



Picatinny Installation Restoration Program

Picatinny is an Official Hawk Watch Site

**NO FURTHER ACTION WITH MONITORING
OF LAND USE
RECORD OF DECISION
FOR
PICA-096 (Sites 10, 27, 69, 117, 119, 120,
121, 123, 134, 136, 145, 164, 172, 174, 175,
176, 177, 185, 186, and PICA Site 208)
AND NO FURTHER ACTION FOR PICA-096
(Site 60)**

**PICATINNY ARSENAL
NEW JERSEY**

FINAL

NOVEMBER 2014

TABLE OF CONTENTS

<i>Section</i>	<i>Page</i>
1.0	PART 1: DECLARATION 1-1
1.1	SITE NAME AND LOCATION 1-1
1.2	STATEMENT OF BASIS AND PURPOSE 1-1
1.3	DESCRIPTION OF THE SELECTED RESPONSE ACTION – NO FURTHER ACTION DECISION 1-2
1.4	STATUTORY DETERMINATIONS 1-3
1.5	AUTHORIZING SIGNATURE 1-3
2.0	PART 2: DECISION SUMMARY 2-1
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 Investigations 2-2
2.2.3	Enforcement Activities 2-2
2.3	COMMUNITY PARTICIPATION 2-2
2.4	SCOPE AND ROLE OF RESPONSE ACTION 2-2
2.5	SITE CHARACTERISTICS 2-3
2.5.1	Physical Characteristics 2-3
2.5.2	Summary of Site Information 2-4
2.6	CURRENT AND POTENTIAL FUTURE LAND USE 2-11
2.7	SUMMARY OF SITE RISKS 2-12
2.7.1	Area D Sites 2-13
2.7.2	Area F Sites 2-14
2.7.3	Area G Sites 2-15
2.7.4	Area J Site 2-16
2.7.5	Area K Sites 2-16
2.7.6	Area L Sites 2-17
2.7.7	Area N Sites 2-18
2.7.8	Area O Site 2-18
2.7.9	Area P Sites 2-18
2.8	DOCUMENTATION OF SIGNIFICANT CHANGES TO THE PREFERRED RESPONSE ACTION FROM THE PROPOSED PLAN 2-20
3.0	PART 3: RESPONSIVENESS SUMMARY 3-1
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 3-8

	3.2 TECHNICAL AND LEGAL ISSUES	3-11
4.0	PART 4: REFERENCES.....	4-1

LIST OF TABLES

Table

1	CHRONOLOGY OF ENVIRONMENTAL INVESTIGATIONS
2	SUMMARY OF SITE RISK EVALUATION
3	SUMMARY OF SITE RISK

LIST OF FIGURES

Figure

1	SITE LOCATION MAP
2	PICATINNY SITE LOCATION MAP
3	LAYOUT OF SITE 69
4	LAYOUT OF SITE 117
5	LAYOUT OF SITE 123
6	LAYOUT OF SITE 60
7	LAYOUT OF SITE 145
8	LAYOUT OF SITE 134
9	LAYOUT OF SITE 136
10	LAYOUT OF SITE 185
11	LAYOUT OF SITE 175
12	LAYOUT OF SITE 172
13	LAYOUT OF SITE 174
14	LAYOUT OF SITE 186
15	LAYOUT OF SITE 176
16	SITE 177 BUILDING 3500 SEWER LINE INVESTIGATION
17	SITE 177 BUILDING 600 SEWER LINE INVESTIGATION
18	SITE 177 BUILDING 3100 SEWER LINE INVESTIGATION
19	SITE 177 BUILDING 1300 SEWER LINE INVESTIGATION
20	LAYOUT OF SITE 10
21	LAYOUT OF SITE 164
22	LAYOUT OF SITE 27
23	LAYOUT OF SITE 119
24	LAYOUT OF SITE 120
25	LAYOUT OF SITE 121
26	LAYOUT OF PICA SITE 208

LIST OF APPENDICES

Appendix

- A CERTIFICATE OF PUBLICATION FOR PUBLIC NOTICES
- B ADDITIONAL QUALITATIVE RISK ASSESSMENT SCREENING EVALUATIONS FOR SELECT SITES—69, 60, 176, 164, 174, 27, 172, 175, AND 185
- C QUALITATIVE HUMAN HEALTH RISK ASSESSMENT FOR SITES 119, 120, AND 121

LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit	kg	kilogram
ARAR	Applicable or Relevant and Appropriate Requirement	LLBF	Little League Baseball Field
Army	U.S. Department of the Army	LOC	Level of Concern
AASF	Army Aviation Support Facility	mg/kg	milligrams per kilogram
ANL	Argonne National Laboratory	mg/l	milligrams per liter
ARDEC	U.S. Army Armament Research, Development, and Engineering Center	msl	mean sea level
Army	U. S. Department of the Army	NCP	National Oil and Hazardous Substances Pollution Contingency Plan
AST	Aboveground Storage Tank	NJ	New Jersey
bgs	below ground surface	NJDEP	New Jersey Department of Environmental Protection
BSB	Bear Swamp Brook	NPL	National Priorities List
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980	NRC	Nuclear Regulatory Commission
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Identification System	PAERAB	Picatinny Arsenal Environmental Restoration Advisory Board
CFR	Code of Federal Regulations	PA	Preliminary Assessment
COPC	Constituent of Potential Concern	PAH	Polycyclic Aromatic Hydrocarbon
DEH	Division of Engineering and Housing	PCB	Polychlorinated biphenyl
Department	New Jersey Department of Environmental Protection	Picatinny	Picatinny Arsenal
DERP	Defense Environmental Restoration Program	PP	Proposed Plan
DU	Depleted Uranium	RA	Response Action
ELCR	Excess Lifetime Cancer Risk	RCRA	Resource Conservation and Recovery Act
EPA	Environmental Protection Agency	RDCSRS	Residential Direct Contact Soil Remediation Standards
ERA	Ecological Risk Assessment	RI	Remedial Investigation
FFA	Federal Facility Agreement	ROD	Record of Decision
FFS	Focused Feasibility Study	SARA	Superfund Amendments and Reauthorization Act of 1986
ft	Feet	SI	Site Investigation
FUSRAP	Formerly Utilized Sites Remedial Action Program	SLERA	Screening Level Ecological Risk Assessment
GIS	Geographic Information System	SRS	Soil Remediation Standards
GPB	Green Pond Brook	SVOC	Semi-Volatile Organic Compound
HHRA	Human Health Risk Assessment	TR	Transformer
HI	Hazard Index or Indices	USEPA	U.S. Environmental Protection Agency
HQ	Hazard Quotient	UST	Underground Storage Tank
ICFKE	ICF Kaiser Engineers, Inc.	WWI	World War I
		WWII	World War II

1.0 PART 1: DECLARATION

1.1 SITE NAME AND LOCATION

Picatinny Arsenal (Picatinny) formally designated as U.S. Department of the Army (Army), Installation Management Command, Northeast Region, Garrison Office, is located in north central New Jersey in Morris County near the city of Dover. Picatinny 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. The Army signed a Federal Facility Agreement (FFA) with the U.S. Environmental Protection Agency (USEPA) in 1991. The Army is authorized to achieve compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) through the Defense Environmental Restoration Program (DERP) and Executive Order 12580.

This Record of Decision (ROD) addresses surface and subsurface soil at 21 Picatinny sites. Surface water and sediment are addressed at a limited number of sites where surface water sediment was present. Groundwater at these sites is generally addressed as part of another site (Area D Groundwater (PICA-076) [Army, 2004] and Mid-Valley Groundwater (PICA-204) [Army, 2012]). The individual site background sections provide details on which media are addressed by this ROD. Generally, Picatinny sites have two numbers assigned to them. The "Site" numbers are individual, unique identifiers for each site that were assigned during the Site Investigation (SI)/Remedial Investigation (RI) phase of work. The "PICA" numbers were assigned to individual sites or to groups of sites in order for the Army to track progress on environmental sites on a national basis in the Army Environmental Database – Restoration Module; therefore, several sites could have the same "PICA" number. This ROD generally uses the Site number to identify the area being discussed; however, figures and tables may reference both numbers for consistency between documents. In addition, one site has only a "PICA" number assigned to it, and is referred to as PICA Site 208 throughout this ROD. To ensure that the areas with the greatest potential for environmental contamination were addressed first, the Army categorized the 16 parts of the base into Areas labeled A (greatest potential) through P (least potential). The Army further categorized these Areas into three phases. Phase I included Areas B through G, Phase II included Areas H through K, and Phase III included Areas L through P. One PICA site (PICA-096) addressed in this ROD includes 21 sites located within Areas D, F, G, J, K, L, N, O, and P, as designated in the Argonne National Laboratory (ANL) RI Concept Plan (ANL, 1991).

The RI study sites addressed herein are as follows: three sites in Area D (69, 117, and 123); two sites in Area F, (60 and 145); three sites in Area G (134, 136, and 185); one site in Area J (175); three sites in Area K (172, 174, and 186); two sites in Area L (176 and 177); one site in Area N (10); one site in Area O (164); and five sites in Area P (27, 119, 120, 121, and PICA Site 208).. These sites and potential response actions (RAs) were evaluated in the Focused Feasibility Study (FFS) (Shaw, 2010). The recommended response action was presented in the 26 Site Proposed Plan (PP) (ARCADIS, 2014a), which includes the 21 sites discussed in this ROD, and presented at the public meeting on June 11, 2014.

Area D is located in the west-central portion of Picatinny. Area F and G are also located in the west-central portion of Picatinny, southwest of Lake Picatinny. Area J is located in the eastern portion of Picatinny, and south of Lake Denmark with Area K located to the west. Area L is located near the southeast border of Picatinny. Area N is located in northern portion of Picatinny. Area O consists of Lake Denmark on the eastern border. Area P is located in the southwestern corner of Picatinny. **Figure 1** presents the site locations.

1.2 STATEMENT OF BASIS AND PURPOSE

This ROD for 21 Picatinny sites presents the RA selected for the sites. The RA is selected in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), and the 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 USEPA. The NJDEP concurs with the selected RA.

1.3 DESCRIPTION OF THE SELECTED RESPONSE ACTION – NO FURTHER ACTION DECISION

No further remedial action is necessary for Sites 10, 27, 69, 117, 119, 120, 121, 123, 134, 136, 145, 164, 172, 174, 175, 176, 177, 185, 186, and PICA Site 208; however, annual monitoring of land use is required at these 20 sites, as they cannot be released for unrestricted use. No action is necessary at Site 60, which can be released for unrestricted use.

For the current and reasonably anticipated future use scenarios at these sites, the cumulative human health risk assessment (HHRA) cancer risks for human receptors are within or below USEPA's generally acceptable target risk range of 1E-06 to 1E-04. Cumulative non-cancer hazard indices (HIs) for all receptors are less than 1, indicating that adverse noncarcinogenic effects are not likely to occur. In several cases a risk assessment was not conducted because no analytes exceeded the non-residential screening levels and no constituents of potential concern (COPCs) were selected.

No unacceptable ecological risks were identified at these sites. In several cases, an ecological risk assessment was not conducted because there were no concentrations exceeding ecological screening values and/or the site did not provide significant habitat for ecological receptors. For several sites, the conclusion of no significant risk to ecological receptors is contingent on maintaining the land use as military/industrial consistent with the assumptions in the ecological risk assessment.

Existing controls will be monitored and maintained to ensure protection of human health and the environment, including: Picatinny access regulations, Picatinny safety program, Army military construction program development and execution, site clearance/soil management procedures, munitions and explosives of concern clearance procedures, and Picatinny Installation Master Plan environmental notations, which includes the Picatinny Geographic Information System (GIS) Database that shows the boundaries of land-use restrictions.

To ensure the existing land use remains intact, the Army will conduct annual monitoring. Sites will be visited each year to monitor existing land use, and the Picatinny Master Plan will be reviewed to identify planned future land uses for the sites. The physical site inspection, photographs, and review of land use will be summarized and certified to the USEPA annually. The certification will state that all sites remain military/industrial, that existing controls which prevent unrestricted use remain in place, and that the selected No Further Action remedy remains protective of human health and the environment. CERCLA 5-Year Reviews will be performed and summarize the results of the monitoring, certifying that land use at these sites remained protective of human health. The Army will also notify the USEPA 45 days in advance of any proposed land use changes that are inconsistent with the risk assessment assumptions (military industrial land use). If future land use changes and additional RAs are required to address a risk associated with that land use change, any dispute regarding the extent or scope of that RA will be settled between the USEPA and the Army under the dispute resolution clause of the FFA.

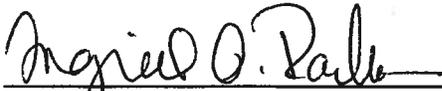
Radiological parameters were evaluated at Site 117 and 208 and data was included in the risk assessments. The proposed remedy is protective of human health and the environment for the current and reasonably anticipated future land use. Given the radiological detections at Sites 117 and 208, the Sites are included in the Formerly Utilized Sites Remedial Action Program (FUSRAP) and must meet certain requirements to be removed from the Nuclear Regulatory Commission permit. New Jersey Department of Environmental Protection (NJDEP), who oversees the closure of FUSRAP sites, cannot make a final decision on removing Site 117 and Site 208 from the permit until additional radiological sampling is completed. Additional sampling is planned and the NJDEP Bureau of Radiation will decide if the investigation is adequate with respect to radiological issues. Any additional data, such as this, will be reviewed as part of the CERCLA 5-Year Review to confirm the selected remedy remains protective of human health and the environment.

Site 60 is excluded from the monitoring reporting because it has acceptable residential risk (within 1E-06 and 1E-04) and HI (less than or equal to 1) and negligible ecological risk.

1.4 STATUTORY DETERMINATIONS

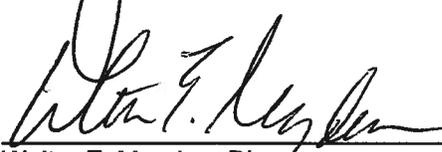
For these sites, the risks did not exceed the generally acceptable risk range (1E-06 to 1E-04) or HI of 1 for the existing and reasonably anticipated future land use (military/industrial). Therefore, there was no basis for action at these sites.

1.5 AUTHORIZING SIGNATURE



Ingrid A. Parker
Lieutenant Colonel, US Army
Commanding

4 Dec. 2014
Date



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

March 2, 2015
Date

2.0 PART 2: DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

This ROD describes the Selected RA for the 21 Picatinny Sites within PICA-096 located at Picatinny Arsenal in Rockaway Township, Morris County, New Jersey. Picatinny is an NPL site and is registered under the CERCLIS number NJ3210020704. The Army is the lead agency for CERCLA actions at these sites and USEPA Region 2 is the lead regulatory agency with oversight responsibilities. An FFA was signed, and the sites are being remediated as part of Installation Restoration Program/DERP. In addition, plans and activities are also 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 (**Figure 2**).

This ROD addresses the RA for the sites as follows: three sites in Area D (69, 117, and 123); two sites in Area F, (60 and 145); three sites in Area G (134, 136, and 185); one site in Area J (175); three sites in Area K (172, 174, and 186); two sites in Area L (176 and 177); one site in Area N (10); one site in Area O (164); and five sites in Area P (27, 119, 120, 121, and PICA Site 208). Area D is located in the west-central portion of Picatinny. Area F and G are also located in the west-central portion of Picatinny, southwest of Lake Picatinny. Area J is located in the eastern portion of Picatinny, and south of Lake Denmark with Area K located to the west. Area L is located near the southeast border of the facility. Area N is located in northern portion of Picatinny. Area O primarily consists of Lake Denmark on the eastern border of Picatinny. Area P is located in the southwestern corner of Picatinny. **Figure 1** presents the site locations.

The remedial action presented in this ROD was selected by the Army, in partnership with USEPA Region 2, in accordance with CERCLA, as amended by the SARA, and the NCP.

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 maximitite (a propellant). During World War I (WWI), Picatinny Arsenal produced all sizes of projectiles. In the years following WWI, Picatinny Arsenal began projectile melt-loading operations and began to manufacture pyrotechnic signals and flares on a production basis. During World War II (WWII), Picatinny Arsenal produced artillery ammunition, bombs, high explosives, pyrotechnics, and other ordnance. After WWII, Picatinny Arsenal's primary role became the research and engineering of new ordnance. However, during the Korean and Vietnam conflicts, Picatinny Arsenal resumed the production and development of explosives, ammunition, and mine systems.

In recent years, Picatinny Arsenal's mission has shifted to conducting and managing research 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.

Picatinny is not closed to the public but access to the Arsenal is strictly controlled. Trespassing and unauthorized activities on Picatinny are illegal. Picatinny has seven elements of site controls including Site Clearance and Soil Management Procedures; Munitions and Explosives of Concern Clearance Procedures; Master Plan Regulations; Picatinny GIS Database; Picatinny Base Access Restrictions; Picatinny Safety Program; and Army Military Construction Program Development and Execution. These controls have been developed with consideration of all reasonably anticipated land uses at the Arsenal including administrative and industrial military operations and outdoor recreation/golf course. The Picatinny Office of the Chief of Security Division and the Public Safety and Environmental Affairs Division are in charge of enforcing these regulations.

2.2.2 Site Investigations

Previous environmental investigations conducted for the sites addressed in this ROD are listed in **Table 1**.

The media at the following sites were not included because they were not identified as a media of concern or are addressed within other operable units as listed below. The data for these sites is included in **Appendix A** of the FFS (Shaw, 2010).

- Site 186 soil exposure is limited, and soil samples were not collected because soil was not determined to be a media of concern; dermal contact to groundwater was examined as the primary exposure route.
- Groundwater at Sites 69, 117, and 123 is addressed as part of the Area D Groundwater ROD (Army, 2004).
- Groundwater at Sites 10, 27, 60, 119, 120, 121, 134, 136, 145, 164, 172, 174, 175, 176, 177, 185, 186, and PICA Site 208 is addressed as part of the Mid-Valley Groundwater ROD (Army, 2012).

2.2.3 Enforcement Activities

No formal enforcement activities have been conducted for the 21 Picatinny sites. Picatinny is working in cooperation with the USEPA and the NJDEP to apply appropriate remedies that will preclude the necessity of formalized enforcement actions, such as Notices of Violation.

2.3 COMMUNITY PARTICIPATION

The 21 Sites addressed in this ROD have 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 Final PP (ARCADIS, 2014a) was given to the PAERAB's co-chair, and a copy was offered to all PAERAB members. The Final PP for these sites was completed and released to the public on June 2, 2014 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 May 25, 2014 and the Star Ledger on May 28, 2014. Copies of the certificates of publication are provided in **Appendix A**. A public meeting was held on June 11, 2014 to inform the public about all of the remedial alternatives considered and the Selected RA for the 21 Sites and to seek public comments. At this meeting, representatives from the U.S. Army, NJDEP, USEPA, and the Army's contractor, ARCADIS, were present to answer questions about the site and RAs under consideration. Following the public meeting, a public comment period was held from June 2, 2014 to July 2, 2014 during which written comments were received from NJDEP and the public. Comments and prepared responses from the public meeting 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 the 21 Sites within PICA-096, including sites: 10, 27, 60, 69, 117, 119, 120, 121, 123, 134, 136, 145, 164, 172, 174, 175, 176, 177, 185, 186, and PICA Site 208.

The selected RA for each of the 21 Sites is based on the environmental investigations that have occurred at each site, and the results of the risk assessments to address potential human and ecological exposures as defined in the scopes of work established for these sites. The environmental investigations conducted at each site are summarized in the following section (Section 2.5), and the risk assessments are summarized in Section 2.7. As described in Section 2.7, the human health risk assessments followed a prescribed approach that included conducting a qualitative risk-screening evaluation, whereby concentrations of analytes in environmental media were compared to risk-based levels of concern (LOCs) established at the time the assessments were completed. The LOCs are described in the administrative record for these sites as being based on a variety of criteria, including New Jersey (NJ) Soil Remediation Standards (SRS) (residential and/or nonresidential), USEPA Region screening criteria (Region 3 RBCs, Region 9 PRGs, Regional Screening Levels), and background levels. At each site, the detected concentrations were compared to the LOCs. If all detected concentrations at a particular site were below the LOCs, the conclusion of the qualitative risk-screening assessment was that no quantitative HHRA was needed. Furthermore, although the future use of the Picatinny Arsenal is for nonresidential purposes, if the qualitative risk-screening evaluation demonstrated that concentrations were below LOCs protective of residential exposures (e.g., NJ residential Direct Contact Soil Remediation Standards [RDCSRS]), the site met the criteria for future unrestricted site use (e.g. residential use) and was so defined as the response action for the purpose of this ROD. If the qualitative risk-screening evaluation demonstrated that site concentration(s) exceeded the LOC(s), a quantitative human health risk assessment was needed and the conclusions from that assessment were used to determine the ultimate response action for this ROD. Table 2 presents a summary of qualitative risk-screening assessments obtained from the administrative records for these sites. The last column in this table documents the conclusions of the qualitative risk-screening conducted at each site. Table 3 presents a summary from the administrative record of the quantitative risk assessments conducted at those sites where such an assessment was required based on the results of the qualitative risk-screening assessments.

At sites with adequate data about the potential nature and extent of impacts and where the qualitative risk-screening assessment or the quantitative risk assessment indicates no significant risk of potential harm to future hypothetical residents, a determination of "No Further Action" is appropriate. At sites where the results of the qualitative risk-screening assessment or the quantitative risk assessment indicate no significant risk of potential harm receptor groups other than residents, a determination of "No Further Action with Monitoring of Land Use is appropriate. Additional qualitative risk evaluations were conducted at some sites at the request of USEPA to determine if site conditions meet the requirements of unrestricted use using current LOCs because either only qualitative risk assessments were conducted previously or because some data were not included in the previous quantitative risk evaluation due to the availability of more recently collected data. These supplemental qualitative risk assessments are presented in **Appendix B** (Sites 69, 60, 174, 176, and 164) and **Appendix C** (Sites 119, 120, and 121).

The Selected RA for Sites 69; 10; 27; 117; 119; 120; 121; 123; 134; 136; 145; 164; 172; 174; 175; 176; 177; 185; 186; and PICA Site 208 is No Further Action with Monitoring of Land Use, which will ensure that the land use remains military/industrial. The Selected RA for Site 60, is No Further Action. The Selected RA for these sites is designed to provide protection to human health and the environment.

2.5 SITE CHARACTERISTICS

2.5.1 Physical Characteristics

Size, Topography, and Geology/Hydrogeology

Picatinny consists of 5,900 acres of improved and unimproved property. Picatinny is located in an elongated, U-shaped valley between Green Pond Mountain and Copperas Mountain to the northwest and an unnamed hill to the southeast. Most of the buildings and other facilities at Picatinny are located on the valley floor or on the slopes along the southeast side of the property. Several firing and testing ranges are located on Green Pond Mountain.

Picatinny lies within Green Pond Valley, a glaciated river valley bounded by Green Pond Mountain to the northwest and Copperas Mountain to the southeast. Elevations at Picatinny range from approximately 1,000 feet (ft) above mean sea level (msl) to 700 ft above msl at Green Pond Brook (GPB) at the

southern boundary. Green Pond Valley is filled with glacially-derived sediments surrounded and underlain by bedrock. The basement rocks are faulted by a series of northeast/southwest trending faults.

The principal source of groundwater in the Green Pond Valley is found in the glacial deposits filling the valley floor. The low-permeability and the steep slopes of Green Pond Mountain and Copperas Mountain restrict infiltration of precipitation in these mountains. As a result, most precipitation flows overland and into the permeable valley fill deposits in the valley center. The small amount of precipitation that enters Green Pond and Copperas Mountains flows down through shallow fractures to the glacial sediments in the valley. Groundwater beneath Picatinny is classified as Class IIA (potable water or water potable after conventional treatment).

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 degrees Fahrenheit (°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 five miles east of Picatinny is 48 inches and is evenly distributed throughout the year.

2.5.2 Summary of Site Information

The background information presented below for each of the individual sites addressed in this ROD is derived, modified and summarized from the information presented in the FFS (Shaw, 2010) which summarizes the information from the documents listed in **Table 1** "Chronology of Environmental Investigations" and from the Final Remedial Investigation Concept Plan for Picatinny Arsenal. Site descriptions presented in this ROD were updated based upon site visits conducted in June 2014 and from information in the Army's current building use database. Much of the site background is the same information that was the basis of the follow-on site inspections, remedial investigations and removal actions.

Area D Sites

Area D is flat with elevations ranging from approximately 695 to 715 ft above msl. Surface water runoff is minimal, as precipitation on the golf course and other undeveloped grassy portions of Area D infiltrates into the ground. Storm drains leading to Bear Swamp Brook (BSB) before it reaches GPB control surface water runoff.

Area D geology consists of the Leithsville Dolomite, which is overlain by glacial sediments. Glacial sediments range in thickness from approximately 100 to 250 ft. Recent swamp deposits occur in the northwest portion of Area D and are represented by organic clays and muck up to 5-ft thick.

Groundwater beneath Area D is contaminated with solvents and is the subject of a separate ROD (Army, 2004) with an approved remedy in place. The groundwater action assessed the possibility of continuing sources associated with soil contamination and determined that there are no continuing sources for groundwater contamination.

Site 69

Site 69 consists of Building 92 and is located in Area D, an industrial area of Picatinny (**Figure 3**). The building is surrounded by paved streets and buildings on three sides, with the Picatinny golf course located directly to the southwest. Building 92 currently houses a physics laboratory and administrative offices. From 1969 until 1982, Building 92 conducted quality assurance testing of painted and anodized coatings. Laboratory wastewater, which included metals, spent acids and solvents, were discharged to a concrete underground storage tank (UST) formerly located outside the building. In 1989, fuel oil was detected in the UST. Absorbent pads were used to collect the oil. Groundwater for this site is being handled under the approved ROD for Area D groundwater.

Site 117

Building 22 was built in 1918, and was located in the middle of the central manufacturing area, along BSB in Area D (**Figure 4**). Buildings 22 and 22A have since been demolished, but the historical activities conducted at Building 22 are discussed herein. Precision machining activity was conducted at Building 22 until 1986 (Dames and Moore, 1998). Activities conducted at Building 22 included machining of depleted uranium (DU) from 1965 to 1988 and machining of other metals such as aluminum, copper, etc. to manufacture appurtenances for antitank weapons, rocket launchers and explosive antitank shells. The nature and quantity of wastes generated and the former waste management practices at Building 22 are unknown. Additionally, former Building 22A, adjacent to and west of Building 22, may have been used for the storage of raw materials and wastes such as solvents and pneumatic/hydraulic oils prior to their usage/disposal. Limited information is available on any past spills and release incidents that occurred at Site 117. Groundwater for this site is being handled under the approved ROD for Area D groundwater.

Site 123

Building 64 is located along the southern bank of BSB, between Third and Fourth Streets in Area D (**Figure 5**). Building 64 is currently listed as an ordnance building in the Army's current building use database. The building was constructed in 1942 and has housed various activities including: an ordnance shipping building, a cutting oils storage area, a nuclear material operation building, and a mechanical shop for performing drilling, metal cutting operations, encapsulation and decapsulation of electronic and mechanical components, and metal plating operations.

Metal plating operations were conducted until mid-1961. Various chemicals including solvents and corrosives were used in the plating operations conducted at Building 64. These included: sodium dichromate, caustic soda, chromic acid, phosphoric acid, oxalic acid, sulfuric acid, degreasing solvents (i.e., chlorinated solvents such as trichloroethene, 1,1,1-trichloroethane and cadmium/cyanide based compounds). No information is available on the nature, quantity, or disposal methodology of the treated wastewaters from the metal plating operations. During an interview conducted by ANL, Picatinny personnel reported that when Building 64 was used as a metal plating shop, flow in BSB adjacent to Site 123 was green and brownish red (ANL, 1991). Additionally, available documents from July 1960 indicate that the neutralization system located outside Building 64 was leaking (Wilford, 1960). The above information suggests that release of wastewater into BSB occurred during this period. Currently, there are no known discharges to BSB. BSB is the subject of a separate ROD and has an approved remedy in place. After the termination of the plating operations, all plating tanks were reportedly drained and washed.

Area F Sites

Historical operations in Area F included an explosives laboratory, a photography laboratory, a projectile loading facility, and an explosive, propellant, and pyrotechnic mixing laboratory.

Area F is located southwest of Lake Picatinny and bounded to the northwest by Green Pond Mountain and to the southeast by an unnamed ridge. GPB flows southwest out of Picatinny Lake through portions of Area F.

Site 60

Building 163 was constructed in 1942 as a high explosives laboratory. The building has been used as a photography laboratory since 1961. Building 163, located in Area F, is presented on **Figure 6**.

The photography laboratory in Building 163 historically generated approximately eight gallons each of developer and bleach/fixer per month as well as four gallons each of black-and-white fixer and stop bath solution. Prior to 1984, these waste streams were drained, via a 2-inch polyvinyl chloride pipe, from two sinks within Building 163 to a 1,000-gallon concrete UST located adjacent to the north corner of the Building. The UST was not used after 1984 and was removed in 1991. The photo processing containers are no longer stored at Building 163. Groundwater for this site is being handled under the approved ROD for Mid-Valley groundwater.

Site 145

Building 477 was constructed in 1945 for use in medium caliber projectile loading activities. Building 477 is currently identified as an ordnance building in the Army's current building use database. The location of Building 477 is presented on **Figure 7**.

Historically, explosives contaminated wastewater was generated daily at Building 477 from the washdown of machines and walls following loading activities and from dust control devices. The wastewater was discharged to a sand filter. This sand filter was located near the northeast corner of the building and was contained within a stone masonry settling pit, which drained to GPB. In 2004, the wooden filter box and its contents were removed from the settling pit. There are no known discharges to GPB, currently. Groundwater for this site is being handled under the approved ROD for Mid-Valley groundwater.

Area G Sites

Area G is located to the west of Area F and GPB. Historically, laundry, waste storage, vehicle maintenance, research and development, and metallurgical operations were performed in this area.

Site 134

Building 302, with a floor area of approximately 37,757 square ft, is a two-story brick wall building with a concrete foundation. The building is equipped with asphalt flooring and roof trusses covered with lumber planks. The location of Building 302 is presented on **Figure 8**. Building 302 is currently identified as a precision machine shop in the Army's building use database.

Building 302 was constructed in 1905 as a maintenance and service shop. Initially, three separate warehouse buildings (former Buildings 61, 62 and 63) occupied the Building 302 area. These three warehouses were combined together and were referred to as 302A, B, and C. In 1937, two wings were added to the east side of the building and the building was renamed Building 302. In the years that followed, small warehouse structures (Buildings 302-B, 302-C, and 302-E) were constructed along the eastern boundary of Site 134 as auxiliary storage sheds for Building 302.

Building 302 has housed two different divisions of the U.S. Army Armament Research, Development, and Engineering Center (ARDEC) – the Division of Engineering and Housing (DEH) and the Logistic Management Division. These divisions operated and maintained various shops including a tin shop, paint shop, machine shop, and millwright shop. Vehicle maintenance operations have been conducted in the millwright shop, located in the northern corner of Building 302. Available documents also indicate that portions of this building may have been used as a laundry facility to wash explosive-contaminated clothing.

Detailed information on the past waste management practices adopted at Building 302 is not available. Due to the nature of activities conducted at Building 302, the wastes generated have predominantly included waste oils (lubricating, hydraulic, TR), solvents, and paints. According to Picatinny personnel, in the past (at least until the early 1980s), a disposal pit adjacent to Building 303 was used to bury waste oil and metal parts. This disposal pit area was reportedly covered with asphalt. In the past (at least until the mid-1980s), the drummed waste from Building 302 was stored on the grounds adjacent to Building 305. In addition, washwater generated at Building 302 was collected in two large above ground holding tanks that were reportedly located adjacent to the southeastern perimeter of the building. The washwater was regularly emptied into a wetland area located southeast of the building. This wetland area emptied into a drainage ditch, which discharged into GPB. There are no known discharges to GPB, currently.

Three spills are known to have occurred at Building 302. One was a vehicle transmission fluid spill that occurred at Building 302. The DEH personnel reportedly cleaned this spill. The second was an herbicide spill that occurred from a contractor's tank truck at Site 134. According to Picatinny personnel, an oil spill also occurred at the facility in 1989-90 when an air compressor located adjacent to Building 302 malfunctioned. The oil flowed into the drainage path and ultimately discharged into GPB.

From November to December 2003, surface soil was excavated along the entire length and width of each of the three drainage ditches associated with this site to a depth of at least 1 ft. Post excavation samples were collected from the sidewalls and bottoms of each excavation, and an additional 6 inches was dug at one location (134EX1-B-4), where lead exceeded the LOC. The post excavation sample collected after this additional excavation was less than the LOC. The excavated soil was relocated and reused, with NJDEP and USEPA approval, to the 3500 building area at Picatinny to increase the existing grade for a

construction project. The soil was placed under building 3518. The FFS notes that controls will be put in place at Building 3518, which is part of a CERCLA site, to ensure that the soil is not exposed.

Groundwater for this site is being handled under the approved ROD for Mid-Valley groundwater.

Site 136

Building 355 was constructed in 1940 as a storehouse, although the types of materials that were stored in the building are unknown. Building 355 is a one-story hollow tile wall building built on a reinforced concrete foundation with a floor area of approximately 24,800 square ft. The building has a composite concrete/asbestos tile floor and a gable roof covered with corrugated asbestos steel sheeting. Building 355 is currently identified as a metallurgy lab with administrative and office space. Building 355 is presented on **Figure 9**.

