potential risk to aquatic and terrestrial receptors associated with exposure to chemicals in environmental media under current conditions at each site. Similar to the HHRA, soil and sediment samples were included in the evaluation conducted during the ERA in order to completely assess the cumulative ecological risk at Site 78 (PICA 013). However, as previously stated, soil and sediment impacts will be discussed in their entirety in future CERCLA documents.

The ERA evaluated surface water flow in drainage ditches that direct storm water runoff to nearby GPB as an exposure pathway. However, the drainage ditches do not represent significant aquatic habitat and therefore are not a representative pathway for exposure (even though some inorganics and PAHs exceeded their respective screening values, the concentrations were relatively low with respect to these values [i.e., hazard quotients less than 10]).

Due to the limited extent of PAH contamination in soils and the location of these soils along Building 91 within paved or maintained lawn areas, an ERA was not required to address the exposure risk to terrestrial biota from PAH contamination. In addition, sediment toxicity tests, benthic invertebrate community assessments, and fish community assessments conducted downstream of Site 78 as part of an ERA for Green Pond Brook and Bear Swamp Brook concluded that no measurable biological impacts were found related to sediment contamination in this section of GPB.

#### Comparison of Results to Ecological Screening Values

Initially, the maximum concentration of each detected chemical was compared to a conservative ecological screening value, called a toxicity reference value (TRV), to identify COPEC. If the maximum concentration was greater than the TRV, the chemical was selected as a COPEC; however, chemicals whose maximum concentration exceeded the TRV by a factor of 10 or more were most likely to be ecologically significant. The Screening Level Ecological Risk Assessment identified several metals as COPECs in surface water and sediment and identified PAHs as COPECs in sediment and soil. However,

as stated above, the extent of PAH impacts is limited to soils immediately adjacent to Building 91, and are attributable to the former railroad line as well as shipping and receiving activities associated with the loading docks. These areas are not considered a likely habitat for ecological receptors. Therefore an ERA is not recommended for PAH contamination in soils.

The RI reported that though transport of contaminants via either groundwater (VOCs) or the drainage ditches (metals and PAHs) to GPB were potential pathways to an ecological receptor, COPC concentrations in GPB surface water were below levels of concern. There were historic LOC exceedances in samples collected from adjacent piezometers; however, there have been no further exceedances in samples collected since July 2004.

### 2.8.3 Unexploded Ordnance

Unexploded Ordnance (UXO) has not been discovered at Site 78 (PICA 013) and is not suspected to exist. Currently, consistent with Army and Picatinny regulations, UXO hazards are controlled by the Picatinny Safety Program. This program includes coordination with the Picatinny Safety Office, land-use restrictions, and UXO clearance procedures. These controls are in place to protect construction workers.

### 2.8.4 Contaminants of Concern and Site Cleanup Levels

COCs in groundwater were identified in the *Final Feasibility Study for Area P – Site 78 (PICA 013)* (ARCADIS 2009). As part of the Site 78 (PICA 013) FS, the contaminants detected in groundwater were screened to identify COCs. COCs are defined as contaminants that:

- 1) Contribute to the majority of site-specific human health or ecological risk based on the HHRA or ERA; and,
- 2) Exceed the SDWA MCLs for groundwater or the NJDEP Groundwater or Surface Water Quality Criteria.

Site cleanup levels were developed for contaminants in groundwater at Site 78 (PICA 013) if the contaminants appeared in a groundwater plume and exceed SCLs. SCLs were determined based on the more stringent value of the NJGWQSs and the SDWA MCLs. Surface water will be monitored for the duration of the groundwater response action to ensure groundwater remediation mitigates potential surface water impacts. SCLs for surface water at Site 78 (PICA 013) are the background threshold levels since site-specific background levels are greater than the NJSWQC.

Four groundwater contaminants (1,1,1-TCA, TCE, cDCE and VC) were identified during the FS in a groundwater plume and above applicable standards. The final COCs, SCLs, and respective concentrations are presented in **Table 8**. As presented above, although there were no continuing sources of contamination, impacts were identified in groundwater beneath Site 78. A CVOC plume, showing the distributions of both TCE daughter products, cDCE and VC, is presented on **Figure 3**.

## 2.9 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are based on human health and environmental factors, which are considered in the formulation and development of Response Actions. Such objectives are developed based on the criteria outlined in Section 300.430(e)(2) of the NCP and Section 121 of SARA.

The RAOs for Site 78 (PICA 013) have been developed in such a way that attainment of these goals will result in the continued protection of human health and the environment. The RAOs are specific to groundwater contamination and incidental surface water impacts originating from Site 78 (PICA 013). The RAOs are as follows:

- To prevent human exposure to contaminated groundwater that would cause unacceptable risk over the duration of the response action;
- To achieve the more stringent of the Federal MCLs or NJGWQSs for the identified contaminants of concern in a reasonable timeframe, thereby restoring groundwater to its beneficial use as a drinking water source; and,
- To maintain current land-use (industrial) and current institutional controls at Site 78 (PICA 013).

## 2.10 DESCRIPTION OF RESPONSE ACTIONS

Site 78 (PICA 013) 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 response actions.

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 response actions. The RAs for groundwater and incidental surface water impacts at Site 78 (PICA 013) are:

- Response Action GW-1: No Action;
- Response Action GW-2: Monitored Natural Attenuation and Land Use Controls;
- Response Action GW-3: Enhanced Reductive Dechlorination, Post-Remedial Monitoring and LUCs;
- Response Action GW-4: *In Situ* Chemical Treatment (Potassium Permanganate), Post-Remedial Monitoring and LUCs; and
- Response Action GW-5: *In Situ* Chemical Treatment (Zero Valent Iron), Post-Remedial Monitoring and LUCs.

### 2.10.1 Response Action GW-1: No Action

<i>Estimated Capital Cost:</i>	\$0
<i>Estimated O&amp;M (Cost over 30 years):</i>	\$0
<i>Estimated Present Worth Cost:</i>	\$0

CERCLA and the NCP require that a No Action response action be evaluated at every site to establish a baseline for comparison of other response actions. Under this RA, no response action would take place.

### 2.10.2 Response Action GW-2: Monitored Natural Attenuation and Land Use Controls

<i>Estimated Capital Cost:</i>	\$40,000
<i>Estimated O&amp;M (Cost over 13 years):</i>	\$270,000
<i>Estimated Present Worth Cost:</i>	\$310,000

(Present worth of the Operation and Maintenance [O&M] and long-term replacement cost is calculated using a 7% discount rate.)

Response Action GW-2 would involve the combination of groundwater monitoring and LUC maintenance, with particular restrictions on groundwater use in order to avoid contact with groundwater during the timeframe that COCs are undergoing degradation within the aquifer. As summarized in the FS (ARCADIS 2009), it is estimated that the remedy would be in place during the entire timeframe that COCs are present at levels above their respective LOCs. Design assumptions associated with this alternative are detailed in the FS.

MNA is considered as a primary remedial action alternative for groundwater at Site 78 (PICA 013) for the following reasons:

- There is no continuing source of COCs to groundwater, as evidenced by the absence of TCE in historical soil samples, the low-levels of TCE found in the groundwater during the RI and other early sampling events, and the absence of TCE in groundwater samples collected since the sodium lactate pilot injection test was implemented;
- The concentrations of the primary COCs declined naturally over time prior to the injection of sodium lactate, and this trend has continued subsequent to the injection, while concentrations of correlated degradation products have increased indicating that reductive dechlorination has been and continues to be active within the plume. Over this time period, the plume has remained stable.

- *In situ* reducing conditions were enhanced in the aquifer as a result of the sodium lactate injection, resulting in ongoing decreases in contaminant mass within the plume over time; and
- Historical concentrations of VOCs in GPB, which may have been related to Site 78 (PICA 013), have been below the NJSWQSSs in all sampling events since 2005.

Based on a review of available data detailed in the FS, it was determined that natural attenuation is playing a significant ongoing role in contaminant mass reduction and plume control at Site 78 (PICA 013).

Implementation of the MNA/LUC remedy would employ groundwater monitoring as an integral component of assessing the effectiveness and pace of natural attenuation of the Site 78 (PICA 013) COCs. Monitoring events would be performed quarterly for the first two years, semi-annually for the next three years, and annually for the remainder of the remedy, with adjustment in frequency to be considered during each 5-year review. Groundwater samples would be collected and analyzed for total VOCs and water quality parameters to confirm the effectiveness of MNA to remediate the plume. Based on historical data trends, it is estimated that it will take approximately 13 years for Alternative GW-2 to restore groundwater to concentrations below the LOCs.

Implementation of LUCs would be used for this remedial action to prevent potential exposure to impacted groundwater. LUCs would be implemented and maintained until remedial goals are achieved. Finally, although the most recent surface water monitoring results (from 2007) detected no LOC exceedances, surface water monitoring also would be implemented as a part of this RA in order to evaluate surface water quality.

#### Land Use Controls

The LUC objectives for Site 78 (PICA 013) will be detailed within the Remedial Design report. These objectives were developed to ensure no contact with groundwater occurs by industrial users that could result in unacceptable risk. Additionally, they control possible changes in groundwater use at the site and prevent the potential intrusion of plume vapors within future buildings/developments constructed above the plume area. Land use controls will be maintained until the concentration of contaminants in groundwater are at such levels to allow unrestricted use and exposure. Currently Picatinny is under an installation wide CEA. This CEA requires the NJDEP to restrict or require the restriction of potable groundwater uses within the CEA by implementing a WRA.

#### Long-Term Monitoring

##### *Groundwater*

The primary objectives of the long-term groundwater monitoring program under RA GW-2 are to: 1) evaluate long-term behavior of the plume; 2) verify that exposure to contaminants and their breakdown products do not pose additional risks; and, 3) provide data to assess whether a contingency remedy is warranted.

Implementation of the long-term groundwater monitoring program under RA GW-2 would involve submittals of plans, field sampling activities, and reporting requirements. The submittal of plans would include the health and safety plan; the project work plan; the field sampling plan; the data quality objectives; and, the quality assurance project plan that will detail elements such as sampling locations, parameters, and frequency, as well as the exit strategy. The reporting requirements would involve, at a minimum, submittal of the monitoring results and five-year review reports.

##### *Surface Water*

The objective of a long-term monitoring program for surface water is to evaluate the potential for surface water impairment due to impacted groundwater discharging to surface water. Surface water monitoring will encompass locations where there are surface water sample locations that have had results above the NJSWQC. Surface water monitoring will continue for the duration of the groundwater monitoring program.

#### Reporting

Periodic reports of sampling and analytical results, closeout reports, and statistical demonstration of compliance with regulatory criteria will be submitted.

### 2.10.3 Response Action GW-3: Enhanced Reductive Dechlorination, Post-Remedial Monitoring and LUCs

<i>Estimated Capital Cost:</i>	\$130,000
<i>Estimated O&amp;M (Cost over 7 years):</i>	\$350,000
<i>Estimated Present Worth Cost:</i>	\$480,000

(Present worth of the O&M and long-term replacement cost is calculated using a 7% discount rate.)

Response Action GW-3 would involve: 1) implementation of organic carbon injections for *in situ* treatment of groundwater to create an *in situ* reactive zone (IRZ) treatment area; 2) long-term groundwater monitoring; and, 3) implementation and maintenance of LUCs.

The system would be comprised of 13 injection wells; seven wells would be installed in addition to the five existing injection wells utilized during the pilot study. These seven wells would be installed downgradient of the existing wells in order to achieve an optimal organic carbon distribution network within the plume area. During the reductive dechlorination phase, specific carbon loading and injection volumes would be tailored to the site based on the permeability of the soil and the results that were observed during the sodium lactate pilot study.

The results of the pilot study indicate that carbon injections would result in mass reduction of source area contaminants. The decay rates, also calculated as part of the pilot study, indicate remedial goals would be achieved within a rapid time frame. It was estimated that no more than two years of semi-annual injections followed by five years of post-remedial monitoring would be necessary to achieve RAOs at Site 78 (seven years total restoration timeframe). Performance monitoring events would be conducted on a quarterly basis to confirm that enhanced reductive dechlorination (ERD) had been established and that chlorinated VOCs were being converted to ethene and ethane. The parameters monitored during active remediation would include total VOCs, total organic carbon (TOC), and water quality parameters. If necessary, follow-up injection events would be conducted as needed. Following the injection period (years 1 and 2), two years of quarterly post-remedial monitoring and three years of annual monitoring (five years total) would be conducted to verify that RAOs are achieved.

Similar to RA GW-2, surface water monitoring also will be conducted and will include locations that have historic COC detections. Surface water monitoring will continue for the duration of the groundwater monitoring program.

#### Land Use Controls

The same LUC components would be implemented under this Response Action as for RA GW-2.

#### Long-Term Monitoring

Response Action GW-3 would entail similar Long-Term Monitoring requirements as RA GW-2.

#### Reporting

Response Action GW-3 would entail similar reporting requirements as RA GW-2.

### 2.10.4 Response Action GW-4: *In Situ* Chemical Treatment (Potassium Permanganate), Post-Remedial Monitoring and LUCs

<i>Estimated Capital Cost:</i>	\$120,000
<i>Estimated O&amp;M (Cost over 6 years):</i>	\$235,000
<i>Estimated Present Worth Cost:</i>	\$355,000

(Present worth of the O&M and long-term replacement cost is calculated using a 7% discount rate.)