Since the late 1960s, Building 355 has primarily housed the engineering division, the research and development division, physical sciences laboratories, and metallurgical laboratories. Various tests historically performed in the metallurgical laboratory within Building 355 included salt spray exposure tests, fracture tests, and mechanical tests. Additionally, Building 355 has housed a photography and x-ray laboratory for the analysis of fractured materials. According to Picatinny personnel, mechanical testing included fracture testing of DU specimens from approximately 1982 to 1993. However, the DU materials to be tested were reportedly always stored in Building 315 (Site 135). DU testing is not currently conducted. Small quantities (approximately 10 gallons per year) of corrosive wastewater and waste oil have been generated at Building 355. These wastes were temporarily stored at a satellite waste-accumulation area within Building 355 and later transported by waste haulers to an off-site disposal location. Soil containing mercury contamination identified during the Dames and Moore Phase I RI was delineated during the Phase I 2A/3A RI (Shaw, 2005) and removed in an interim removal measure conducted in 2003. Post-excavation results indicate no residual mercury contamination.

Groundwater for this site is being handled under the approved ROD for Mid-Valley groundwater.

Site 185

Site 185 encompasses former Building 350, built between 1938 and 1940. Building 350 was attached to former Building 352 by a long, narrow courtyard. Building 350 was used as the Concepts and Applications Laboratory, which included photography, electronics, dynamics, solid-state circuitry, ceramics, and optical laboratories. An acid drain filter, located in the western portion of the building, discharged wastewater from the sinks, fume hoods, and floor drain into a storm sewer north of the building. Sometime prior to 1971, Building 350 was converted to office space. The date of demolition of Building 350 is unknown, however it was after 2007. Since the demolition, a different building has been constructed at this site. The former Building 350 location is presented on **Figure 10**.

Area J Site

Historical operations in Area J are associated with helicopter support activities. Area J is located south of Lake Denmark and contains surface water fed by the Lake.

Site 175

Site 175 is frequently referred to as the Army Aviation Support Facility #2 (AASF #2), which is owned and operated by the New Jersey Army National Guard. The site, which is located in the southeastern portion of Picatinny in Area J, can be identified from aerial photographs as unimproved woodlands until the heliport was constructed in the late 1960s or early 1970s. Site 175 was a fenced area that included a helicopter maintenance and aviation building (Building 3801), a heliport, and three aboveground storage tanks (ASTs) (**Figure 11**). In 2005, use of the site as a helicopter aviation and maintenance facility was discontinued. Currently, the site is used for truck maintenance and storage.

Available documentation indicates that the helicopters supported at this site used JP-4 (65% kerosene, 35% gasoline) fuel. Helicopter parts were cleaned by dipping the parts into solvent or spraying the parts with circulating solvent. The contents of the solvent basin, located in Building 3801, were replaced approximately once a year. The wastes generated during helicopter maintenance were documented to include: helicopter waste oil (250 gallons per year), aviation fuel (360 gallons per year), and mineral spirit solvents (PD 680) (30 gallons per year). All wastes were reportedly liquid and stored in 55-gallon drums,

which were disposed at an appropriate off-site disposal facility. A 90-day outdoor drum storage area existed to the south of Building 3801, but this area underwent Resource Conservation Recovery Act (RCRA) Closure by Weston in October 1991.

Three ASTs exist at two locations within Site 175. The first location includes two 10,000-gallon JP-4 ASTs located southwest of Building 3801. The second location is northwest of Building 3801 and contains one #2 fuel oil 8,000-gallon AST. These ASTs were installed to replace three USTs previously at the site. According to Picatinny personnel, petroleum spills during product transfer and valve drips reportedly occurred at both locations frequently when the tanks were USTs. The two JP-4 USTs were upgraded to ASTs in 1994. The #2 fuel oil UST was upgraded to an AST in 1993.

Area K Sites

Area K is located in a heavily wooded area, east of Picatinny Lake. Area K was previously owned and operated by the Department of the Navy and is commonly referred to as Navy Hill. The area is currently active, although its uses have changed over the past 50 years.

An intermittent stream conveys surface water drainage from the far western portions of Area K both overland and through a series of underground pipes and culverts to GPB located to the northwest. The eastern portion of the area is predominantly swampland.

Site 172

Site 172 is located in the southeastern portion of Picatinny in Area K. Site 172 is located on an elevated ridge commonly referred to as Navy Hill. This area is currently an asphalt parking lot.

According to the 1991 ANL RI Concept Plan (ANL, 1991), Picatinny personnel reported that oil was purposely applied to the parking area (**Figure 12**) to prepare it for an inspection. Reportedly, many types of oil were applied to the asphalt. It is possible that some of the oil used contained PCBs.

Site 174

Site 174 is located on an elevated ridge commonly referred to as Navy Hill. The current building at Site 174, designated "3420", is an active pumping station and should not be confused with the old sewage treatment plant and supporting structures which have been demolished. A 1947 aerial photograph shows a pump station, at least two sludge holding tanks, and a square concrete structure partitioned into four sludge drying beds (**Figure 13**).

Site 174 accepted and processed all the runoff and wastewaters from the 3300 and 3400 series buildings for an unknown period of time. It is likely that it received laboratory chemicals, metals, pyrotechnics, propellants, and high explosives that were conveyed through building discharge points and surface runoff. According to Picatinny inspection reports, sewage spills of up to 5,000 gallons were common at the site. Treated water from Site 174 was conveyed underground in 2-ft diameter concrete pipes. Brick-lined sumps, approximately three ft deep, connected the concrete pipes, which conveyed the water from the various stages of treatment. The treated water discharged to a stream northeast of the site, which eventually flows to GPB in the central valley of Picatinny. The brick sumps and approximately 200 ft of associated piping were excavated and disposed of off-site in July 2003 as part of a facility-wide sump investigation.

Site 186

Building 3316 (**Figure 14**), was constructed for use as a vehicle maintenance facility. This building is currently identified as the recreational equipment checkout building.

When vehicle maintenance was conducted at this site, both garage bays contained a grease pit that discharged directly into the underlying soil. Wash water from the primary vehicle bay flowed into a gutter-type drain before it entered a dry well reportedly located under or south of the bay's outdoor concrete ramp. Facility personnel interviews indicated that used oil was repeatedly dumped into the drywell before the site was repaved. The main bay's floor channels were renovated (date unknown) in order to direct all wastewater into the sanitary sewer. Wastewater from the kitchen and perhaps clothes washing operations reportedly was discharged into a septic tank behind the firehouse and next to the Auto Craft Shop (Building 3315).

Area L Sites

Area L is located near the southeast border of the facility on the gently rising hillside and the unnamed ridge near the Mt. Hope entrance. Area L is bordered by the facility boundary to the southeast, Area F in Phase I to the northwest, and Areas I and K in Phase II to the north.

Robinson Run, a tributary of GPB, flows westward through the central portion of Area L and serves as the primary surface water discharge point in the central portion of Area L. Robinson Run originates from a spring/seep in a marshy headwaters area proceeds in a westerly direction. An unnamed intermittent tributary originating at Fisher's Pond feeds Robinson Run from the south.

Site 176

The Little League Baseball Field (LLBF), approximately 120 ft x 200 ft, is located in the northern portion of Area L bordered on the southwest by Walsh Road and the west by Schrader Road (Figure 15). This site is currently used for recreational activities that included soccer and baseball.

There is an inconsistency in the information regarding historical dumping of dredged material from GPB at Site 176. Dredge spoil material may have been dumped at either the LLBF (Site 176), or the Softball Fields (Site 163), or both. Reportedly, the material potentially disposed on this site was dredged from GPB in 1982. GPB has received waste streams from most operations at Picatinny, including sewage and industrial wastewater discharges, storm runoff, and discharge from a contaminated groundwater plume. Consequently, the dredged material from GPB potentially contained a variety of contaminants, such as, metals, explosives, base neutral/acid extractables, PCBs, and volatile organic compounds. In addition, for three years (specific timeframe unknown), materials were reportedly disposed of in pits at the site. However, it is unclear as to whether these materials were disposed of at this site or Site 163. If contaminated material was disposed at Site 176, it is not known if uncontaminated soil was placed to cover the contaminated material during the conversion of the site to a ball field.

Site 177

Site 177 is the Picatinny Sanitary Sewer Breaks/Leaks. The sanitary sewer system at Picatinny consists of vitrified clay, cast iron, asbestos cement and galvanized pipes. Due to the age of the facility, some of the sewer pipe is extremely old and, therefore, likely to have experienced cracks, sags, misalignments, and root infiltration. As a result, the soils and groundwater along the sewer lines may have become contaminated at points where the pipes cracked or leaked.

It should be noted that even before modern waste handling techniques were required, the sanitary sewer system at Picatinny was not routinely used to receive industrial waste. In many sections of the facility used for munitions production, there were no sanitary connections to the production buildings. Typically, the only building in a production area with a sanitary connection was the change house, which did not routinely handle hazardous materials. However, it is possible that the sanitary sewer system received hazardous material from other historical sources. A potential source would have been maintenance and laboratory facilities because these buildings were more likely to have sewer connections. The industrial waste inputs to the system are believed to be small scale. Another significant input to the system may have been from photograph developing operations. Historically, there are no complete records documenting the type and scale of these inputs.

Beginning in the late 1970s, an infiltration problem was identified in the sewer system. Picatinny moved to evaluate the scope of the problem and address it through re-lining pipes and replacing pipes. Many feet of pipes were replaced or upgraded during this process. As a result of this construction, rubble has been generated and subsequently deposited in the former location of Building 276 (Site 100, Area H, Phase II). This rubble consists primarily of broken concrete, asphalt, rocks and to a lesser extent soil, covering an area of approximately 20,000 square ft.

Due to the age and in some cases the type of material used in sewer line construction, there have been numerous spills and overflows of the sewer system. Many of the overflows, which occur at lift stations, are also the result of the age of the system. Due to a large amount of infiltration, rain events cause the system to receive flows beyond its capacity. In some cases, the pumps at lift stations fail and sewage is spilled onto the ground surface. Another common reason for spills is line blockage typically due to root intrusion. Over the years, there have been dozens of spills and overflows across the facility due to the

aforementioned reasons. The standard operating procedure for handling sewage overflows, while repairs are being accomplished, is to attempt to divert the spill from waterways and to treat the area with disinfectant after the spill has been stopped. It should also be noted that due to infiltration, sewage at Picatinny is typically dilute.

Figures 16 through 19 depict the sampling locations, which were selected by the New York District Army Corps of Engineers, the sanitary sewer repair manager.

Area N Sites

The former range referred to as Building 1242 is located west of Lake Denmark in the northwest mountainous region of Picatinny. The site is located on Green Pond Mountain and Copperas Mountain near the end of Gorge Road in an unused former testing area (Area N).

Site 10

The chemical burial pit is located adjacent to the Berkshire perimeter gate near the Picatinny boundary on the north side of Picatinny (**Figure 20**). Picatinny personnel indicated that containers of unknown chemicals were placed in the 25 ft x 25 ft x 5 ft pit. The containers were then covered with fill material, and concrete slab, either prefabricated or poured on-site, was placed over the fill. Other reports state that the pit was covered with rocks. Signs are present in the area, prohibiting excavation. Picatinny personnel stated that a mustard gas warning sign had been in place at the site. Exact dates of use of the chemical burial pit are not known, however, Picatinny personnel indicated that no material has been buried in the area for the past 30 years. Currently, the site is inactive. Another prominent site feature is an aboveground water line, coming from the southeast. This aboveground line was installed for fire safety and is empty until needed. Documentation regarding the chemical burial pit is limited; however, both cyanide and fluoroacetates have been repeatedly mentioned as chemicals buried in the pit.

Area O Site

Area O is a large area in the northern section of Picatinny, which is predominantly occupied by Lake Denmark.

Site 164

Building 1217 is located off the eastern side of Twenty-Fourth Avenue approximately 600 ft west of Lake Denmark in Area O (**Figure 21**). Constructed in 1944, Building 1217 was originally used as a storage magazine. It also functioned as a propellant processing facility in the mid-1980s, packaging surveillance propellant samples for testing at a separate facility. It is currently identified as a magazine storage facility in the Army's building use database.

Picatinny personnel indicated that the surveillance operation required opening a master container, removing a small aliquot of propellant, and then carrying the aliquot to one of the satellite buildings. Operations at Building 1217 originally consisted of taking the propellant sample from the building, loading it onto a railroad buggy, and transporting it to Building 1217-B to be packed into sample containers and later tested at a separate facility. In the mid-1980s, concerns raised by the safety office discontinued the practice of transporting the propellant to Building 1217-B. The propellant samples were subsequently packed in Building 1217.

In 1990, Building 1217 was being used as a propellant storage facility. A 1992 General Safety Program Evaluation indicated no hazardous waste was generated at this building. All the propellant had been removed from the building by March 1996 and the building is currently empty.

Buildings 1217-A and 1217-B, originally packed surveillance propellant samples for testing. The buildings were located approximately 100 and 200 ft respectively from Building 1217. In 1964, the two buildings were combined into one building and moved 750 ft west of Building 1217. The combined building was not located during the 1996 site inspection.

Area P Sites

Site 27

Site 27 is located adjacent to Shinkle Road and is bounded on the west and east by Fourth Avenue and GPB, respectively (**Figure 22**).

Former Building T-90, previously used to store road salt and cinders, was located near the intersection of Shinkle Road and Fourth Avenue. The building had no utility connections. The building, formerly a Quonset hut constructed of corrugated steel with an asphalt floor area of approximately 3,000 square ft, was demolished in 1983. Activities that occurred at this site would have included the loading and mixing of road salt using heavy equipment. All road salt and cinders were removed in the late summer of 1983 and moved to a new salt storage dome. This site is currently inactive.

Site 119

Site 119 consists of Buildings 46, 47, and 48. These buildings are nearly identical in structure and were all originally used to store propellant. All three buildings are currently listed as storage buildings. These buildings are located along First Avenue in Area P near the western boundary of Picatinny (**Figure 23**).

Constructed in 1940, Buildings 46, 47 and 48 were originally designed as magazines to store smokeless powder. The buildings also stored other types of propellant and explosives such as ammonium nitrate and dinitrotoluene. In 1978, the explosive allowances for the buildings were cancelled as part of a Picatinny action to remove all explosive materials from the lower portion of Picatinny. In early 1978, an inspection by the Safety Office determined explosives were no longer stored in the buildings.

Site 120

Building 50 (**Figure 24**) was previously used to store smokeless powder and propellant, and to pack propellant surveillance samples. Currently, Building 50 is identified as a storage building. The building had 100,000-pound and 25,000-pound explosive allowances in 1956 and 1959, respectively for Class 2 and 2A explosives. The explosive allowance for the majority of the buildings in this area of Picatinny (Buildings 46-49 & 51-57) were cancelled in 1978, due to the implementation of Phase I ARDEC plan, which proposed the movement of all explosive material from the lower portion of Picatinny. In early 1978, the Safety Office inspected Buildings 46-49 & 51-57, and at that time all of the inspected buildings contained no explosives. It is not known whether the omission of Building 50 was an oversight, the allowance had already been cancelled, or whether explosives were still in storage at Building 50.

Site 121

Building 57 (**Figure 25**) was constructed in 1941 to store smokeless powder. In 1964, it was converted into a packing and shipping building. The building is currently used as a shipping/receiving facility. A 1974 explosive allowance stated that the class and type of material being stored at Building 57 consisted of small quantities of Class 1-7 explosives for overnight storage. The explosive weight was not to exceed 100 pounds. The explosive allowance for Building 57 was cancelled in 1978, and a safety inspection determined that the building did not contain any explosives.

PICA Site 208

The former Dog Pound is located southeast of Building 70 at the intersection of two overgrown fire break/power line access roads in the swampy area just north of the Picatinny golf course (**Figure 26**). This site, which was discovered during an interview and follow-on site visit with a former Radiation Protection Officer (name unknown), is situated between Area E and Area P.

Facility 28A was a former building or fixture next to the site, but no evidence of this structure was found during the initial site survey. Used from 1953 to 1971, the former Dog Pound consisted of an asphalt pad surrounded by a chain link fence. It was used to temporarily store containers of: DU scrap from milling operations in Buildings 31 and 22, and radioactive waste from Building 91 and perhaps from other facilities. During the Phase III 2A/3A field activities, field personnel found no evidence of a chain link fence around the asphalt pad and the asphalt pad was severely cracked and overgrown with vegetation.

2.6 CURRENT AND POTENTIAL FUTURE LAND USE

Picatinny's Master Plan designates future land use of Areas D, F, G, J, K, L, N, O, and P as military and industrial conducted in a secured area. There are no plans to change this land use in the foreseeable future.

2.7 SUMMARY OF SITE RISKS

Baseline HHRA, lead blood models (for sites where lead was present), and ecological risk assessments (ERAs) were conducted in accordance with 40 Code of Federal Regulations (CFR) 300.430(d)(4) for the sites as part of the various RIs that evaluated these sites. As noted in Section 2.4, the HHRA approach for evaluating potential exposures to human receptor groups included a qualitative risk screening step (see Table 2) followed by a quantitative risk assessment, where necessary (see Table 3). The qualitative risk-screening evaluation consisted of comparing detected concentrations in soil, sediment and surface water (where relevant) to conservative LOCs. LOCs were defined as risk-based concentrations protective of human exposures or background concentrations (where risk-based concentrations were deemed lower than background). When the risk assessments were conducted at these sites, the LOCs were based on current risk assessment practices and risk-based criteria included Region 3 soil Preliminary Remediation Goals (derived based on a target cancer risk limit of one in one million for carcinogenic compounds and based on a hazard quotient of 1 for compounds with effects other than cancer) and New Jersey soil standards protective of direct contact (ingestion and dermal absorption) associated with nonresidential exposures. At some sites, the qualitative risk-screening evaluation also included comparing to New Jersey soil standards protective of direct contact associated with hypothetical residential exposures, although future residential land use will not occur at any of the 21 sites. If the qualitative evaluation indicated that site concentrations were below the LOCs, no further risk evaluation was required. At sites where concentrations exceeded LOCs, a quantitative HHRA was conducted.

An ecological evaluation was conducted at each site to consider the potential for ecological risk. The size of the site and the availability and quality of habitat were evaluated to determine the likelihood that there would be a significant risk to the ecological community before deciding to proceed into further evaluation. If a potential risk to the ecological community was identified, further ecological risk evaluations were conducted.

Additional qualitative risk-screening evaluations were conducted to determine if unrestricted use could be attained at some sites based on a comparison of site concentrations to EPA's Regional Screening Levels (RSLs) protective of residential soil exposures. The results of these additional analyses are presented in **Appendix B** (Sites 69, 60, 174, 176, and 164) and **Appendix C** (Sites 119, 120, and 121). **Appendix B and C** screening assessments utilized May or November 2013 RSLs. The RSLs were updated in May 2014; however, there were no changes in the 2014 RSLs relative to changes in toxicity values. Therefore, the **Appendix B and C** screening assessments are consistent with the 2014 RSLs.

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 HI. The HI is the sum of all the HQs for all constituents of concern 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. The regulatory benchmark for noncancer health effects is 1. An HI less than or equal to 1 indicates that toxic noncarcinogenic health effects should not likely 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 1E-06 to 1E-04 as generally acceptable cancer risk. If the ELCR exceeds the 1E-04 target risk level, site-specific remedial goal options are derived for the relevant contaminants and exposure scenarios.

As discussed previously, the sites are currently used for military/industrial purposes with no plans to change the use in the foreseeable future. The risk assessments were conducted to evaluate the potential risk associated with exposure to chemicals in soil, sediment, groundwater, and surface water. Risks were calculated for the reasonably anticipated future land use, as well as hypothetical residential use scenarios in some cases. At sites where quantitative HHRA were conducted (i.e., sites where the qualitative risk screening indicated levels above the LOCs), the potential exposure scenarios evaluated include 1) incidental ingestion and dermal contact with surface soil by current industrial/research worker receptors (at some sites, an outdoor maintenance worker was also evaluated); 2) incidental ingestion and dermal contact with subsurface soil by future construction worker receptors (inhalation of airborne soil particulates was also evaluated at some sites); 3) at some sites, potential exposures to groundwater as a

drinking water resource and/or to soil by hypothetical future residents (child and adult) were evaluated; at sites with surface water bodies, potential exposures to surface water and sediment by a youth visitor were considered in the default risk assessment. However, the adult resident, child resident, and combined adult/child resident scenarios are not reasonably anticipated future land use scenarios. Thus, annual monitoring, as described in Section 1.3, will be conducted at sites that were not evaluated for the residential scenarios to ensure land use has not changed, as they cannot be released for unrestricted (residential) use.

A summary of the results of the human health and ecological risk assessments and the lead blood model are included below for each of the sites evaluated within this ROD. The results of the qualitative and quantitative risk assessments are presented in **Tables 2 and 3** respectively, and are included to help clarify the determination of the appropriate RA at each of the sites.

2.7.1 Area D Sites

Site 69

No surface soil data exists for this site. As noted in Section 2.5.1, the site is surrounded by paved streets and buildings on three-sides and by a golf course directly to the southwest. Based on the available subsurface soil data, Site 69 risks and hazards were qualitatively estimated for one potentially exposed receptor population: future construction/excavation workers that may be exposed to subsurface soils. As part of the Phase I Risk Management Plan (IT, 2000), risks and hazards at Site 69 were evaluated by comparing concentrations with human health risk-based screening concentrations used in the Dames and Moore (1998) Phase I Risk Assessment. Analytical data used in the Site 69 screening include results from four soil borings composited together and reported in U.S. Army Center for Health Promotion and Preventive Medicine (1998). None of the detected inorganic constituents in soil exceeded the risk-based screening criteria (see Table 2). Accordingly, risks are assumed to be less than 1E-06 and hazards are assumed to be less than 1.0 given that the LOCs are based on these risk management thresholds, and site concentrations are less than the LOCs. In addition, the data were compared to NJ RDCSRS, and there were no exceedances. An additional qualitative risk evaluation of site conditions relative to current EPA RSLs protective of residential exposures is presented in **Appendix B** (Table B-1). It is noted that, although no surface soil data exists for this site, all detected analytes in subsurface soil are less than the EPA's RSLs.

An ERA was not completed for Site 69 because the site is a building in the industrial area of Picatinny with limited habitat. Further, there are no complete exposure pathways by which ecological receptors could contact concentrations in subsurface soil and groundwater.

Impacts to groundwater are being addressed under the approved Area D ROD for groundwater. Therefore, because the groundwater is being addressed through the Area D ROD and there are no exceedances of NJ RDCSRS, this site meets the requirements to allow unrestricted use. However, given the lack of surface soil data, the RA for this site is No Further Action with land use monitoring.

Site 117

Based on the quantitative risk assessments performed for this site for current and reasonably anticipated future use (see Table 3):

- The estimated carcinogenic risks are within the generally accepted range of 1E-06 and 1E-04
- The estimated noncarcinogenic hazards are less than or equal to 1
- Lead is not a concern
- Although some metals were detected in soils and plant material, animal and plant populations have not been adversely affected based on surveys performed. The site is less than 0.25 acres and offers poor habitat. Therefore, there are no unacceptable ecological risks at Site 117 based upon reasonably anticipated exposure scenarios (military/industrial land use)
- Radiological surveys conducted at this site indicated activity at background levels

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

Site 123

Based on the quantitative risk assessments performed for this site for current and reasonably anticipated future use (see Table 3):

- The estimated carcinogenic risks are within the generally accepted range of 1E-06 and 1E-04
- The estimated noncarcinogenic hazards are less than 1
- Lead is not a concern
- Due to the limited size of usable habitat, and the site being too small to support a sufficiency of ecological receptors to constitute a concern, risks to site biota are not anticipated for any projected exposure scenarios (military/industrial land use)
- Radiological surveys conducted at this site indicated activity at background levels

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

2.7.2 Area F SitesSite 60

Based on the quantitative risk assessments performed for this site for current and reasonably anticipated future uses (see Table 3):

- The estimated carcinogenic risks are below or within the generally accepted range of 1E-06 and 1E-04
- The estimated noncarcinogenic hazards are less than 1
- Lead is not a concern
- Ecological risks are not expected to be significant
- Groundwater at this site is being addressed under the approved ROD for Mid-Valley groundwater

In addition, the residential carcinogenic risk is within or less than the generally acceptable risk range and the residential noncarcinogenic hazard is less than 1. An additional qualitative risk evaluation of site conditions relative to current EPA RSLs protective of residential exposures is presented in **Appendix B**. Table B-2 provides the data and screening criteria used for the additional qualitative assessment. Therefore, based on the quantitative and qualitative risk assessments, this site meets the requirements to allow unrestricted use.

Site 145

Based on the results of the qualitative risk assessment of surface and subsurface soil, COPCs were identified for evaluation in the quantitative risk assessment (see Table 2). However, no COPC was identified that is considered a potential human carcinogen so no cancer risk estimates were generated in the quantitative risk assessment (IT, 1999) (see Table 3).

- The estimated noncarcinogenic hazard is less than 1 for maintenance worker and the industrial/research worker
- The estimated noncarcinogenic hazard is greater than 1 for the construction worker (HI =20) due to manganese inhalation; however, all manganese concentrations are less than NJ Non-Residential SRS and Industrial Regional Screening Levels.
- Lead is not a concern
- Site 145 is located in Drainage Area 2, Area F. The conclusion of the baseline ERA for Area F was that ecological populations in this area were comparable to reference. Additionally GPB (PICA-193) is adjacent to the site and is being monitored for any contaminant migration from this site as part of an approved long term chemical and biological monitoring program. Therefore, no further action for ecological risks is warranted.

- Groundwater is being addressed under the approved ROD for Mid-Valley groundwater

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

2.7.3 Area G Sites

Site 134

Based on the quantitative risk assessments performed for this site for current and reasonably anticipated future use (see Table 3):

- The estimated carcinogenic risks are within the generally accepted range of 1E-06 and 1E-04
- The estimated noncarcinogenic hazards are less than 1
- Lead is not a concern for any receptor
- Ecological risks are not expected to be significant because Site 134 is in an industrialized area offering little habitat value for wildlife under current military/industrial land use
- Groundwater at this site is being addressed under the approved ROD for Mid-Valley groundwater

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

Site 136

Based on the quantitative risk assessments performed for this site for current and reasonably anticipated future use (see Table 3):

- The estimated carcinogenic risk for the industrial worker is less than the generally accepted range of 1E-06 and 1E-04; no carcinogenic risk was estimated for the construction worker as no carcinogenic COPC was defined for this scenario;
- The estimated noncarcinogenic hazards are less than 1 after an interim action removed elevated mercury from the site
- Lead is not a concern
- Ecological risks are not expected to be significant
- Groundwater at this site is being addressed under the approved ROD for Mid-Valley groundwater

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

Site 185

No human health risks or hazards were quantified for this site because no constituents of concern above the industrial screening levels were identified for media identified (see Table 2). Soil exposure was not evaluated because soil samples were enclosed within a concrete vault or were below LOCs. No ERA was performed for the site due to the lack of habitat. Based on site information and detections beneath the LOCs protective of current and reasonably anticipated future use:

- The carcinogenic risks are expected to be within or less than the generally accepted range of 1E-06 and 1E-04
- The noncarcinogenic hazards are expected to be less than 1
- Ecological risks are not expected to be significant under military/industrial use because Site 136 provides little habitat and the sole chemical of potential ecological concern (mercury) was remediated in an interim removal action

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

2.7.4 Area J Site

Site 175

There were no constituents identified at concentrations greater than the screening levels; therefore, a HHRA was not performed for this site (see Table 2). Similarly, an ERA was not determined necessary for this site based on the lack of contaminants detected and the nature of the site (heliport with a combination of lawn and paving). Based on site information and detections beneath the LOCs protective of current and reasonably anticipated future use:

- The carcinogenic risks are expected to be within or less than the generally accepted range of 1E-06 and 1E-04
- The noncarcinogenic hazards are expected to be less than 1
- Ecological risks are not expected to be significant because the majority of the site is paved or mowed lawn under military/industrial land use

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

2.7.5 Area K Sites

Site 172

There were no constituents identified at concentrations greater than the screening levels; therefore, an HHRA was not performed for this site (see Table 2). Similarly, an ERA was not determined necessary for this site. Based on site information and detections beneath the LOCs protective of current and reasonably anticipated future use:

- The carcinogenic risks are expected to be within or less than the generally accepted range of 1E-06 and 1E-04
- The noncarcinogenic hazards are expected to be less than 1
- Ecological risks are not expected to be significant because Site 172 is almost entirely asphalt pavement and, therefore, provides little habitat under military/industrial land use

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

Site 174

There were no constituents identified in surface soil, subsurface soil, and groundwater at concentrations greater than the screening levels. Some analytes in sediment and surface water samples exceeded the LOCs, which were defined at that time as Region 3 RBCs for soil and tap water, respectively. However, only the surface soil exposures were evaluated in a quantitative HHRA. For the purpose of evaluating potential risks based on current and foreseeable future site conditions, a qualitative evaluation of Site 174 surface soil, sediment, and surface water data was conducted (see **Appendix B**) relative to current risk based concentrations protective of worker exposures (including USEPA 2013/2014 RSLs; and ORNL RAIS PRGs for surface water and sediment).

- The estimated carcinogenic risk is within the generally accepted range of 1E-06 and 1E-04 (see Table 3)
- The estimated noncarcinogenic hazard is less than 1 (see Table 3)
- Lead is not a concern
- Based on the baseline ERA conducted for this site (IT, 2000), ecological risks are not expected to be significant
- Groundwater at this site is being addressed as part of the Mid-Valley Groundwater ROD

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

Site 186

Little soil is exposed at this site as the building is surrounded by pavement, and no soil samples were collected. Groundwater was the only media sampled at the site. For groundwater samples collected at Site 186, aluminum, chromium, iron, manganese, nickel, sodium, and vanadium were the only analytes detected above the LOCs and were selected as COPCs (see Table 2). The following exposure pathway was quantitatively evaluated in the HHRA: dermal absorption exposure to chemicals in groundwater by construction/excavation workers (see Table 3).

No carcinogenic COPCs were identified in the groundwater (see Table 2). Groundwater at this site is being addressed as part of the Mid-Valley Groundwater ROD.

The cumulative HI from exposure to impacted site media is below the target hazard level of 1.0 for the construction/excavation worker (Table 3).

No ERA was performed at Site 186. The majority of this area is paved and is located within a high human-use part of Picatinny Arsenal. Building 3316 is completely surrounded by pavement for either roads or vehicular parking. Thus, very little suitable habitat exists for most species under military/industrial land use.

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

2.7.6 Area L Sites

Site 176

Due to either low or non-detect concentrations in surface and subsurface soil samples collected from across the site, no COPCs were selected for the industrial use and construction worker scenarios (see Table 2). A future residential scenario was evaluated in a quantitative risk assessment (see Table 3) and concluded that there were no unacceptable risks for that scenario:

- The estimated carcinogenic risk is within the generally accepted range of 1E-06 and 1E-04
- The estimated noncarcinogenic hazards are less than 1
- Lead is not a concern
- Ecological risks are not expected to be significant as chemical concentrations did not exceed ecological LOCs (Shaw, 2005)

An additional qualitative risk evaluation of site conditions relative to current EPA RSLs protective of residential exposures is presented in **Appendix B** (Table B-3). The detected analytes in surface and subsurface soil are less than the EPA's RSLs. Therefore, this site meets the requirements to allow unrestricted use. However, due to NJDEP and USEPA concerns regarding the limited amount of data for this site, the RA for this site is No Further Action with Monitoring of Land Use.

Site 177

There were no constituents identified with concentrations greater than the screening levels for current and reasonably anticipated future use scenarios (see Table 2). A risk assessment was performed for the hypothetical future residential scenario (see Table 3) and concluded that:

- The estimated carcinogenic risk is within the generally accepted range of 1E-06 and 1E-04
- The estimated noncarcinogenic hazards are less than 1
- Lead is not a concern
- Based on the Screening Level Ecological Risk Assessment (SLERA), ecological risks are not expected to be significant because zinc, which was the only compound identified as potentially posing an ecological risk, was present in the subsurface minimizing the potential for exposure

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use acknowledging that there was an exceedance of benzo(a)pyrene in subsurface soil.

2.7.7 Area N Sites

Site 10

Based on the quantitative risk assessments performed for this site for current and reasonably anticipated future use (see Table 3):

- The estimated carcinogenic risks are less than or within the generally accepted range of 1E-06 and 1E-04
- The estimated noncarcinogenic hazards are less than 1
- Lead is not a concern
- Ecological risks are not expected to be significant

In addition, the residential carcinogenic risk is within or less than the generally acceptable risk range and the residential noncarcinogenic hazard is less than 1. However, given the historical use of the site and the calculated risks/hazards for this site are at the upper bound of the acceptable risk range, this site is recommended for No Further Action with Monitoring of Land Use rather than No Further Action.