Response Action GW-4 would involve: 1) injection of potassium permanganate solution into the subsurface to achieve chemical oxidation; 2) long-term groundwater monitoring; and, 3) implementation and maintenance of LUCs.

Based on current groundwater conditions and the size of the plume area, the system would be comprised of 12 injection wells in order to achieve the necessary oxidant/COC contact. The potassium permanganate solution would be mixed at the surface and pumped via a manifold to each of these

injection points. The selected concentration of potassium permanganate would be based on testing the natural oxidant demand of the soil and groundwater. Once potassium permanganate is present in groundwater at concentrations exceeding the natural oxidant demand, oxidation reactions would occur rapidly, facilitating remediation of the groundwater plume. It is anticipated that one injection event would be necessary for treatment of the existing groundwater impacts.

Surface water monitoring also will be conducted similar to RA GW-2 as a component of this response action and will include locations that have historic COC detections. Post-remedial groundwater and surface water monitoring for site-specific COCs would be conducted on a quarterly basis for two years following the initial injection in year 1. Three years of semi-annual sampling would be conducted following this two-year period, for a total restoration time period of six years. A second injection event could be warranted if COC concentrations rebound during the post-remedial monitoring period.

Monitoring would include analysis for total VOCs, biogeochemical indicators, and water quality parameters to confirm the effectiveness of permanganate injections. Detailed objectives associated with the permanganate injection and associated long-term monitoring plan would be developed and presented during the RD phase.

#### Land Use Controls

The same LUC components would be implemented under this Response Action as for RA GW-2.

#### Long-Term Monitoring

Response Action GW-4 would entail similar Long-Term Monitoring requirements as RA GW-2; however, as stated above, associated long-term monitoring would be presented in the Remedial Design.

#### Reporting

Response Action GW-4 would entail similar reporting requirements as RA GW-2.

### **2.10.5 Response Action GW-5: *In Situ* Chemical Treatment (Zero Valent Iron), Post-Remedial Monitoring and LUCs**

<i>Estimated Capital Cost:</i>	\$420,000
<i>Estimated O&amp;M (Cost over 6 years):</i>	\$240,000
<i>Estimated Present Worth Cost:</i>	\$660,000

(Present worth of the O&M and long-term replacement cost is calculated using a 7% discount rate.)

Response Action GW-5 would involve: 1) injection of a nanoscale Zero Valent Iron (ZVI) slurry for the *in situ* treatment of the chlorinated solvent plumes at Site 78; 2) long-term groundwater monitoring; and, 3) implementation and maintenance of LUCs.

ZVI would be mixed at the surface and injected into impacted intervals within the plume area. Based on current groundwater flow and quality conditions and the size of the central region of the plume, 60 injection locations would be required to achieve the necessary contact between the ZVI and the COCs to facilitate remediation of the plume.

Based upon the current understanding of conditions at Site 78 (PICA 013), the required ZVI mass was assumed to be 40 grams/liter; however, actual dosing would be based on field testing prior to full-scale injection. Following contact within the saturated zone, ZVI would immediately transform the COCs via direct reaction and subsequently generate reducing conditions, resulting in the continued treatment of chlorinated VOCs dissolved in groundwater.

Similar to the permanganate alternative, it is anticipated that one ZVI injection event (year 1), followed by two years of quarterly and three years of semi-annual post-remedial monitoring would be required to achieve RAOs. Under these assumptions, total restoration could be achieved in a timeframe of six years.

Groundwater samples would be collected and analyzed for total VOCs, biogeochemical indicators, and water quality parameters to confirm the effectiveness of ZVI injection. Sampling events would confirm the destruction of chlorinated VOCs, evaluation of which would be presented during the RD phase.

Surface water monitoring also will be conducted similar to RA GW-2 and will include locations that have historic COC detections. Surface water monitoring will continue for the duration of the groundwater monitoring program.

#### Land Use Controls

The same LUC components would be implemented under this Response Action as for RA GW-2.

#### Long-Term Monitoring

Response Action GW-5 would entail similar Long-Term Monitoring requirements as RA GW-2.

#### Reporting

Response Action GW-5 would entail similar reporting requirements as RA GW-2.

### **2.11 COMPARATIVE ANALYSIS OF RESPONSE ACTIONS**

The advantages and disadvantages of each of the Response Actions were compared using the nine CERCLA evaluation criteria established by the USEPA in Section 300.430(e) of the NCP. The detailed comparative analysis of all the Response Actions is provided in the FS for Site 78 (PICA 013); a summary of this comparison is provided in the following text.

#### **2.11.1 Protection of Human Health and the Environment**

Remedial Action Alternative GW-1 (No Action) does not offer any protection. Alternative GW-2 (Monitored Natural Attenuation), Alternative GW-3 (Enhanced Reductive Dechlorination), Alternative GW-4 (*In Situ* Chemical Oxidation), and Alternative GW-5 (Zero Valent Iron) are all equally protective of the environment due to their relatively rapid treatment of the majority of the contaminant mass. All of these alternatives are expected to achieve the RAOs for groundwater within 13 years.

#### **2.11.2 Compliance with Applicable or Relevant and Appropriate Requirements**

Remedial Action Alternative GW-2 would comply with chemical-specific ARARs in approximately 13 years. Alternative GW-3 would meet chemical-specific ARARs in approximately seven years. Alternatives GW-4 and GW-5 would equally meet chemical-specific ARARs for groundwater within approximately six years. ARARs would not be achieved by the No Action Alternative. All alternatives, with the exception of Alternative GW-1, include LUCs to assure that the groundwater in Site 78 (PICA 013) is not used for human consumption during the expected duration of each remedy. Action- and location-specific ARARs would be met by Alternatives GW-2 through GW-5 with the proper permit equivalents.

#### **2.11.3 Long-term Effectiveness and Permanence**

The remediation timeframe to assess whether Alternative GW-1 would satisfy the long-term effectiveness and permanence criterion is unknown because there would be no monitoring of the plume to determine whether the magnitude of the residual risks decrease over time due to natural attenuation. However, Alternatives GW-2 through GW-5 all provide permanent reduction in contaminant mass and are thus effective in the long-term at meeting RAOs. Because natural conditions within the aquifer have been favorable to degradation of Site COCs, the time frames to achieve long-term effectiveness of all RAs except the No-Action Alternative are similar.

Alternative GW-2 would achieve long-term effectiveness after 13 years. Alternatives GW-3 through GW-5 remove the majority of the contaminant mass and achieve long-term effectiveness after post-remedial polishing, approximately six to seven years after remedy implementation.

#### **2.11.4 Reduction in Toxicity, Mobility, or Volume through Treatment**

No active treatment is provided under Alternative GW-1 or GW-2. Alternatives GW-3 through GW-5 enhance the naturally occurring processes by additional facilitation of COC degradation through treatment. Reduction in toxicity to below Picatinny Arsenal LOCs is anticipated to occur within six to seven years for Alternatives GW-3 through GW-5, and in only 13 years for Alternative GW-2 with no additional treatment.

### 2.11.5 Short-term Effectiveness

Remedial Action Alternative GW-1 does not monitor groundwater and any changes in risk to the community would not be known; therefore, the RAOs, and thus the SCLs, would not be achieved. Alternative GW-2 does not pose any short-term exposure hazards to workers. Alternatives GW-3 through GW-5 all involve injection of material into the aquifer. There are risks associated with the injections via potential worker contact with contaminated media. However, Alternative GW-4 (*In Situ* Chemical Oxidation) contains the highest safety hazard when compared to the other alternatives due to the worker hazard of handling permanganate solution. These hazards can be minimized by following the Site Health and Safety Plan.

### 2.11.6 Implementability

Remedial Action Alternative GW-1 requires no resources to implement. Alternative GW-2 requires minimal resources and a limited effort associated with ongoing monitoring and reporting requirements. Alternatives GW-3 through GW-5 would require more extensive logistical planning, detailed engineering design, and labor to implement the technologies, in addition to the effort associated with ongoing monitoring and reporting. Moreover, the downgradient portion of the groundwater plume is located in a wetland area on Picatinny Arsenal. Implementation of Alternatives GW-3 through GW-5 could entail significant disturbance of these wetlands during installation of the infrastructure required for the engineered treatment alternatives.

### 2.11.7 Cost

There are no costs associated with Remedial Action Alternative GW-1. Alternative GW-2 is the most cost-effective of the other alternatives, in that it achieves RAOs in a timeframe similar to Alternatives GW-3 through GW-5, but at a significantly lower cost of \$310,000. Present worth costs for GW-3 through GW-5 are \$480,000, \$354,000 and \$660,000, respectively. Alternative GW-5 (Zero Valent Iron) has the highest capital and O&M costs, which are substantially greater than the other alternatives.

## 2.12 MODIFYING CRITERIA

### 2.12.1 State/Support Agency Acceptance

This document was prepared in partnership with USEPA and NJDEP representatives. USEPA approval and NJDEP concurrence of the Selected RA is anticipated. NJDEP concurrence of the Site 78 (PICA 013) FS and the PP for Site 78 (PICA 013) has been documented.

Permit equivalency approvals are being documented and will be obtained through the CERCLA process for all work that would require a State of New Jersey permit, if being done under State authority.

### 2.12.2 Community Acceptance

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

## 2.13 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  $1 \times 10^{-3}$  or higher being considered as principal threat waste. As concluded in the Risk Assessment, none of the contaminants that exceeded LOCs in groundwater at Site 78 (PICA 013) meet the criteria to be considered a principal threat waste. In addition, groundwater itself is not a principal threat because it is considered a non-source material.

## 2.14 SELECTED RESPONSE ACTION

This ROD represents the Selected RA for Site 78 (PICA 013) at Picatinny, Rockaway Township, Morris County, New Jersey, developed in accordance with CERCLA as amended and consistent with the NCP. Based on the results of the comparative analysis and comments received from the USEPA and NJDEP, the Selected RA includes the following:

- Groundwater: Response Action GW-2: Monitored Natural Attenuation and Land Use Controls.

### 2.14.1 Summary of the Rationale for the Selected Response Action

The Selected RA achieves the RAOs, meets the threshold criteria, and provides the best balance of tradeoffs with respect to the balancing and modifying criteria. The Selected RA addresses the limited risk posed by groundwater effectively, is the most implementable remediation, and is cost effective.

The Selected RA is consistent with CERCLA. The implementation of MNA and LUCs at Site 78 (PICA 013) was considered appropriate based on contaminant concentrations within groundwater beneath the Site and the observed degradation of CVOCs.

### 2.14.2 Detailed Description of the Selected Response Action

The Selected RA for remediation of groundwater at Site 78 (PICA 013) includes the implementation of MNA and LUCs.

In order to implement the Selected RA, the following actions will be required:

- Preparation of the following documents:
  - Remedial Design and Construction Work Plans
  - Remedial Action Report
- Construction surveys;
- Investigative derived waste management;
- Clearing of vegetation, as needed;
- Construction of monitoring wells; and
- Implementation of LUCs.

### 2.14.3 Land Use Controls

LUCs will be required at Site 78 (PICA 013) due to the residual contamination exceeding residential standards that will remain on-site during implementation of the Selected RA. The Army is responsible for implementing, enforcing, maintaining, and reporting on the LUCs. The LUCs that will be implemented at the site will be included as part of the RD.

The LUC objectives for Site 78 (PICA 013) groundwater and surface water are as follows:

- Prevent access or use of the groundwater and surface water until cleanup levels are met.
- Prevent the potential intrusion of plume vapors within future buildings.
- Maintain the integrity of any current or future remedial monitoring system, such as monitoring wells.
- Maintain the existing CEA.
- Prohibit excavation without safeguards in all areas below the water table where groundwater contaminants exceed SCLs.

Currently Picatinny is under an installation wide CEA. This CEA requires the NJDEP to restrict or require the restriction of potable groundwater uses within the CEA by implementing a WRA.

Land use controls will be maintained until the concentration of hazardous substances in groundwater and incidental surface water are at such levels to allow for unrestricted use and unlimited exposure. Due to the fact that Site 78 (PICA 013) is a site entirely included within the Picatinny property boundary and will

remain under ownership and control of the Federal government, a deed notice will not be necessary. However, the intent of the New Jersey administrative code with respect to deed restrictions will be met. Should Picatinny Arsenal be sold or moved out of Army/Federal ownership, the requirements of the NJDEP Deed Restriction policies will be complied with. 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. Upon implementation of the remedy the following activities will be completed to fully implement LUCs:

- Install and maintain engineering controls (typically signs) per the RD;
- Amend the Picatinny GIS to document the area of applicability, engineering controls, and sign locations;
- Prepare an announcement for all Picatinny employees and residents informing them of the LUCs at Site 78 (PICA 013); and,
- Conduct annual inspections of the Sites and complete an Annual Certification of LUCs.

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 USEPA for review and approval a LUC remedial design that shall contain implementation and maintenance actions, including periodic inspections.