2.7.8 Area O Site

Site 164

All concentrations of constituents from samples collected at this site are below screening criteria and therefore no contaminants of concern were selected (see Table 2). An additional qualitative risk evaluation of site conditions relative to current EPA RSLs protective of residential exposures was also conducted and is presented in **Appendix B** (Table B-4). With the exception of thallium, the detected concentrations of analytes in soil do not exceed the residential or nonresidential soil RSLs. Thallium was detected in a surface soil sample at a concentration greater than the residential soil RSL but below the non-residential soil RSL. It is noted that the thallium detection is below the current NJ SRS. Based on information from the site for current and reasonably anticipated future use, and including future hypothetical residential use:

- The carcinogenic risk is expected to be less than the generally accepted range of 1E-06 and 1E-04
- The noncarcinogenic hazard is less than 1
- Ecological risks are not expected to be significant

Therefore, this site meets the requirements to allow unrestricted use. However, given the limited amount of data available for evaluating this site, this site is recommended for NFA with Monitoring of Land Use.

2.7.9 Area P Sites

Site 27

No risk assessment was conducted for this site as sodium in groundwater was the only COPC. Sodium was detected in one groundwater sample at a concentration of 13,300 milligrams per liter (mg/l), above the recommended daily allowance of 20 mg/l for individuals on a restricted sodium diet. A total of 13 surface soil samples have been collected at this site, including 4 samples collected as part of a 1996 PA/SI, including sample T90SS-B with a beryllium concentration (270 mg/kg) that exceeded the soil LOC; and 9 surface soil samples collected as part of Phase III investigation in 1998 and 1999 to evaluate the nature and extent of the beryllium detection in the 1996 sample (information provided in the FS [Shaw 2010]). All detected concentrations of beryllium in the 1998/1999 samples were below the LOC. Subsequent to the 1996 PA/SI sampling activities and prior to the 1998/1999 Phase III investigation, the entire area in the vicinity of previous sample T90SS-B was paved with asphalt. The area of sampling location T90SS-B was covered with asphalt. The Phase III sampling occurred beneath and adjacent to the asphalt. Based on the qualitative risk-screening evaluation, beryllium was only detected above the residential soil LOCs in one surface sample currently beneath asphalt; all other soil samples, including surface soil samples adjacent to the asphalt are below the LOCs (see Table 2). Based on these data:

- The carcinogenic risk for the current and reasonably anticipated future use is expected to be less than or within the generally accepted range of 1E-06 and 1E-04

- The noncarcinogenic hazard is expected to be less than 1
- Ecological risks are not expected to be significant because soil concentrations did not exceed ecological LOCs (Shaw, 2005)

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

Site 119

The results of the qualitative risk assessment indicated three LOC exceedances in a single surface soil: the polycyclic aromatic hydrocarbons (PAHs) benzo(a)pyrene, benz(a)anthracene, and benzo(b)fluoranthene (see Table 2). A qualitative HHRA (ARCADIS, 2014b) was also conducted for Site 119 using current EPA RSLs as screening criteria (**Appendix C**). Based on the evaluation of site conditions relative to current risk-based criteria, no unacceptable human health risks or hazards are expected for the reasonably anticipated land use (military/industrial). Additionally, the source of the minor exceedance of the screening criterion is likely attributed to the adjacent inactive railroad beds and pavement rather than site-related activities.

The SLERA (Shaw, 2005) indicates a potential risk to wildlife may be present from PAHs as well as some metals; however, because the site is located within an area of inactive railroad beds and pavement, it does not offer significant habitat for wildlife under military/industrial land use. The SLERA concluded that additional ERA investigations are not warranted for Site 119.

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

Site 120

The results of the qualitative risk assessment indicate that three PAHs were detected in a single surface soil sample at a level above the LOCs (see Table 2). A qualitative HHRA (ARCADIS, 2014b) was also conducted for Site 120 and is provided in **Appendix C**. Based on the evaluation of site conditions, no unacceptable human health risks or hazards are expected for the reasonably anticipated land use (military/industrial). Additionally, the source of the minor exceedance of the screening criterion is likely attributed to the adjacent inactive railroad beds and pavement rather than site-related activities.

The SLERA (Shaw, 2005) indicates a potential risk to wildlife may be present from PAHs as well as some metals; however, because the site is located within an area of inactive railroad beds and pavement, it does not offer significant habitat for wildlife under military/industrial land use. The SLERA concluded that additional ERA investigations are not warranted for Site 120.

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

Site 121

The results of the qualitative risk assessment indicate that four PAHs were detected in a single surface soil sample at levels above the LOCs (see Table 2). Like adjacent Sites 119 and 120, a qualitative HHRA (ARCADIS, 2014b) was conducted for Site 121 (see **Appendix C**). No unacceptable human health risks or hazards are expected for the reasonably anticipated land use (military/industrial). Additionally, the source of the few minor exceedances of screening criteria is likely attributed to the adjacent, inactive railroad beds and pavement rather than site related activities.

The SLERA (Shaw, 2005) indicates a potential risk to wildlife may be present from PAHs as well as some metals; however, because the site is located within an area of inactive railroad beds and gravel cover, it does not offer significant habitat for wildlife under military/industrial land use. The SLERA concluded that additional ERA investigations are not warranted for Site 121.

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

PICA Site 208

Based on the quantitative risk assessments performed for this site, for current and reasonably anticipated future use (see Table 3):

- The estimated chemical carcinogenic risks are less than or within the generally accepted range of 1E-06 and 1E-04

- The estimated radiological carcinogenic risks are less than or within the generally accepted range of 1E-06 and 1E-04
- The estimated noncarcinogenic hazards are less than 1
- With the exception of groundwater exposures (as drinking water) to arsenic, the estimated carcinogenic risk associated with potential exposures to soil, sediment and air by future hypothetical residents is within the generally accepted range of 1E-06 and 1E-04.
- The estimated radiological carcinogenic risk associated with future hypothetical residents is within the generally accepted range of 1E-06 and 1E-04
- With the exception of groundwater exposures (as drinking water) to manganese, the estimated noncarcinogenic hazards associated with potential exposures to soil, sediment and air by future hypothetical residents is less than 1
- Lead is not a concern
- Groundwater at this site is being addressed under the approved ROD for Mid-Valley groundwater
- Based on the SLERA, ecological risks are not expected to be significant because the impacted area is small, and habitat value is low

Accordingly, this site is recommended for No Further Action with Monitoring of Land Use.

2.8 DOCUMENTATION OF SIGNIFICANT CHANGES TO THE PREFERRED RESPONSE ACTION FROM THE PROPOSED PLAN

At the request of the USEPA and the NJDEP, the following changes have been made to this ROD from the original 26 Site PP:

The Preferred Response Action for Sites 69, 164, and 176 was modified from NFA to NFA with Monitoring of Land Use based on the limited amount of data available for evaluating these sites.

Sites 7, 52/95/96, 173, 187, and 207 have been removed from the ROD.

No other significant changes have been made to this ROD from the PP.

3.0 PART 3: RESPONSIVENESS SUMMARY

The final component of this ROD is the Responsiveness Summary. The purpose of the Responsiveness Summary is to provide a summary of the stakeholders' comments, concerns, and questions about the Selected RA for the 21 Picatinny Sites and the Army's responses to these concerns.

The Army has fulfilled the public participation requirements identified in 40 CFR 300.430(f), and Title 10 United States Code 2705(b)(2), and maintained an administrative record, which is available for the public, in accordance with 40 CFR 300.800. The 21 Picatinny sites have been the topic of presentations at the PAERAB. A copy of the PP was given to the PAERAB's co-chair and a copy was offered to all PAERAB members. A final PP for 26 Picatinny Sites was completed and released to the public on June 2, 2014 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 May 25, 2014 and in the Star Ledger on May 28, 2014. Copies of the certificates of publication are provided in **Appendix A**. A public meeting was held on June 11, 2014 to inform the public about the Selected RA for the 21 Picatinny sites and to seek public comments. At this meeting, representatives from the U.S. Army, NJDEP, USEPA, and the Army's contractor, ARCADIS, were present to answer questions about the site and response actions under consideration. A public comment period was held from June 2, 2014 to July 2, 2014 during which comments from NJDEP were received and one written comment from the public was received.

Comments received from the NJDEP were evaluated and considered in selecting the final RA, as well. The NJDEP has submitted a letter expressing their concerns regarding the selected RA and this ROD. The NJDEP letter and responses to the letter are detailed in Section 3.1.

Subsequent to the comments submitted on the Proposed Plan by the NJDEP, the Army and USEPA met with the NJDEP to address their concerns over the ROD. The results of the meeting were that the Army and USEPA agreed to NJDEP's request to remove 5 sites from the ROD and change the remedy for 3 other sites from NFA to NFA with Monitoring of Land Use. The 5 sites removed from the ROD will be addressed in a future ROD. As a result of these revisions, the NJDEP concurred with the selected remedy in the ROD.

All comments and concerns summarized below have been considered by the Army and USEPA in selecting the final cleanup methods for the Site.

3.1 PUBLIC ISSUES AND LEAD AGENCY RESPONSES

As of the date of this ROD, the Army and the USEPA endorse the Selected RA for the 21 Sites. Comments received during the 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

WRITTEN COMMENTS

Comment No. 1, Mark Hiler, Restoration Advisory Board Community Member (Letter to Mr. Ted Gabel dated July 1, 2014)

RE: Comments on Proposed Plan for 26 Sites

Dear Mr. Gabel (Ted):

I am writing on behalf of myself and a majority of the members of the Rockaway Township Environmental Commission in regard to the Proposed Plan for 26 Sites that was the subject of a June 11, 2014 public meeting.

I have been a member of the RAB for over 20 years and understand the lengthy, costly, and complicated process to move sites to a formal conclusion. I have always felt more dollars should be spent on the clean up, and less on the process to arrive at what to cleanup.

Picatinny Arsenal is located in one of the most densely populated states in the country. Approximately 1400 new dwelling units at two different locations will be built within one mile of the Route 15 entrance to the arsenal. We feel the following comments are necessary at this time.

The Army's recommended action is No Further Action With Monitoring for 21 Sites and No Further Action for 5 Sites. We have several concerns with the Army's preferred alternatives as follows:

- The Army has failed to consider New Jersey Department of Environmental Protection (NJDEP) input regarding State standards during the Remedial Investigation/Feasibility Study (RI/FS) process. Although the Army has responded to written comments by the NJDEP, the response(s) have not included any movement toward to NJ SRS
- The Army has taken an approach that completely disregards the NJ SRS. The risk-based approach by the Army does not allow for consideration of promulgated state standards. The NJ SRS should be used to determine whether remedial action is necessary.

Response to point #1 and #2: Under CERCLA, Section 121, State Standards don't apply unless a remedial action is taken. The subject of compliance with the NJDEP soil remediation standards has been discussed at numerous meetings between the USEPA, NJDEP, and Army teams. Under the CERCLA process (Superfund) under which Picatinny Arsenal is governed, unacceptable site-related risks are required before restoration actions are needed and can be taken. Risk assessments have been conducted at each of these sites in accordance with USEPA risk assessment guidance, and no unacceptable risk has been found for the current and reasonably anticipated future land use. Further, there are no adverse impacts to ecological receptors. As such, no action is appropriately recommended under the CERCLA process. The Army and the USEPA consider that the recommended remedy is fully protective of human health and the environment. The Army will certify annually that the land use remains military/industrial, as described in Section 1.3. If land use is no longer military/industrial, the Army and USEPA will evaluate whether the remedy remains protective for the new land use. If it is not protective due to changed land use, the Army and USEPA will select another remedy.

Mr. Hiler's letter continues:

- The failure of the Army to adhere to state promulgated standards at Picatinny Arsenal could set a precedent for other military and federal sites within the state and for other regulated commercial and industrial sites within the state.

Response to point #3: All NPL sites are evaluated individually based on site-specific conditions in accordance with CERCLA and the NCP.

Mr. Hiler's letter continues:

Despite objection by the NJDEP on multiple aspects of the proposed action, the Army has stated that the remedy can be implemented without State concurrence because state "input is one of the modifying criteria in evaluating alternatives."

Response to point #4: Under the CERCLA (Superfund) process, under which Picatinny Arsenal is governed; there are nine evaluation criteria to consider for the analysis of alternatives. The nine criteria are divided into three categories: 1) threshold criteria, 2) primary balancing criteria, and 3) modifying criteria. State concurrence is one of the modifying criteria. Therefore, state input is considered in the selection of the alternative; however, under the CERCLA process, unacceptable site-related risks are required before restoration actions are needed and can be taken. Risk assessments have been conducted at each of these sites in accordance with USEPA risk assessment guidance, and no unacceptable risk has been found for the current and reasonably anticipated future land use. Further, there are no adverse impacts to ecological receptors. As such, no action is appropriately recommended under the CERCLA process.

Given that the NJ SRS have been promulgated by due process and are presumably based on sound scientific principles, there is no reasonable justification for their non-adherence. We request that the Army and the U.S. Environmental Protection Agency reconsider the preferred alternatives.

Response to point #5: Under the CERCLA process (Superfund) under which Picatinny Arsenal is governed, unacceptable site-related risks are required before restoration actions are needed and can be taken. Risk assessments have been conducted at each of these sites in accordance with USEPA risk assessment guidance, and no unacceptable risk has been found for the current and reasonably anticipated future land use. Further, there are no adverse impacts to ecological receptors. As such, no action is appropriately recommended under the CERCLA process. The Army and the USEPA consider that the recommended remedy is fully protective of human health and the environment. The Army will certify annually that the land use remains military/industrial, as described in Section 1.3. If land use is no longer military/industrial, the Army and USEPA will evaluate whether the remedy remains protective for the new land use. If it is not protective due to changed land use, the Army and USEPA will select another remedy.

Comment No. 2, Kenneth J. Kloo, Director Division of Remediation Management, NJDEP (Letter to Mr. Ted Gabel and Mr. Walter Mugdan dated June 9, 2014)

Comments received from the NJDEP were evaluated and considered in selecting the final RA. The NJDEP submitted a letter expressing their concerns regarding the selected RA and this ROD. In particular, the letter states their position that the NJ SRS should be utilized to determine if a remedial action is required at a site. The NJDEP letter and responses to the letter are detailed in Section 3.1. The Army and the USEPA have agreed that under CERCLA in the absence of unacceptable risk for the current and reasonably anticipated future use and the absence of CERCLA action, an Applicable or Relevant and Appropriate Requirement (ARAR) analysis is not required. The NJDEP has indicated that applying the NJ SRS is required despite the absence of unacceptable risk for current and reasonably anticipated land use. The position of the Army and USEPA is that the remedy is protective of human health and the environment.

RE: Picatinny Arsenal – Final No Further Action with Monitoring of Land Use Proposed Plan for 26 Sites, May, 2014

The New Jersey Department of Environmental Protection (Department) has completed its review of the May 2014 "Final No Further Action with Monitoring of Land Use Proposed Plan for 26 Sites, U.S. Army Garrison Picatinny Arsenal, New Jersey" prepared by the U.S. Army and reviewed by the U.S. Environmental Protection Agency (EPA) Region II. The Department does not concur with the proposed remedy for the following reasons:

- The risk at Picatinny Arsenal should have been evaluated on a site wide basis. Once it was determined that there is unacceptable risk for the site, the appropriate New Jersey Soil Remediation Standards would apply to the entire site.

Response to point #1: There are numerous specific areas at Picatinny that were used in the past for industrial processes and/or testing activities that are collectively referred to as "sites." All of these sites are being addressed under CERCLA, and the NJDEP had the opportunity to comment on the PA/SI (Argonne Concept Plan), where the selection of more than 160 sites for evaluation and the approaches for the risk-based evaluations (which included comparisons to the New Jersey Soil Remediation Standards) were made. Evaluating risk on a Picatinny site-wide basis, even when including only sites potentially impacted by historical uses (past industrial processes and/or testing activities), would increase the data set by including the data for sites that are not impacted areas/data for those sites, which would typically lower the exposure point concentrations and overall risk evaluations. In addition, land use and site features are considered when evaluating potential complete exposure pathways; accordingly, an individual site may be included in the site-wide evaluation for an exposure scenario that is not relevant for that specific site, which could result in an "unacceptable risk determination" for an incomplete exposure pathway at that site. Remedial decisions are being made on a site by site basis, as was agreed many years ago. Application of Applicable or Relevant and Appropriate Requirements (ARARs) across the entire Arsenal based on their triggering at individual sites is not consistent with CERCLA.

The NJDEP letter continues:

- The Army is not applying the New Jersey Soil Remediation Standards to determine if a remedial action is necessary.

Response to point #2: Under the CERCLA process (Superfund) under which Picatinny Arsenal is governed, unacceptable site-related risks are required before restoration actions are needed and can be taken. Risk assessments have been conducted at each of these sites in accordance with USEPA risk assessment guidance, and no unacceptable risk has been found for the current and reasonably anticipated future land use. Further, there are no adverse impacts to ecological receptors. As such, no action is appropriately recommended under the CERCLA process. The Army and the USEPA consider that the recommended remedy is fully protective of human health and the environment. The Army will certify annually that the land use remains military/industrial, as described in Section 1.3. If land use is no longer military/industrial, the Army and USEPA will evaluate whether the remedy remains protective for the new land use. If it is not protective due to changed land use, the Army and USEPA will select another remedy.

The NJDEP letter continues:

- EPA's decision to determine the need for a remedial action based on a risk range and to ignore exceedances of promulgated statewide Soil Remediation Standards is precedent-setting and will have negative impacts on remedial decisions made at other National Priorities List, Federal Facility and responsible party sites across the country.

Response to point #3: All NPL sites are evaluated individually based on site-specific conditions in accordance with CERCLA and the NCP. As stated in 40 CFR 300.430(a), "The purpose of the remedy selection process is to implement remedies that eliminate, reduce, or control risks to human health and the environment." The purpose of conducting a risk assessment under the CERCLA program is to "...help establish acceptable exposure levels for use in developing remedial alternatives in the FS [Feasibility Study]" (40 CFR 300.430(d)4). The generally acceptable risk range referenced in the PP and this ROD is the risk range specified in 40 CFR 300.430(e)(2)(i)(A)(2): "For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10⁻⁴ [1E-04] and 10⁻⁶ [1E-06] using information on the relationship between dose and response."

It is clear from these excerpts that the purpose and process of CERCLA and NCP is to address risks at a site to protect human health and the environment rather than ensure that state standards be attained. According to CERCLA Section 121, State Standards don't apply unless a remedial action is taken.

It is recognized that the NJDEP considers this precedence setting from their viewpoint as the NJDEP is now seeing other federal facilities proposing remedial actions based on risk and not applying the NJ SRS to determine a need for an active remedy.

The NJDEP letter continues:

The Department has expressed its position in detail regarding these issues in the Department's March 7, 2013 letter to the Army and EPA. The Department also provided comments on drafts of this proposed plan and associated response to comment documents via email on August 26, 2013, November 12, 2013, January 30, 2014, February 20, 2014, and May 5, 2014. To date these comments have generally not been addressed to the Department's satisfaction.

Response to point #4: The USEPA-approved risk assessments summarized in the FS indicate that there are no unacceptable human health risks for the current and reasonably anticipated future land use at these sites. CERCLA (Superfund) is the governing law for Picatinny Arsenal and unacceptable site-related risks are required for an action to be taken. These sites do not pose unacceptable human health risks for the current and reasonably anticipated future land use nor do they pose unacceptable impacts to ecological receptors. Annual monitoring will be conducted to ensure site use remains consistent with the assumptions of the risk assessment (military/industrial land use).

The NJDEP letter continues:

Listed below are some of the major technical issues that remain.

- The Department, in cooperation with the Department of Energy is in the process of closing out Formerly Utilized Sites Remedial Action Program (FUSRAP) facilities in New Jersey, one of which is Picatinny Arsenal. Site 117 and PICA 208, which are sites in this proposed plan, still have FUSRAP issues. The Army will be conducting radiological sampling in these areas outside of the CERCLA process. The Department cannot make a final decision on Site 117 and PICA 208 until after the radiological sampling is completed, and the Department's Bureau of Environmental Radiation agrees that the investigation is adequate and agrees to a path forward with respect to radiological issues. The Department recommends that these sites be removed from the proposed plan until the radiological issues are addressed in a manner consistent with the strategy approved for the Detonation Area.

Response to point #5: Radiological parameters were evaluated at Site 117 and 208 and data was included in the risk assessments. The proposed remedy is protective of human health and the environment for the current and reasonably anticipated future land use. Given the radiological detections at Sites 117 and 208, the Sites are included in the FUSRAP and must meet certain requirements to be removed from the Nuclear Regulatory Commission (NRC) permit. The Army acknowledges that NJDEP, who oversees the closure of FUSRAP sites, cannot make a final decision on removing Site 117 and Site 208 from the permit until additional radiological sampling is completed. Additional sampling is planned and the NJDEP Bureau of Radiation will decide if the investigation is adequate with respect to radiological issues. This additional investigation conducted under FUSRAP of potential radiological constituents in media at Sites 117 and PICA Site 208 does not preclude these sites from inclusion in this ROD. Any additional data, such as this, will be reviewed as part of the CERCLA 5-Year Review to confirm the selected remedy remains protective of human health and the environment.

The NJDEP letter continues:

- A number of the sites in this proposed plan (Sites 52, 95, 96, 117, 119, 120, 121, 145 and 207) contain contamination related to former railroad lines. The vertical and horizontal extent of railroad related contamination has not been delineated at these sites. In a response document, the Army stated "the railroads tracks were not a primary activity at any of the sites within this proposed plan; the risk posed by the small area of track within the borders of each site is minimal relative to the other site activities". The Department disagrees with this statement. The former rail lines at Picatinny cover a significant area. The nature and extent of contamination associated with the former rail lines has not been characterized, nor has the potential risk to human health and the environment been assessed. The former rail lines throughout Picatinny should be designated as a separate area of concern and investigated and remediated as appropriate. Remedial options for the potentially widespread PAH and arsenic contamination related to the extensive former railroad infrastructure throughout the Arsenal must be addressed prior to selecting a remedy for the individual sites. Therefore, the Army's proposal for no further action is unacceptable for these sites with rail lines that have contamination which is not delineated. The Department requires delineation and remediation of former rail lines.

Response to point #6: The CERCLA program investigates releases to the environment, and if there is a known spill or crash or event that would have released contaminants along the railroad lines, those lines will be investigated. Just because a railroad track runs through a property, it does not mean it needs to be investigated. After being listed on the NPL, to ensure that the areas with the greatest potential for environmental contamination were addressed first, the Army categorized the 16 parts of the Picatinny Arsenal into Areas labeled A (greatest potential) through P (least potential). The Army further categorized these Areas into three phases. Phase I included Areas B through G, Phase II included Areas H through K, and Phase III included Areas L through P, as designated in the ANL RI Concept Plan. The various sites within these areas were determined because of the potential environmental impacts due to the

primary Army activities conducted at the sites. Data collection and risk evaluations have been conducted on a site by site basis at Picatinny during PA/SIs, RIs, and Feasibility Studies.

The Army is aware of both USEPA's and NJDEP's request to address the abandoned railways and agrees to address the the abandoned railways to determine whether any CERCLA releases have occurred and will address any identified releases in accordance with CERCLA.

The NJDEP letter continues:

- The Department does not agree with the proposed remedy for Site 176, Site 187 (Building 67), Site 173 and PICA 208 because either insufficient data has been collected during the remedial investigation and/or soil contamination is present above New Jersey Soil Remediation Standards.

Response to point #7: The selected RA for Site 176 has been revised to NFA with Monitoring of Land Use in response to NJDEP concerns regarding quantity of available data. Sites 173 and 187 have been removed from this ROD. For PICA Site 208, since FUSRAP issues are being addressed under the Nuclear Regulatory Commission with the NJDEP Bureau of Radiation, the NJDEP has agreed that all issues except radiological have been addressed for PICA Site 208 and NFA with Monitoring of Land Use is acceptable.

The NJDEP letter continues:

In conclusion, and for the reasons listed above, the Department does not concur with the proposed plan, nor is the remedy protective of human health and the environment.

Response to point #8: The subject of compliance with the NJDEP soil remediation standards has been discussed at numerous meetings between the USEPA, NJDEP, and Army teams. Under the CERCLA process (Superfund) under which Picatinny Arsenal is governed, unacceptable site-related risks are required before restoration actions are needed and can be taken. Risk assessments have been conducted at each of these sites in accordance with USEPA risk assessment guidance and no unacceptable risk has been found for the current and reasonably anticipated future land use. Further, there are no adverse impacts to ecological receptors. No action is appropriately recommended under the CERCLA process. The Army and the USEPA consider that the recommended remedy is fully protective of human health and the environment. The Army will certify annually that the land use remains military/industrial, as described in Section 1.3. If land use is no longer military/industrial, the Army and USEPA will evaluate whether the remedy remains protective for the new land use. If it is not protective due to changed land use, the Army and USEPA will select another remedy.

Comment No. 3, Michael Glaab, Picatinny Arsenal Environmental Restoration Advisory Board (PAERAB), (Email to Mr. Ted Gabel and Mr. Walter Mugdan dated June 13, 2014)

RE: Picatinny Arsenal – Final No Further Action with Monitoring of Land Use Proposed Plan for 26 Sites (May – June 2014)

As the official community representative to the PAERAB for the municipality of Jefferson Township, I herewith declare that I concur with the points of discussion presented in the state of New Jersey's statement of non-concurrence (dated June 9, 2014) that was entered into the public record by Ms. Anne Pavelka (NJDEP Case Manager of the Bureau of Case Management) during the June 11, 2014 public hearing concerning the U.S. Army's Proposed Plan for 26 Sites. Indeed, I oppose the proposed plan concept as currently envisioned and I strongly recommend that it be reconsidered.

Response to point #1: Responses have been provided to the specific June 9, 2014 NJDEP comments in the responses to "Comment No. 2."

Mr. Glaab's email continues:

This proposed plan is inadequate and insufficiently protective of the environment. It is also insufficiently protective of the health and welfare of the arsenal's neighboring communities and also of those individuals employed at and/or residing on Picatinny Arsenal.

Response to point #2: Under the CERCLA process (Superfund) under which Picatinny Arsenal is governed, unacceptable site-related risks are required before restoration actions are needed and can be taken. Risk assessments have been conducted at each of these sites in accordance with USEPA risk assessment guidance, and no unacceptable risk has been found for the current and reasonably anticipated future land use. Further, there are no adverse impacts to ecological receptors. As such, no action is appropriately recommended under the CERCLA process. The Army and the USEPA consider that the recommended remedy is fully protective of human health and the environment at the facility as well as surrounding communities. The Army will certify annually that the land use remains military/industrial, as described in Section 1.3. If land use is no longer military/industrial, the Army and USEPA will evaluate whether the remedy remains protective for the new land use. If it is not protective due to changed land use, the Army and USEPA will select another remedy.

Mr. Glaab's email continues:

It is especially troubling that insufficient effort is apparently being devoted to responsible adherence to the cleanup standards of the state of New Jersey. Accordingly, I agree with and concur with the concerns publicly stated during the public hearing by Mr. Pat Matarazzo, who also serves on the PAERAB, regarding this proposed plan's lack of adherence to New Jersey's environmental standards.

Response to point #3: The subject of compliance with the NJDEP soil remediation standards has been discussed at numerous meetings between the USEPA, NJDEP, and Army teams. Under the CERCLA process (Superfund) under which Picatinny Arsenal is governed, unacceptable site-related risks are required before restoration actions are needed and can be taken. Risk assessments have been conducted at each of these sites in accordance with USEPA risk assessment guidance and no unacceptable risk has been found for the current and reasonably anticipated future land use. Further, there are no adverse impacts to ecological receptors. No action is appropriately recommended under the CERCLA process. The Army and the USEPA consider that the recommended remedy is fully protective of human health and the environment. The Army will certify annually that the land use remains military/industrial, as described in Section 1.3. If land use is no longer military/industrial, the Army and USEPA will evaluate whether the remedy remains protective for the new land use. If it is not protective due to changed land use, the Army and USEPA will select another remedy.

Mr. Glaab's email continues:

In addition, I am concerned that insufficient consideration appears to have been devoted to the minimizing of human exposure to the following substances and/or to their effective removal or degradation:

1. Dioxin
2. Radiation, Radioactive nuclides, etc.
3. Manganese

Response to point #4: Under the CERCLA process (Superfund) under which Picatinny Arsenal is governed, unacceptable site-related risks are required before restoration actions are needed and can be taken. Risk assessments have been conducted at each of these sites in accordance with USEPA risk assessment guidance, and no unacceptable risk has been found for the current and reasonably anticipated future land use. These assessments included dioxins, radioactive nuclides, and manganese if present. Further, there are no adverse impacts to ecological receptors. As such, no action is appropriately recommended under the CERCLA process. The Army and the USEPA consider that the recommended remedy is fully protective of human health and the environment. The Army will certify annually that the land use remains military/industrial, as described in Section 1.3. If land use is no longer military/industrial, the

Army and USEPA will evaluate whether the remedy remains protective for the new land use. If it is not protective due to changed land use, the Army and USEPA will select another remedy.

Mr. Glaab's email continues:

Monitoring with Natural Attenuation is a passive measure that essentially consists of limited monitoring of a contaminated area while the environment either naturally degrades, usually slowly, the contaminants or the contaminants actually migrate elsewhere. Numerous members of the PAERAB throughout its decades of existence have repeatedly expressed a preference for actual removal or degradation of contaminants at the arsenal rather than simple monitoring with natural attenuation.

Response to point #5: The selected remedy for these sites is No Further Action with Monitoring of Land Use, not Monitoring with Natural Attenuation. Risk assessments have been conducted at each of these sites in accordance with USEPA risk assessment guidance, and no unacceptable risk has been found for the current and reasonably anticipated future land use. Further, there are no adverse impacts to ecological receptors. As such, no action is appropriately recommended under the CERCLA process. Under the CERCLA process (Superfund) under which Picatinny Arsenal is governed, unacceptable site-related risks are required before restoration actions are needed and can be taken. The Army and the USEPA consider that the recommended remedy is fully protective of human health and the environment. The Army will certify annually that the land use remains military/industrial, as described in Section 1.3. If land use is no longer military/industrial, the Army and USEPA will evaluate whether the remedy remains protective for the new land use. If it is not protective due to changed land use, the Army and USEPA will select another remedy.

Mr. Glaab's email continues:

Finally, I formally express my objection to the fact that although the 30 day public comment period for this proposed plan began on June 2 of 2014 that the public hearing for this proposed plan was not conducted until June 11th of 2014 – nine (9) days after the comment period began.

Response to point #6: CERCLA Section 117(a) and the NCP (40CFR 300.430(f)(3)) indicate that a notice must be published in the local newspaper to notify the public that the proposed plan is available in the administrative record and that a reasonable opportunity for submission of written and oral comments, not less than 30 days (from when the document is available in the administrative record) is required. Neither CERCLA nor the NCP state that the public meeting must be conducted at the beginning of the comment period.

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

COMMENTS FROM PUBLIC MEETING

Comment No.1, Anne Pavelka, Case Manager NJDEP Site Remediation Program.

NJDEP read the following prepared statement on Picatinny Arsenal's 26 Site PP during the June 11, 2014 Public Meeting.

My name is Anne Pavelka, and I am the case manager for Picatinny Arsenal for the New Jersey Department of Environmental Protection (NJDEP) Site Remediation Program.

The NJDEP does not concur with the Proposed Plan that has been discussed. The NJDEP makes remedial decisions in accordance with the promulgated remediation standards that are based on one in a million cancer risk. The NJDEP does not agree with the proposal by the Army and approved by the US EPA which makes remedial decisions based on one in ten thousand cancer risk. We believe that since Picatinny Arsenal is located in the State of New Jersey, the Army should comply with New Jersey's rules and regulations. We have prepared comments on the Proposed Plan and copies of them are available on the sign-in table if you are interested.

Response to Comment No. 1: Under the CERCLA process (Superfund) under which Picatinny Arsenal is governed, unacceptable site-related risks are required before restoration actions are needed and can be

taken. Risk assessments have been conducted at each of these sites in accordance with USEPA risk assessment guidance and no unacceptable risk has been found for the current and reasonably anticipated future land use. Further, there are no adverse impacts to ecological receptors. No action is appropriately recommended under the CERCLA process. The Army and the USEPA consider that the recommended remedy is fully protective of human health and the environment. The Army will certify annually that the land use remains military/industrial, as described in Section 1.3. If land use is no longer military/industrial, the Army and USEPA will evaluate whether the remedy remains protective for the new land use. If it is not protective due to changed land use, the Army and USEPA will select another remedy.

Comment No. 2, William Roach, Project Manager USEPA Region 2

USEPA read the following prepared statement on Picatinny Arsenal's 26 Site PP during the June 11, 2014 Public Meeting.

There was a lengthy review of the previous 25 Site No Further Action ROD, and there has been a lot of discussion to come up with this remedy of No Further Action with Land Use Monitoring. EPA has reviewed all the reports and work plans for those reports and risk assessments, and we approved those risk assessments. To get to this Proposed Plan, there was much time spent on reviews of background documents and comments back and forth. We have reached this point and reviewed the draft Proposed Plan and submitted comments. We approved the release of the Proposed Plan to the public. Based on the comments we receive from the public and whether we receive State concurrence, which doesn't seem very likely, we will decide if the remedy is acceptable. When the decision gets put into a ROD, we review that document and if we approve that document, it gets signed by our Director of the Emergency and Remedial Response Division.

Response to Comment No. 2: The comment is acknowledged. No response necessary.

Comment No. 3 by Ms. JoAnn Mandisini of Rockaway Valley Regional Sewer Authority: What are some of the thresholds that were referred to in the presentation such as metals being under a threshold? Do the documents in the libraries have the lab analysis information?

Response to Comment No. 3: The threshold to determine if a chemical enters a risk assessment is usually based on the level of concern which is negotiated with NJDEP and USEPA and is either the NJDEP criteria at the time of the risk assessment or a USEPA criteria. The laboratory analysis is part of the documents at the libraries. For example, at the Building 302, the highest concentration of PAHs was 15 parts per million compared to a level of concern of 0.2 parts per million. The PP and ROD presents the concentrations detected and the criteria they were compared to.

Comment No. 4 by Mr. Michael Glaab: What were the levels of manganese [at Site 134] compared to the background concentrations?

Response to Comment No. 4: Manganese was detected at 1,090 mg/kg in surface soil at Site 134 (Building 302). The background level established for manganese at Picatinny is 3,700 mg/kg. Manganese is a naturally occurring mineral detected frequently in soil and groundwater throughout Picatinny. The source of manganese at Picatinny is the local geology and not site-related.

Comment No. 5 by Mr. Tom Brackin, Community Member of the Restoration Advisory Board: I was curious when you talked about the removal of the septic system. Was anything found beyond that structure?

Response to Comment No. 5: The laws for this type of tank closure were followed which would include post-removal sampling. All the data is provided to the State, and they review and determine whether it is adequate. Contaminants were not detected in the soil samples collected around the structure. If something had leaked from the underground storage tank and made its way into the groundwater, the Area D groundwater studies and remediation would address it.

Comment No. 6 by Ms. JoAnn Mandisini of Rockaway Valley Regional Sewer Authority: You said groundwater is being remediated at one of the sites. Is there a groundwater treatment facility? Is the treatment regulated by NJDEP permit?

Response to Comment No. 6: Picatinny is addressing and remediating the groundwater at a number of sites on the Arsenal, including Area D and Mid-Valley. We comply with the permit equivalency process under CERCLA. The purpose of the public meeting is not to discuss these groundwater systems. If you

attend the Restoration Advisory Board meeting after this meeting, there will be some discussion of all the groundwater remediation projects.

Comment No. 7 by Mr. Michael Glaab: There is supposed to be a 30-day comment period? Today is June 11 and the comment period ends July 2 which is not 30 days.

Response to Comment No. 7: The 30-day comment period begins when the public notice is published in the newspapers--the Star Ledger and the Daily Record.

Comment No. 8 by Mr. Michael Glaab: Can you explain why you are not willing to follow NJDEP's suggestion about railroad lines?

Response to Comment No. 8: The commenter is referring to a request from NJDEP asking the Army to investigate and remediate many miles of railroad lines. The Army has sampled railroad lines when they are part of sites and NJDEP has made an additional request for the Army to investigate the railroad lines for arsenic and PAHs. The railroad lines are not part of the 21 Sites. In general terms, the CERCLA program investigates releases to the environment, and if there is a known spill or crash or event that would have released contaminants along the railroad lines, those lines would be investigated. Just because a railroad track runs through a property, it does not mean it needs to be investigated. Similarly, an asphalt road (which contains PAHs) running through a site would not be automatically investigated. The Army is aware of both USEPA's and NJDEP's request to address the abandoned railways and agrees to address *the abandoned railways* to determine whether any CERCLA releases have occurred and will address any identified releases in accordance with CERCLA.

Comment No. 9, Mr. Pat Matarazzo, Rockaway Township Environmental Commission and Community Member of Picatinny Restoration Advisory Board: I am concerned with the Army ignoring the State of New Jersey's regulations. New Jersey has the ability to take a Federal regulation and make it more stringent and has done so with many regulations throughout the State which becomes the enforceable limit in the State of New Jersey. By ignoring New Jersey standards, it throws a shadow on the entire process that we govern with in New Jersey. I don't understand why the Army would ignore the State's request which is to protect New Jersey itself. I think you should consider observing NJDEP's request.

Response to Comment No. 9: Under the CERCLA process (Superfund) under which Picatinny Arsenal is governed, unacceptable site-related risks are required before restoration actions are needed and can be taken. Only once an action is needed are ARARs (New Jersey's Regulations) evaluated and considered. Risk assessments have been conducted at each of these sites in accordance with USEPA risk assessment guidance and no unacceptable risk has been found for the current and reasonably anticipated future land use. Further, there are no adverse impacts to ecological receptors. No action is appropriately recommended under the CERCLA process. The Army and the USEPA consider that the recommended remedy is fully protective of human health and the environment. The Army will certify annually that the land use remains military/industrial, as described in Section 1.3. If land use is no longer military/industrial, the Army and USEPA will evaluate whether the remedy remains protective for the new land use. If it is not protective due to changed land use, the Army and USEPA will select another remedy.

Comment No. 10, by Mr. Michael Glaab: I concur with NJDEP's assessment and am reassured that NJDEP has [submitted a letter Army and USEPA].

Response to Comment No. 10: Comment is noted. No response necessary.

COMMENTS FROM FACT SHEET COMMENT FORM

Comment No. 1, Henry VanDyke, Restoration Advisory Board Community Member: (Mr. VanDyke indicated he served as Building Manager and HAZMAT Officer for Building 92 for several years). Building 92 [had a] concrete tank filled with stone from Limecrest to neutralize any acids from metallurgic lab sinks. Radiation calibration [equipment was] contained in lead-lined room (thick walls) and discontinued early after Building was dedicated ~1969-1970, if at all.

Response to Comment No. 1: The comment is acknowledged and the description of historical operations at the building is consistent with the Army's understanding of the Site's background and historical uses.

3.2 TECHNICAL AND LEGAL ISSUES

The NJDEP has submitted a letter regarding compliance with their soil remediation standards as documented above. The Army and the USEPA have agreed that under CERCLA in the absence of unacceptable risk for the current and reasonably anticipated future and the absence of CERCLA action, an ARAR analysis is not required.

The NJDEP has indicated applying the NJ SRS is required despite the absence of unacceptable risk for current and reasonably anticipated use. The NJDEP has concurred on the selected remedy after the Army agreed to remove 5 sites from the ROD and change the remedy for 3 sites from NFA to NFA with Monitoring of Land Use.”

4.0 PART 4: REFERENCES

- ARCADIS, 2014a. No Further Action with Monitoring of Land Use Proposed Plan for 26 Sites. Picatinny Arsenal, New Jersey. May.
- ARCADIS, 2014b. Qualitative Human Health Risk Assessment for Sites 119, 120 and 121. Picatinny Arsenal, New Jersey. July.
- Argonne National Laboratory (ANL), 1991. Final Remedial Investigation Concept Plan for Picatinny Arsenal, Volume 2: Descriptions for Remedial Investigation Sites. Argonne National Laboratory, Environmental Assessment, and Information Sciences Division. Argonne, Illinois. March.
- Dames and Moore, 1998. Draft Final Phase I Remedial Investigation Report – Picatinny Arsenal, New Jersey. Prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland.
- Foster Wheeler, 1991. U.S. Army Armament Research, Development, and Engineering Center (ARDEC) Discharge Investigation Project Report, Volumes I – IV.
- IT Corporation (IT), 1999. Phase I Additional Remedial Investigation, Sites 22, 44, 61, 104, 122, 135, 141, and 145. Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract No. DACA-31-95-D-0083. September 1999. Final.
- IT, 2000. Phase II Ecological Risk Assessment, Remedial Investigation/Feasibility Study, Picatinny Arsenal, New Jersey. Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract No. DACA-31-95-D-0083. February 2000. Draft Final.
- Shaw Environmental, Inc. (Shaw), 2005. Phase III & Phase I 2A/3A Sites Screening level Ecological Risk Assessment. June.
- Shaw, 2010. 25 Sites Focused Feasibility Study. Picatinny, New Jersey. Final Prepared for U.S. Army Corps of Engineers. Final.
- U.S. Army, 2004. Final Area D Groundwater Record of Decision. Picatinny Arsenal. April.
- U.S. Army, 2012. Record of Decision for Groundwater and Surface Water in the Mid-Valley Region (PICA-204), Picatinny Arsenal, New Jersey. September.
- U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), 1998. Relative Risk Site Evaluation No. 38-EH-569097, Picatinny Arsenal, New Jersey, June, August, and December 1997. Prepared for U.S. Army Armament, Research, Development, and Engineering Center, Picatinny Arsenal.
- Wilford, J.F., 1960. Safety Report prepared by J. Wilford. October 27, 1959.

Remedial Investigations

- ICF Kaiser Engineers (ICFKE), 1998. Phase II Remedial Investigation Report, Round 1, Volume 3, Area I, 1A Sites Recommended for Additional Investigation. Picatinny Arsenal, Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract DACA31-95-D0083. November 1998. Draft Final.
- ICFKE, 1998. Phase II Remedial Investigation Report, Round 1, Volume 3, Area I, 2A/3A Sites Recommended for Additional Investigation. Picatinny Arsenal, Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract DACA31-95-D0083. November 1998. Draft Final.
- ICFKE, 1998. Phase II Remedial Investigation Report, Round 1, Volume 3, Area I, 1A Sites Recommended for Additional Investigation. Picatinny Arsenal, Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract DACA31-95-D0083. November 1998. Draft Final.
- ICFKE, 1998. Phase II Remedial Investigation Report, Round 1, Volume 3, Area I, No Further Action Sites. Picatinny Arsenal, Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract DACA31-95-D0083. November 1998. Draft Final.

- IT, 2001d. Picatinny Arsenal Phase II Group 3 Sites Remedial Investigation Report, Sites 1, 2 & 4 (Final). Prepared for U.S. Army Corps of Engineers – Baltimore District. Contract No. DACA-31-95-D-0083. October 2001.
- Shaw, 2003. Phase II Remedial Investigation Report, Rounds 1 & 2, Volume 4 – Area J Sites, Site 175. Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract No. DACA-31-95-D-0083. December 2003. Draft Final.
- Shaw, 2003. Phase II Remedial Investigation Report, Rounds 1 & 2, Volume 5 – Area K Sites. Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract No. DACA-31-95-D-0083. December 2003. Draft Final.
- Shaw, 2004. Picatinny Task Order 17 Additional Site Investigations Remedial Investigation Report Sites: 3, 31,192, & 199 Volume 1. Final. Prepared for U. S. Army Corps of Engineers.
- Shaw, 2004. Picatinny Arsenal Phase III 2A/3A Remedial Investigation Report. Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract No. DACA-31-95-D-0083. December 2004. Final.
- Shaw, 2005. Phase I 2A/3A Sites Remedial Investigation Report. Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract No. DACA-31-95-D-0083. January 2005. Final.
- Shaw, 2005. Picatinny Task Order 17 Remedial Investigation Report. Final. Prepared for U. S. Army Corps of Engineers.
- Shaw, 2005. Phase III-1 A Sites Task Order 17 Remedial Investigation Report Area L. Final. Prepared for U. S. Army Corps of Engineers.
- Shaw, 2005. Picatinny Task Order 17 Phase II Remedial Investigation Report, Rounds 1 and 2, Volume 3 – Area I remaining Sites. Draft Final. Prepared for U. S. Army Corps of Engineers.
- Shaw, 2005. Picatinny Task Order 17 Phase II Remedial Investigation Report, Rounds 1 and 2, Volume 3 – Area I 500 Area Sites. Final. Prepared for U. S. Army Corps of Engineers.
- Shaw, 2005. Picatinny Task Order 17 Phase II Remedial Investigation Report, Rounds 1 and 2, Volume 5 – Area K Sites. Final. Prepared for U. S. Army Corps of Engineers.
- Shaw, 2005. Phase III-2A/3A Remedial Investigation Report Volume 2 – Area L Sites. Final. Prepared for U. S. Army Corps of Engineers.
- Shaw, 2005. Phase III-2A/3A Remedial Investigation Report. Final. Prepared for U. S. Army Corps of Engineers.
- Shaw, 2005. Phase III-1A Sites Remedial Investigation Report. Prepared for U.S. Army Corps of Engineers, Baltimore District. Contract No. DACA-31-95-D-0083. April 2005. Final.
- Shaw, 2005. Phase III–1A Sites Task Order 17 Remedial Investigation Report, Area L, Volume 2, Binder 3, Groundwater Assessment. Final. Prepared for U. S. Army Corps of Engineers.
- Shaw, 2005. Phase III–1A Sites Task Order 17 Remedial Investigation Report, Area L, Volume 2, Binder 2, Picatinny, New Jersey. Final. Prepared for U. S. Army Corps of Engineers.
- Shaw, 2005. Picatinny Task Order 17 Supplemental Investigation of the Apple Trees Recreational Area, Site 192. Final. Prepared for U. S. Army Corps of Engineers.

Tables

**Table 1 - Chronology of Environmental Investigations
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

EVENT	DATE RANGE
1. Preliminary Assessments/Site Investigations (PA/SI)	1988 - 1996
2. Remedial Investigations (RI)	1995 - 1998
3. Follow up activities on RI (additional sampling and/or focused remedial actions)	1990 - 2005

**Table 2 - Summary of Site Risk Evaluation
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Area	Site Number	PICA Number	Building Number	Site Description	Environmental Media Considered in Risk Assessment?	Qualitative Risk Evaluation:	LOC Exceedances	HHRA or ERA Needed?
D	69	94	Building 92	Surveillance Laboratory	Subsurface Soil and Groundwater	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRs to determine if a recommendation of NFA was appropriate for the site. Groundwater: LOC defined as the 1) lower of Federal and NJ MCLs, 2) higher of NJ Groundwater Quality Criteria or PQLs, 3) any non-zero MCLG. If these are unavailable, LOCs for groundwater are the lower of the Federal drinking water standards and health advisories and USEPA Region 3 Tap Water RBCs (10-6 target risk).	<u>Subsurface Soil Samples:</u> No exceedance of NJ NRSRS or RSRs. <u>Groundwater Samples:</u> 1 exceedance for TCE .	No quantitative HHRA or ERA required.
	117	96	Building 22	Precision Machine Shop	Surface Soil	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRs to determine if a recommendation of NFA was appropriate for the site.	<u>Surface Soil Samples:</u> 2 exceedances for PAHs,	COPCs identified; conduct quantitative HHRA and ERA.
	123	98	Building 64	Metal Plating Shop	Surface and Subsurface Soil	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRs to determine if a recommendation of NFA was appropriate for the site.	<u>Surface Soil Samples:</u> 1 exceedance for Total PCBs; 1 exceedance for benzo(a)pyrene. <u>Subsurface Soil Samples:</u> 1 exceedance for Total PCBs.	COPCs identified; quantitative HHRA and ERA required.
F	60	101	Building 163	Photography Laboratory	Surface Soil	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRs to determine if a recommendation of NFA was appropriate for the site.	<u>Surface Soil Samples:</u> No exceedance of NJ NRSRS or RSRs.	Quantitative HHRA and ERA conducted to evaluate unrestricted use..
	145	114	Building 477	Explosive & Propellant Mix Area	Surface and Subsurface Soil, Groundwater, Sediment and Surface Water	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRs to determine if a recommendation of NFA was appropriate for the site. Groundwater: LOC defined as the 1) lower of Federal and NJ MCLs, 2) higher of NJ Groundwater Quality Criteria or PQLs, 3) any non-zero MCLG. If these are unavailable, LOCs for groundwater are the lower of the Federal drinking water standards and health advisories and USEPA Region 3 Tap Water RBCs (10-6 target risk). Sediment: LOC defined as the 1) lower of TELs (Smith, 1996) and LELs (OMEE, 1993) where they exist 2,) USEPA SQC for compounds without TELs or LELs, 3) USEPA Region 3 Industrial Soil RBCs. Surface water: LOC defined as the 1) lower of the Federal WQC and NJ SWQC where they exist, 2) USEPA Region 3 Tap Water RBCs.	<u>Surface Soil Samples:</u> No exceedances. <u>Subsurface Soil Samples:</u> 1 exceedance for 2,4-DNT (20 ppm), 2,6-DNT (10 ppm) & thallium (179 ppm). <u>Groundwater Samples:</u> Exceedances for several metals (primarily Hydronpunch and unfiltered samples), 2 exceedances for RDX and 1 for TNT in 1 monitoring well. <u>Sediment Samples:</u> 1 exceedance for copper. <u>Surface Water Samples:</u> 1 exceedance for several metals.	COPCs identified; quantitative HHRA required. No ERA required.
G	134	29	Building 302	Maintenance & Service Shops	Surface and Subsurface Soil	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRs to determine if a recommendation of NFA was appropriate for the site.	<u>Surface Soil Samples:</u> several exceedances for PAHs, 1 exceedance for lead. <u>Subsurface Soil Samples:</u> No exceedances.	COPCs identified; quantitative HHRA and ERA required.
	136	29	Building 355	Metallurgy Laboratory	Surface Soil and Groundwater	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRs to determine if a recommendation of NFA was appropriate for the site. Groundwater: LOC defined as the 1) lower of Federal and NJ MCLs, 2) higher of NJ Groundwater Quality Criteria or PQLs, 3) any non-zero MCLG. If these are unavailable, LOCs for groundwater are the lower of the Federal drinking water standards and health advisories and USEPA Region 3 Tap Water RBCs (10-6 target risk).	<u>Surface Soil Samples:</u> 2 exceedances for arsenic and mercury. <u>Groundwater Samples:</u> 1 exceedance for manganese and lead.	COPCs identified; quantitative HHRA required. No ERA required.
	185	29	Building 350	Former Laboratory	Surface Soil and Groundwater	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRs to determine if a recommendation of NFA was appropriate for the site. Groundwater: LOC defined as the 1) lower of Federal and NJ MCLs, 2) higher of NJ Groundwater Quality Criteria or PQLs, 3) any non-zero MCLG. If these are unavailable, LOCs for groundwater are the lower of the Federal drinking water standards and health advisories and USEPA Region 3 Tap Water RBCs (10-6 target risk).	<u>Surface Soil Samples:</u> No exceedances. <u>Groundwater Samples:</u> No exceedances.	No quantitative HHRA or ERA required.

**Table 2 - Summary of Site Risk Evaluation
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Area	Site Number	PICA Number	Building Number	Site Description	Environmental Media Considered in Risk Assessment?	Qualitative Risk Evaluation:	LOC Exceedances	HHRA or ERA Needed?
J	175	158	Building 3801	Helicopter Maintenance	Surface and Subsurface Soil, Groundwater, Sediment, and Surface Water	<p>Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRs to determine if a recommendation of NFA was appropriate for the site.</p> <p>Groundwater: LOC defined as the 1) lower of Federal and NJ MCLs, 2) higher of NJ Groundwater Quality Criteria or PQLs, 3) any non-zero MCLG. If these are unavailable, LOCs for groundwater are the lower of the Federal drinking water standards and health advisories and USEPA Region 3 Tap Water RBCs (10-6 target risk).</p> <p>Sediment: LOC defined as the 1) lower of TELs (Smith, 1996) and LELs (OMEE, 1993) where they exist 2.) USEPA SQC for compounds without TELs or LELs, 3) USEPA Region 3 Industrial Soil RBCs.</p> <p>Surface water: LOC defined as the 1) lower of the Federal WQC and NJ SWQC where they exist, 2) USEPA Region 3 Tap Water RBCs.</p>	<p><u>Surface Soil Samples</u>: No exceedances. <u>Subsurface Soil Samples</u>: No exceedances. <u>Groundwater Samples</u>: 1 exceedance for methylene chloride. <u>Sediment Samples</u>: No exceedances. <u>Surface Water Samples</u>: No exceedances.</p>	No quantitative HHRA or ERA required.

**Table 2 - Summary of Site Risk Evaluation
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Area	Site Number	PICA Number	Building Number	Site Description	Environmental Media Considered in Risk Assessment?	Qualitative Risk Evaluation:	LOC Exceedances	HHRA or ERA Needed?
K	172	161	Adjacent to Building 3328	Parking lot	Surface and Subsurface Soil	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRS to determine if a recommendation of NFA was appropriate for the site.	Surface Soil Samples: No exceedances. Subsurface Soil Samples: No exceedances.	No quantitative HHRA or ERA required.
	174	161	Building 3420	Former Sewage Treatment Plant	Surface and Subsurface Soil, Groundwater, Sediment, and Surface Water	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRS to determine if a recommendation of NFA was appropriate for the site. Groundwater: LOC defined as the 1) lower of Federal and NJ MCLs, 2) higher of NJ Groundwater Quality Criteria or PQLs, 3) any non-zero MCLG. If these are unavailable, LOCs for groundwater are the lower of the Federal drinking water standards and health advisories and USEPA Region 3 Tap Water RBCs (10-6 target risk). Sediment: LOC defined as the 1) lower of TELs (Smith, 1996) and LELs (OMEE, 1993) where they exist 2,) USEPA SQC for compounds without TELs or LELs, 3) USEPA Region 3 Industrial Soil RBCs. Surface water: LOC defined as the 1) lower of the Federal WQC and NJ SWQC where they exist, 2) USEPA Region 3 Tap Water RBCs.	Surface Soil Samples: No exceedances. Subsurface Soil Samples: No exceedances. Groundwater Samples: No exceedances. Sediment Samples: 4 exceedances for PAHs and metal, 3 exceedances for DDD, DDE, and DDT. Surface Water Samples: 1 exceedance for aluminum, 2 exceedances for arsenic and sodium.	COPCs identified; Quantitative HHRA and ERA required.
	186	161	Building 3316	Fire House, Former Vehicle Maintenance Facility	Groundwater	Groundwater: LOC defined as the 1) lower of Federal and NJ MCLs, 2) higher of NJ Groundwater Quality Criteria or PQLs, 3) any non-zero MCLG. If these are unavailable, LOCs for groundwater are the lower of the Federal drinking water standards and health advisories and USEPA Region 3 Tap Water RBCs (10-6 target risk).	Groundwater Samples: 3 exceedances for iron, 2 exceedances for manganese and sodium, 1 exceedance for aluminum, chromium, lead, nickel, silver, n-nitrosodimethylamine, and PCE.	Quantitative HHRA required. No ERA required.
L	176	176	--	Little League Baseball Field	Surface and Subsurface Soil	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRS to determine if a recommendation of NFA was appropriate for the site.	Surface Soil Sample: No exceedances. Subsurface Soil Sample: 1 exceedance for benzo(a)pyrene.	Quantitative HHRA required for unrestricted use only. No ERA required.
	177 ¹	177	--	Sanitary Sewer Line Breaks/ Leaks	Subsurface Soil	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRS to determine if a recommendation of NFA was appropriate for the site.	Subsurface Soil Sample: 1 exceedance for benzo(a)pyrene.	No quantitative HHRA or ERA required; however, residential HHRA was evaluated.
N	10	53	--	Former Chemical Burial Area	Surface and Subsurface Soil and Groundwater	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRS to determine if a recommendation of NFA was appropriate for the site. Groundwater: LOC defined as the 1) lower of Federal and NJ MCLs, 2) higher of NJ Groundwater Quality Criteria or PQLs, 3) any non-zero MCLG. If these are unavailable, LOCs for groundwater are the lower of the Federal drinking water standards and health advisories and USEPA Region 3 Tap Water RBCs (10-6 target risk).	Surface Soil Samples: No exceedances. Subsurface Soil Samples: No exceedances. Groundwater Samples: 3 exceedances for aluminum, 2 exceedances for manganese (naturally occurring minerals due to site geology)	Quantitative HHRA required for unrestricted use only. No ERA required.

**Table 2 - Summary of Site Risk Evaluation
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Area	Site Number	PICA Number	Building Number	Site Description	Environmental Media Considered in Risk Assessment?	Qualitative Risk Evaluation:	LOC Exceedances	HHRA or ERA Needed?
O	164	183	Building 1217	General Purpose Magazine	Surface Soil	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRS to determine if a recommendation of NFA was appropriate for the site.	Surface Soil Samples: No exceedances.	No quantitative HHRA or ERA is needed
P	27	69	Former Building T-90	Salt Storage Area	Surface Soil and Groundwater	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRS to determine if a recommendation of NFA was appropriate for the site. Groundwater: LOC defined as the 1) lower of Federal and NJ MCLs, 2) higher of NJ Groundwater Quality Criteria or PQLs, 3) any non-zero MCLG. If these are unavailable, LOCs for groundwater are the lower of the Federal drinking water standards and health advisories and USEPA Region 3 Tap Water RBCs (10-6 target risk).	Groundwater Samples: 1 exceedance for sodium. Surface Soil Samples: 1 exceedance for beryllium.	No quantitative HHRA or ERA required.
	119	69	Buildings 46, 47 & 48	Propellant Storage	Surface Soil	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRS to determine if a recommendation of NFA was appropriate for the site.	Surface Soil Samples: 2 exceedances for benzo(a)pyrene, 1 exceedance for benz(a)anthracene & benzo(b)fluoranthene	No quantitative HHRA or ERA required.
	120	69	Building 50	Propellant Storage	Surface Soil	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRS to determine if a recommendation of NFA was appropriate for the site.	Surface Soil Samples: 1 exceedance for three PAHs	No quantitative HHRA or ERA required.
	121	69	Building 57	Chemical Storage	Surface Soil	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRS to determine if a recommendation of NFA was appropriate for the site.	Surface Soil Samples: 1 exceedance for four PAHs.	No quantitative HHRA or ERA required.
	--	PICA 208 ²	NA	DU Scrap Storage Area	Surface Soil, Groundwater, Sediment, and Surface Water	Soil LOC is defined as exceedances of NJ NRSRS. In cases where a site exhibited no exceedances of the NJ NRSRS, the site was compared to NJ RSRS to determine if a recommendation of NFA was appropriate for the site. Groundwater: LOC defined as the 1) lower of Federal and NJ MCLs, 2) higher of NJ Groundwater Quality Criteria or PQLs, 3) any non-zero MCLG. If these are unavailable, LOCs for groundwater are the lower of the Federal drinking water standards and health advisories and USEPA Region 3 Tap Water RBCs (10-6 target risk). Sediment: LOC defined as the 1) lower of TELs (Smith, 1996) and LELs (OMEE, 1993) where they exist, 2) USEPA SQC for compounds without TELs or LELs, 3) USEPA Region 3 Industrial Soil RBCs. Surface water: LOC defined as the 1) lower of the Federal WQC and NJ SWQC where they exist, 2) USEPA Region 3 Tap Water RBCs.	Surface Soil Sample: 1 exceedance for arsenic and several exceedances for thorium-232. Groundwater Samples: 2 exceedances for aluminum and lead, 3 exceedances for iron and manganese (naturally occurring minerals due to site geology) and 3 exceedances for arsenic. Sediment Samples: 2 exceedances for several PAHs, several exceedances for metals. Surface Water Samples: 1 exceedance for several metals, 3 exceedances for iron and manganese.	Quantitative HHRA required. No ERA required.

1- Site 177 was established for the investigation of known sewer line breaks or leaks. These breaks/leaks are located throughout Picatinny.

2- PICA Site 208 does not have a Site Number assigned to it.

COPC - Constituent of potential concern

ERA - Ecological risk assessment

HHRA - Human health risk assessment

LEL - Lowest effects level

LOC - Level of concern

MCL - Maximum contaminant levels

MCLG - Maximum contaminant levels groundwater

NA - not applicable or not available

NFA - No further action

NJ NRSRS - New Jersey non-residential soil remediation standards

NJ RSRS - New Jersey residential soil remediation standards

PQL - practical quantitation limit

PRG - preliminary remediation goal

RBC - risk based concentration

SQC - Sediment quality criterion

SWQC - Surface water quality criterion

TEL - Threshold effects level

USEPA RSL - US Environmental Protection Agency regional screening level

WQC - Water quality criteria

**Table 3 - Summary of Site Risk
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Area	Site Number	PICA Number	HHRA Conducted?	Media	Land Use Scenario	Population	Carcinogenic Risk	Risk Drivers	Noncarcinogenic Hazard	Hazard Drivers	Lead (detected in soil in mg/kg)*
D	69	94	no								
	117	96	HHRA	Shallow Soil	Current	Outdoor Maintenance Worker	3.0E-06	NR	<1	NH	max = 420
				Shallow Soil	Future	Industrial/Research Worker	4.0E-05	NR	<1	NH	
				Total Soil	Future	Construction/Excavation Worker	2.0E-05	NR	1	NH	
	123	98	Revised HHRA	Surface Soil	Current	Outdoor Maintenance Worker	1.3E-05	NR	<1	NH	max = 56
				Surface Soil	Future	Industrial/Research Worker	7.6E-05	NR	<1	NH	
Total Soil				Future	Construction/Excavation Worker	2.0E-06	NR	<1	NH		
F	60	101	HHRA	Surface Soil	Current	Industrial/Research Worker	1.9E-06	NR	<1	NH	max = 49
				Subsurface Soil	Future	Construction/Excavation Worker	1.4E-07	NR	<1	NH	
				Soil	Future	Adult Resident	4.1E-06	NR	<1	NH	
				Soil	Future	Child Resident	4.9E-06	NR	<1	NH	
145	114	Revised HHRA	Shallow Soil	Current	Maintenance Worker		--	<1	NH	max = 174	
			Shallow Soil	Future	Industrial/Research Worker	NA	--	<1	NH		
			Total Soil	Future	Construction/Excavation Worker		--	20	Manganese (inhalation) ³		
G	134	29	Revised HHRA	Shallow Soil	Current	Outdoor Maintenance Worker	1E-06	NR	<1	NH	mean = 333 (surface soil) & 242 (all soil)
				Shallow Soil	Future	Industrial/Research Worker	1E-05	NR	<1	NH	
				Total Soil	Future	Construction/Excavation Worker	1E-06	NR	<1	NH	
	136	29	Revised HHRA	Shallow Soil	Future	Industrial/Research Worker	NA	--	1	NH	max = 183
				Total Soil	Future	Construction/Excavation Worker	NA	--	<1	NH (post soil-removal action)	
	185	29	no Interim Remedial Action conducted 2003 removing acid drain filter/concrete vault.								
J	175	158	no								

**Table 3 - Summary of Site Risk
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Area	Site Number	PICA Number	HHRA Conducted?	Media	Land Use Scenario	Population	Carcinogenic Risk	Risk Drivers	Noncarcinogenic Hazard	Hazard Drivers	Lead (detected in soil in mg/kg)*
K	172	161	no								
	174	161	HHRA	Surface Soil	Current	Site Worker	6E-06	NR	<1	NH	max = 59.6
	186	161	HHRA	Groundwater	Future	Construction/Excavation Worker	NA		<1	NH	--
L	176	176	HHRA	Total Soil	Future	Adult Resident	1E-05	NR	<1	NH	max = 22.2
				Total Soil	Future	Child Resident	9E-06	NR	<1	NH	
				Total Soil	Future	Adult + Child Resident	2E-05	NR	--	--	
	177	177	HHRA	Total Soil	Future	Adult Resident	9E-06	NR	<1	NH	max = 124
				Total Soil	Future	Child Resident	6E-06	NR	<1	NH	
				Total Soil	Future	Adult + Child Resident	2E-05	NR	NA	NA	
N	10	53	HHRA	Surface Soil	Current	Industrial/Research Worker	1E-05	NR	<1	NH	max = 22.8
				Total Soil	Future	Construction/Excavation Worker	6E-07	NR	<1	NH	
				Groundwater Soil	Future	Adult Resident	6E-05	NR	<1	NH	
				Groundwater Soil	Future	Child Resident	4E-05	NR	1	NH	
				Groundwater Soil	Future	Adult + Child Resident	1E-04	NR	NA	NA	
				Surface Soil	Future	Industrial Research Worker	2E-05	NR	<1	NH	
O	164	183	no								

**Table 3 - Summary of Site Risk
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Area	Site Number	PICA Number	HHRA Conducted?	Media	Land Use Scenario	Population	Carcinogenic Risk	Risk Drivers	Noncarcinogenic Hazard	Hazard Drivers	Lead (detected in soil in mg/kg)*	
P	27	69	no; limited potential for groundwater use as drinking water resource.	Groundwater	Future							
	119	69	no									
	120	69	no									
	121	69	no									
		--	PICA 208 ²	HHRA	Surface Soil Air Groundwater	Current/ Future	Industrial/ Research Worker	1E-05	NR	<1	NR	max = 279
					Groundwater	Current/ Future	Construction/ Excavation Worker	1E-08	NR	<1	NR	
					Surface Water Sediment	Future	On-Site Youth Visitor Chemical Risk	8E-06	NR	<1	NR	
					Sediment	Future	On-Site Youth Visitor Radiological Risk	2E-06	NR	NA	NA	
					Groundwater Sediment Soil Air	Future	<i>Adult Resident Chemical Risks</i>	<i>4E-04</i>	<i>Arsenic/ Groundwater</i>	<i>8.60</i>	<i>Manganese/ Groundwater</i>	
					Groundwater Sediment Soil Air	Future	<i>Child Resident Chemical Risks</i>	<i>3E-04</i>	<i>Arsenic/ Groundwater</i>	<i>25.00</i>	<i>Manganese/ Groundwater</i>	
				Groundwater Sediment Soil Air	Future	<i>Adult + Child Resident Chemical Risks</i>	<i>6E-04</i>	<i>Arsenic/ Groundwater</i>	NA	NA		
				Sediment	Future	<i>Adult Resident Radiological Risks</i>	<i>2E-05</i>	NR	NA	NA		
				Sediment	Future	<i>Child Resident Radiological Risks</i>	<i>4E-06</i>	NR	NA	NA		
				Sediment	Future	<i>Adult + Child Resident Radiological Risks</i>	<i>2E-05</i>	NR	NA	NA		

Blue shading indicates revised HHRA results (Shaw, 2005/2010)

Italics Italics indicate risk scenarios for land use/groundwater use that are not reasonably anticipated future uses.