#### 2.14.4 Summary of Expected Response Action Costs

The costs associated with the implementation of MNA and LUCs are provided in **Table 9** and summarized in the following list:

##### Capital Costs

▪ MNA	
- Monitoring Well Installation	\$ 10,390
- Waste Characterization	\$ 2,090
- Engineering Design	\$ 3,120
- Construction Oversight	\$ 2,000
- Project Management	\$ 1,250
- Implementation of H&S Measures	\$ 370
- Establishment of Institutional Controls and CEA	\$ 15,000
- Contingency (15%)	\$5,130
<b>Total Capital Costs</b>	<b>\$ 40,000</b>

##### O&M Costs (13 Years)

▪ 13-Year MNA Sampling Cost	\$ 69,822
▪ Labor (Scientist I)	\$ 1,520
▪ Well Abandonment, Replacement, and Maintenance	\$20,520
▪ Monitoring Report Writing	\$ 180,950
<b>Total Present Worth O&amp;M Costs (7% Dis., 30 years)</b>	<b>\$270,000</b>

**TOTAL PRESENT WORTH** **\$310,000**

The costing information in this section is based on the estimates created in support of the Feasibility Study (ARCADIS 2009).

### 2.14.5 Expected Outcomes of the Selected Response Action

It is anticipated that current land use will continue unchanged after implementation of the Selected RA. It also is expected that enforcement of LUCs will ensure that risks to human and ecological receptors remain within acceptable levels.

## 2.15 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 response action 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 RA meets these statutory requirements.

### 2.15.1 Protection of Human Health and the Environment

The Selected RA will protect human health and the environment by reducing existing on-site contamination and maintaining LUCs that limit exposure. In addition, by incorporating natural remedial processes *in situ*, exposure risks to sites workers are limited even further.

### 2.15.2 Compliance with Applicable or Relevant and Appropriate Requirements

The Selected Remedy of the implementation of MNA and LUCs to limit the exposure to existing groundwater contaminants is expected to comply with all ARARs. The ARARs and other criteria, advisories, and guidance to-be-considered are presented in **Tables 4, 5, and 6**.

### 2.15.3 Cost Effectiveness

In the lead agency's judgment, the Selected RA 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 response actions 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 the Selected RA was determined to be proportional to its costs, and hence the Selected RA represents a reasonable value for the money to be spent.

The Army believes that the Selected RA is cost-effective and is protective of human health and the environment.

### 2.15.4 Utilization of Permanent Solutions and Response Action Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Possible

The Selected RA employs permanent solutions to passively treat and reduce the volume of contaminants present at Site 78 (PICA 013). The Selected RA satisfies the criteria for long-term effectiveness by eliminating, as well as preventing, unacceptable exposures to groundwater. The Selected RA reduces the toxicity, mobility and volume of contamination via a passive technology; is minimally intrusive; and will have reduced short-term risks by implementing land use controls. Additionally, there are no significant implementability issues associated with the Selected RA.

### 2.15.5 Preference for Treatment as a Principal Element

The Selected RA addresses groundwater contamination at Site 78 (PICA 013) via the use of passive, natural *in situ* processes. An active treatment technology was not considered necessary because the selected Response Action is protective of human health and the environment, is expected to comply with ARARs in a timeframe comparable with active treatment technologies, and is more cost effective.

**2.15.6 Five-Year Review Requirements**

Because this RA 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 response action initiation. Five-year reviews will ensure that the Selected RA is, or will be, protective of human health and the environment.

### 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 Proposed Plan for Site 78 (PICA 013) and the Army's responses to these concerns.

Site 78 (PICA 013) has been the topic of presentations at the PAERAB. PAERAB members have provided comments regarding the proposed Response Action. A copy of the PP was given to the PAERAB's community co-chair and a copy was offered to all PAERAB members. A final PP for Site 78 (PICA 013) was completed and released to the public on April 15, 2010 at the information repositories listed in Section 2.3.

Multiple newspaper notifications were made to inform the public of the start of the PP comment period, solicit comments from the public, and announce the public meeting. The notification was run in the Daily Record on April 5, 2010 and in the Star Ledger on April 7, 2010. Copies of the certificates of publication are provided in **Appendix A**. A public meeting was held on April 15, 2010 to inform the public about the Selected RA for Site 78 (PICA 013) 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 response actions under consideration. A public comment period was held from April 15, 2010 to May 14, 2010 during which comments from the public were received.

In general, the community is accepting of the Selected RA and is in favor of remediating groundwater contamination located at Site 78 (PICA 013). All comments and concerns summarized below have been considered by the Army, USEPA, and NJDEP in selecting the final cleanup methods for Site 78 (PICA 013) at Picatinny.

#### 3.1 PUBLIC ISSUES AND LEAD AGENCY RESPONSES

As of the date of this ROD, the Army endorses the Selected RA for Site 78 (PICA 013). The USEPA and the NJDEP support the Army's plan. Comments received during the Site 78 (PICA 013) public comment period on the PP are summarized below. The comments are categorized by source.

##### 3.1.1 Summary of Written Comments Received during the Public Comment Period

Two written comments were received on the Selected RA during the public comment period and are summarized as follows:

Comment 1: Ms. Lisa Voyce, a member of PAERAB: Has there been an evaluation of vapor intrusion within [Building] 91? Any sub-slab sampling [(only because source was so close to building)]? DEP/EPA [vapor intrusion] guidance? Why continue [surface water] monitoring of (highly) volatile compounds?

Response: In response to public concerns received during the public comment period for the PP, the vapor intrusion pathway was evaluated through the collection of three sub-slab soil gas samples from Building 91. Sub-slab soil gas samples were collected consistent with NJDEP (2005) VI Guidance and as detailed in the approved Work Plan (ARCADIS 2010b). The samples were collected in October and November 2010 and analyzed for the NJDEP VOC list in accordance with USEPA Method TO-15. A total of four constituents were detected in two of the three samples. All sub-slab soil gas results were compared to the NJDEP non-residential Soil Gas Screening Levels (SGSL), and all were below the SGSLs. Therefore, the results are below the conservative health-based screening levels (SGSLs) and no further action is required in regard to the vapor intrusion pathway at Building 91.

Surface water monitoring will be conducted to ensure contaminants identified above the SCLs in groundwater do not impact the GPB; although they are volatile, they can still be detected if present. Surface water impacts have not been identified during previous investigations; therefore, it appears that natural attenuation is occurring at a rate where contaminants are degrading prior to discharging at GPB. Monitoring for groundwater

contaminants within the GPB will confirm this degradation rate remains throughout the duration of the Selected RA.

Comment 2: Comments dated May 13, 2010 from William Baker of Scarinci Hollenbeck submitted on behalf of Pondview Estates, Inc (Pondview). The following provides a response to the three comments received and includes only the comment title as presented in the letter. The complete letter and comment text is included in **Appendix C**.

Comment: The risk assessment relied upon to support the Proposed Plan was inadequate.

Response: The Human Health Risk Assessment (HHRA) performed evaluated all appropriate exposure pathways based upon the location and characteristics of the groundwater contamination present. As summarized in the Proposed Plan and detailed in the prior Remedial Investigation (RI) Report and Feasibility Study (FS) – the groundwater contaminant plume at Site 78 (PICA 013) is a shallow plume present in the surficial aquifer which discharges to surface water (Green Pond Brook) at near non-detect levels within the bounds of the Site and well within the bounds of Picatinny Arsenal (Picatinny). The plume is not a threat to bedrock or deep offsite production wells, such as those that may be required to produce the relatively large volumes of water (1.26 million gallons per day) noted in the comments received.

It also is noted that the Area C Record of Decision does require the Army to monitor wells located at the southern boundary between Picatinny and Pondview, including four wells located beyond the limits of Picatinny.

Comment: The most recent groundwater data indicate a “rebound” effect on contaminant levels.

Response: In regard to this comment’s discussion of unacceptable risk, it is also important to note that the risk assessment conclusions are drawn from exposure assumptions that result in a very conservative evaluation. The risk is driven by hypothetical future drinking water scenarios which assume that the maximum detected concentration of vinyl chloride throughout the Site remains constant over the exposure duration for an industrial worker (25 years), and that the hypothetical drinking water wells are installed in the shallow surficial aquifer.

The letter considered the increase in vinyl chloride in the aquifer after the pilot test to be a rebound effect. In fact, these concentration changes are expected and indicate that higher chlorinated compounds (parent compounds) are degrading as a result of the lactate injection and natural conditions. Vinyl chloride is a breakdown product, and its presence is a positive sign that dechlorination is occurring. As detailed in the FS and summarized in the Proposed Plan, the increase in vinyl chloride concentrations is transient. Over time vinyl chloride will degrade to carbon dioxide and water, and therefore is not considered a long-term risk to human health at the Site.

In addition, land use controls (LUCs) incorporated into the selected remedy will prevent the use of groundwater for drinking water at the Site and as a result, the exposure assumptions within the risk assessment are not likely to occur. Also long-term monitoring will be conducted at the Site to ensure concentrations do continue to decrease, and the plume shrinks over time as predicted. Finally, and as noted in the

response to Comment No. 1 above, the Army also will conduct separate long-term monitoring near and beyond the southern boundary of Picatinny.

Therefore, the identified remedy (Monitored Natural Attenuation [MNA] and LUCs) is appropriate.

Comment: The Army's selected remedy does not best achieve the remedial action objectives.

Response: The Army does believe that the selected remedy achieves the best balance of tradeoffs relative to the established threshold, primary balancing and modifying criteria. Although it may take slightly longer than other alternatives, the selected remedy is protective of human health and the environment as potential for exposure is controlled and monitoring will be conducted to document the decrease in concentrations. Past natural degradation and prior pilot testing, utilizing innovative in-situ treatment technology, has effectively reduced groundwater contamination thereby enabling the suitability of an MNA approach at this time. It should be noted that MNA utilizes natural degradation processes to reduce contaminant concentrations over time and passively "treats" contamination by breaking it down to harmless end products.

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

Nine verbal comments specific to the Selected RA were received during the public meeting held on April 15, 2010. Transcripts from the public meeting have been submitted to the Administrative Record (located at the information repositories listed in Section 2.3) for the site.

The comments received on the Selected RA are summarized as follows:

Comment 1: Mr. Michael Glaab, a member of the PAERAB: What is a conservative estimate of how long it would take for the natural attenuation to occur?

Response: Mr. Llewellyn, ARCADIS: The projected worse-case scenario is 13 years.

Comment 2: Mr. Bill Roach, USEPA: EPA has reviewed the Proposed Plan and reserves concurrence on the remedy until the Record of Decision stage as there are still two criteria that we take very seriously which are State acceptance and community acceptance.

Response: Comment noted.

Comment 3: Mr. Greg Zalaskus, NJDEP: Same as EPA, we also wait until after the community comments to concur on the remedy, but we are supportive of the approach. We have worked closely with the Army and ARCADIS for a long time and are very pleased that the sodium lactate dealt with a large portion of the contamination at the site; if it had not, we might be doing something different at this point, but altogether we are pleased with the approach and support it.

Response: Comment noted.

Comment 4: Mr. Glaab: You stated the pilot test using sodium lactate was very effective and knocked out most of the contamination. Can you provide more specifics on the effectiveness as it relates to the TCE, DCE and vinyl chloride?

Response: Mr. Llewellyn: It was effective on all the compounds. I will provide more details in the Responsiveness Summary [see below].

TCE concentrations at sample location 78MW-3 (10-feet downgradient) had decreased below the detection limit following initial injection activities. cDCE concentrations had decreased by approximately 60 percent at 78MW-3. Eleven months after the initial injection, cDCE concentrations at well 78MW-5 (20-feet downgradient) also had decreased by approximately 60 percent and significant concentration reductions (well below the LOC of 70 µg/L) were observed further downgradient of the injection line at sampling locations 78MW-6 and 78PZ-2 (located 50-feet and 170-feet, respectively). VC concentrations at sampling location 78MW-6 decreased by approximately 50 percent when sampled 11 months after the initial injection and were reduced below the LOC of 1 µg/L at 78PZ-2.

Comment 5: Mr. Glaab: I would like to reiterate a comment made by EPA during its previous document review. If the sodium lactate was so effective, why wasn't consideration given to additional treatment with sodium lactate especially near Green Pond Brook?

Response: Mr. Llewellyn: Consideration was given to additional injections under Alternative 3. The pilot test knocked out a considerable amount of the contaminant mass so we would achieve very little additional reduction for quite a lot of effort. We are very close to the Brook already, and if we get any closer to the Brook, we would be influencing surface water quality with the sodium lactate injections.

Mr. Gabel: Another important factor is the time. With monitored natural attenuation the remedy time is 13 years and with additional injections the time frame is seven years. When evaluated against the criteria of cost and short term impacts, monitored natural attenuation was more favorable than additional injections.

Comment 6: Mr. Jay Romano, Picatinny Arsenal Employee: I am the division chief in Building 91 and would like to know what public notice was given as no one told anyone in Building 91. The only notice we saw was in the community bulletin. Many people who worked in Building 91 were asking questions which I did not have information to answer.

Response: Mr. Gabel: The issue is not inside Building 91 nor the soil surrounding Building 91, but the groundwater that flows underneath the building. We will have to do a better job in notifying the buildings associated with environmental actions. We place public notices in the Star Ledger and Daily Record, and I had an announcement placed in the Picatinny Express. I will make sure communication between the Garrison and buildings mentioned in any environmental action is better in the future.

Mr. Coulters: Can you confirm that there was a point of contact listed in the public notices so anyone with questions could have a contact?