1 – Site 177 was established for the investigation of known sewer line breaks or leaks. These breaks/leaks are located throughout Picatinny.

2 – PICA Site 208 does not have a Site Number assigned to it

3 - A review of other sites at Picatinny has shown that the hazard attributed to manganese has been overestimated in the Phase I RI (Shaw, 2005b. Feasibility Study for Sites 31 and 101. Prepared for U.S. Army Corps of Engineers, Baltimore

"-" = No value reported

*Lead data was obtained from Shaw 2010 25 Sites FS Vol. 2 (PTA_AE04.00031B)

HHRA - Human health risk assessment

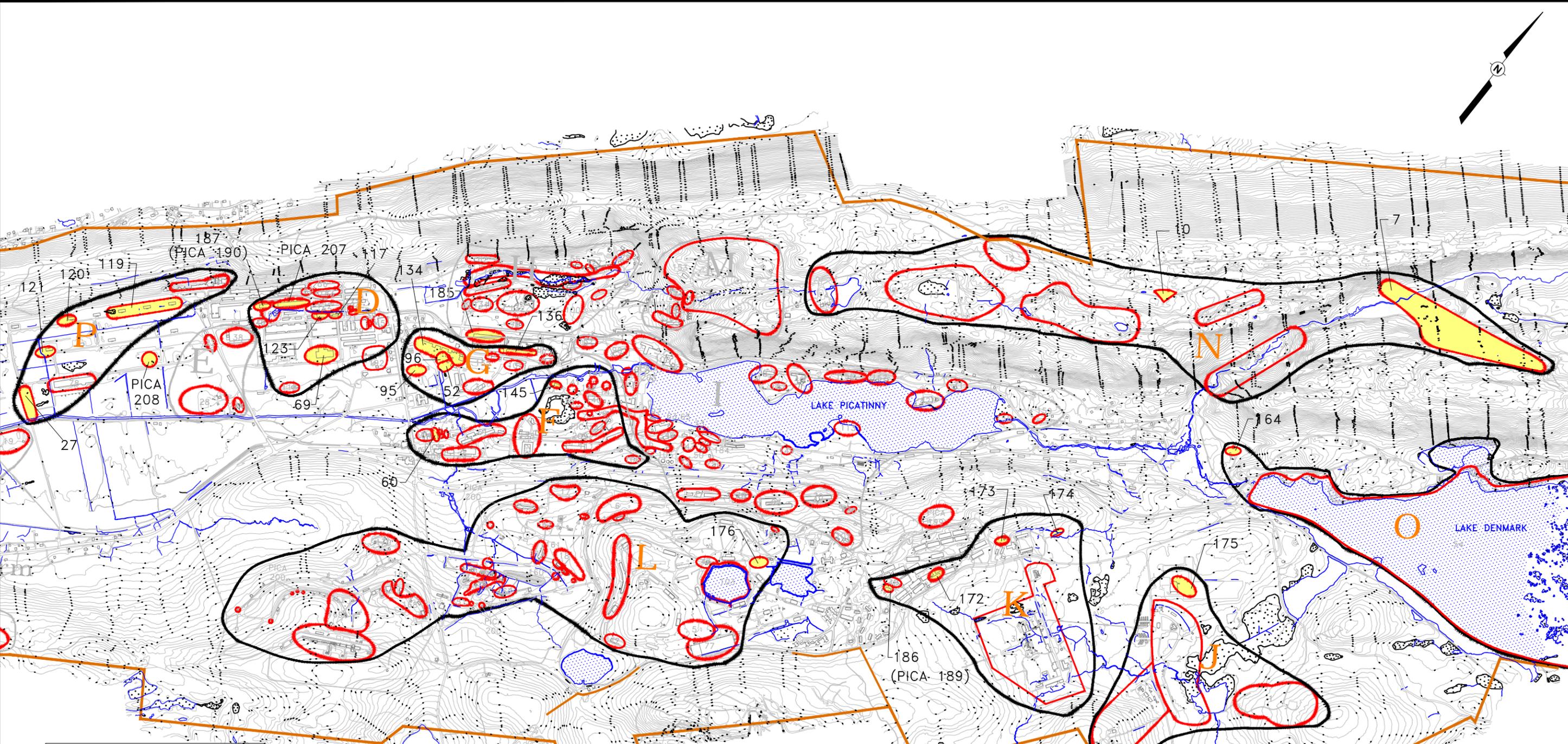
NA - Not applicable

NH - No unacceptable hazard (Hazard Index less than or equal to 1)

NR - No unacceptable risk (risk is within or less than the acceptable risk range 10⁻⁶ to 10⁻⁴)

Figures

CITY:SYRACUSE,NY DIV:GROUP:ENV/CAD DBK,SARTORI PIC,T,E,TALELE PM,T,LLEWELYN TM,K,PAHORST LVR,OP:ON="OFF"-REF G:\ENV\CAD\SYRACUSE\ACT\G068\PICA\125\A01\DWG\PROJECT\G068\PICA-1.dwg LAYOUT: 1 SAVED: 12/1/2013 4:07 PM ACADVER: 18.15 (LMS TECH) PAGESETUP: SYR-LD2B-PDF PLOTSTYLETABLE: PLT\FULL.CTB PLOTTED: 12/1/2013 4:07 PM BY: SARTORI, KATHERINE XREFS: IMAGES: PROJECTNAME: " " GP068\PICA-LD



LEGEND	
	RAILROAD
	PAVED ROADWAY
	COVERED WALKWAY
	SWAMP
	LAKE/POND
	STREAM
	DRAINAGE CANAL
	SITE BOUNDARY
	AREA BOUNDARY
	PICATINNY BOUNDARY
	BUILDING
	FIELD STUDY SITE



UNITED STATES ARMY
PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
LAND USE ROD FOR 21 SITES**

SITE LOCATION MAP

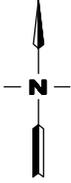
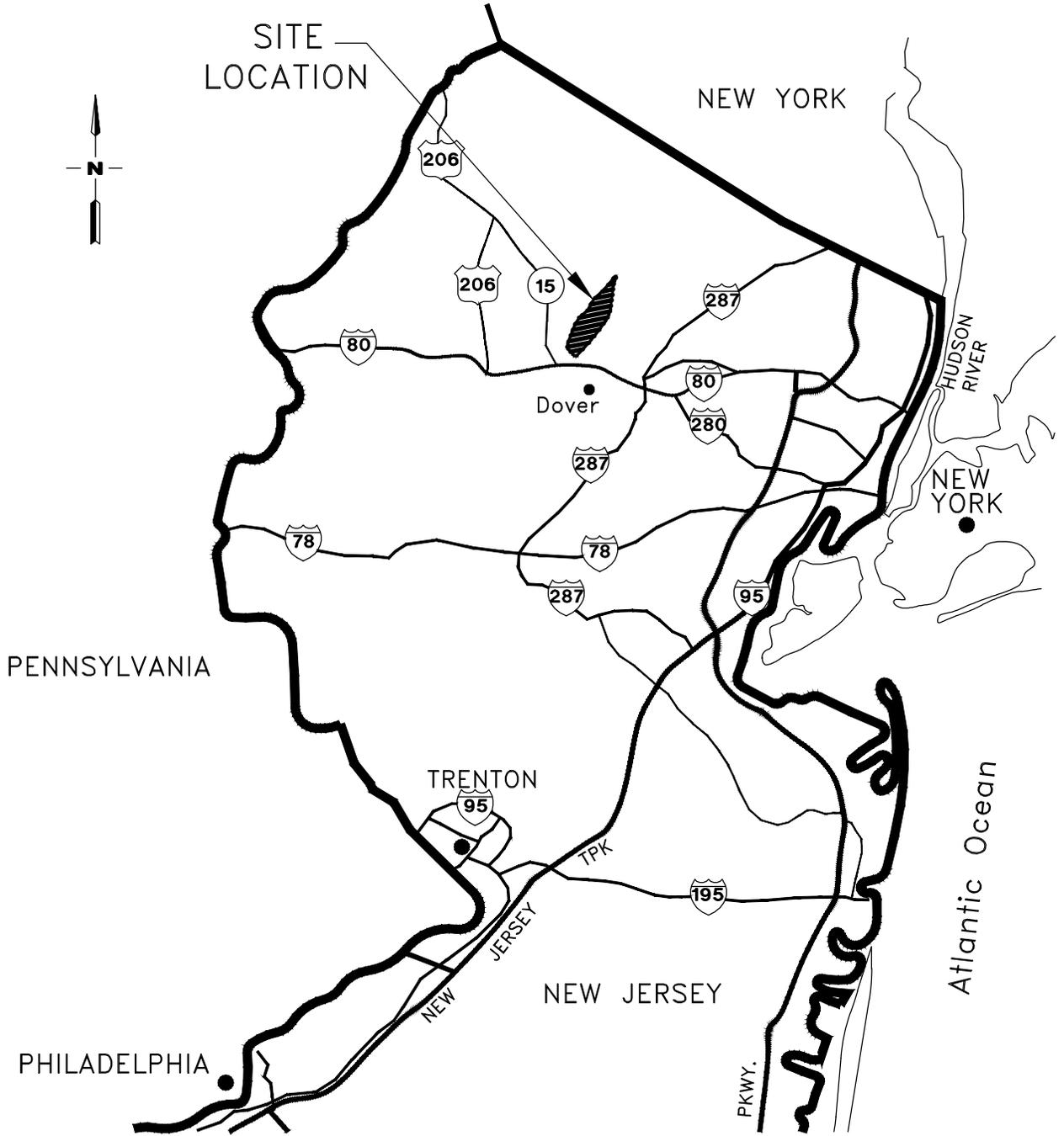
SOURCE NOTE:
FIGURE REPRODUCED FROM 25 SITES
FOCUSED FEASIBILITY STUDY REPORT,
SHAW ENVIRONMENTAL INC., AUGUST 2010
(DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
DRAWING NO. 2-2, DATED 7/15/05)



FIGURE
1

CITY:SYRACUSE, NY DIV:GROUP/ENV/CAD DB:K.SARTORI PIC: T.E. TALELE PM:T.LLEWELLYN TM:K.PANHORST LYR:(OPTION)-OFFE-REF: G:\ENV\CAD\STRACUSE\ACT\GP06\FICA\0123\IA001\DWG\PROJECT\GP06\FICA-2.dwg LAYOUT: 2 SAVED: 1/21/2013 4:08 PM ACADVER: 18.15 (LMS TECH) PAGESETUP: SYR-PA-PDF PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 1/21/2013 4:08 PM BY: SARTORI, KATHERINE

XREFS: IMAGES: PROJECTNAME: --- GP06\FICA\PA



SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-1, DATED 11/15/04)

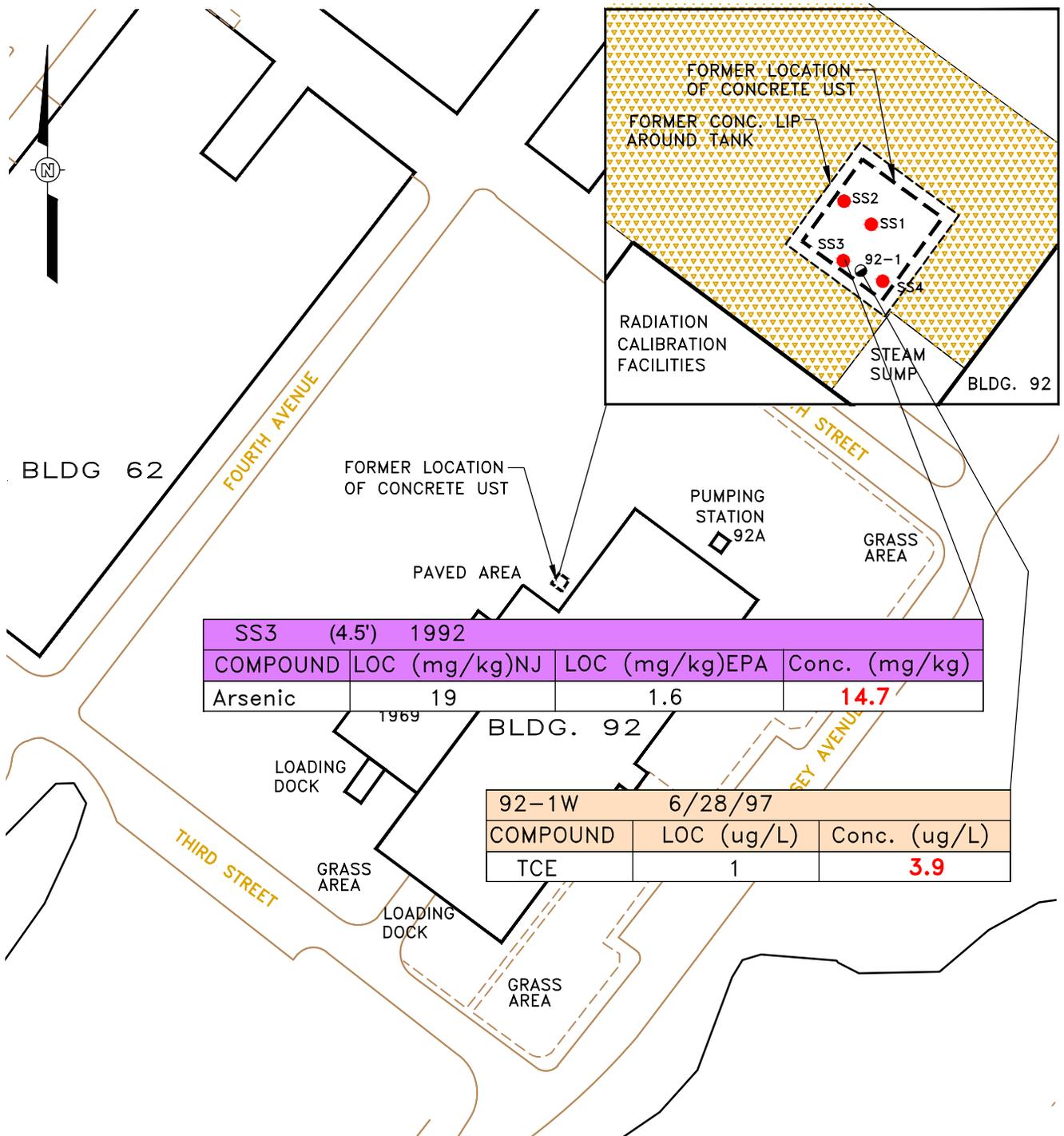
UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE ROD FOR 21 SITES**

PICATINNY SITE LOCATION MAP



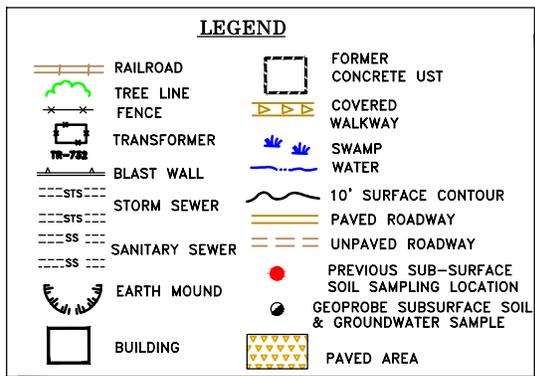
FIGURE
2

CITY:SYRACUSE, NY DIV:GROUP/ENV/CAD DB:K.SARTORI PIC, T.E. TALELE PM:T.LLEWELLYN TM:K.PANHORST LYR:(OPTION)-OFF-REF: G:\ENV\CAD\STRACUSE\XACT\GPOBPICAD\1231\A001\DWG\PROJECT\GPOBPICA-3.dwg LAYOUT: 3 - SAVED: 1/21/2013 4:08 PM ACADVER: 18.1S (LMS TECH) PAGES: 1 PLOT: 1 PLOT DATE: 1/21/2013 4:08 PM BY: SARTORI, KATHERINE



NOTE:
LOC EXCEEDENCES BELOW PICATINNY BACKGROUND LEVELS ARE NOT PRESENTED.

SOURCE NOTE:
FIGURE REPRODUCED FROM 25 SITES FOCUSED FEASIBILITY STUDY REPORT, SHAW ENVIRONMENTAL INC., AUGUST 2010 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC." DRAWING NO. 2-6, DATED 4/07/10)



UNITED STATES ARMY
PICATINNY ARSENAL, NEW JERSEY
NO FURTHER ACTION WITH MONITORING OF LAND USE ROD FOR 21 SITES

**SITE 69-BLDG. 92
LOC EXCEEDENCES**



FIGURE

3

XREFS: IMAGES: PROJECTNAME: ----
 GP06\PICA-LA

MWF-3A		4/29/94	8/1/94
COMPOUND	LOC (ug/L)	Conc. (ug/L)	Conc. (ug/L)
PCE	1	5.90	2.50
Aluminum	200	537/ND#	4,000
Iron	300	1360/ND#	10,600
Lead	5	ND/ND#	7.81
Manganese	50	762/746#	1,010

MWF-3B		4/29/94	8/1/94
COMPOUND	LOC (ug/L)	Conc. (ug/L)	Conc. (ug/L)
RDX	0.5	0.690	0.458
Aluminum	200	1,200/ND#	803
Iron	300	1,700/105#	1,310
Manganese	50	1,000/992#	892

LEGEND

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

SAMPLING LOCATIONS

- MONITORING WELL
- SURFACE WATER/SEDIMENT
- SURFACE SOIL
- SOIL BORING
- TEST PIT
- SOIL GAS

NOTE: # DENOTES FILTERED ANALYSIS

SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 11-6, DATED 4/07/10)

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

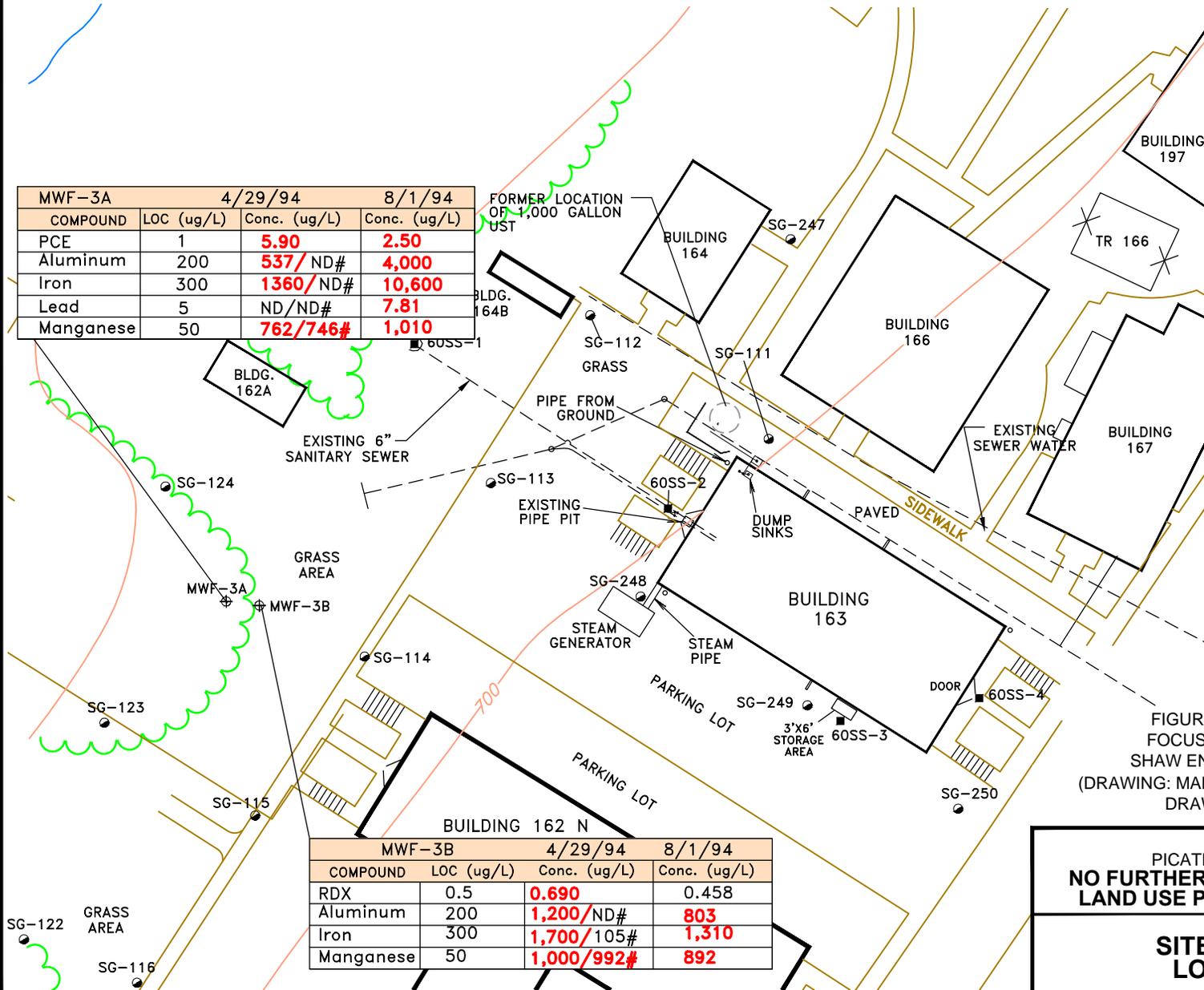
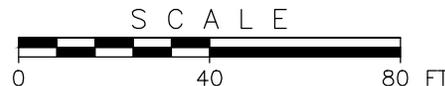
**SITE 60 - BUILDING 163
 LOC EXCEEDENCES**



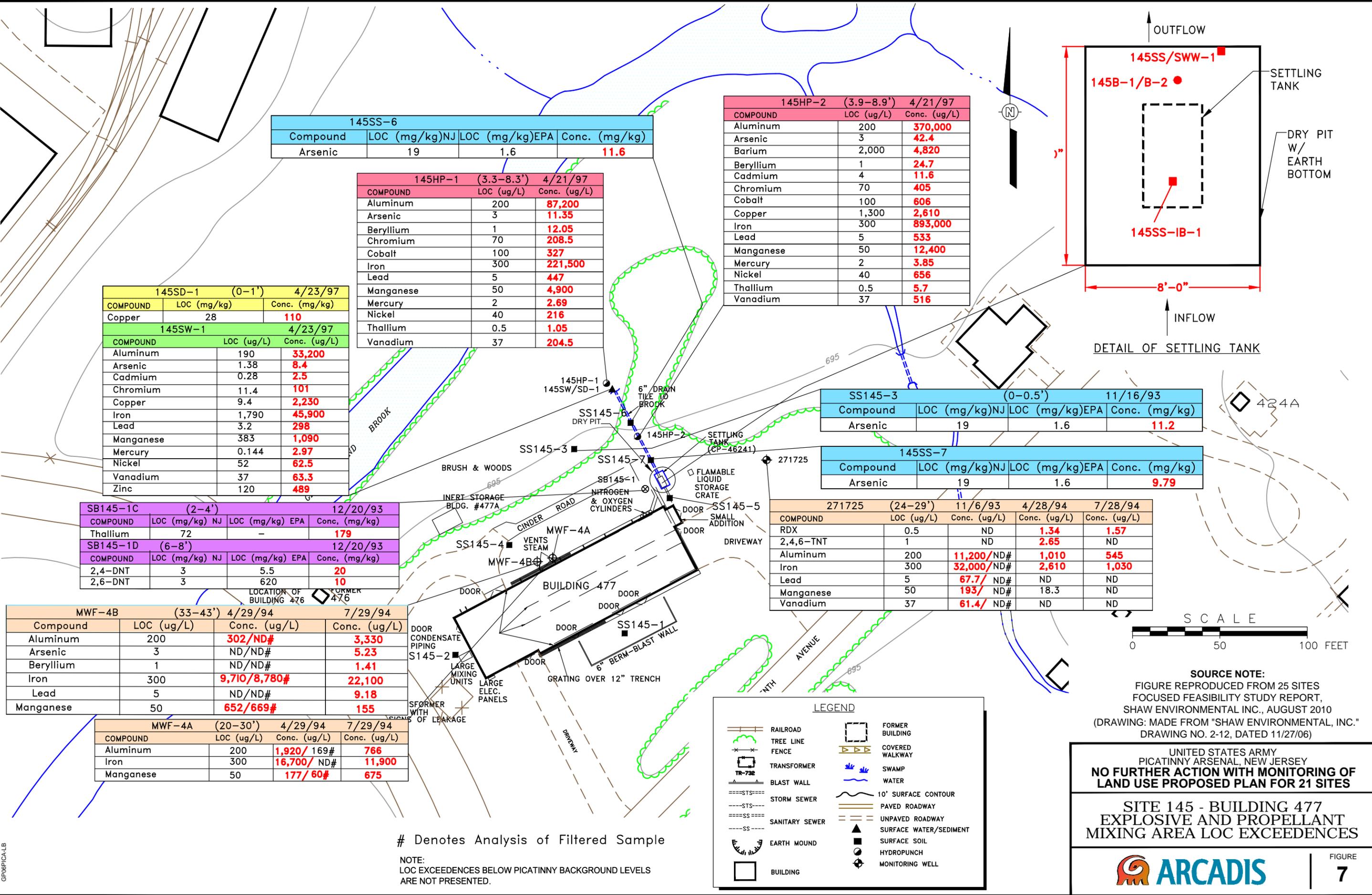
FIGURE

6

NOTE:
 LOC EXCEEDENCES BELOW PICATINNY BACKGROUND LEVELS
 ARE NOT PRESENTED.



CITY:SYRACUSE,NY DIV:GROUP:ENV/CAD DBK/SARTORI PIC:T.E.TALEE PM:T.LLEWELLYN TM:K.PANHORST LVR:OP/ONE"OFF=REF" G:\ENV\CAD\BRIGHTON\ACT\G08P\CA\0125\A0110\WG\PROJECT\G08P\CA-9.dwg LAYOUT:7 SAVED:10/6/2014 2:19 PM ACADVER:18.1 S (LMS TECH) PAGES:7 SVR:LB-PDF PLOTSTYLETABLE:PLT\FULL.CTB PLOTTED:10/6/2014 2:19 PM BY:FOX,AARON XREFS:IMAGES:G:\P\CA\LB PROJECTNAME:



145SS-6			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	11.6

145HP-1 (3.3-8.3') 4/21/97			
COMPOUND	LOC (ug/L)	Conc. (ug/L)	
Aluminum	200	87,200	
Arsenic	3	11.35	
Beryllium	1	12.05	
Chromium	70	208.5	
Cobalt	100	327	
Iron	300	221,500	
Lead	5	447	
Manganese	50	4,900	
Mercury	2	2.69	
Nickel	40	216	
Thallium	0.5	1.05	
Vanadium	37	204.5	

145HP-2 (3.9-8.9') 4/21/97			
COMPOUND	LOC (ug/L)	Conc. (ug/L)	
Aluminum	200	370,000	
Arsenic	3	42.4	
Barium	2,000	4,820	
Beryllium	1	24.7	
Cadmium	4	11.6	
Chromium	70	405	
Cobalt	100	606	
Copper	1,300	2,610	
Iron	300	893,000	
Lead	5	533	
Manganese	50	12,400	
Mercury	2	3.85	
Nickel	40	656	
Thallium	0.5	5.7	
Vanadium	37	516	

145SD-1 (0-1') 4/23/97			
COMPOUND	LOC (mg/kg)	Conc. (mg/kg)	
Copper	28	110	

145SW-1 4/23/97			
COMPOUND	LOC (ug/L)	Conc. (ug/L)	
Aluminum	190	33,200	
Arsenic	1.38	8.4	
Cadmium	0.28	2.5	
Chromium	11.4	101	
Copper	9.4	2,230	
Iron	1,790	45,900	
Lead	3.2	298	
Manganese	383	1,090	
Mercury	0.144	2.97	
Nickel	52	62.5	
Vanadium	37	63.3	
Zinc	120	489	

SB145-1C (2-4') 12/20/93				
COMPOUND	LOC (mg/kg) NJ	LOC (mg/kg) EPA	Conc. (mg/kg)	
Thallium	72	-	179	

SB145-1D (6-8') 12/20/93				
COMPOUND	LOC (mg/kg) NJ	LOC (mg/kg) EPA	Conc. (mg/kg)	
2,4-DNT	3	5.5	20	
2,6-DNT	3	620	10	

MWF-4B (33-43') 4/29/94 7/29/94				
Compound	LOC (ug/L)	Conc. (ug/L)		Conc. (ug/L)
Aluminum	200	302/ND#	3,330	
Arsenic	3	ND/ND#	5.23	
Beryllium	1	ND/ND#	1.41	
Iron	300	9,710/8,780#	22,100	
Lead	5	ND/ND#	9.18	
Manganese	50	652/669#	155	

MWF-4A (20-30') 4/29/94 7/29/94				
COMPOUND	LOC (ug/L)	Conc. (ug/L)		Conc. (ug/L)
Aluminum	200	1,920/ 169#	766	
Iron	300	16,700/ ND#	11,900	
Manganese	50	177/ 60#	675	

SS145-3 (0-0.5') 11/16/93			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	11.2

145SS-7			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	9.79

271725 (24-29') 11/6/93 4/28/94 7/28/94					
COMPOUND	LOC (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	
RDX	0.5	ND	1.34	1.57	
2,4,6-TNT	1	ND	2.65	ND	
Aluminum	200	11,200/ND#	1,010	545	
Iron	300	32,000/ND#	2,610	1,030	
Lead	5	67.7/ ND#	ND	ND	
Manganese	50	193/ ND#	18.3	ND	
Vanadium	37	61.4/ ND#	ND	ND	

Denotes Analysis of Filtered Sample

NOTE:
LOC EXCEEDENCES BELOW PICATINNY BACKGROUND LEVELS
ARE NOT PRESENTED.

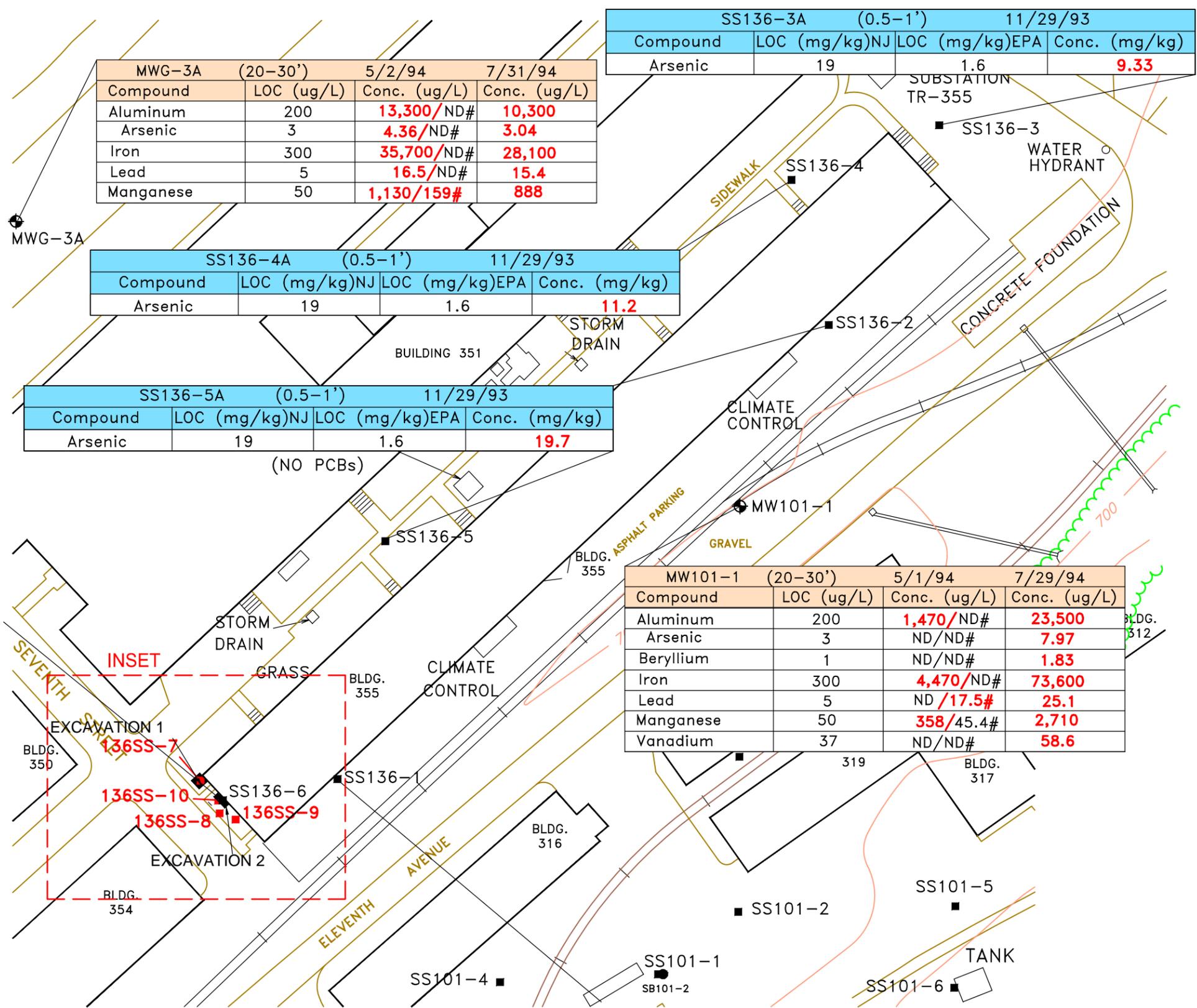
SOURCE NOTE:
FIGURE REPRODUCED FROM 25 SITES
FOCUSED FEASIBILITY STUDY REPORT,
SHAW ENVIRONMENTAL INC., AUGUST 2010
(DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
DRAWING NO. 2-12, DATED 11/27/06)

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

**SITE 145 - BUILDING 477
 EXPLOSIVE AND PROPELLANT
 MIXING AREA LOC EXCEEDENCES**

FIGURE
7

CITY: SYRACUSE, NY DIV: GROUP: ENV/CAD DBK/SARTORI PIC: T.E. TALELE PM: T. LLEWELLYN TM: K. PANHORST LVR: (0)1010# OFF: REF: G:\ENV\CAD\BRIGHTON\ACT\G08P08PICA\01251A\0110\DWG\PROJECT\G08P08PICA-12.dwg LAYOUT: 9 SAVED: 10/6/2014 2:21 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: SYR.LB-PDF PLOTSTYLETABLE: PLT\FULL.CTB PLOTTED: 10/6/2014 2:21 PM BY: FOX, AARON XREFS: IMAGES: G:\P08PICA.LB PROJECTNAME:



MWG-3A (20-30') 5/2/94 7/31/94			
Compound	LOC (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Aluminum	200	13,300/ND#	10,300
Arsenic	3	4.36/ND#	3.04
Iron	300	35,700/ND#	28,100
Lead	5	16.5/ND#	15.4
Manganese	50	1,130/159#	888

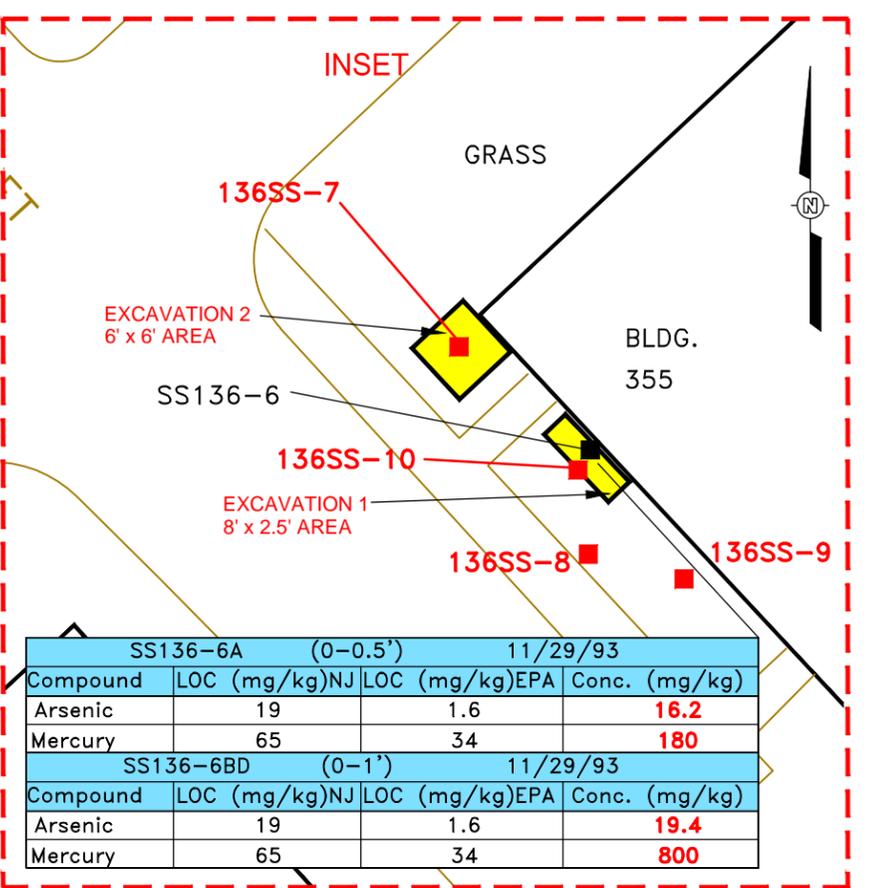
SS136-3A (0.5-1') 11/29/93			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	9.33

SS136-4A (0.5-1') 11/29/93			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	11.2

SS136-5A (0.5-1') 11/29/93			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	19.7

(NO PCBs)

MW101-1 (20-30') 5/1/94 7/29/94			
Compound	LOC (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Aluminum	200	1,470/ND#	23,500
Arsenic	3	ND/ND#	7.97
Beryllium	1	ND/ND#	1.83
Iron	300	4,470/ND#	73,600
Lead	5	ND/17.5#	25.1
Manganese	50	358/45.4#	2,710
Vanadium	37	ND/ND#	58.6



SS136-6A (0-0.5') 11/29/93			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	16.2
Mercury	65	34	180

SS136-6BD (0-1') 11/29/93			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	19.4
Mercury	65	34	800

- EXISTING SAMPLING LOCATIONS**
- ⊕ MONITORING WELL
 - ▲ SURFACE WATER/SEDIMENT
 - SURFACE SOIL
 - SOIL BORING
 - ⊥ TEST PIT
 - HYDROPUNCH
- PHASE I 2A/3A SAMPLING LOCATIONS**
- ⊕ MONITORING WELL
 - ▲ SURFACE WATER/SEDIMENT
 - SURFACE SOIL
 - SOIL BORING
 - ⊥ TEST PIT
 - HYDROPUNCH

AREA EXCAVATED DURING INTERIM REMEDIAL ACTION, NOVEMBER 2003.

NOTE: LOC EXCEEDENCES BELOW PICATINNY BACKGROUND LEVELS ARE NOT PRESENTED.

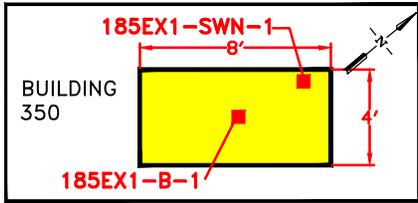


SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES FOCUSED FEASIBILITY STUDY REPORT, SHAW ENVIRONMENTAL INC., AUGUST 2010 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC." DRAWING NO. 2-16, DATED 11/27/06)

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

**SITE 136 - BUILDING 355
 METALLURGY LABORATORY
 LOC EXCEEDENCES**

FIGURE
9



DETAILS OF EXCAVATION

350-1W (13.58-23.58')		7/13/97	12/27/00
Compound	LOC (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Lead	5	14.0	ND

185SS-1A (0-1')				10/14/04
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)	
Arsenic	19	1.6	20.0	

350-2W (10.47-25.4')		7/13/97
Compound	LOC (ug/L)	Conc. (ug/L)
Lead	5	16.0

LEGEND

- RAILROAD
- TREE LINE
- FENCE
- TRANSFORMER
- BLAST WALL
- STORM SEWER
- SANITARY SEWER
- EARTH MOUND
- BLDG. NO.
- FORMER BUILDING
- COVERED WALKWAY
- SWAMP
- WATER

EXISTING SAMPLING LOCATIONS

- MONITORING WELL
- SURFACE WATER/SEDIMENT
- SURFACE SOIL
- SOIL BORING
- TEST PIT
- HYDROPUNCH

PHASE I 2A/3A SAMPLING LOCATIONS

- MONITORING WELL
- SURFACE WATER/SEDIMENT
- SURFACE SOIL
- SOIL BORING
- TEST PIT
- HYDROPUNCH

LOCATIONS NOT SAMPLED

- ABANDONED MONITORING WELL

AREA OF CONCERN

SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-17, DATED 6/23/05)

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

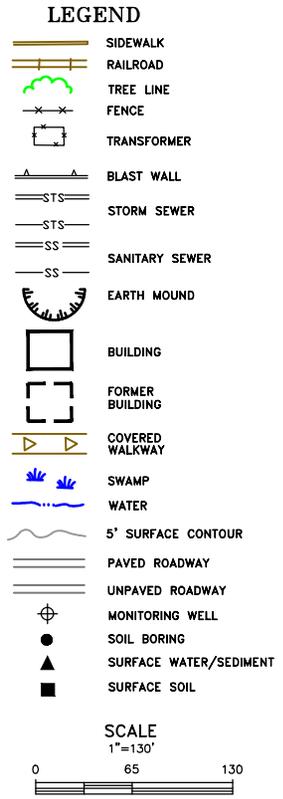
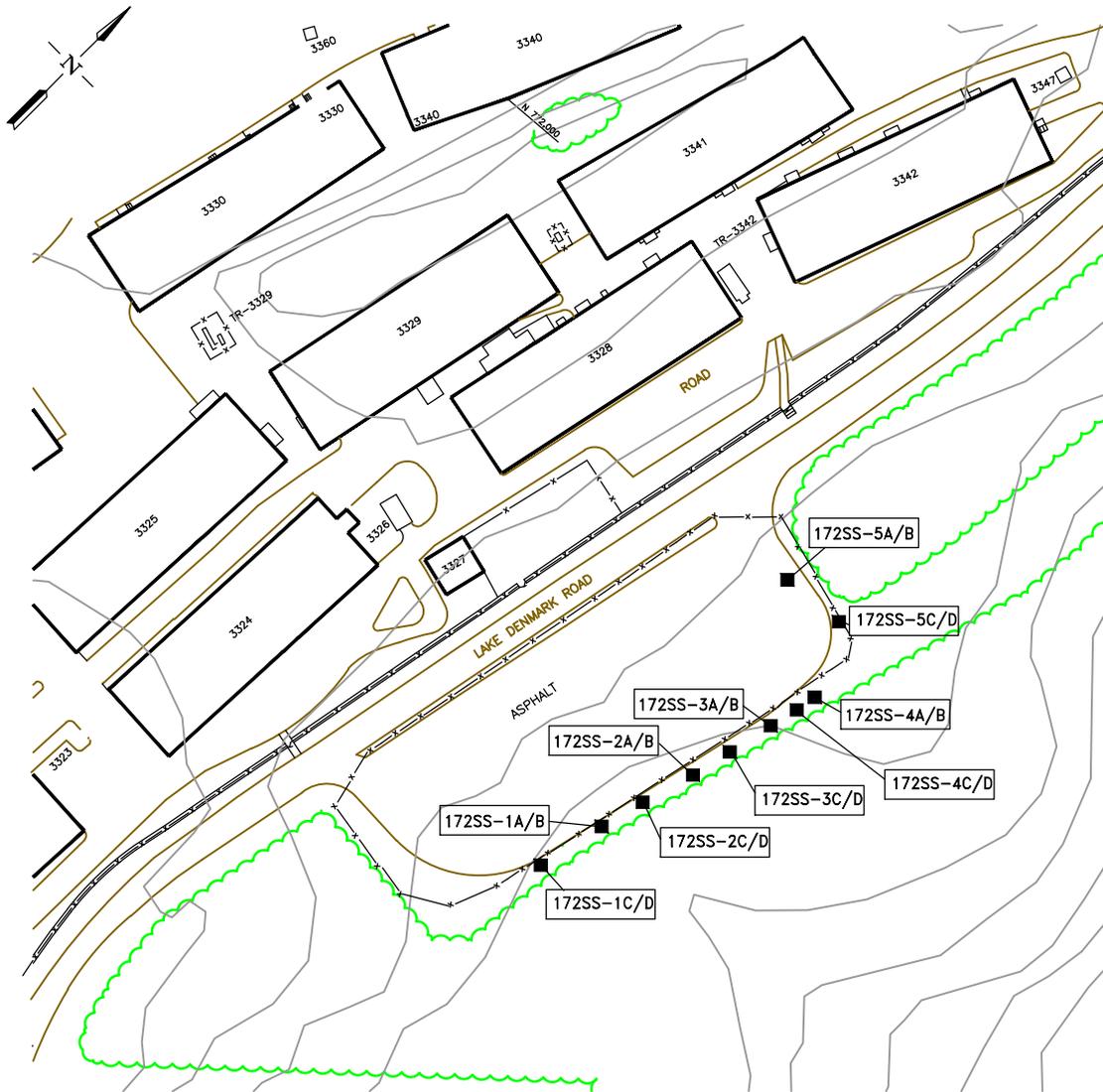
**SITE 185 - BUILDING 350
 LOC EXCEEDENCES**

ARCADIS

FIGURE **10**

NOTE:
 LOC EXCEEDENCES BELOW PICATINNY BACKGROUND LEVELS
 ARE NOT PRESENTED.





SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-19, DATED 7/25/05)

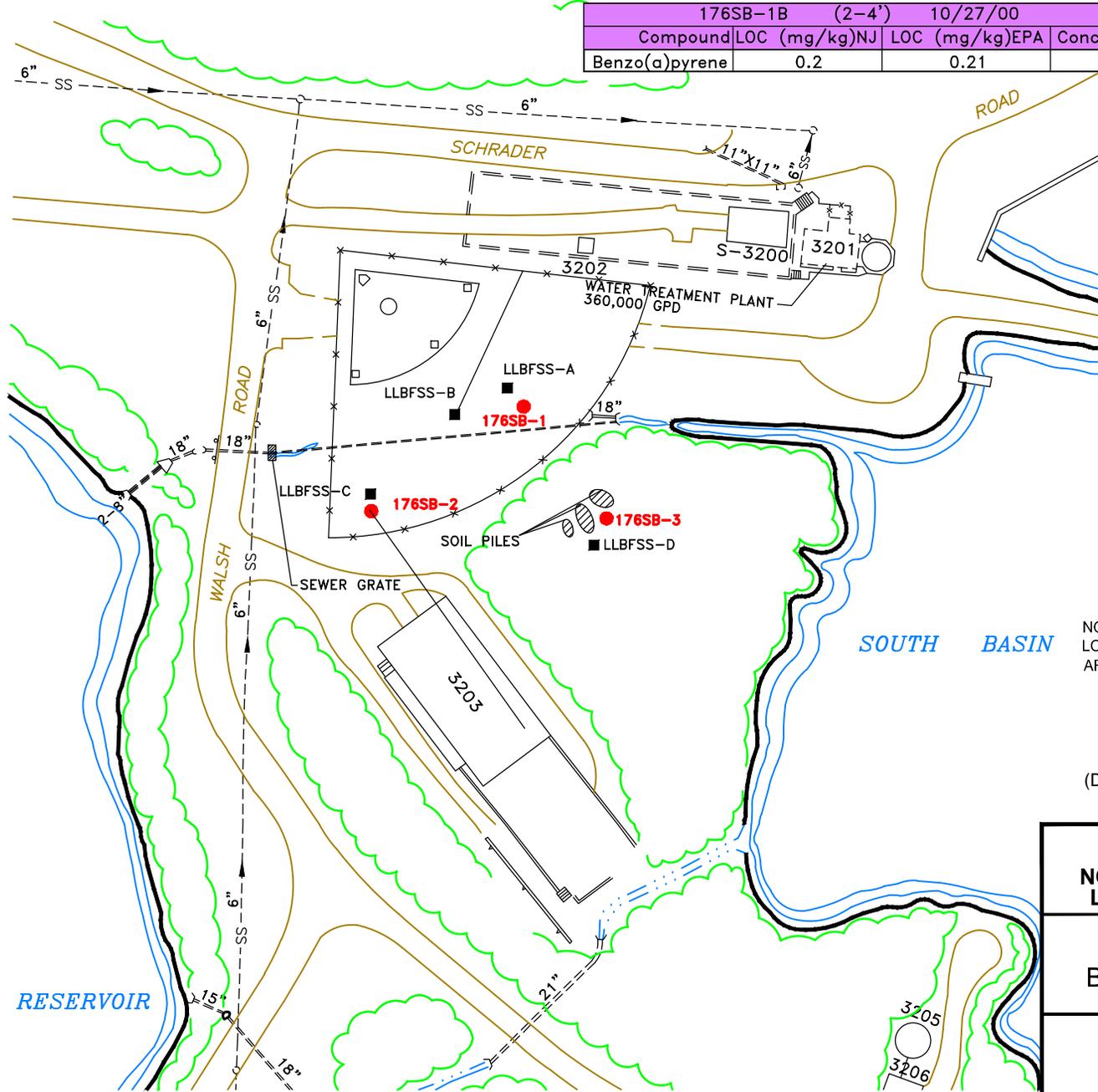
UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

**SITE 172
 PARKING LOT ACROSS
 FROM BLDG 3328**

NOTE:
 TOPOGRAPHIC CONTOUR SOURCE IS THE IDENTIFICATION AND ANALYSIS OF WETLANDS, FLOODPLAINS, THREATENED AND ENDANGERED SPECIES AND ARCHAEOLOGICAL GEOMORPHOLOGY AT PICATINNY, NJ (WES, 1994), WHICH USED TOPOGRAPHIC CONTOURS DERIVED FROM 1948 SURVEY MAPS. THESE SURVEY MAPS WERE SCANNED TO CREATE ELECTRONIC FILES AND WERE MANUALLY REFINED. WHILE THESE CONTOURS DEPICT GENERAL TOPOGRAPHY WELL, THEY ARE NOT PRECISE IN SOME LOCATIONS.



176SB-1B (2-4') 10/27/00			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Benzo(a)pyrene	0.2	0.21	0.47



LEGEND

- RAILROAD
- TREE LINE
- FENCE
- TRANSFORMER
TR-732
- BLAST WALL
- STS
OR
STS
- SS
OR
SS
- EARTH MOUND
- BLDG. NO.
- BLDG. NO.
- COVERED WALKWAY
- SWAMP
- WATER

EXISTING SAMPLING LOCATIONS	
	SURFACE SOIL
	SOIL BORING

PHASE III 2A/3A RI SAMPLING LOCATIONS	
	SOIL BORING

NOTE:
 LOC EXCEEDENCES BELOW PICATINNY BACKGROUND LEVELS
 ARE NOT PRESENTED.

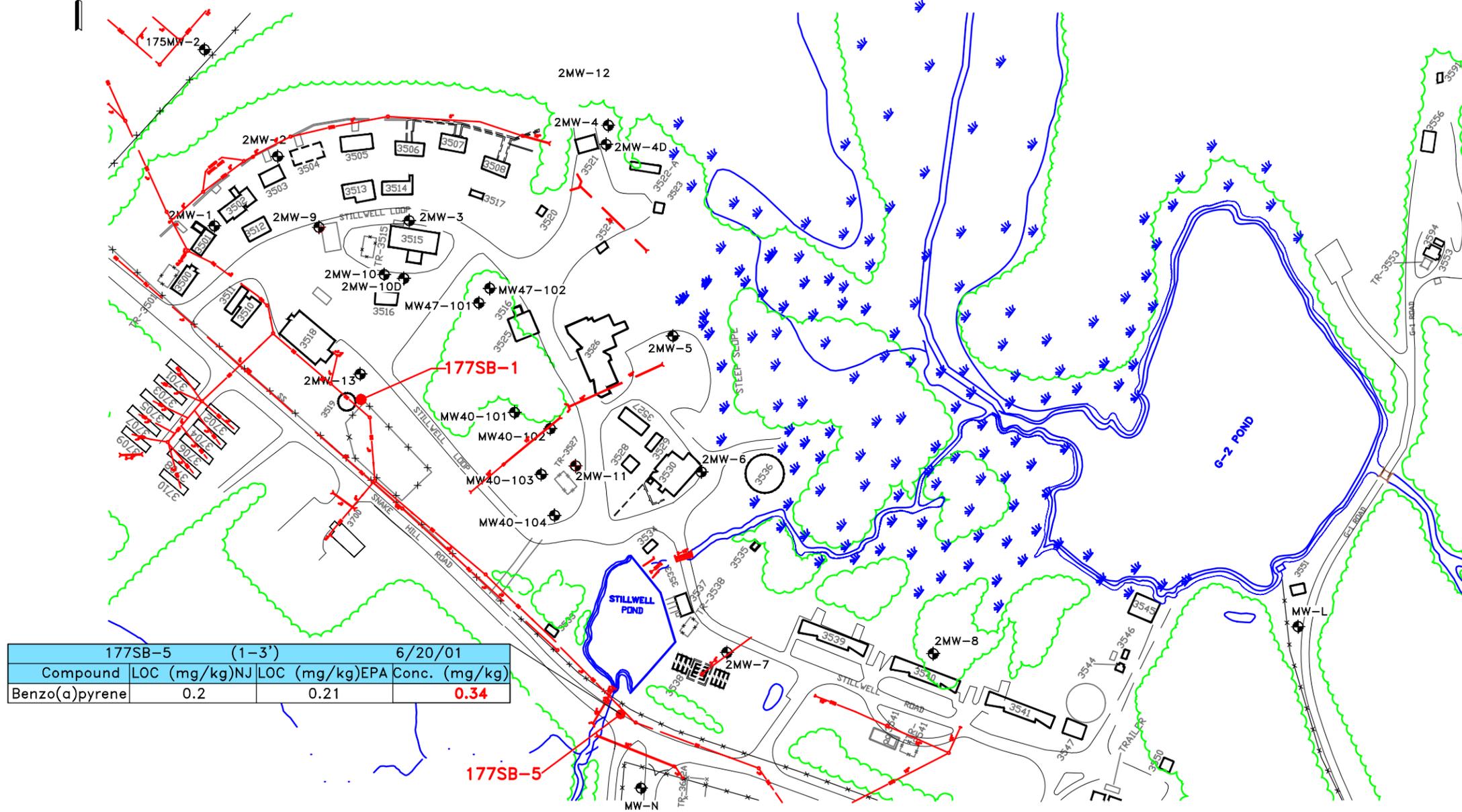
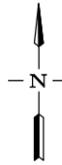
SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-23, DATED 4/09/10)

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

**SITE 176 - LITTLE LEAGUE
 BASEBALL FIELD SAMPLE LOCATIONS**

CITY:SYRACUSE,NY DIV:GROUP/ENV/CAD DBK/SARTORI PIC:TE:TALLELE PM:T:LLEWELYN TM:K:PAHORST LVR:(0)10N="OFF=REF" G:\ENV\CAD\BRIGHTON\ACT\G08\PIA\0125\A01\DWG\PROJECT\G08\PIA-20.dwg LAYOUT:16 SAVED:10/6/2014 2:54 PM ACADVER:18.1S (LMS TECH) PAGES:16 PLOT:PLT FULL CBT BY:FOX,AARON

PROJECTNAME: ...
 XREFS: IMAGES: G:\P08\PIA\LB



Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Benzo(a)pyrene	0.2	0.21	0.34

LEGEND

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

- EXISTING SAMPLING LOCATIONS**
- SOIL BORING
 - MONITORING WELL
- PHASE III 2A/3A RI SAMPLING LOCATIONS**
- SOIL BORING

NOTE:
 LOC EXCEEDENCES BELOW PICATINNY BACKGROUND LEVELS
 ARE NOT PRESENTED.

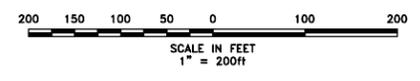
SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-24, DATED 4/15/10)

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

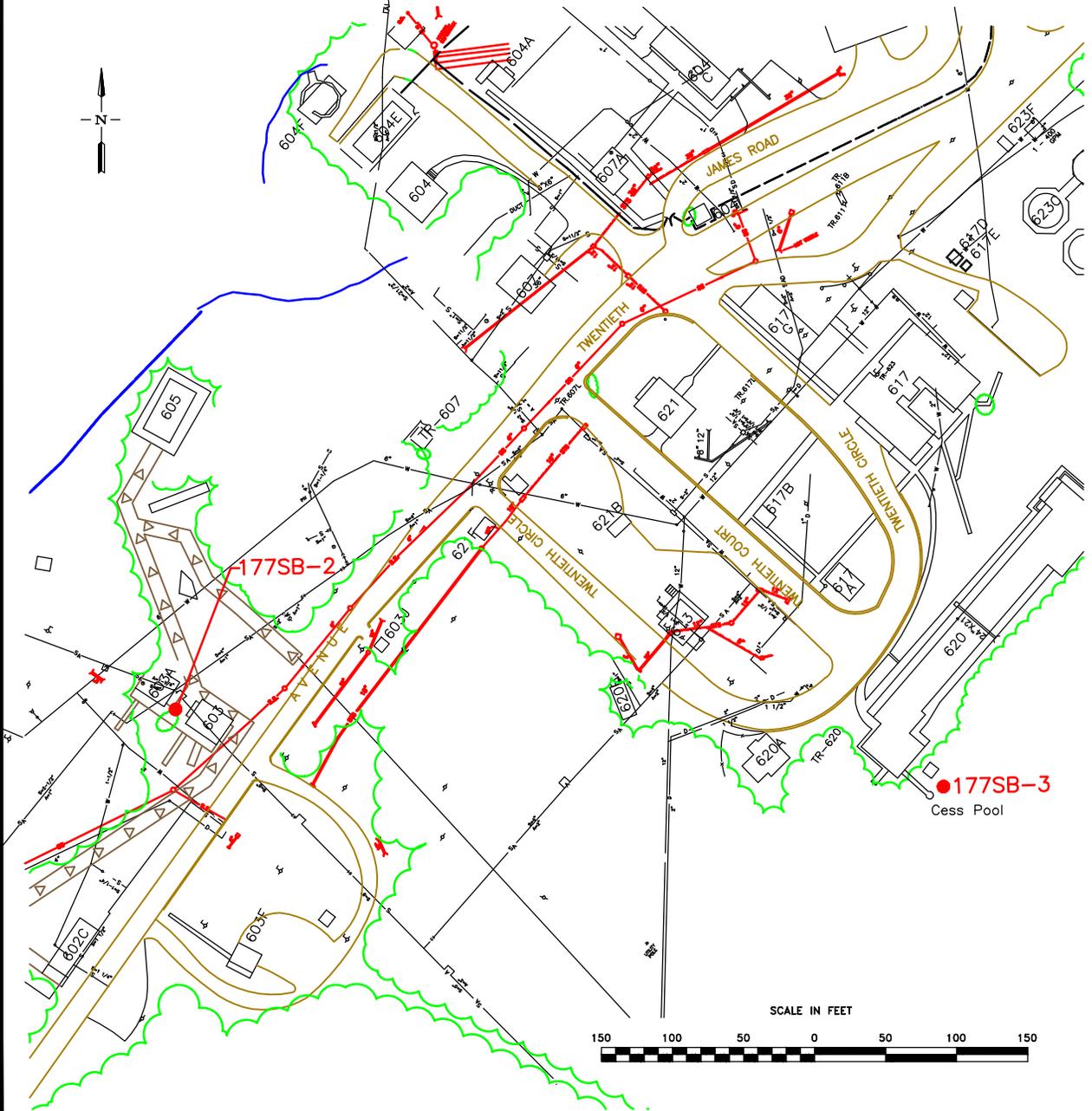
**SITE 177 - 3500 BUILDING AREA
 SEWER LINE INVESTIGATION**



FIGURE
16



NOTE:
 TOPOGRAPHIC CONTOUR SOURCE IS THE IDENTIFICATION AND ANALYSIS OF WETLANDS, FLOODPLAINS, THREATENED AND ENDANGERED SPECIES AND ARCHAEOLOGICAL GEOMORPHOLOGY AT PICATINNY, NJ (WES, 1994), WHICH USED TOPOGRAPHIC CONTOURS DERIVED FROM 1948 SURVEY MAPS. THESE SURVEY MAPS WERE SCANNED TO CREATE ELECTRONIC FILES AND WERE MANUALLY REFINED. WHILE THESE CONTOURS DEPICT GENERAL TOPOGRAPHY WELL, THEY ARE NOT PRECISE IN SOME LOCATIONS.



LEGEND

- RAILROAD
- TREE LINE
- FENCE
- TRANSFORMER
TR-732
- BLAST WALL
- STS
OR
STS STORM SEWER
- SS
OR
SS SANITARY SEWER
- EARTH MOUND
- BLDG.
NO. BUILDING
- BLDG.
NO. FORMER BUILDING
- COVERED WALKWAY
- SWAMP
- WATER

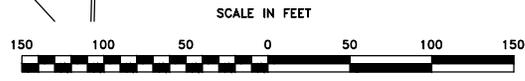
EXISTING SAMPLING LOCATIONS
 ● SOIL BORING

PHASE III 2A/3A RI
 SAMPLING LOCATIONS
 ● SOIL BORING

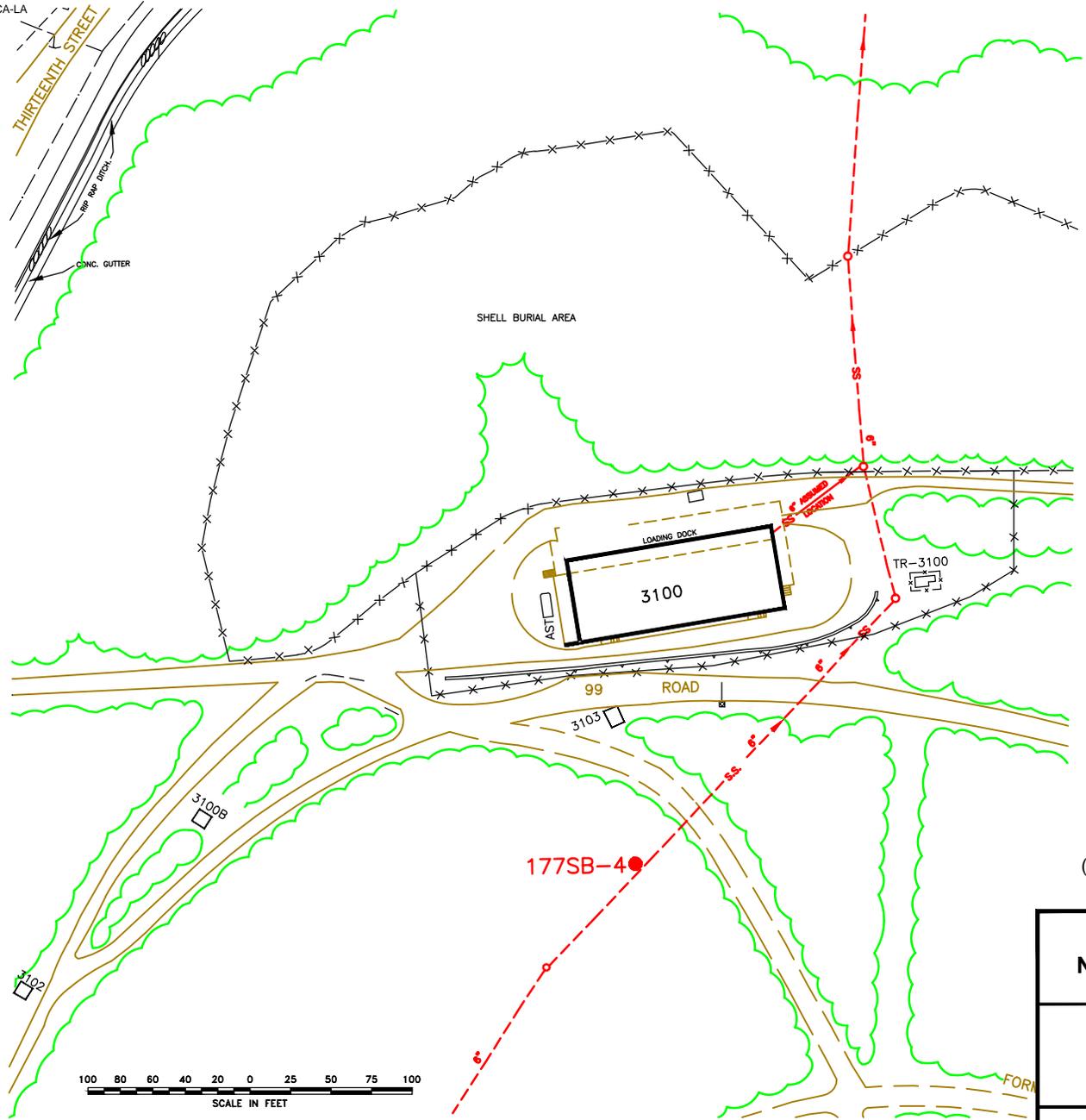
SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-25, DATED 4/15/10)

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

**SITE 177 - 600 BUILDING AREA
 SEWER LINE INVESTIGATION**



XREFS: IMAGES: PROJECTNAME: ----
 GP06PICA-LA



LEGEND

- RAILROAD
- TREE LINE
- FENCE
- TRANSFORMER
TR-732
- BLAST WALL
- STORM SEWER
OR
--STS--
- SANITARY SEWER
OR
--SS--
- EARTH MOUND
- BUILDING
BLDG.
NO.
- FORMER BUILDING
BLDG.
NO.
- ROAD
- SWAMP
- WATER



- | | |
|-----------------------------|-------------|
| EXISTING SAMPLING LOCATIONS | |
| | SOIL BORING |

- | | |
|---------------------------------------|-------------|
| PHASE III 2A/3A RI SAMPLING LOCATIONS | |
| | SOIL BORING |

SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-26, DATED 4/15/10)

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

SITE 177 - 3100 BUILDING AREA
 SEWER LINE INVESTIGATION



NOTE:
 LOC EXCEEDENCES BELOW PICATINNY BACKGROUND LEVELS
 ARE NOT PRESENTED.