Mr. Gabel: Yes. My contact information was listed in the public notice.

Mr. Glaab: The Restoration Advisory Board would welcome another member who could represent the perspective of employees who work and reside at the arsenal.

Mr. Gabel: Board meetings also are advertised in the local newspapers and the Picatinny Voice.

Comment 7: Mr. Robert Dellberg, former Picatinny Arsenal Employee: I used to work in Building 91. How do you know there were no exposures to the office space? If the chemicals were stored and used in the building 20 or 30 years ago, what was the exposure to people working at that time in the building? What precautions and measurements have been taken to ensure there is not an issue inside the building? As someone who used to work in the building, and as a concern for those who still work in the building, I would like to see testing performed inside the building.

Response: Mr. Gabel: The environmental cleanup program looks at the chemical contamination being found in the media [soil, groundwater, surface water or sediment] and performs very conservative risk assessments which will make assumptions based on someone

actually consuming the groundwater. Picatinny has industrial hygienists that would evaluate whether there is a problem inside a building. Picatinny's environmental staff do inspections of buildings to ensure all environmental regulations are being complied with in each building. Picatinny has looked at the potential for vapors to move into a building where there is groundwater contamination under the building for example, Area D where the groundwater plume is bigger and has higher concentrations of contamination than at Site 78. The level of contamination at Site 78 is not at the levels that would trigger the need for such an assessment to be performed.

Mr. Llewellyn: There is no evidence to suggest compounds are present underneath the building as most of the mass is well away from building.

Mr. Coulters: I will discuss the issue further with Mr. Gabel and look at Picatinny's vapor intrusion studies to confirm no investigation is needed.

Comment 8: Mr. Glaab: Was a point source for the contamination found?

Response: Mr. Llewellyn: We did not which is very common with these types of sites. All we can do is develop an understanding of what is happening now at the site.

Comment 9: Mr. Pat Matarazzo, a community member of the PAERAB: My concern is the level of cleanup that is going to be performed. Green Pond Brook is a C1 stream as classified by New Jersey so there can be no measurable change to the existing water quality. I want to make sure you are cleaning to the appropriate level as it flows to the Rockaway River and then eventually to the Boonton Reservoir, a drinking water source. I would suggest doing some acute bioassay work to make sure the Brook does not have any contamination.

Response: Mr. Llewellyn: There is a separate action going on now for Green Pond Brook where we are doing bioassays, chemical monitoring, and biological monitoring on an annual basis. The chemicals in Green Pond Brook associated with Site 78 are below surface water criteria so we would continue to monitor and ensure that remains the case.

### **3.2 TECHNICAL AND LEGAL ISSUES**

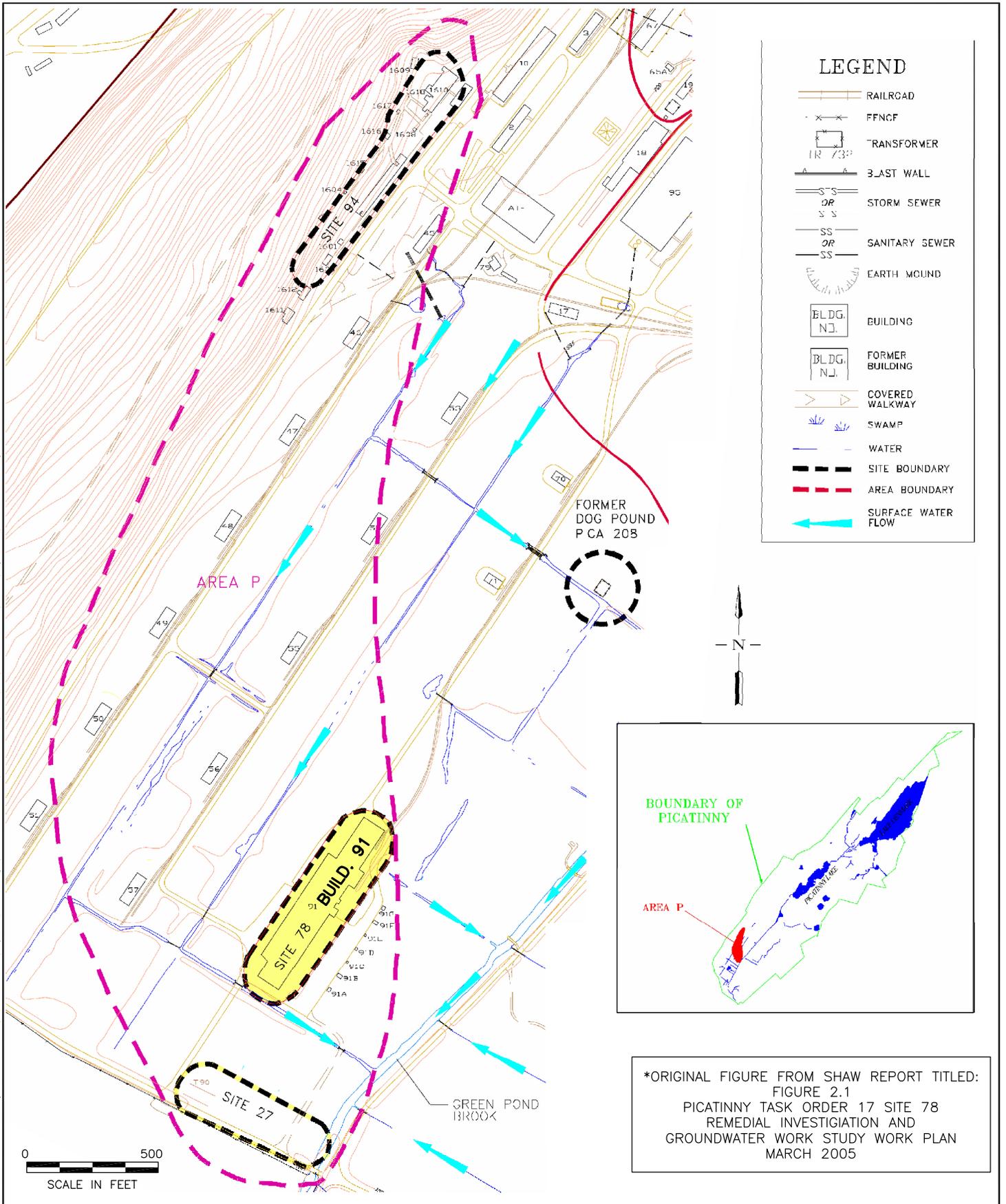
No technical or legal issues were raised on the Selected RA.

## 4.0 PART 4: REFERENCES

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## Figures

Date\Time : Wed, 24 Mar 2010 - 2:19pm Path\Name : G:\Projects\Picatinny\Site Technical\PICA 13 Optic\Proposed Plan\Final\Figures\PP-FIG-1.dwg

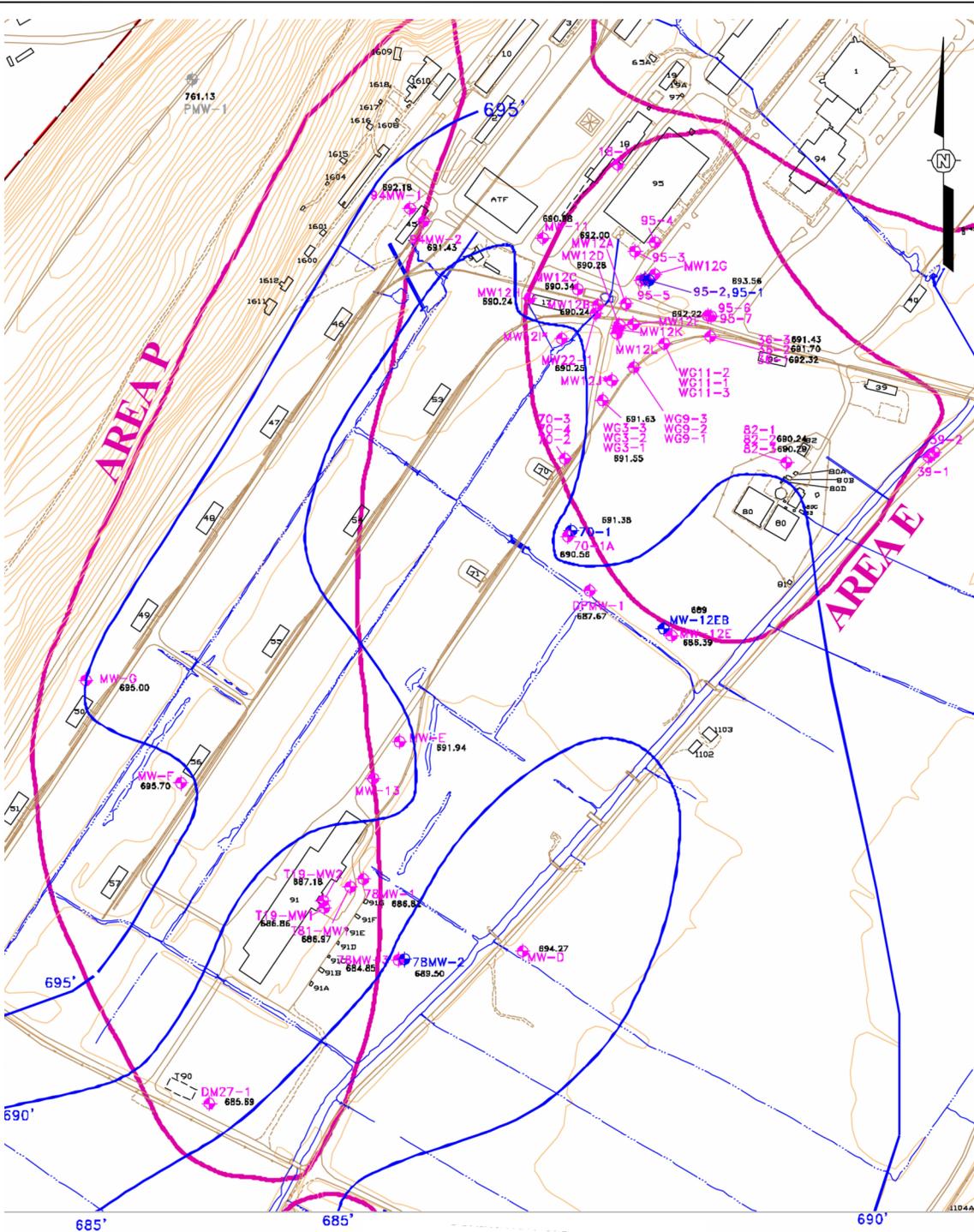


SITE LOCATION MAP

RECORD OF DECISION FOR SITE 78 (PICA 013) PICATINNY ARSENAL, DOVER, NEW JERSEY

PROJECT NUMBER  
GPO6PICA.0013

FIGURE  
1



GROUNDWATER CONTOUR FOR THE UNCONFINED AQUIFER, 7/7/03 (FT. msl)

- ⊕ SCREENED IN THE UNCONFINED AQUIFER
- ⊕ SCREENED IN THE UPPER SEMI-CONFINED AQUIFER
- ⊕ SCREENED IN THE LOWER SEMI-CONFINED AQUIFER
- ⊕ SCREENED IN THE BEDROCK AQUIFERS
- ⊕ FAILED OR ABANDONED

- |  |                 |  |                |
|--|-----------------|--|----------------|
|  | EARTH MOUND     |  | RAILROAD       |
|  | BUILDING        |  | TREE LINE      |
|  | FORMER BUILDING |  | FENCE          |
|  | COVERED WALKWAY |  | TRANSFORMER    |
|  | SWAMP           |  | BLAST WALL     |
|  | WATER           |  | STORM SEWER    |
|  |                 |  | SANITARY SEWER |

\*ORIGINAL FIGURE FROM SHAW REPORT TITLED:  
 FIGURE 2.3  
 PICATINNY TASK ORDER 17 SITE 78  
 REMEDIAL INVESTIGATION AND  
 GROUNDWATER PILOT STUDY WORK PLAN  
 MARCH 2005