FIGURE

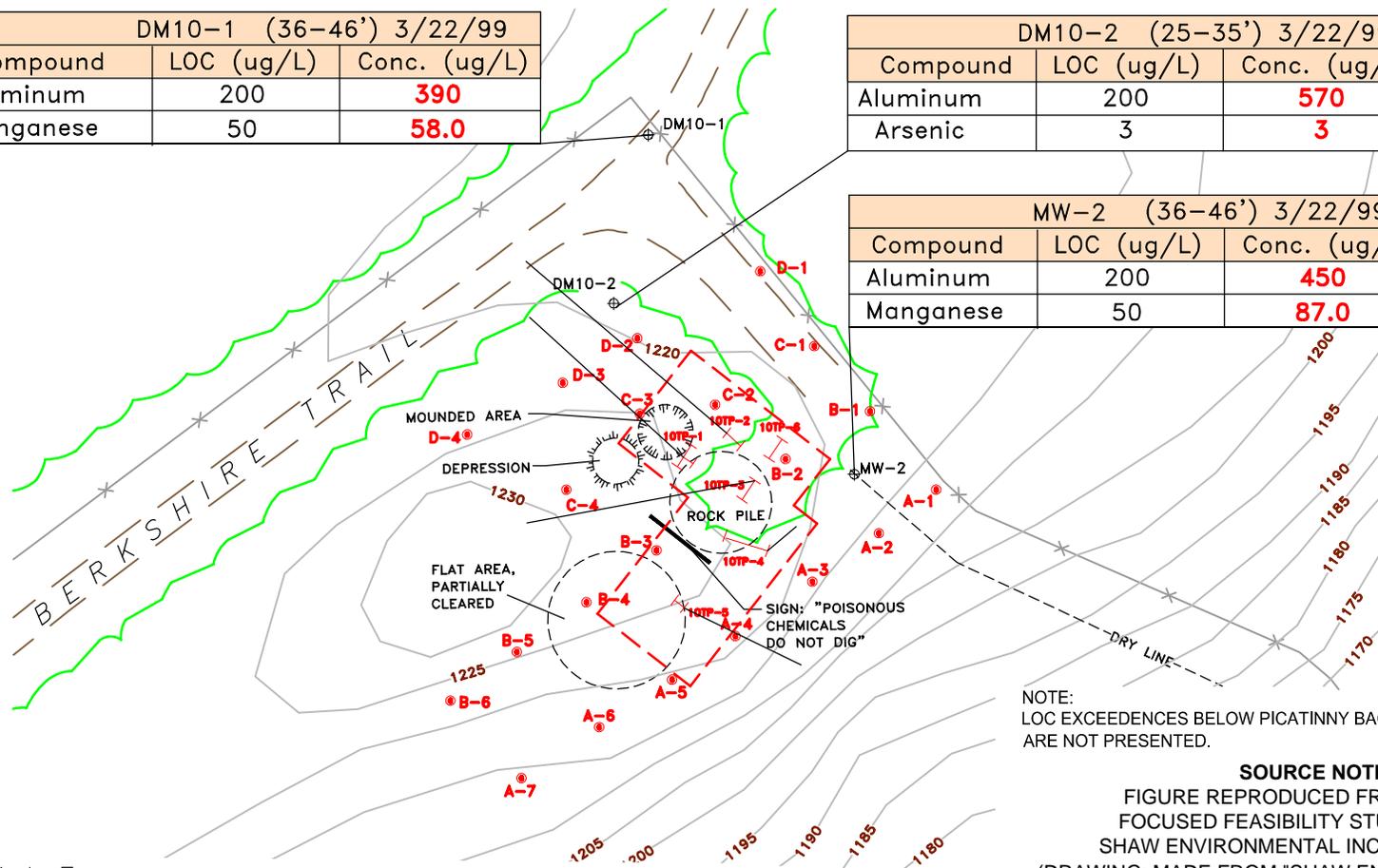
18

Soil borings 10SB-1 and 10SB-2 will be located adjacent to the anomalies identified.

DM10-1 (36-46') 3/22/99		
Compound	LOC (ug/L)	Conc. (ug/L)
Aluminum	200	390
Manganese	50	58.0

DM10-2 (25-35') 3/22/99		
Compound	LOC (ug/L)	Conc. (ug/L)
Aluminum	200	570
Arsenic	3	3

MW-2 (36-46') 3/22/99		
Compound	LOC (ug/L)	Conc. (ug/L)
Aluminum	200	450
Manganese	50	87.0



NOTE:
 LOC EXCEEDENCES BELOW PICATINNY BACKGROUND LEVELS
 ARE NOT PRESENTED.

SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-29, DATED 4/15/10)



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

- SAMPLING LOCATIONS**
- MONITORING WELL
 - SURFACE WATER/SEDIMENT
 - SURFACE SOIL
 - SOIL BORING
 - TEST PIT
 - HYDROPUNCH
 - GORE-SORBER

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

**SITE 10-CHEMICAL BURIAL PIT
 LOC EXCEEDENCES**



FIGURE
20

XREFS: IMAGES: PROJECTNAME: ----
 GP06PICA-LA



LEGEND:

- RAILROAD
- TREE LINE
- FENCE
- TRANSFORMER
TR-732
- BLAST WALL
- STORM SEWER
STS
OR
STS
- SANITARY SEWER
SS
OR
SS
- EARTH MOUND
- BLDG. NO.
- BLDG. NO.
- COVERED WALKWAY
- SWAMP

EXISTING SAMPLING LOCATIONS	
	MONITORING WELL
	SURFACE WATER/SEDIMENT
	SURFACE SOIL



SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-30, DATED 6/27/05)

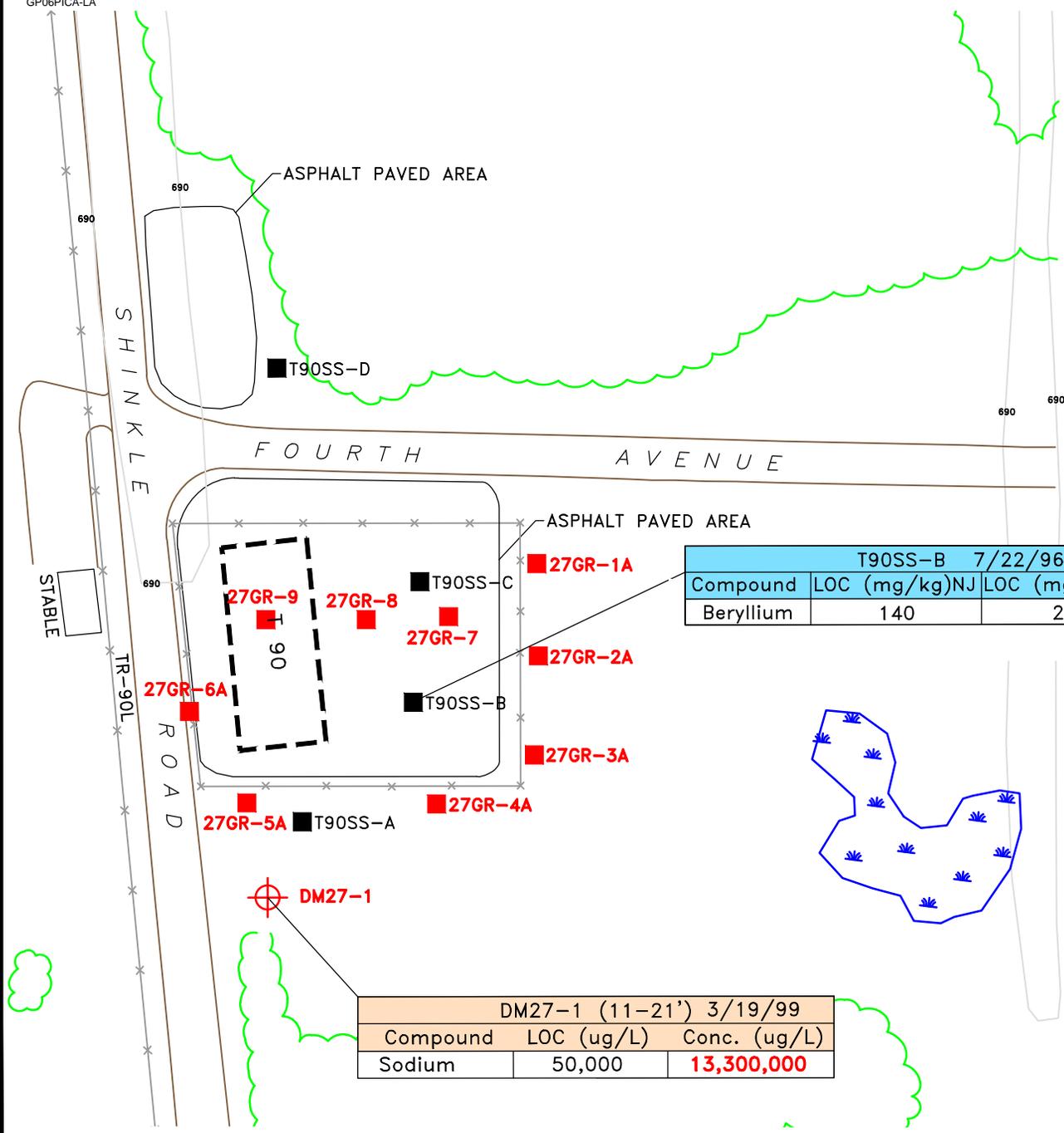
UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

SITE 164 - BUILDING 1217,
 GENERAL PURPOSE MAGAZINE

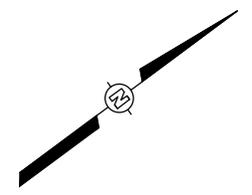


FIGURE
21

XREFS: IMAGES: PROJECTNAME: ----
 GP06\PICA-LA



- RAILROAD
- TREE LINE
- FENCE
- TRANSFORMER
TR-732
- BLAST WALL
- STORM SEWER
OR
STS
- SANITARY SEWER
OR
SS
- EARTH MOUND
- BLDG.
NO.
- FORMER BUILDING
BLDG.
NO.
- COVERED WALKWAY
- SWAMP
- WATER



SAMPLE LOCATIONS
 MONITORING WELL
 SURFACE SOIL

T90SS-B 7/22/96 (0-1')			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Beryllium	140	2,000	270

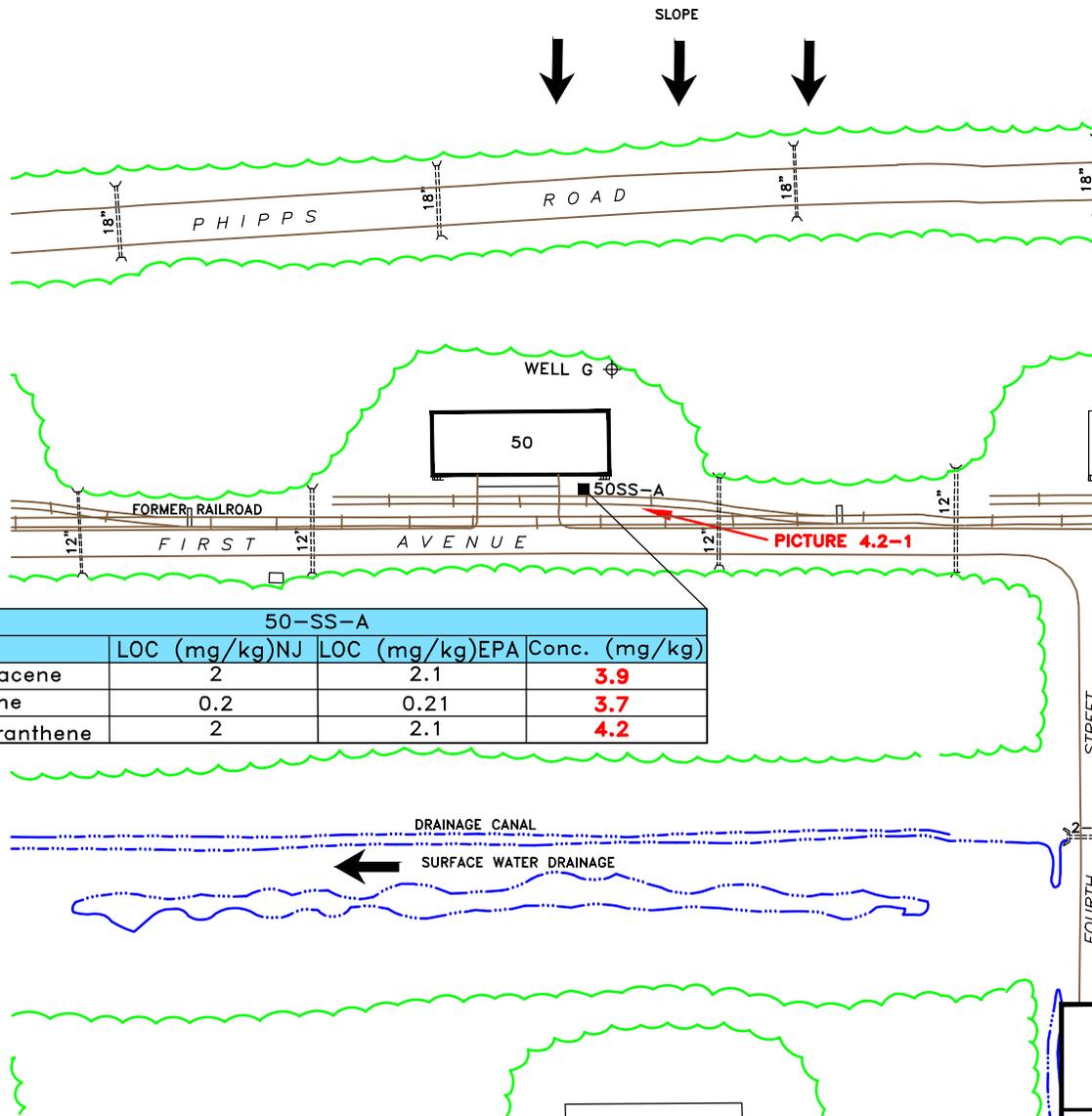
DM27-1 (11-21') 3/19/99		
Compound	LOC (ug/L)	Conc. (ug/L)
Sodium	50,000	13,300,000



SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-31, DATED 4/09/10)

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

SITE 27
FORMER SALT STORAGE AREA
LOC EXCEEDENCES



LEGEND:

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

EXISTING SAMPLING LOCATIONS	
	MONITORING WELL
	SURFACE WATER/SEDIMENT
	SURFACE SOIL

50-SS-A			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Benz(a)anthracene	2	2.1	3.9
Benzo(a)pyrene	0.2	0.21	3.7
Benzo(b)fluoranthene	2	2.1	4.2

SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-33, DATED 4/12/10)

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

**SITE 120 - BUILDING 50
 STORAGE MAGAZINE
 LOC EXCEEDENCES**

NOTE:
 LOC EXCEEDENCES BELOW PICATINNY BACKGROUND LEVELS
 ARE NOT PRESENTED.



LEGEND:

- RAILROAD
- TREE LINE
- FENCE
- TRANSFORMER
TR-732
- BLAST WALL
- STS
OR
STW
- SS
OR
SS
- EARTH MOUND
- BLDG. NO. BUILDING
- BLDG. NO. FORMER BUILDING
- COVERED WALKWAY
- SWAMP



EXISTING SAMPLING LOCATIONS	
	MONITORING WELL
	SURFACE WATER/SEDIMENT
	SURFACE SOIL

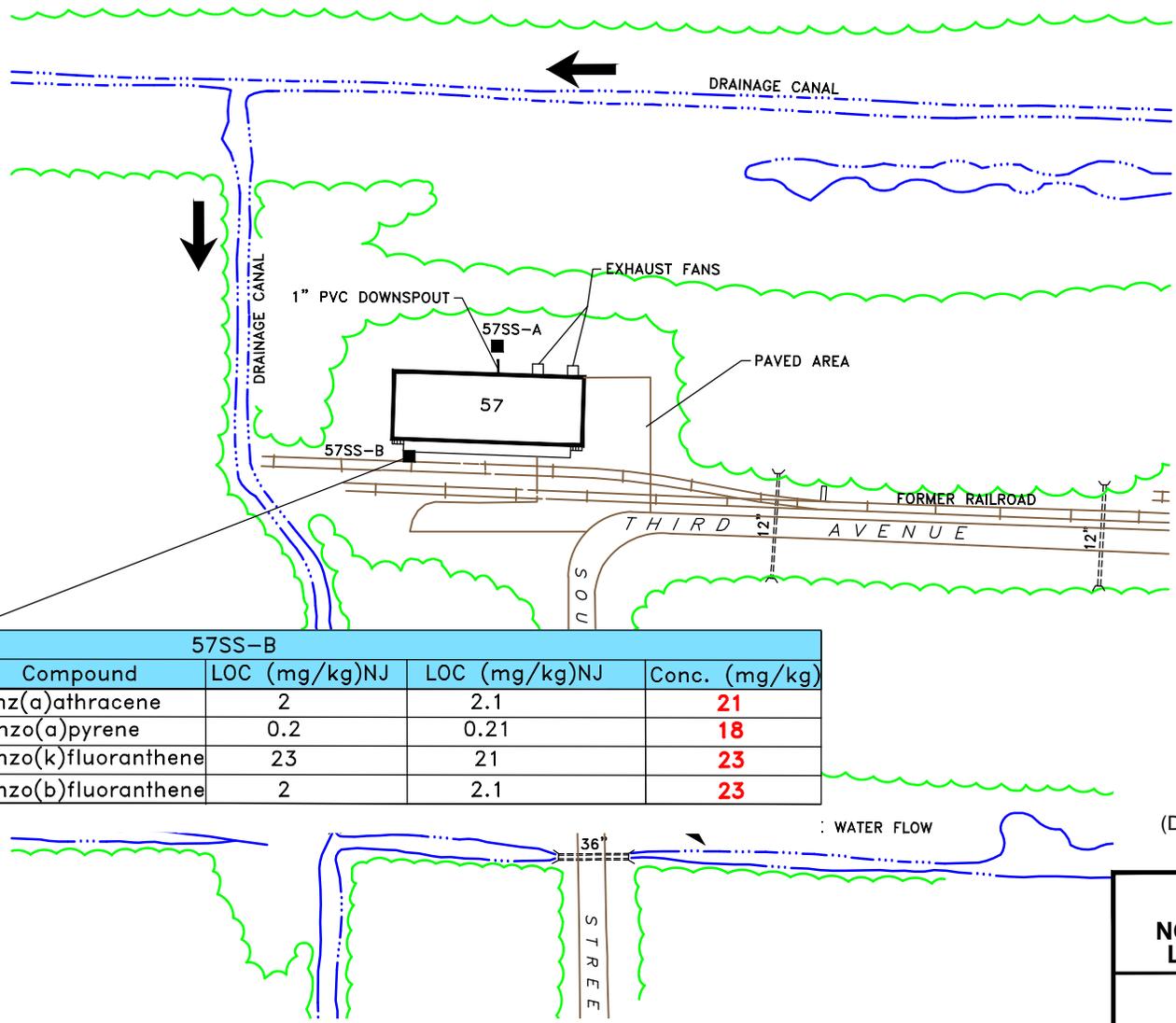
SOURCE NOTE:
 FIGURE REPRODUCED FROM 25 SITES
 FOCUSED FEASIBILITY STUDY REPORT,
 SHAW ENVIRONMENTAL INC., AUGUST 2010
 (DRAWING: MADE FROM "SHAW ENVIRONMENTAL, INC."
 DRAWING NO. 2-34, DATED 4/15/10)

UNITED STATES ARMY
 PICATINNY ARSENAL, NEW JERSEY
**NO FURTHER ACTION WITH MONITORING OF
 LAND USE PROPOSED PLAN FOR 21 SITES**

**SITE 121 - BUILDING 57
 LOC EXCEEDENCES**



FIGURE
25

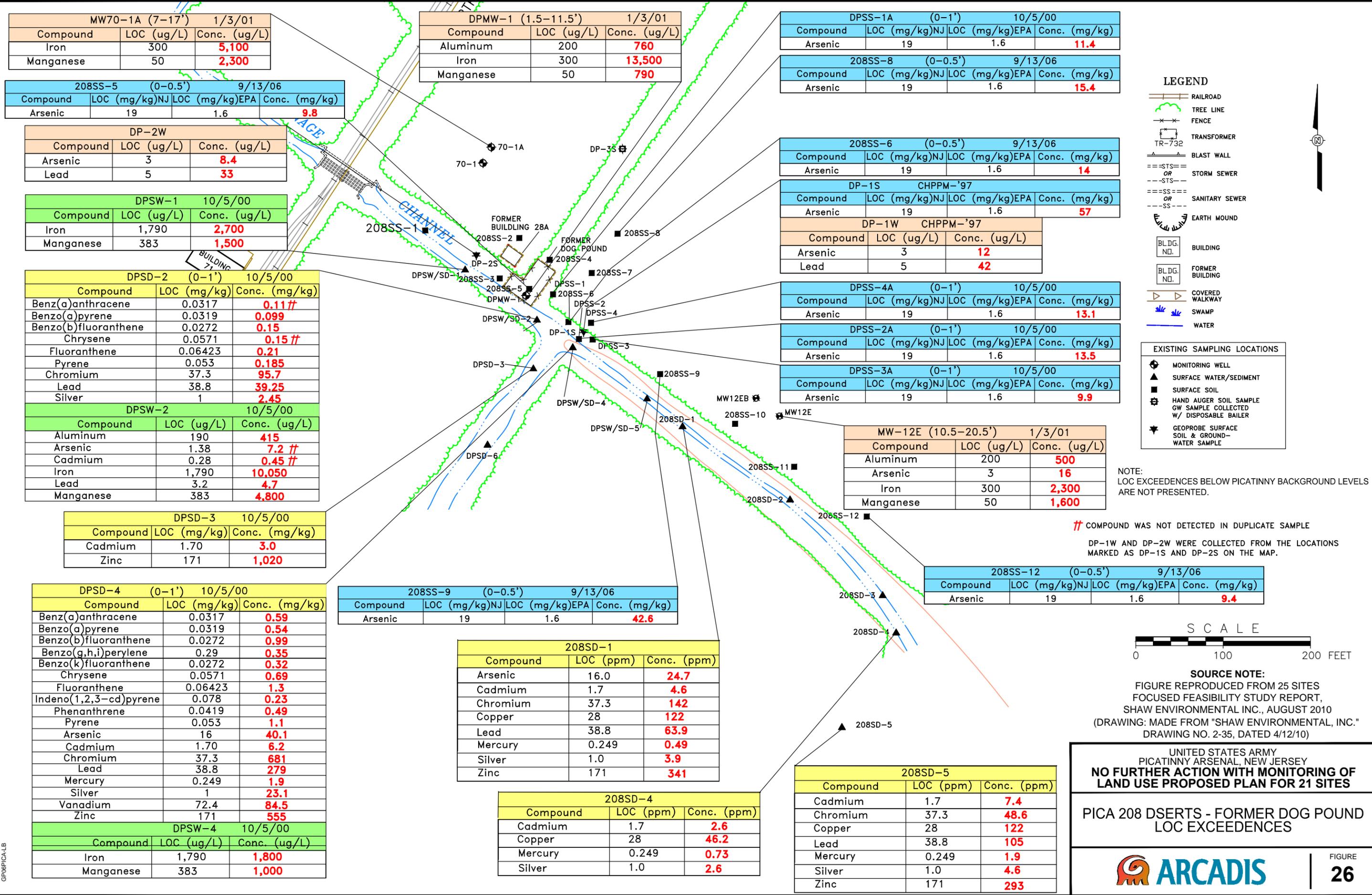


57SS-B			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)NJ	Conc. (mg/kg)
Benz(a)athracene	2	2.1	21
Benzo(a)pyrene	0.2	0.21	18
Benzo(k)fluoranthene	23	21	23
Benzo(b)fluoranthene	2	2.1	23

NOTE:
 LOC EXCEEDENCES BELOW PICATINNY BACKGROUND LEVELS
 ARE NOT PRESENTED.



CITY:SYRACUSE, NY DIV:GROUP/ENV/CAD DB/K/SARTORI PIC: T.E. TALELE PM:T. LLEWELLYN TM:K. PANHORST LVR:OP/ONE OFF:REF
 G:\ENV\CAD\BRIGHTON\ACT\GPR\CA\0125\A01\DWG\PROJECT\GPR\CA-31.dwg LAYOUT: 26 SAVED: 10/6/2014 3:04 PM ACADVER: 18.1S (LMS TECH) PAGES: 26 PLOT: 10/6/2014 3:04 PM BY: FOX, AARON
 XREFS: IMAGES: PROJECTNAME: G:\PICS\LB



MW70-1A (7-17') 1/3/01		
Compound	LOC (ug/L)	Conc. (ug/L)
Iron	300	5,100
Manganese	50	2,300

DPMW-1 (1.5-11.5') 1/3/01		
Compound	LOC (ug/L)	Conc. (ug/L)
Aluminum	200	760
Iron	300	13,500
Manganese	50	790

DPSS-1A (0-1') 10/5/00			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	11.4

208SS-8 (0-0.5') 9/13/06			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	15.4

208SS-5 (0-0.5') 9/13/06			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	9.8

DP-2W		
Compound	LOC (ug/L)	Conc. (ug/L)
Arsenic	3	8.4
Lead	5	33

DPSW-1 10/5/00		
Compound	LOC (ug/L)	Conc. (ug/L)
Iron	1,790	2,700
Manganese	383	1,500

DPSD-2 (0-1') 10/5/00		
Compound	LOC (mg/kg)	Conc. (mg/kg)
Benz(a)anthracene	0.0317	0.11 #
Benzo(a)pyrene	0.0319	0.099
Benzo(b)fluoranthene	0.0272	0.15
Chrysene	0.0571	0.15 #
Fluoranthene	0.06423	0.21
Pyrene	0.053	0.185
Chromium	37.3	95.7
Lead	38.8	39.25
Silver	1	2.45

DPSW-2 10/5/00		
Compound	LOC (ug/L)	Conc. (ug/L)
Aluminum	190	415
Arsenic	1.38	7.2 #
Cadmium	0.28	0.45 #
Iron	1,790	10,050
Lead	3.2	4.7
Manganese	383	4,800

DPSD-3 10/5/00		
Compound	LOC (mg/kg)	Conc. (mg/kg)
Cadmium	1.70	3.0
Zinc	171	1,020

DPSD-4 (0-1') 10/5/00		
Compound	LOC (mg/kg)	Conc. (mg/kg)
Benz(a)anthracene	0.0317	0.59
Benzo(a)pyrene	0.0319	0.54
Benzo(b)fluoranthene	0.0272	0.99
Benzo(g,h,i)perylene	0.29	0.35
Benzo(k)fluoranthene	0.0272	0.32
Chrysene	0.0571	0.69
Fluoranthene	0.06423	1.3
Indeno(1,2,3-cd)pyrene	0.078	0.23
Phenanthrene	0.0419	0.49
Pyrene	0.053	1.1
Arsenic	16	40.1
Cadmium	1.70	6.2
Chromium	37.3	681
Lead	38.8	279
Mercury	0.249	1.9
Silver	1	23.1
Vanadium	72.4	84.5
Zinc	171	555

DPSW-4 10/5/00		
Compound	LOC (ug/L)	Conc. (ug/L)
Iron	1,790	1,800
Manganese	383	1,000

208SS-9 (0-0.5') 9/13/06			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	42.6

208SD-1		
Compound	LOC (ppm)	Conc. (ppm)
Arsenic	16.0	24.7
Cadmium	1.7	4.6
Chromium	37.3	142
Copper	28	122
Lead	38.8	63.9
Mercury	0.249	0.49
Silver	1.0	3.9
Zinc	171	341

208SD-4		
Compound	LOC (ppm)	Conc. (ppm)
Cadmium	1.7	2.6
Copper	28	46.2
Mercury	0.249	0.73
Silver	1.0	2.6

DPSS-4A (0-1') 10/5/00			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	13.1

DPSS-2A (0-1') 10/5/00			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	13.5

DPSS-3A (0-1') 10/5/00			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	9.9

MW-12E (10.5-20.5') 1/3/01		
Compound	LOC (ug/L)	Conc. (ug/L)
Aluminum	200	500
Arsenic	3	16
Iron	300	2,300
Manganese	50	1,600

208SS-12 (0-0.5') 9/13/06			
Compound	LOC (mg/kg)NJ	LOC (mg/kg)EPA	Conc. (mg/kg)
Arsenic	19	1.6	9.4

Appendix A

Certificate of Publication for Public
Notices

Affidavit of Publication

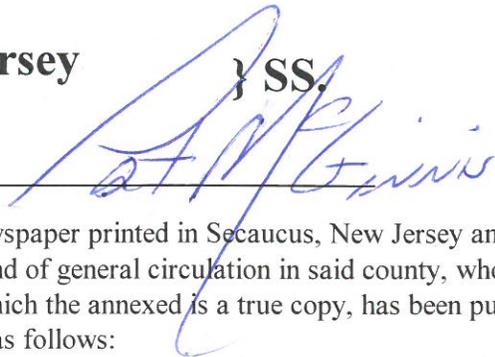
Publisher's Fee \$52.78 Affidavit \$35.00

State of New Jersey

} SS.

Morris County

Personally appeared _____



Of the **Daily Record**, a newspaper printed in Secaucus, New Jersey and published in Parsippany, in said County and State, and of general circulation in said county, who being duly sworn, depose and saith that the advertisement of which the annexed is a true copy, has been published in the said newspaper 1 times, once in each issue as follows:

5/25/14

_____ A.D. 2014



Sworn and subscribed before me, this
25 day of May, 2014



Notary Public of New Jersey

**PUBLIC NOTICE
U.S. ARMY INVITES PUBLIC COMMENT ON PROPOSED PLAN FOR NO
FURTHER ACTION WITH MONITORING OF LAND USE AT 26 PICATINNY
SITES RESTORATION ADVISORY BOARD MEETING**

PROPOSED PLAN FOR 26 SITES AT PICATINNY ARSENAL

The US Army's Environmental Program at Picatinny Arsenal invites public comment on a Proposed Plan for 26 sites. The 26 sites have a broad range of former and current uses. Picatinny's Master Plan designates future use of these areas as military and industrial within a secured Army base. There are no plans to change this land use in the foreseeable future. Various chemicals have been used at these sites, and soil, sediment, surface water and groundwater have been sampled and studied. No unacceptable human health or ecological risks have been identified for the current and reasonably anticipated future use of these sites (military/industrial). Therefore, no adverse impacts are expected for site users or other personnel.

Because there are no unacceptable impacts from historical operations for industrial use at these sites, the Army has issued a Proposed Plan for No Further Action with Monitoring of Land Use. Monitoring of land use will be required to ensure the sites continue to be used as military/industrial areas. Periodic reviews will be conducted to confirm the selected remedy remains protective of human health and the environment.

Proposed Plan Public Meeting

The Army invites the public to attend a meeting on **Wednesday, June 11, 2014, 6:30 p.m.**, Hilton Garden Inn (near the Rockaway Townsquare Mall), 375 Mt. Hope Avenue, Rockaway, NJ, 07866. The meeting location is wheelchair accessible.

Written Comments

Copies of the Feasibility Study and Remedial Investigation summary and the Proposed Plan for these 26 sites is available for public review at the Environmental Affairs Directorate at Picatinny by contacting Mr. Ted Gabel at (973) 724-6748 or ted.b.gabel.civ@mail.mil in advance. A copy of the Proposed Plan and the PDF version of the Feasibility Study for these sites will be available for review at the Rockaway Township Library (61 Mount Hope Road) and Morris County Library (30 East Hanover Avenue, Whippany). In addition, you can have the Proposed Plan emailed to you by contacting Mr. Ted Gabel by email.

The public may submit written comments during the 30-day comment period (June 2 to July 2, 2014). Comments must be postmarked by July 2, 2014 and sent to Mr. Ted Gabel, U.S. Army Garrison, Picatinny Arsenal, IMPI-PWE, Building 319, Picatinny Arsenal, NJ, 07806-5000 or by email to ted.b.gabel.civ@mail.mil.

RESTORATION ADVISORY BOARD MEETING

The U.S. Army at Picatinny Arsenal will hold its next Environmental Restoration Advisory Board meeting on **Wednesday, June 11, 2014, at approximately 7:30 p.m. (Immediately following the Proposed Plan meeting), at the Hilton Garden Inn (near the Rockaway Townsquare Mall)**. Contact Mr. Gabel for more information. The public is invited to attend.

(\$52.78)

972953

Kathleen A. Gibson
Notary Public State of New Jersey
My Commission Expires Dec. 18, 2014

PUBLIC NOTICE

U.S. ARMY INVITES PUBLIC COMMENT ON PROPOSED PLAN FOR NO FURTHER ACTION WITH MONITORING OF LAND USE AT 26 PICATINNY SITES

RESTORATION ADVISORY BOARD MEETING

PROPOSED PLAN FOR 26 SITES AT PICATINNY ARSENAL

The US Army's Environmental Program at Picatinny Arsenal invites public comment on a Proposed Plan for 26 sites. The 26 sites have a broad range of former and current uses. Picatinny's Master Plan designates future use of these areas as military and industrial within a secured Army base. There are no plans to change this land use in the foreseeable future. Various chemicals have been used at these sites, and soil, sediment, surface water and groundwater have been sampled and studied. No unacceptable human health or ecological risks have been identified for the current and reasonably anticipated future use of these sites (military/industrial). Therefore, no adverse impacts are expected for site users or other personnel.