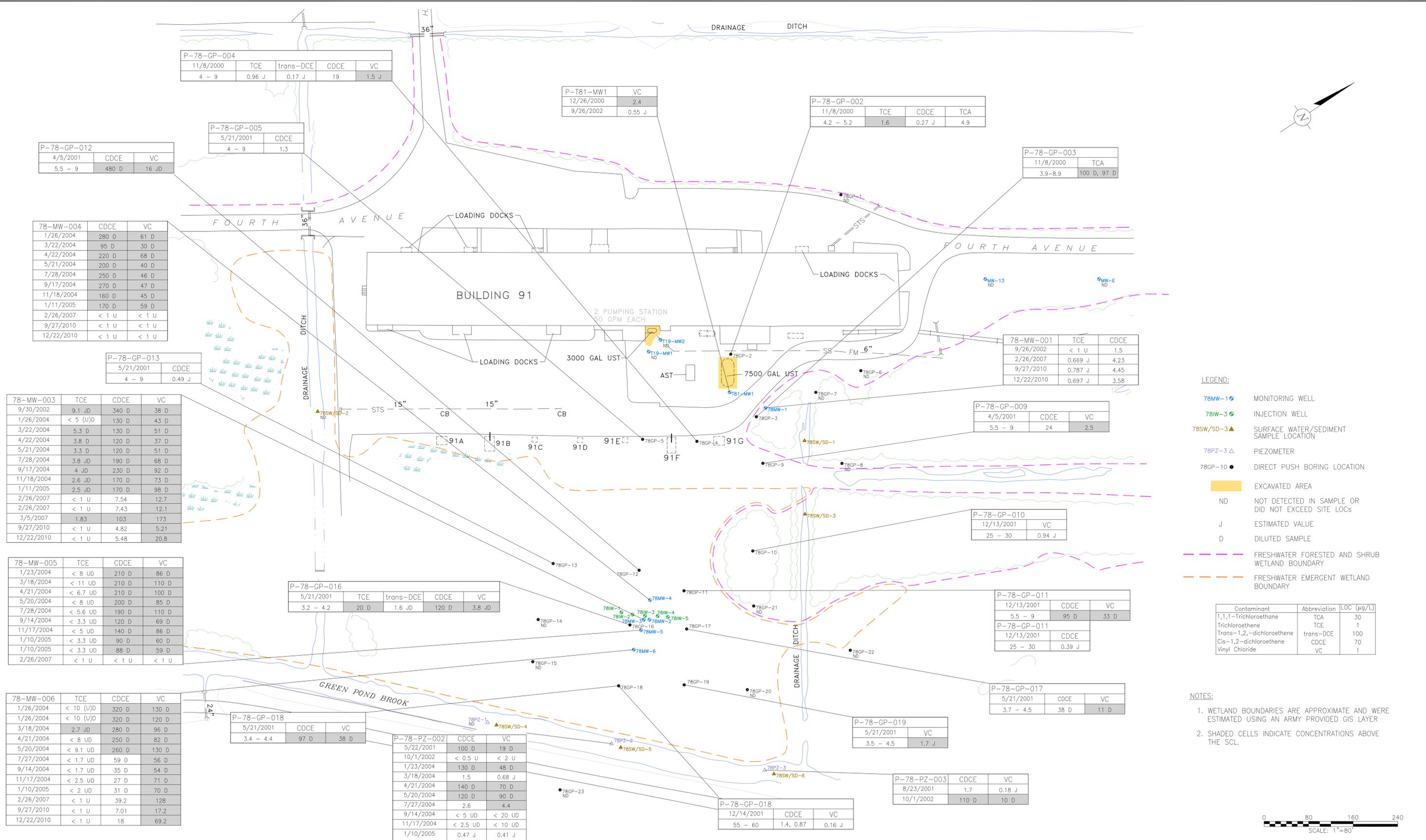


POTENTIOMETRIC SURFACE MAP FOR THE UNCONFINED AQUIFER

RECORD OF DECISION FOR SITE 78 (PICA 013) PICATINNY ARSENAL, DOVER, NEW JERSEY

PROJECT NUMBER	GPO6PICA.0013
FIGURE	2

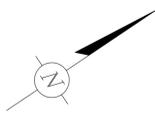
Path Name: C:\ENR\GIS\BAM\ENR\PROJECT\GP06PICA.0013\0001\VP-FG-3-2.dwg  
 Date/Time: Sat, 05 Mar 2011 10:39am



EXTENT OF cis-1,2-DICHLOROETHENE AND VINYL CHLORIDE IN GROUNDWATER PRIOR TO SODIUM LACTATE INJECTION

RECORD OF DECISION FOR SITE 78 (PICA 013) PICATINNY ARSENAL, NEW JERSEY

PROJECT NUMBER  
GP06PICA.0013  
FIGURE  
3



P-78-SW-002	Al	As	Fe	Pb	Mn	Na
12/7/1998	555	6.2	8880	4.19	1770	46300

P-78-SW-001	As	Fe	Mn	Na
12/7/1998	9.27	6950	750	53500

P-78-SW-005	VC
5/22/2001	< 2 U
9/30/2002	< 2 U
9/30/2002	0.36 J
2/24/2003	< 1 U
7/24/2003	< 1 U
8/12/2004	< 2 U
1/25/2005	< 1 U
7/11/2005	< 1 U
1/30/2006	< 1 U
9/25/2006	< 1 U
2/16/2007	< 1 U
9/27/2010	< 1 U
12/8/2010	< 1 U

P-78-SW-004	TCE	VC
5/22/2001	0.21 J	< 2 U
9/30/2002	0.53 J	< 2 U
2/24/2003	< 1 U	< 1 U
7/24/2003	< 1 U	< 1 U
8/12/2004	< 1 U	< 2 U
1/25/2005	0.4 J	< 1 U
7/11/2005	1	1.8
1/30/2006	< 1 U	< 1 U
9/25/2006	0.371 J	< 1 U
2/16/2007	0.431 J	< 1 U
9/27/2010	< 1 U	< 1 U
12/8/2010	< 1 U	< 1 U

P-78-SW-006	VC
8/23/2001	0.26 J
9/30/2002	< 2 U
2/24/2003	< 1 U
7/24/2003	< 1 U
8/12/2004	< 2 U
1/25/2005	< 1 U
7/11/2005	< 1 U
1/30/2006	< 1 U
2/16/2007	< 1 U
9/27/2010	< 1 U
12/8/2010	< 1 U

**LEGEND:**

- 78MW-1 ● MONITORING WELL
- 78IW-3 ● INJECTION WELL
- 78SW/SD-3 ▲ SURFACE WATER/SEDIMENT SAMPLE LOCATION
- 78PZ-3 △ PIEZOMETER
- 78GP-10 ● DIRECT PUSH BORING LOCATION
- EXCAVATED AREA
- J ESTIMATED VALUE
- ND NOT DETECTED ABOVE LOCs
- FRESHWATER FORESTED AND SHRUB WETLAND BOUNDARY
- FRESHWATER EMERGENT WETLAND BOUNDARY

Contaminant	Abbreviation	LOC (µg/L)
Trichloroethene	TCE	1
Vinyl Chloride	VC	0.082
Aluminum	Al	190
Arsenic	As	1.38
Iron	Fe	1790
Lead	Pb	3.2
Manganese	Mn	383
Sodium	Na	42300

**NOTES:**

1. WETLAND BOUNDARIES ARE APPROXIMATE AND WERE ESTIMATED USING AN ARMY PROVIDED GIS LAYER
2. SHADED CELLS INDICATE CONCENTRATIONS ABOVE THE SCL.



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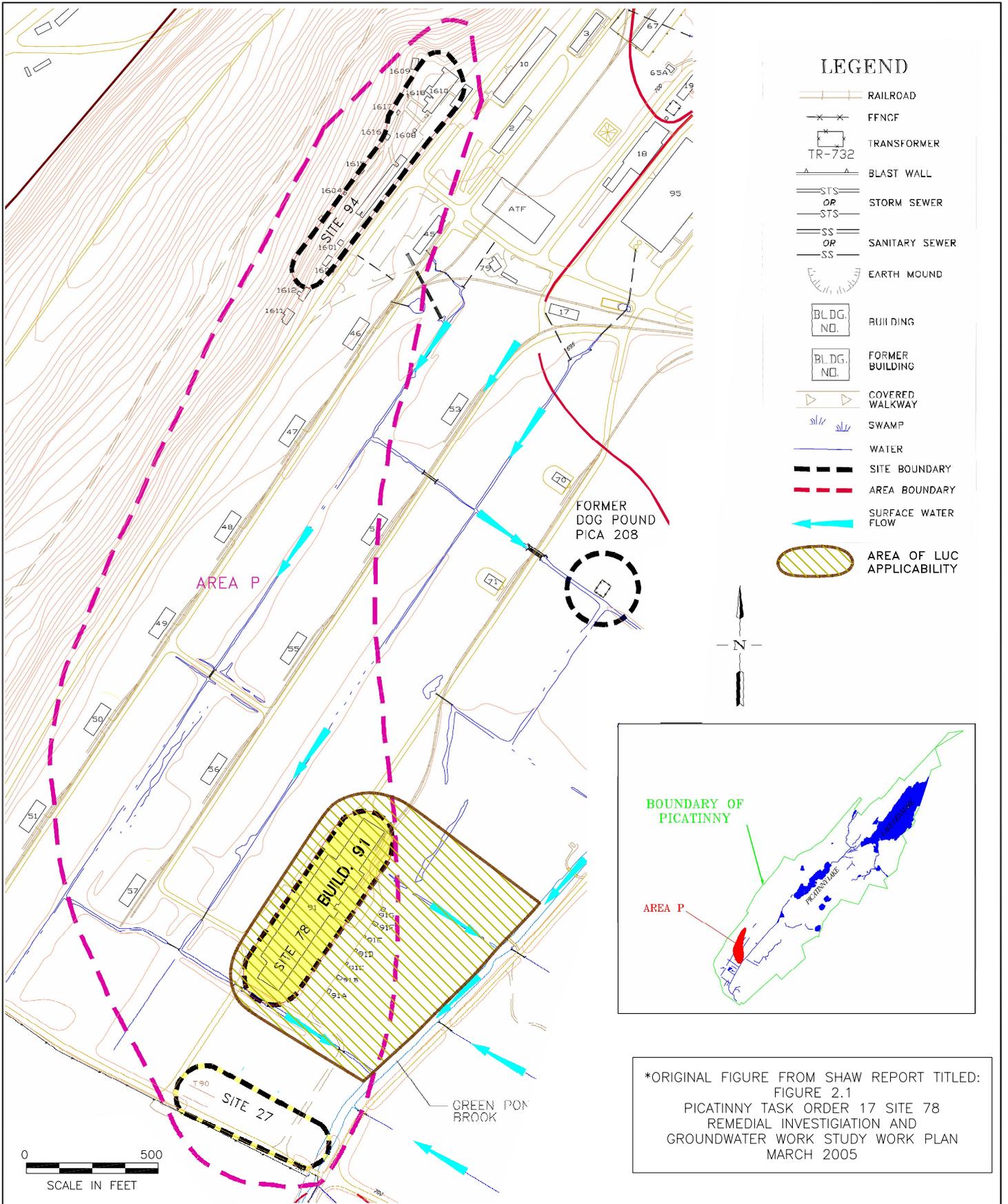


HISTORICAL EXCEEDANCES OF LEVELS OF CONCERN  
IN SURFACE WATER

RECORD OF DECISION  
FOR SITE 78 (PICA 013)  
PICATINNY ARSENAL,  
DOVER, NEW JERSEY

PROJECT NUMBER  
GP06PICA.0013  
FIGURE  
4

Date\Time : Fri, 04 Feb 2011 - 12:29pm Path\Name : G:\Projects\Picatinny\Site Technical\PICA 13 Optic\Proposed Plan\Final\Figures\PP-FIG-1-ROD.dwg



\*ORIGINAL FIGURE FROM SHAW REPORT TITLED:  
 FIGURE 2.1  
 PICATINNY TASK ORDER 17 SITE 78  
 REMEDIAL INVESTIGATION AND  
 GROUNDWATER WORK STUDY PLAN  
 MARCH 2005



LUC BOUNDARIES MAP

RECORD OF DECISION  
 FOR SITE 78 (PICA 013)  
 PICATINNY ARSENAL,  
 DOVER, NEW JERSEY

PROJECT NUMBER  
 GP06PICA.0013

FIGURE  
 5

## Tables

**Table 1**  
**Chronological Order of Investigations Conducted at Site 78 (PICA 013)**  
**Site 78 (PICA 013)**  
**Picatinny Arsenal, New Jersey**

Event	Date
1. Submittal of Closure Plan for Building 91.	1990
2. NJDEP Acceptance of Closure Plan.	1992
3. Submittal of Final Phase III PA/SI Work Plan.	July 1996
4. Performance of PA/SI Sampling Activities.	September 1996 to November 1996
5. Regulatory Submittal of the Phase III – 1A RI Work Plan.	October 1997
6. Regulatory Submittal of the PA/SI Report.	January 1998
7. Regulatory Approval of the Phase III – 1A RI Work Plan.	September 1998
8. UST Removal.	1999
9. Performance of RI Sampling Activities.	October 1998 to January 2003
10. Regulatory Submittal of Remedial Investigation Report.	December 2003
11. Performance of Sodium Lactate Groundwater Pilot Study.	2004
12. Regulatory Approval of Remedial Investigation Report.	March 2005
13. Regulatory Submittal of Sodium Lactate Groundwater Pilot Study Report.	July 2005
14. Performance of Feasibility Study Sampling Activities.	February 2007
15. Regulatory Submittal of Final Feasibility Study Site 78 (PICA 013) Report.	July 2009
16. Regulatory Approval of Final Feasibility Study Site 78 (PICA 013) Report.	August 2009

Notes:

1. NJDEP - New Jersey Department of Environmental Protection
2. PA/SI - Preliminary Assessment/Site Investigation
3. RI - Remedial Investigation
4. UST - Underground Storage Tank

**Table 2**  
**Contaminants Detected in Groundwater Samples that Exceed LOCs**  
**Site 78 (PICA 013)**  
**Picatinny Arsenal, New Jersey**

Constituent	Range of Concentrations (µg/L)		LOC (µg/L)	Source of LOC Value	Frequency of Detection	No. of Samples Exceeding LOC
	Minimum	Maximum				
1,1,1-Trichloroethane	4.9	100	30	NJGWQC	3/97	2
Trichloroethene	0.2	20	1	NJGWQC	17/97	13
cis-1,2-dichloroethene	0.27	480	70	NJGWQC	64/97	41
Vinyl Chloride	0.16	173	1	PQL	60/97	54

Notes:

1. LOC - Level of Concern
2. µg/L - micrograms per Liter
3. NJGWQC – New Jersey Groundwater Quality Criterion
4. PQL – New Jersey State Practical Quantitation Limit

**Table 3**  
**Contaminants Detected in Surface Water Samples that Exceed LOCs**  
**Site 78 (PICA 013)**  
**Picatinny Arsenal, New Jersey**

Constituent	Range of Concentrations (µg/L)		LOC (µg/L)	Source of LOC Value	Frequency of Detection	No. of Samples Exceeding LOC
	Minimum	Maximum				
Trichloroethene	0.21	1	1	NJSWQC	28/41	0
cis-1,2-Dichloroethene	0.28	4.1	592.0 <sup>6</sup>	NJSWQC, AWQC	31/41	0
Vinyl Chloride	0.26	1.8	0.082	NJSWQC	3/41	3
Aluminum	182	555	190	BG Threshold	2/2	1
Arsenic	6.2	9.27	1.38	BG Threshold	2/2	2
Iron	6950	8880	1790	BG Threshold	2/2	2
Lead	2.06	4.19	3.2	AWQC	2/2	1
Manganese	750	1770	383	BG Threshold	2/2	2
Sodium	46300	53500	42300	BG Threshold	2/2	2

Notes:

1. AWQC – USEPA Water Quality Criteria
2. BG Threshold – Surface Water Background Threshold Value
3. LOC - Level of Concern
4. µg/L - micrograms per Liter
5. NJSWQC – New Jersey Surface Water Quality Criteria
6. No LOC value exists for cis-1,2-dichloroethene in surface water therefore the New Jersey Surface Water Quality Criteria and USEPA Water Quality Criteria for trans-1,2-dichloroethene has been substituted.

**Table 4**  
**Chemical-Specific Applicable or Relevant and Appropriate Requirements (ARARs)**  
**Site 78 (PICA 013)**  
**Picatinny Arsenal, New Jersey**

Contaminant of Concern	Groundwater SCLs (mg/kg)	Surface Water SCLs (mg/kg)
1,1,1-Trichloroethane (1,1,1-TCA)	30 <sup>(4)</sup>	120 <sup>(7)</sup>
Trichloroethene (TCE)	1 <sup>(4)</sup>	1.09 <sup>(7)</sup>
cis-1,2-dichloroethene (cDCE)	70 <sup>(4)</sup>	592 <sup>(3, 6, 7)</sup>
Vinyl Chloride (VC)	1 <sup>(5)</sup>	0.083 <sup>(7)</sup>

Notes:

1. mg/kg = milligram per kilogram
2. SCL = site cleanup level
3. No LOC value exists for cis-1,2-dichloroethene in surface water therefore the New Jersey Surface Water Quality Criteria and USEPA Water Quality Criteria for trans-1,2-dichloroethene has been substituted.
4. Value obtained from the New Jersey Groundwater Quality Standards [N.J.A.C. 7:9-6] (last updated 7 November 2005).
5. Value obtained from the New Jersey Groundwater Quality Standards [N.J.A.C. 7:9C], Appendix Table 1- Specific Groundwater Quality Criteria - Class IIA and Practical Quantitation Levels.
6. Value obtained from the USEPA Water Quality Criteria (last updated in 2009) developed in accordance with Section 304 (a) of the Clean Water Act.
7. Value obtained from the New Jersey Department of Environmental Protection Surface Water Quality Criteria [N.J.A.C. 7:9B] (last updated 4 January 2010).

**Table 5**  
**Location-Specific ARARs and TBCs**  
**Site 78 (PICA 013)**  
**Picatunny Arsenal, New Jersey**

Location	Law/Regulation	Requirement of Law/Regulation	ARAR/TBC Status
Wetlands	Presence of wetlands as defined in Executive Order 11990- § 7 (c) and 40 CFR 6, Appendix A § 4 (J)	<p>Whenever possible, Federal agency actions must avoid or minimize adverse impacts on wetlands and act to preserve and enhance their natural and beneficial values.</p> <p>Agencies should particularly avoid new construction in wetland areas unless there are no practicable alternatives.</p> <p>Federal agencies shall incorporate wetlands protection consideration into planning, regulating, and decision-making processes.</p>	TBC Substantive permit requirements will be considered for stream, wetlands, and/or transition area encroachments during the implementation of the specific remedial alternative.
Floodplains	Within 100-year floodplain as defined in 40 CFR 6, Appendix A § 4 (d)	Facility must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by flooding.	TBC Area P, along GPB, is within the 25 and 100-year flood plains. Portions are also within the 10-year flood plain. Flood plain restrictions are specified in the cited law.
	Within "lowland and relatively flat area adjoining inland and coastal waters and other flood-prone areas such as offshore islands, including at a minimum that area subject to a 1 percent or greater chance of flooding in any given year." [Executive Order 11988 § 6 (c) and 40 C.F.R. 6, Appendix A and § 4(d)].	<p>Federal agencies shall take action to reduce the risk of flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values of flood plains.</p> <p>Federal agencies shall evaluate potential effects of actions in flood plains and ensure consideration of flood hazards and flood plain management.</p> <p>If action is taken in flood plains, Federal agencies shall consider alternatives to avoid adverse effects and potential harm.</p>	TBC Area P, along GPB, is within the 25 and 100-year flood plains. Portions are also within the 10-year flood plain. Flood plain restrictions are specified in the cited law.

**Table 5**  
**Location-Specific ARARs and TBCs**  
**Site 78 (PICA 013)**  
**Picatunny Arsenal, New Jersey**

Location	Law/Regulation	Requirement of Law/Regulation	ARAR/TBC Status
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 <i>et seq</i> ) - Fish and Wildlife Coordination Act (16 U.S.C. 661 <i>et seq</i> ) - 50 CFR 402 - 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 practicable alternatives. Federal agencies shall incorporate rare, threatened, or endangered species protection consideration into planning, regulating, and decision-making processes.	<u>ARAR</u> Remedial activities within Area P are unlikely to adversely impact species listed in the Endangered Species Act. However, the remedial alternative may impact GPB, a possible home of the bog turtle ( <i>Clemmys muhlenbergii</i> ). Because bog turtles are considered threatened/ endangered species, the Endangered Species Act will be considered an ARAR for Area P.

Notes:

1. ARAR - Applicable or Relevant and Appropriate Requirement
2. GPB - Green Pond Brook
3. TBC - To-Be-Considered Requirement

**Table 6**  
**Action-Specific ARARs and TBCs**  
**Site 78 (PICA 013)**  
**Picatinny Arsenal, New Jersey**

Action	Law/Regulation	Requirements of Law/Regulation	ARAR/TBC Status
Sampling and Analysis	Remediation Technical Requirements NJAC 7:26E-3	Requirements of quality assurance for sampling and analysis at remediation sites.	<u>ARAR</u> Applicable to groundwater monitoring, treated groundwater sampling, and other analytical activities.
	NJDEP Field Sampling Procedures Manual, May 1992	State guidance and general industry procedures for sampling.	<u>TBC</u> To be considered when sampling groundwater and other media during remediation activities.
General Remediation	Technical Requirements for Site Remediation NJAC 7:26E 1, 4-7	Specifies the minimum technical requirements to investigate and remediate contamination on any site.	<u>ARAR</u> Applicable for on-site remediation activities.
Land Use Controls	CEA NJAC 7:9-6.6	CEA can be established in order to provide notice that the constituent standards for a given aquifer classification are not or will not be met in a localized area and that designated aquifer uses are suspended in the affected area by the term of the CEA. The intent of such Departmental action is to ensure that the uses of the aquifer are restricted until standards are achieved.	<u>ARAR</u> Relevant and appropriate for the reduction of future potential groundwater use exposure in Area P.

Notes:

1. ARAR - Applicable or Relevant and Appropriate Requirement
2. CEA - Classification Exception Area
3. NJDEP - New Jersey Department of Environmental Protection
4. TBC - To-Be-Considered Requirement

**Table 7**  
**Human Health Risk Assessment Results**  
**Site 78 (PICA 013)**  
**Picatinny Arsenal, New Jersey**

Receptor	Cumulative Cancer Risk	Hazard Index
Current/Future Industrial/Research Worker	$1 \times 10^{-4}$	0.2
Current/Future Construction/Excavation Worker	$3 \times 10^{-8}$	0.03
On-Site Youth Visitor	$4 \times 10^{-6}$	0.2
Future Adult Resident	$3.1 \times 10^{-4}$	1.3
Future Child Resident	$5.6 \times 10^{-4}$	3.7
Supplemental Future Industrial/Research Worker	$4 \times 10^{-4}$	0.6

**Table 8**  
**Final Site Cleanup Levels (SCLs) and Detected Concentrations**  
**for Site 78 (PICA 013) Contaminants of Concern (COCs)**  
**Site 78 (PICA 013)**  
**Picatunny Arsenal, New Jersey**

Contaminant of Concern	Groundwater		Surface Water	
	SCL (µg/L)	Maximum Detected Concentration (µg/L)	SCL (µg/L)	Maximum Detected Concentration (µg/L)
1,1,1-Trichloroethane (1,1,1-TCA)	30	100	120	ND
Trichloroethene (TCE)	1	20	1.09	1
cis-1,2-Dichloroethene (cDCE)	70	480	592.0 <sup>4</sup>	4.1
Vinyl Chloride (VC)	1	173	0.083	2

Notes:

1. COC - Contaminant of Concern
2. µg/L - micrograms per Liter
3. ND - This constituent has not been detected at Site 78 during previous investigations.
4. No Site Cleanup Level exists for cis-1,2-dichloroethene in surface water therefore the New Jersey Surface Water Quality Criteria and USEPA Water Quality Criteria for trans-1,2-dichloroethene has been substituted.

**Table 9**  
**Costs for Response Action GW-2 - Monitored Natural Attenuation and Land Use Controls**  
**Site 78 (PICA 013)**  
**Picatinny Arsenal, New Jersey**

	Description	Costs
<b>Capital Costs</b>		
	Monitoring Well Installation	\$ 10,390
	Waste Characterization	\$ 2,090
	Engineering Design	\$ 3,120
	Construction Oversight	\$ 2,000
	Project Management	\$ 1,250
	Implementation of H&S Measures	\$ 370
	Establishment of Land Use Controls	\$ 15,000
	<b>Capital Cost Subtotal</b>	<b>\$ 34,220</b>
	<b>Contingency (15%)</b>	<b>\$ 5,133</b>
	<b>Total Capital Cost</b>	<b>\$ 39,353</b>
<b>O&amp;M Costs</b>		
	13-Year MNA Sampling	\$ 69,822
	Labor (Scientist I)	\$ 1,520
	Well Abandonment, Replacement, and Maintenance	\$ 20,520
	Monitoring Report Writing	\$ 180,950
	<b>Discounted O&amp;M Costs (7% Interest)<sup>3</sup></b>	<b>\$ 272,812</b>
	<b>Total Remediation Cost</b>	<b>\$ 312,165</b>

Notes:

1. H&S - Health and Safety
2. MNA - Monitored Natural Attenuation
3. O&M - Operation and Maintenance. O&M costs are totaled as a present worth cost based on a 7% net investment rate for a 30-year period.

## **Appendix A**

Certificate of Publication for Public  
Notices



Post-Remedial Monitoring, and LUCs.  
**Alternative GW-5: In Situ** Chemical Treatment (Zero Valent Iron (ZVI)), Post-Remedial Monitoring, and LUCs.

**Preferred Response Action**

Alternative GW-2 is the Preferred Response Action for groundwater and incidental surface water at Site 78. This Alternative provides an optimum balance between the selection criteria and is protective of human health and the environment. The Preferred Response Action may be modified or a new Alternative may be developed based on public input. The final Response Action selected will be documented in a Record of Decision that summarizes this 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, April 15, 2010, 8 p.m., Hilton Garden Inn** (near the Rockaway Townsquare Mall), 375 Mt. Hope Avenue, Rockaway, NJ 07886. 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 the 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. Starting April 15, 2010, a copy of the Proposed Plan for Site 78 (PICA 013) is available for review at the Rockaway Township Library (81 Mount Hope Road) and Morris County Library (30 East Hanover Avenue, Whippany). The public may submit written comments during the 30-day comment period (April 15 to May 14, 2010). Comments must be postmarked by May 14, 2010 and sent to Mr. Ted Gabel, Environmental Affairs Office, U.S. Army Installation Management Agency, Northeast Regional Garrison Office, Building 319, Picatinny, NJ, 07806.  
**(\$82.40) 120477**

PUBLIC NOTICE

U.S. ARMY INVITES PUBLIC COMMENT ON PROPOSED PLAN FOR SITE 78 (PICA 013)

PUBLIC INVITED TO RESTORATION ADVISORY BOARD MEETING

The U.S. Army at Picatinny Arsenal (Picatinny) invites the public to comment on the Proposed Plan addressing contaminated groundwater and incidental surface water at the Picatinny Arsenal Site 78 (PICA 013). Site 78 is located in the southwestern portion of Picatinny.

PROPOSED PLAN FOR SITE 78 (PICA 013)

Site 78 encompasses four acres and is located to the west of Green Pond Brook on the southwest side of the installation. Environmental impacts at Site 78 are associated with historical activities conducted at Building 91 located approximately 500 feet northwest of Green Pond Brook. The building was constructed in 1942 as a storehouse and supply building and contained an optics laboratory in which operations were conducted between 1980 and the mid-1990s. Currently office space is located within Building 91, and the building's loading docks still receive materials. The Army has conducted comprehensive environmental investigations at the Site. Low level detections of volatile organic compound (VOC) contamination have been identified in groundwater due to historical activities conducted at Site 78, specifically Building 91. This Proposed Plan for Site 78 only addresses groundwater contamination and subsequent surface water contamination. Sediment and soil contamination at Site 78 will be addressed in their entirety in future CERCLA documents. Human health risk assessments indicated that a Response Action will be required to protect human receptors at Site 78 from future potential risk. Ecological risk assessments concluded that no measureable biological impacts were found.

Alternatives Evaluated

The Army, the U.S. Environmental Protection Agency, and the New Jersey Department of Environmental Protection evaluated the following alternatives for groundwater at Site 78s:

Alternative GW-1: No action.

Alternative GW-2: Monitored natural attenuation (MNA) and land use controls (LUCs).

Alternative GW-3: Enhanced Reductive Dechlorination, Post-Remedial Monitoring, and LUCs.

Alternative GW-4: In Situ Chemical Treatment (Potassium Permanganate), Post-Remedial Monitoring, and LUCs.

Alternative GW-5: In Situ Chemical Treatment (Zero Valent Iron [ZVI]), Post-Remedial Monitoring, and LUCs.

Preferred Response Action

Alternative GW-2 is the Preferred Response Action for groundwater and incidental surface water at Site 78. This Alternative provides an optimum balance between the selection criteria and is protective of human health and the environment. The Preferred Response Action may be modified or a new Alternative may be developed based on public input. The final Response Action 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, April 15, 2010, 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 the 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. Starting April 15, 2010, a copy of the Proposed Plan for Site 78 (PICA 013) is 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 (April 15 to May 14, 2010). Comments must be postmarked by May 14, 2010 and sent to Mr. Ted Gabel, Environmental Affairs Office, U.S. Army Installation Management Agency, Northeast Regional Garrison Office, Building 319, Picatinny, NJ, 07806.

STATE OF NEW JERSEY } SS
COUNTY OF ESSEX

Susan McManis

Being duly sworn, according to law, on his/her oath sayeth that he/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 7th day of April 2010

and continued therein for successively, at least once in each

for one day.

Susan McManis

Sworn to and subscribed

before me this 26th

day of April, 2010

Lauren Kincaid

NOTARY PUBLIC of NEW JERSEY

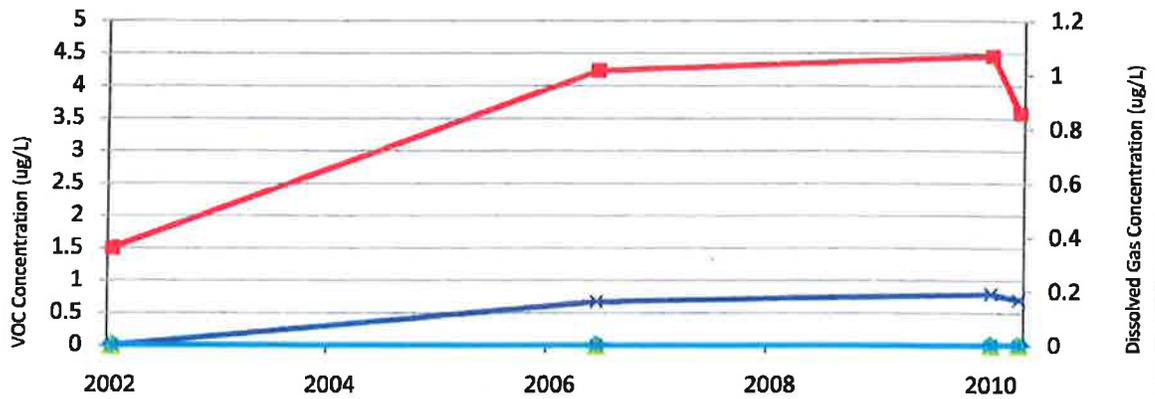
LAUREN M. KINCAID
NOTARY PUBLIC OF NEW JERSEY
MY COMMISSION EXPIRES APRIL 14, 2014

## **Appendix B**

Trend Plots of Select VOC and  
Dissolved Gases Data

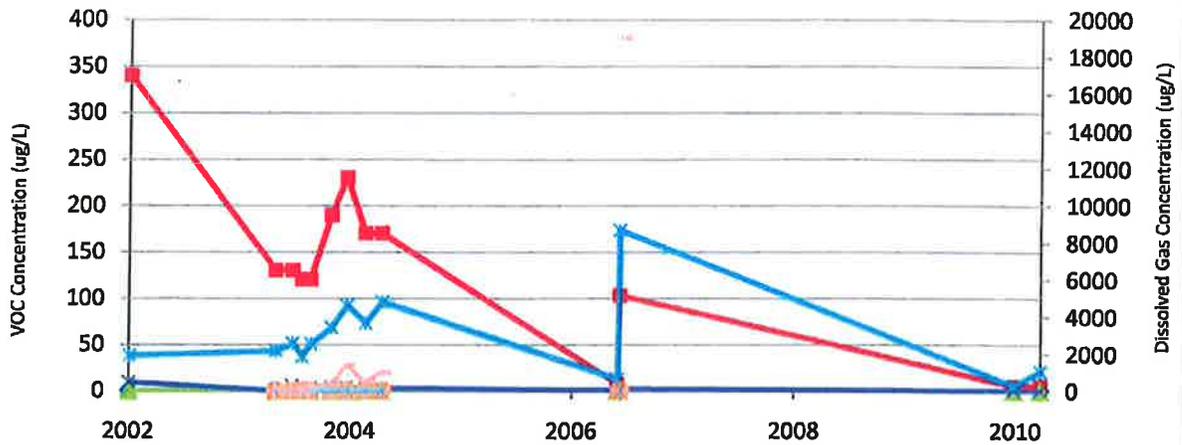
Trend Plots of Select VOC and Dissolved Gases Data  
Site 78 (PICA 013) Groundwater

Groundwater Trend Plot For 78-MW-001



	9/26/2002	2/27/2007	9/27/2010	12/22/2010
1,1-Dichloroethene	0	0	0	0
cis-1,2-Dichloroethene	1.5	4.23	4.45	3.58
Tetrachloroethene	0	0	0	0
Trichloroethene	0	0.669	0.787	0.697
Vinyl chloride	0	0	0	0
Ethane				
Ethene				
Methane				

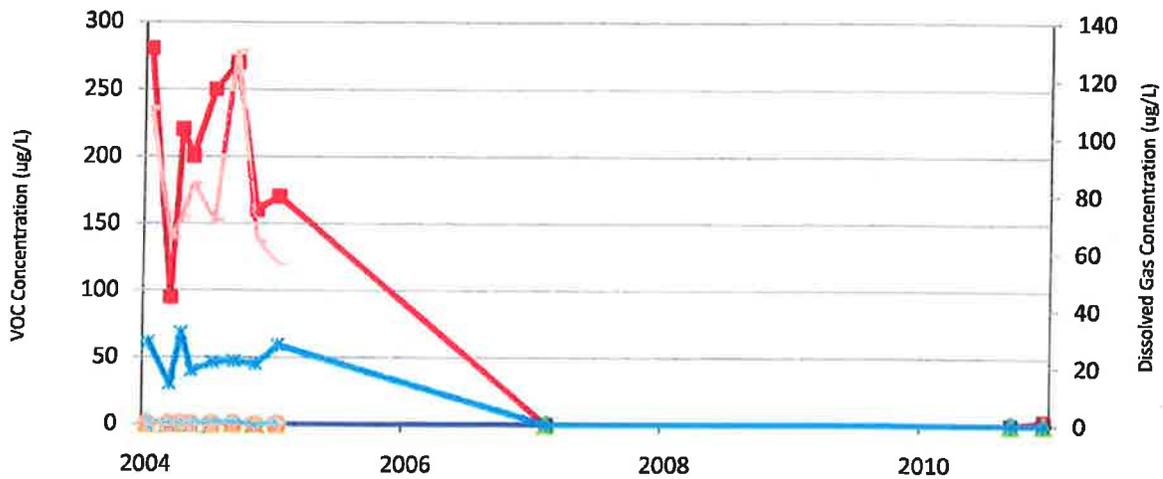
Groundwater Trend Plot For 78-MW-003



	9/30/2002	1/26/2004	3/22/2004	4/22/2004	5/21/2004	7/28/2004	9/17/2004	11/18/2004	1/11/2005	2/26/2007	3/5/2007	9/27/2010	12/22/2010
1,1-Dichloroethene	0	0	0	0	0	0	0	0	0	0	0	0	0
cis-1,2-Dichloroethene	340	130	130	120	120	190	230	170	170	7.54	103	4.82	5.48
Tetrachloroethene	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichloroethene	9.1	0	5.3	3.8	3.3	3.8	4	2.6	2.5	0.5	1.83	0	0
Vinyl chloride	38	43	51	37	51	68	92	73	96	12.7	173	5.21	20.8
Ethane		0	0.2	0.39	0.69	0	0	0.29	0		1.2		
Ethene		0.56	0	0.46	0.96	0	0	0	0.92		5.5		
Methane		120	69	93	250	320	1400	460	1000		19000		

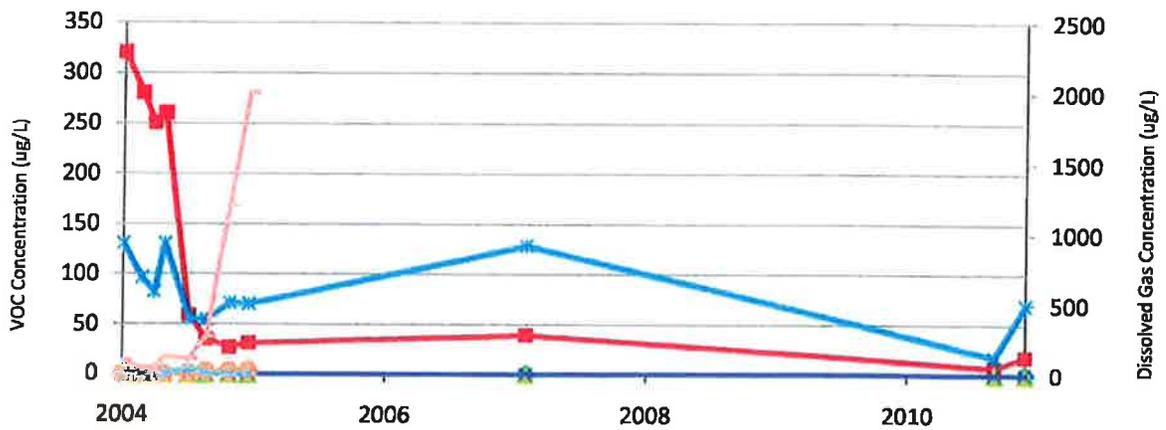
Trend Plots of Select VOC and Dissolved Gases Data  
Site 78 (PICA 013) Groundwater

Groundwater Trend Plot For 78-MW-004



	1/26/2004	3/22/2004	4/22/2004	5/21/2004	7/28/2004	9/17/2004	11/19/2004	1/11/2005	2/26/2007	9/27/2010	12/22/2010
1,1-Dichloroethene	0	0	0	0	0	0	0	0	0	0	0
cis-1,2-Dichloroethene	280	95	220	200	250	270	160	170	0	0	2.9
Tetrachloroethene	0	0	0	0	0	0	0	0	0	0	0
Trichloroethene	0	0	0	0	0	0	0	0	0	0	0.497
Vinyl chloride	61	30	68	40	46	47	45	59	0	0	0
Ethane	0	0	0	0	0	0	0	0			
Ethane	1	0.46	0.81	0.7	0.78	1.1	0	0.92			
Methane	110	65	72	84	71	130	64	56			

Groundwater Trend Plot For 78-MW-006



	1/26/2004	3/18/2004	4/21/2004	5/20/2004	7/27/2004	9/14/2004	11/17/2004	1/10/2005	2/26/2007	9/27/2010	12/22/2010
1,1-Dichloroethene	0	0	0	0	0	0	0	0	0	0	0
cis-1,2-Dichloroethene	320	280	250	260	59	35	27	91	39.2	7.01	18
Tetrachloroethene	0	0	0	0	0	0	0	0	0	0	0
Trichloroethene	0	0	0	0	0	0	0	0	0	0	0
Vinyl chloride	130	96	82	130	56	54	71	70	128	17.2	69.2
Ethane	0	0	0	0	5.1	21	20	28			
Ethane	1.3	0.54	0.43	2.9	35	7	4.1	8.3			
Methane	100	45	25	120	110	270	1200	2000			





## **Appendix C**

Comments Submitted on Behalf of  
Pondview Estates

WILLIAM A. BAKER, Counsel  
wbaker@scarincihollenbeck.com  
Direct Phone: 201-806-3414 Direct Fax: 201-806-3506

May 13, 2010

**VIA CERTIFIED MAIL, R.R.R.**

Ted Gabel, Environmental Affairs Director  
U.S. Army Installation Management Agency  
Northeast Regional Garrison Office  
Building 319  
Picatinny, NJ 07806-5000

**Re: Comments on Proposed Plan for Site 78 Groundwater at Picatinny Arsenal  
Our File No.: 9889.2000**

Dear Mr. Gabel:

Please accept these comments submitted on behalf of Pondview Estates, Inc. ("Pondview"), regarding the Army's proposed remedial action plan ("Proposed Plan") for the above referenced Area of Concern at Picatinny Arsenal (the "Site"). As you know, Pondview's property is also located in Rockaway Township, immediately west of and across State Highway 15 from Picatinny Arsenal.

I. The Risk Assessment Relied Upon to Support to Proposed Plan Was Inadequate

The Human Health Risk Assessment (HHRA) performed for the Site was limited only to potential onsite potable use of the Site groundwater and ignored any potential future off-site use by owners of property located adjacent to Picatinny, including but not limited to Pondview. Consequently, the Risk Assessment analysis is inadequate, flawed and deficient because it did not give consideration to groundwater use off-site and downgradient of the contaminated groundwater at the Site a required under CERCLA. See, e.g., 40 C.F.R. § 300.430.

In particular, the Army continues to ignore the intended use by Pondview of groundwater from the same source aquifer that is located beneath Picatinny. Pondview and Rockaway Township initially jointly filed a Water Allocation Permit (WAP) application with the New Jersey Department of Environmental Protection (NJDEP) in 2000. In addition, Pondview was issued an NJDEP Water Use Registration in 2001 allowing Pondview to use up to 100,000 gallons per day from the

{00565940.DOC}

existing wells located upon its property. Accordingly, the Army has been aware of Pondview's planned groundwater use for nearly a decade. Largely due to concerns relating to groundwater conditions at Picatinny, NJDEP was unwilling to approve this original permit application.

Recently, Pondview's efforts to obtain authorization for its intended groundwater diversion and use have significantly progressed. Pursuant to a May 3, 2010 Order issued by the New Jersey Superior Court, a revised application will shortly be submitted to NJDEP on behalf of Pondview and Rockaway Township seeking approval to withdraw for potable use 1.26 mgd of groundwater.<sup>1</sup> As demonstrated by the forthcoming submission of the Pondview WAP application which would result in a significant use of groundwater, the Army's HHRA analysis should have included the potential for future potable use of groundwater by off-site users. Therefore, the Proposed Plan should be tabled until a properly comprehensive Risk Assessment for the Site is performed.

## 2. The Most Recent Groundwater Data Indicate a "Rebound" Effect on Contaminant Levels

According to the Proposed Plan (PP), sampling data gathered from previous investigations identified low level of volatile organic compounds (VOCs) in groundwater related to historical activities within Site 78, specifically at Building 91. The primary contaminants of concern (COCs) are cis-1,2-DCE (levels of contamination ranging as high as 480 ppb; NJDEP groundwater quality standard (GWQS): 70 ppb), vinyl chloride (levels up to 173 ppb; GWQS: 1 ppb); 1,1,1-TCA (up to 100 ppb; GWQS: 30 ppb); and TCE (up to 30 ppb; GWQS: 1 ppb). Although the Risk Assessment performed for the Army was only limited to potential on-site human receptors (and thus excluded any consideration of Pondview's potential future groundwater use), nevertheless the Army's analysis concluded that "under current conditions at Site 78, constituents [specifically vinyl chloride] in groundwater do pose an unacceptable risk to human health based on existing cancer risks and exceed applicable drinking water standards." *PP at 7.*

Despite this conclusion, the remedial alternative selected by the Army for Site 78 is monitored natural attenuation with institutional land use controls (i.e., a CEA). The Army justifies this passive approach to addressing the existing groundwater contamination largely on the basis of supposed significantly reduced levels of COCs in groundwater after in-situ treatment. However, the results from the most recent sampling performed in 2007 reflect higher levels of DCE and vinyl chloride observed at two key downgradient monitoring wells (MW-003 and MW-005) than during the previous sampling event.

Rather than demonstrating continuing chlorinated VOC breakdown from natural attenuation as the Army suggests, the recent groundwater data appears to indicate that some rebound effect is occurring in the plume area. Rebound effect is a relatively common occurrence with in-situ treatment technologies. (See, e.g., Jacobs and Testa, 2003; Richardson et al., 2002; Smith et al., 1998; Smith et al., 2000.) Thus, at present, the most recent groundwater data does not provide conclusive support for natural attenuation. Therefore, before opting for a natural attenuation remedy based upon incomplete data, the Army should appropriately undertake additional

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<sup>1</sup> The abovementioned Court Order is appended hereto as Exhibit A, and explicitly requires Rockaway Township to sign, endorse and file with NJDEP the revised I Water Allocation Permit Application No. 5248

groundwater sampling at the aforementioned well locations, in order to better evaluate the effectiveness of the prior in-situ treatment phase and confirm whether or not natural attenuation of groundwater contamination is indeed continuing to occur.

3. The Army's Selected Remedy Does Not Best Achieve Remedial Action Objectives

As noted above, the remedial alternative selected is monitored natural attenuation (MNA) with institutional land use controls. According to the Army, this alternative will achieve compliance with groundwater RAOs within 13 years. *PP at 14*. The Army contends that MNA is the most appropriate remedy for the groundwater plume at Site 78 because it achieves the stated remedial action objectives (RAOs) for Site 78 of (1) overall protection of human health and the environment and (2) compliance with applicable environmental standards; while additionally providing the best balance of trade-offs relative to the various balancing criteria. *PP at 15*.

However, despite the justification provided by the Army, the selected remedy falls short of meeting certain criteria under the provisions of CERCLA Section 121(b) used to evaluate the appropriateness of remedial action alternatives. The Army's selected alternative (1) is not as protective of human health and the environment as other options not chosen, because it will take a longer time (6-7 years) to achieve compliance with applicable groundwater and drinking water standards; (2) does not utilize alternative treatment technology; and (3) does not satisfy the preference for treatment as a principal element.<sup>2</sup> Given that the other alternatives would have achieved compliance within 7 years (as opposed to 13), it is significant that there is no discussion in the PP -- and apparently no analysis was undertaken -- as to the increased risk of human exposure to groundwater contamination that would still remain at levels exceeding applicable standards during years 7 through 13 of the Army's selected remedy.

The public should be disappointed by the realization that the Army rejected two other remedial alternatives that would each entail continued in-situ chemical treatment of the groundwater plume. Either alternative would have resulted in achieving drinking water standards 6 to 7 years sooner than the Army's selected alternative at only a modest increase of \$44,000 or \$170,000 in the respective estimated cost of each option. The Army's stated difficulty in implementing the other active treatment technologies due to potential adverse impact on the isolated wetlands in the remediation area does not seem to justify the trade-off, but rather appears to largely come down to comparative costs.

Given the selected remedy's deficiencies set forth above, including but not limited to the failure to (1) perform an adequate risk assessment; (2) evaluate whether groundwater levels for COCs used to justify MNA were subject to a rebound effect; and (3) fully satisfy the statutory requirements of

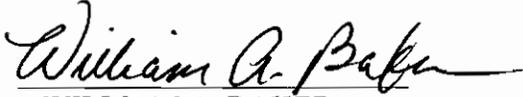
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<sup>2</sup> To the extent that the Army may be seeking to rely on the prior employment of sodium lactate injections in a 2004 pilot study as a basis for satisfying the latter two criteria, which are intended to be used in connection with the evaluation of a future response action, this approach would appear to be inconsistent with CERCLA requirements.

May 13, 2010  
Page 4

CERCLA §121(b), Pondview urges that the Army's Proposed Plan for Site 78 Groundwater be rejected or modified appropriately to address these concerns.

Very truly yours,



WILLIAM A. BAKER  
For the Firm

WAB:pd  
Enclosure

cc: William Roach, USEPA Region II (w/enc.)  
Gregory Zalaskus, NJDEP Site Remediation Program (w/enc.)  
Pondview Estates, Inc. (w/enc.)

**FILED**

MAY 03 2010

**B. THEODORE BOZONELIS, A.J.S.C.  
JUDGE'S CHAMBERS  
MORRIS COUNTY COURTHOUSE**

**PORZIO, BROMBERG & NEWMAN, P.C.**  
100 Southgate Parkway  
Morristown, NJ 07962-1997  
(973) 538-4006  
Attorneys for Plaintiff,  
Pondview Estates, Inc.

PONDVIEW ESTATES, INC., a New Jersey Corporation,

Plaintiff,

v.

TOWNSHIP OF ROCKAWAY, a Municipal Corporation, a Municipal Corporation, PLANNING BOARD OF THE TOWNSHIP OF ROCKAWAY, and BOARD OF ADJUSTMENT OF THE TOWNSHIP OF ROCKAWAY,

Defendants.

SUPERIOR COURT OF NEW JERSEY  
LAW DIVISION: MORRIS COUNTY

DOCKET NO. MRS-L-230-07

CIVIL ACTION

ORDER

THIS MATTER having been opened to the Court by Porzio, Bromberg & Newman, P.C., attorneys for plaintiff, Pondview Estates, Inc. ("Pondview"), on notice to The Buzak Law Group LLC, attorneys for defendants, the Township of Rockaway ("Township"), the Planning Board of the Township of Rockaway ("Planning Board"), and the Board of Adjustment of the Township of Rockaway ("Board of Adjustment") (collectively, the "Defendants"), by way of Motion to (1) compel Rockaway to consent to, endorse and file the requisite revised formal Water Allocation Permit Application No. 5248 with the New Jersey Department of Environmental Protection ("NJDEP") *at both the full and reduced pumpage rate* (2) modify the prior condition of land use approval that was granted by Pondview by eliminating the condition of providing excess water to the Township from on-site wells; and (3) modify the prior condition of land use approval so as to allow the Pondview site to be served by any combination of water from the Rockaway Township

water system, other municipal utility authorities, neighboring municipalities and/or on-site wells; and the Court having previously entered Orders of April 18, 2008 Order and May 9, 2008 concerning Water Allocation Permit Application No. 5248 and the Hydraulic Barrier System Pilot Test Report; and the Court having considered the pleadings on file, the papers submitted for and against said Motion, and the argument of counsel; and for the reasons set forth on the record by the Court at the April 16, 2010 motion hearing; and for good cause shown,

IT IS, therefore, on this 3 day of May, 2010,

ORDERED that Pondview's motion to compel the signing, consent to, endorsement and filing by Rockaway with the NJDEP of the requisite revised Water Application Permit ("WAP") Application No. 5248 at the full and approved pumpage rate of 1.26 million gallons per day is granted in accordance with the Court's previous Orders of April 18, 2008 and May 9, 2008; and it is further

ORDERED that if the Township fails to sign, consent to, endorse and file with the NJDEP the requisite revised WAP Application for the full and approved pumpage rate of 1.26 million gallons per day by May 17, 2010, Pondview may file such WAP Application for the full and approved pumpage rate of 1.26 million gallons per day with the NJDEP and the NJDEP shall consider such WAP Application as consented to, endorsed and filed by the Township of Rockaway pursuant to this Order and the Court's previous Orders of April 18, 2008 and May 9, 2008; and it is further

ORDERED that the Township shall cooperate with Pondview in providing those items necessary for such WAP Application at the full and approved pumpage rate of 1.26 million gallons per day that are in the Township's possession, custody and/or control, including:

- (a) Proof of Meter Calibration for each source;

- (b) Current Water Conservation and Drought Management Plan;
- (c) List of all contracts with other municipalities or water companies to supply or purchase water;
- (d) List of municipalities to be supplied with water and a map of the service area when not restricted by established municipal limits; and
- (e) List of interconnections, size of each interconnection, and the water system serviced.

and it is further

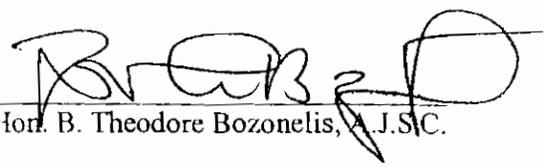
ORDERED that Pondview's motion to compel the Township to sign, consent to, endorse and file with the NJDEP a WAP Application for the reduced pumpage rate of .33 million gallons per day needed to serve only the Pondview Site is denied as premature; and it is further

*\* for lack of jurisdiction because of no showing of changed circumstances*  
~~ORDERED~~ that Pondview's motion to modify the prior condition of its land use

approvals to eliminate the condition of providing excess water from on-site wells to the Township is denied as ~~premature~~ *without prejudice*, and it is further

ORDERED that Pondview's motion to modify the prior condition of its land use approvals to allow the Pondview site to be served by any combination of water from the Township of Rockaway's water system, other municipal utility authorities, neighboring municipalities and/or on-site wells is denied without prejudice; and it is further

ORDERED that a copy of the within Order shall be served upon all counsel <sup>*and*</sup> within 7 days from receipt of this entered Order. *and the Special Master*

  
 Hon. B. Theodore Bozonelis, A.J.S.C.

*Form of order settled on review of objections*