Because there are no unacceptable impacts from historical operations for industrial use at these sites, the Army has issued a Proposed Plan for No Further Action with Monitoring of Land Use. Monitoring of land use will be required to ensure the sites continue to be used as military/industrial areas. Periodic reviews will be conducted to confirm the selected remedy remains protective of human health and the environment.

Proposed Plan Public Meeting

The Army invites the public to attend a meeting on Wednesday, June 11, 2014, 6:30 p.m., Hilton Garden Inn (near the Rockaway Townsquare Mall), 375 Mt. Hope Avenue, Rockaway, NJ, 07866. The meeting location is wheelchair accessible.

Written Comments

Copies of the Feasibility Study and Remedial Investigation summary and the Proposed Plan for these 26 sites is available for public review at the Environmental Affairs Directorate at Picatinny by contacting Mr. Ted Gabel at (973) 724-6748 or ted.b.gabel.civ@mail.mil in advance. A copy of the Proposed Plan and the PDF version of the Feasibility Study for these sites will be available for review at the Rockaway Township Library (61 Mount Hope Road) and Morris County Library (30 East Hanover Avenue, Whippany). In addition, you can have the Proposed Plan emailed to you by contacting Mr. Ted Gabel by email.

The public may submit written comments during the 30-day comment period (June 2 to July 2, 2014). Comments must be postmarked by July 2, 2014 and sent to Mr. Ted Gabel, U.S. Army Garrison, Picatinny Arsenal, IMPI-PWE, Building 319, Picatinny Arsenal, NJ, 07806-5000 or by email to ted.b.gabel.civ@mail.mil.

RESTORATION ADVISORY BOARD MEETING

The U.S. Army at Picatinny Arsenal will hold its next Environmental Restoration Advisory Board meeting on Wednesday, June 11, 2014, at approximately 7:30 p.m. (immediately following the Proposed Plan meeting), at the Hilton Garden Inn (near the Rockaway Townsquare Mall). Contact Mr. Gabel for more information. The public is invited to attend.

STATE OF NEW JERSEY } SS
COUNTY OF ESSEX

Don Potts

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 28th day of MAY and continued therein for _____ successively, at least once in each _____ for 1 day MP

Sworn to and subscribed before me this 6th day of June, 2014

[Signature]
NOTARY PUBLIC of NEW JERSEY

MEDINAH Y. JONES
Notary Public, State of New Jersey
My Commission Expires
January 18, 2018

Appendix B

Additional Qualitative Risk
Assessment Screening
Evaluations for Select Sites 69,
60, 176, 164, 174, 27, 172, 175,
and 185

**Table B-1 - Site 69 - Predictive Surveillance Laboratory - Analytical Soil Sample Results (mg/kg)
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Constituent	Current NJ SRS**		2013 RSLs***								CHPPM RRSE (Table D-2)	Subsurface Soil Data (D&M 1998, PTA.D&M.0038)				
	Residential	Non-Residential	Residential Soil RSLs				Non-Residential Soil RSLs				PICA 92-1S	SS1	SS2	SS3	SS4	SSDUP
			TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1	TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1	1997 Subsurface	1992 8 ft	1992 7 ft	1992 4.5 ft	1992 4.5 ft	1992
Acetone	70000	300000	NA	NA	NA	61000	NA	NA	NA	630000		ND	ND	22	25	ND
Methylene Chloride	34	97	5600	560	56	360	96000	9600	960	3100		5.1 JB	5.6 JB	6.3 B	5.6 JB	5.2 JB
Aluminum	78000	NA	NA	NA	NA	77000	NA	NA	NA	990000		5490	7350	8840	8920	5950
Arsenic (b)	19	19	61	6.1	0.61	34	240	24	2.4	380	4.1	4.03	7.29	14.7	3.12	5.24
Antimony	31	450	NA	NA	NA	31	NA	NA	NA	410	0.69	--	--	--	--	--
Barium	16000	59000	NA	NA	NA	15000	NA	NA	NA	190000	34	24.2	57	131	30.5	28.6
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		13800	1230	2820	980	3210
Chromium (c)	120,000	NA	NA	NA	NA	120000	NA	NA	NA	1500000	8.6	6.88	8.63	10.2	10.5	6.98
Chromium (d)	240	6100	29	2.9	0.29	230	560	56	5.6	3100		--	--	--	--	--
Cobalt	1600	590	37000	3700	370	23	190000	19000	1900	300		ND	6.39	7.45	10.1	ND
Copper	3100	45000	NA	NA	NA	3100	NA	NA	NA	41000	13	13.4	12.9	16.9	13.8	13.1
Iron	NA	NA	NA	NA	NA	55000	NA	NA	NA	720000		10300	13000	16200	15000	10300
Lead	400	800	NA	NA	NA	400	NA	NA	NA	800	19	9.29	11.9	24.8	6.79	17.7
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		8770	1900	2220	2220	2450
Manganese	11000	5900	NA	NA	NA	1800	NA	NA	NA	23000		300	768	1640	591	304
Mercury	23	65	NA	NA	NA	10	NA	NA	NA	43		ND	ND	0.11	ND	0.12
Nickel	1600	23000	1300000	130000	13000	1500	6400000	640000	64000	20000	13	7.22	8.48	10.1	15	6.24
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		558	491	593	448	426
Selenium	390	5700	NA	NA	NA	390	NA	NA	NA	5100		ND	0.68	0.85	0.48	0.69
Silver	390	5700	NA	NA	NA	390	NA	NA	NA	5100		ND	1.66	3.21	2.13	2.27
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		566	506	486	404	416
Vanadium	78	1100	NA	NA	NA	390	NA	NA	NA	5100		11.1	13.2	17.1	14	11.2
Zinc	23000	110000	NA	NA	NA	23000	NA	NA	NA	310000	37	29.5	42.9	116	40.9	31.2
TPH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		192	55.8	ND	104	196

Notes:

Bold type = concentration exceeds the 2013 Non-Residential RSL at 1x10-4 Target Cancer Risk or HI of 1.

Italic type = concentration exceeds 2013 Residential RSL at 1x10-4 Target Cancer Risk or HI of 1.

Shading indicates concentration exceeds NJ Residential SRS.

b = background value for arsenic at Picatinny Arsenal is 9.23 mg/kg.

c = Evaluated as Trivalent chromium (Cr+3). D&M 1998 did not specify whether total, trivalent, or hexavalent chromium. Assigned to trivalent by ARCADIS.

d = Evaluated as Hexavalent chromium (Cr+6)

B = detected in blank RSL = Regional Screening Levels

J = concentration should be considered estimated. SRS = Soil Remediation Standards

-- or NA = Not Available TCR = Total Cancer Risks

ND = Not Detected

*According to D&M 1998, data was not screened against NJ standards, as standards for subsurface soil data were unavailable; data was compared to background only

**NJ SRS: New Jersey Administrative Code 7:26D, last amended 5/7/2012. Chromium Soil Cleanup Criteria based on Ingestion/Dermal pathways (http://www.state.nj.us/dep/srp/guidance/rs/chrome_criteria.pdf; April 2010)

***RSL column Notes:

- 1) RSLs updated November 2013 and available at <http://www.epa.gov/region9/superfund/prg/>
- 3) NA = No RSL available.
- 4) Manganese RSL is not based on the manganese reference dose as listed on IRIS. USEPA has adjusted the IRIS reference dose for use in deriving conservative RSLs.
- 5) TCR = Target Cancer Risk; HI = Hazard Index
- 6) The RSLs for the following compounds are not based on toxicity data presented in IRIS but from other sources (provisional toxicity or state-derived values): aluminum, hexavalent chromium, cobalt, copper, iron, and nickel.

Table B-2 - Site 60 - Photography Laboratory - Analytical Soil Sample Results (mg/kg)
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey

Constituent	Former Levels of Concern for Soil Cleanup*			Current NJ SRS**		2013 RSLs***								1991 Subsurface Soil Data (Shaw 2005, PTA.TO17.0070J)						2005 Surface Soil Data (Shaw 2005, PTA.TO17.0070M)									
	Residential	Non-Residential	Impact to GW	Residential	Non-Residential	Residential Soil RSLs				Non-Residential Soil RSLs				SS1	SS1-DUP	SS2	SS3	SS4	SS5	SS6	60SS-1A	60SS-1A	60SS-1B	60SS-2A	60SS-2B	60SS-3A	60SS-3B	60SS-4A	60SS-4B
						TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1	TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1																
	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991	1991	8/28/00 0 - 1 ft	12/19/03 0 - 1 ft	8/28/00 1 - 2 ft	9/15/00 0 - 1 ft	9/15/00 1 - 2 ft	9/15/00 0 - 1 ft	9/15/00 1 - 2 ft	9/15/00 0 - 1 ft	9/15/00 1 - 2 ft	
Total TCL VOCs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.002 JB	NA	0.0031	0.002 J	0.003 J	0.003 J	0.004 J	--	--	--	--	--	--	--	--	--	
Total TCL BNAs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.191 J	NA	NA	NA	NA	NA	NA	--	--	--	--	--	--	--	--		
Total non-TCL BNAs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	31.00 JB	NA	NA	NA	NA	NA	NA	--	--	--	--	--	--	--	--		
4-Methyl-2-pentanone (MIBK)	1000	1000	50	NA	NA	NA	NA	NA	5300	NA	NA	NA	53000	--	--	--	--	--	--	NT	0.210 J	NT	NT	NT	NT	NT	NT		
Benz(a)anthracene	0.9	4	500	0.6	2	15	1.5	0.15	NA	210	21	2.1	NA	--	--	--	--	--	--	NT	0.0260 J	NT	NT	NT	NT	NT	NT		
Benzo(a)pyrene	0.66	0.66	100	0.2	0.2	1.5	0.15	0.015	NA	21	2.1	0.21	NA	--	--	--	--	--	--	NT	0.0330 J	NT	NT	NT	NT	NT	NT		
Benzo(b)fluoranthene	0.9	4	50	0.6	2	15	1.5	0.15	NA	210	21	2.1	NA	--	--	--	--	--	--	NT	0.0660 J	NT	NT	NT	NT	NT	NT		
Benzo(g,h,i)perylene	NA	NA	NA	380000	30000	NA	NA	NA	NA	NA	NA	NA	NA	--	--	--	--	--	--	NT	0.0260 J	NT	NT	NT	NT	NT	NT		
Benzo(k)fluoranthene	0.9	4	500	6	23	150	15	1.5	NA	2100	210	21	NA	--	--	--	--	--	--	NT	0.0240 J	NT	NT	NT	NT	NT	NT		
Chrysene	9	40	500	62	230	1500	150	15	NA	21000	2100	210	NA	--	--	--	--	--	--	NT	0.0430 J	NT	NT	NT	NT	NT	NT		
Fluoranthene	2300	10000	100	2300	24000	NA	NA	NA	2300	NA	NA	NA	22000	--	--	--	--	--	--	NT	0.0930 J	NT	NT	NT	NT	NT	NT		
Naphthalene	230	4200	100	6	17	360	36	3.6	140	1800	180	18	620	--	--	--	--	--	--	NT	0.370 J	NT	NT	NT	NT	NT	NT		
Phenanthrene	NA	NA	NA	NA	300000	NA	NA	NA	NA	NA	NA	NA	NA	--	--	--	--	--	--	NT	0.030 J	NT	NT	NT	NT	NT	NT		
Pyrene	1700	10000	100	1700	18000	NA	NA	NA	1700	NA	NA	NA	17000	--	--	--	--	--	--	NT	0.060 J	NT	NT	NT	NT	NT	NT		
Aluminum	NA	NA	NA	78000	NA	NA	NA	NA	77000	NA	NA	NA	990000	--	--	--	--	--	--	NT	5490	NT	NT	NT	NT	NT	NT		
Antimony	14	340	NA	31	450	NA	NA	NA	31	NA	NA	NA	410	ND	ND	ND	ND	5.2 J	ND	NT	0.270 J	NT	NT	NT	NT	NT	NT		
Arsenic (b)	20	20	NA	19	19	61	6.1	0.61	34	240	24	2.4	380	1.3 J	1.7 J	1.2 J	1.5 J	1.5 J	1.3 J	0.82 J	NT	2.30	NT	NT	NT	NT	NT		
Barium	700	47000	NA	16000	59000	NA	NA	NA	15000	NA	NA	NA	190000	27.7 J	24.9 J	23.2	32.5 J	41.2 J	35.1 J	39.4 J	NT	28.9	NT	NT	NT	NT	NT		
Beryllium	1	1	NA	16	140	140000	14000	1400	160	690000	69000	6900	2000	0.31 J	0.32 J	0.28 J	0.41 J	0.32 J	0.31 J	0.31 J	--	--	--	--	--	--	--		
Cadmium	39	100	NA	78	78	180000	18000	1800	70	930000	93000	9300	800	ND	ND	ND	ND	ND	ND	NT	0.140 J	NT	NT	NT	NT	NT	NT		
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	--	--	--	--	NT	1680	NT	NT	NT	NT	NT	NT		
Chromium (c)	240	6100	NA	120000	NA	NA	NA	NA	120000	NA	NA	NA	1500000	--	--	--	--	--	--	NT	13.3	NT	NT	NT	NT	NT	NT		
Chromium (d)	NA	NA	NA	240	6100	29	2.9	0.29	230	560	56	5.6	3100	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Chromium (e)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.9	1.9 J	1.9	3.5	4.2	3.6	3.8	--	--	--	--	--	--	--		
Cobalt	NA	NA	NA	1600	590	37000	3700	370	23	190000	19000	1900	300	--	--	--	--	--	--	NT	5.00 J	NT	NT	NT	NT	NT	NT		
Copper	600	600	NA	3100	45000	NA	NA	NA	3100	NA	NA	NA	41000	20.3	24.7	15.7	49.4	110	32.8	39	NT	19.5	NT	NT	NT	NT	NT		
Iron	NA	NA	NA	NA	NA	NA	NA	NA	55000	NA	NA	NA	720000	--	--	--	--	--	--	NT	10100	NT	NT	NT	NT	NT	NT		
Lead	400	600	NA	400	800	NA	NA	NA	400	NA	NA	NA	8000	19.3	24.2	14.8	28.2	49	22	28	NT	22.6	NT	NT	NT	NT	NT		
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	--	--	--	--	NT	1890	NT	NT	NT	NT	NT	NT		
Mercury	14	270	NA	23	65	NA	NA	NA	10	NA	NA	NA	43	1.18	0.7	0.5	2.15	5.3	1.11	1.42	NT	0.350 J	NT	NT	NT	NT	NT		
Nickel	250	2400	NA	1600	23000	1300000	130000	13000	1500	6400000	640000	64000	20000	6.8 J	6.3 J	5.4 J	7.8	8.1 J	6.2 J	6.7 J	NT	8.70	NT	NT	NT	NT	NT		
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	--	--	--	--	NT	484 J	NT	NT	NT	NT	NT	NT		
Silver	110	4100	NA	390	5700	NA	NA	NA	390	NA	NA	NA	5100	ND	ND	ND	8.6	2.2 J	ND	ND	NT	12.7 J	NT	NT	NT	NT	NT		
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--	--	--	--	--	NT	31.6 J	NT	NT	NT	NT	NT	NT		
Thallium	NA	NA	NA	5	79	NA	NA	NA	0.78	NA	NA	NA	10	1.8	1.4 J	2.2	2.3	3.2	1.4 J	ND	--	--	--	--	--	--	--		
Vanadium	370	7100	NA	78	1100	NA	NA	NA	390	NA	NA	NA	5100	--	--	--	--	--	--	NT	14.3	NT	NT	NT	NT	NT	NT		
Zinc	1500	1500	NA	23000	110000	NA	NA	NA	23000	NA	NA	NA	310000	28.5	30.2	20	58.2	88.9	37.3	43.9	NT	43.7	NT	NT	NT	NT	NT		

Notes:
Bold type = concentration exceeds the 2013 Non-Residential RSL at 1x10⁻⁴ Target Cancer Risk or HI of 1.
Italic type = concentration exceeds 2013 Residential RSL at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Shading indicates concentration exceeds NJ Residential SRS.

b = background value for arsenic at Picatinny Arsenal is 9.23 mg/kg.

c = Evaluated as Trivalent chromium (Cr+3). Shaw 2005 did not specify whether total, trivalent, or hexavalent chromium. Assigned to trivalent by ARCADIS.

d = Evaluated as Hexavalent chromium (Cr+6)

e = Evaluated as Total chromium

B = detected in blank RSL = Regional Screening Levels

BNA = Base/Neutral/Acid Compounds SRS = Soil Remediation Standards

J = concentration should be considered estimated. TCR = Total Cancer Risks

-- or NA = Not Available TCL = Target Compound List

ND = Not Detected VOC = Volatile Organic Compound

NT = Not Tested

*Levels of Concern (LOC) based on New Jersey Administrative Code 7:26D as reported in Shaw 2005 (PTA.TO17.0070M). Do not have information on what criteria 1991 soil samples were compared against

**NJ SRS: New Jersey Administrative Code 7:26D, last amended 5/7/2012. Chromium Soil Cleanup Criteria based on Ingestion/Dermal pathways (http://www.state.nj.us/dep/srp/guidance/rs/chrome_criteria.pdf; April 2010)

***RSL column Notes:

- 1) RSLs updated November 2013 and available at <http://www.epa.gov/region9/superfund/prg/>
- 2) RSLs protective of noncarcinogenic effects reflect a hazard index of 1
- 3) NA = No RSL available.
- 4) Manganese RSL is not based on the manganese reference dose as listed on IRIS. USEPA has adjusted the IRIS reference dose for use in deriving conservative RSLs.
- 5) TCR = Target Cancer Risk; HI = Hazard Index
- 6) The RSLs for the following compounds are not based on toxicity data presented in IRIS but from other sources (provisional toxicity or state-derived values): aluminum, hexavalent chromium, cobalt, copper, iron, and nickel.

Table B-3 - Site 176 - Little League Baseball Field (1) - Analytical Soil Sample Results (mg/kg)
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey

Constituent	Former Levels of Concern for Soil Cleanup*			Current NJ SRS**		2013 RSLs***								Surface Soil Data (ICF 1998, PTA.TO01.0013)				2005 Subsurface Soil Data (Shaw 2005, PTA.T017.00560)			
	Residential	Non-Residential	Impact to GW	Residential	Non-Residential	Residential Soil RSLs				Non-Residential Soil RSLs				LLBFSS-A	LLBFSS-B	LLBFSS-C	LLBFSS-D	176SB-1B	176SB-2B	176SB-3B	176SB-3B DUP
						TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1	TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1								
Bis (2-ethylhexyl) phthalate	49	210	100	35	140	3500	350	35	1200	12000	1200	120	12000	0.62 a	--	--	--	0.320 J	0.0810 J	0.300 J	0.220 J
Di-n-butyl phthalate	5700	10000	100	6100	68000	NA	NA	NA	6100	NA	NA	NA	62000	1.3 a	1.0 a	--	1.1 a	--	--	--	--
Acenaphthene	3400	10000	100	3400	37000	NA	NA	NA	3400	NA	NA	NA	33000	--	--	--	--	0.0840 J	0.410 U	0.460 U	0.400 U
Anthracene	10000	10000	100	17000	30000	NA	NA	NA	17000	NA	NA	NA	170000	--	--	--	--	0.200 J	0.410 U	0.460 U	0.400 U
Benz(a)anthracene	0.9	4	500	0.6	2	15	1.5	0.15	NA	210	21	2.1	NA	--	--	--	--	0.530	0.410 U	0.460 U	0.400 U
Benzo(a)pyrene	1	1	100	0.2	0.2	1.5	0.15	0.015	NA	21	2.1	0.21	NA	--	--	--	--	0.470	0.410 U	0.460 U	0.400 U
Benzo(b)fluoranthene	0.9	4	50	0.6	2	15	1.5	0.15	NA	210	21	2.1	NA	--	--	--	--	0.670	0.410 U	0.460 U	0.400 U
Benzo(g,h,i)perylene	NA	NA	NA	380000	30000	NA	NA	NA	NA	NA	NA	NA	NA	--	--	--	--	0.270 J	0.410 U	0.460 U	0.400 U
Benzo(k)fluoranthene	0.9	4	500	6	23	150	15	1.5	NA	2100	210	21	NA	--	--	--	--	0.250 J	0.410 U	0.460 U	0.400 U
Carbazol	NA	NA	NA	24	96	NA	NA	NA	NA	NA	NA	NA	NA	--	--	--	--	0.110 J	0.410 U	0.460 U	0.400 U
Chrysene	9	40	500	62	230	1500	150	15	NA	21000	2100	210	NA	--	--	--	--	0.610	0.410 U	0.460 U	0.400 U
Dibenze(a,h)anthracene	0.66	0.66	100	0.2	0.2	1.5	0.15	0.015	NA	21	2.1	0.21	NA	--	--	--	--	0.0710 J	0.410 U	0.460 U	0.400 U
Fluoranthene	2300	10000	100	2300	24000	NA	NA	NA	2300	NA	NA	NA	22000	--	--	--	--	1.30	0.410 U	0.460 U	0.400 U
Fluorene	2300	10000	100	2300	24000	NA	NA	NA	2300	NA	NA	NA	22000	--	--	--	--	0.0930 J	0.410 U	0.460 U	0.400 U
Indeno(1,2,3-c,d)pyrene	1	4	500	0.6	2	15	1.5	0.15	NA	NA	NA	NA	NA	--	--	--	--	0.320 J	0.410 U	0.460 U	0.400 U
Phenanthrene	NA	NA	NA	NA	300000	NA	NA	NA	NA	NA	NA	NA	NA	--	--	--	--	0.900	0.410 U	0.460 U	0.400 U
Pyrene	1700	10000	100	1700	18000	NA	NA	NA	1700	NA	NA	NA	17000	--	--	--	--	1.00	0.410 U	0.460 U	0.400 U
Aluminum	NA	NA	NA	78000	NA	NA	NA	NA	77000	NA	NA	NA	990000	3310	4470	4120	5580	12900 J	27000 J	19900 J	18000 J
Antimony	14	340	NA	31	450	NA	NA	NA	31	NA	NA	NA	410	--	--	--	--	0.980 J	1.90 J	0.880 J	0.950 J
Arsenic (b)	20	20	NA	19	19	61	6.1	0.61	34	240	24	2.4	380	1.30	2.40	1.20	2.10	3.80 J	3.80 J	2.30 J	3.20 J
Barium	700	47000	NA	16000	59000	NA	NA	NA	15000	NA	NA	NA	190000	16.0	22.0	21.0	25.0	70.9 J	145 J	70.2 J	55.9 J
Beryllium	1	1	NA	16	140	140000	14000	1400	160	690000	69000	6900	2000	0.270	0.370	0.280	0.370	--	--	--	--
Cadmium	1	100	NA	78	78	180000	18000	1800	70	930000	93000	9300	800	0.720	0.680	3.80	0.830	1.20 J	0.0600 J	0.280 U	0.240 U
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1100	870	2200	1800	3110 J	2940 J	1550 J	1310 J
Chromium (c)	NA	NA	NA	120,000	NA	NA	NA	NA	120000	NA	NA	NA	1500000	6.40	8.40	21.0	11.0	17.3 J	35.5 J	30.9 J	28.9 J
Chromium (d)	NA	NA	NA	240	6100	29	2.9	0.29	230	560	56	5.6	3100	--	--	--	--	--	--	--	--
Cobalt	NA	NA	NA	1600	590	37000	3700	370	23	190000	19000	1900	300	3.70	4.50	5.40	6.50	7.50 J	25.6 J	12.0 J	11.8 J
Copper	600	600	NA	3100	45000	NA	NA	NA	3100	NA	NA	NA	41000	9.80	15.0	23.0	14.0	17.5 J	10.9 J	24.7 J	9.10 J
Iron	NA	NA	NA	NA	NA	NA	NA	NA	55000	NA	NA	NA	720000	10200	13000	13300	2220	20500 J	39800 J	28600 J	31500 J
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1130	1290	2380	1820	2910 J	5420 J	3000 J	2830 J
Manganese	NA	NA	NA	11000	5900	NA	NA	NA	1800	NA	NA	NA	23000	173	236	236	255	--	--	--	--
Mercury	14	270	NA	23	65	NA	NA	NA	10	NA	NA	NA	43	0.0230 J	0.0400 J	0.170	--	0.110 J	0.120 U	0.140 U	0.120 U
Nickel	250	2400	NA	1600	23000	1300000	130000	13000	1500	6400000	640000	64000	20000	5.40	7.30	7.90	9.70	10.5 J	21.8 J	16.3 J	15.7 J
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	290	360	360	460	990 J	1440 J	788 J	634 J
Selenium	63	3100	NA	390	5700	NA	NA	NA	390	NA	NA	NA	5100	--	--	--	--	1.60 J	2.40 J	2.00 J	2.10 J
Silver	110	4100	NA	390	5700	NA	NA	NA	390	NA	NA	NA	5100	--	0.530 J	1.10 J	--	0.340 J	0.620 U	0.700 U	0.610 U
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	24.0 J	--	33.0 J	40.0 J	149 J	164 J	86.6 J	117 J
Zinc	1500	1500	NA	23000	110000	NA	NA	NA	23000	NA	NA	NA	310000	25.0	36.0	40.0	32.0	437 J	45.0 J	33.6 J	26.3 J

Notes:

(1) Dataset does not include soil samples collected in 1991, including 18 soil samples were collected from the 6-12 inch horizon and analyzed for acid/base neutral compounds, metals, and PCBs. Four of the samples from the left field area had low levels of PCBs from 170 ppb to 195 ppb. All other parameters were below detection limits, except for metals which were reportedly within the range of levels for natural background. The samples were not analyzed for explosives. Twelve additional samples were obtained from the Little League Baseball Field in 1991 as part of a risk assessment to determine potential risks to individuals using the field. TPH ranged from ND to 54 ppm. All other constituents were within background levels except for DDT (0.33 ppm), DDE (0.033 ppm) obtained from the left outfield, and zinc at 1,200 ppm, obtained in the left infield, possibly due to the galvanized backstop fence. The risk assessment concluded that the risks to individuals playing at or using the field were negligible, both for carcinogenic and non-carcinogenic constituents (ICF 1998, PTA.TO01.0013). These data could not be located in the administrative record.

Italic type = concentration exceeds 2013 Residential RSL at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Shading indicates concentration exceeds NJ Residential SRS.

a = the associated laboratory blank data was not reported for concentrations less than the sample quantitation limit; therefore the detected sample concentration should be considered suspect.

b = background value for arsenic at Picatinny Arsenal is 9.23 mg/kg.

c = Evaluated as Trivalent chromium (Cr+3). ICF 1998 and Shaw 2005 did not specify whether total, trivalent, or hexavalent chromium. Assigned to trivalent by ARCADIS.

d = Evaluated as Hexavalent chromium (Cr+6)

J = concentration should be considered estimated.

SRS = Soil Remediation Standards

-- or NA = Not Available

TCR = Total Cancer Risks

RSL = Regional Screening Levels

U = Non-detect; value is detection limit

*Levels of Concern (LOC) based on New Jersey Administrative Code 7:26D as reported in ICF 1998 (PTA.TO01.0013)

**NJ SRS: New Jersey Administrative Code 7:26D, last amended 5/7/2012. Chromium Soil Cleanup Criteria based on Ingestion/Dermal pathways (http://www.state.nj.us/dep/srp/guidance/rs/chrome_criteria.pdf; April 2010)

1) RSLs updated November 2013 and available at <http://www.epa.gov/region9/superfund/prg/>

2) RSLs protective of noncarcinogenic effects reflect a hazard index of 1

3) NA = No RSL available.

4) Manganese RSL is not based on the manganese reference dose as listed on IRIS. USEPA has adjusted the IRIS reference dose for use in deriving conservative RSLs.

5) TCR = Target Cancer Risk; HI = Hazard Index

6) The RSLs for the following compounds are not based on toxicity data presented in IRIS but from other sources (provisional toxicity or state-derived values): aluminum, hexavalent chromium, cobalt, copper, iron, and nickel.

**Table B-4 - Site 164 - Storage Magazine - Analytical Soil Sample Results (mg/kg)
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Constituent	Former Levels of Concern for Soil Cleanup*			Current NJ SRS**		2013 RSLs***								Surface Soil Data (ICF 1998, PTA.T001.0013)		
	Residential	Non-Residential	Impact to GW	Residential	Non-Residential	Residential Soil RSLs				Non-Residential Soil RSLs				1217SS-A	1217SS-B	1217SS-C
						TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1	TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1	5/23/97	5/23/97	5/23/97
Nitrate	2	2	NA	NA	NA	NA	NA	NA	130000	NA	NA	NA	1600000	--	--	2.20
Aluminum	NA	NA	NA	78000	NA	NA	NA	NA	77000	NA	NA	NA	990000	2530	5810	6700
Arsenic (b)	20	20	NA	19	19	61	6.1	0.61	34	240	24	2.4	380	8.50	3.30	3.90
Barium	700	47000	NA	16000	59000	NA	NA	NA	15000	NA	NA	NA	190000	21.3	23.0	27.7
Beryllium	1	1	NA	16	140	140000	14000	1400	160	690000	69000	6900	2000	--	0.0900 J	0.300
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6370	432	1330
Chromium (c)	NA	NA	NA	120,000	NA	NA	NA	NA	120000	NA	NA	NA	1500000	1.70	6.60	9.60
Chromium (d)	NA	NA	NA	240	6100	29	2.9	0.29	230	560	56	5.6	3100	--	--	--
Cobalt	NA	NA	NA	1600	590	37000	3700	370	23	190000	19000	1900	300	2.30	2.50	6.50
Copper	600	600	NA	3100	45000	NA	NA	NA	3100	NA	NA	NA	41000	3.60	5.40	13.2
Iron	NA	NA	NA	NA	NA	NA	NA	NA	55000	NA	NA	NA	720000	6530	7970	14300
Lead	400	600	NA	400	800	NA	NA	NA	400	NA	NA	NA	800	4.40 J	8.50	18.8
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4030	682	1850
Manganese	NA	NA	NA	11000	5900	NA	NA	NA	1800	NA	NA	NA	23000	48.7	112	255
Mercury	14	270	NA	23	65	NA	NA	NA	10	NA	NA	NA	43	0.00510 J	0.0230 J	0.00370 J
Nickel	250	2400	NA	1600	23000	1300000	130000	13000	1500	6400000	640000	64000	20000	3.30	4.20	9.70
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3140	242	439
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	128	--	40.8 J
Thallium	NA	NA	NA	5	79	NA	NA	NA	0.78	NA	NA	NA	10	1.30	--	--
Vanadium	370	7100	NA	78	1100	NA	NA	NA	390	NA	NA	NA	5100	4.60	11.9	18.1
Zinc	1500	1500	NA	23000	110000	NA	NA	NA	23000	NA	NA	NA	310000	13.6	21.0	163

Notes:

Bold type = concentration exceeds the 2013 Non-Residential RSL at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Italic type = concentration exceeds 2013 Residential RSL at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Shading indicates concentration exceeds NJ Residential SRS.

b = background value for arsenic at Picatinny Arsenal is 9.23 mg/kg.

c = Evaluated as Trivalent chromium (Cr+3). ICF 1998 did not specify whether total, trivalent, or hexavalent chromium. Assigned to trivalent by ARCADIS.

d = Evaluated as Hexavalent chromium (Cr+6)

J = concentration should be considered estimated.

SRS = Soil Remediation Standards

-- or NA = Not Available

TCR = Total Cancer Risks

RSL = Regional Screening Levels

*Levels of Concern (LOC) based on New Jersey Administrative Code 7:26D as reported in ICF 1998 (PTA.T001.0013)

**NJ SRS: New Jersey Administrative Code 7:26D, last amended 5/7/2012. Chromium Soil Cleanup Criteria based on Ingestion/Dermal pathways (http://www.state.nj.us/dep/srp/guidance/rs/chrome_criteria.pdf; April 2010)

1) RSLs updated November 2013 and available at <http://www.epa.gov/region9/superfund/prg/>

2) RSLs protective of noncarcinogenic effects reflect a hazard index of 1

3) NA = No RSL available.

4) Manganese RSL is not based on the manganese reference dose as listed on IRIS. USEPA has adjusted the IRIS reference dose for use in deriving conservative RSLs.

6) The RSLs for the following compounds are not based on toxicity data presented in IRIS but from other sources (provisional toxicity or state-derived values): aluminum, hexavalent chromium, cobalt, copper, iron, and nickel.

Table B-5 - Site 174 - Building 3420, Old Sewage Treatment Plant - Analytical Surface Soil and Sediment Sample Results (mg/kg)
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey

Constituent	Current NJ SRS ⁽¹⁾		2013 Soil RSLs ⁽²⁾								Surface Soil Samples				2014 Sediment Criteria ⁽⁸⁾				Sediment Samples											
	Residential	Non-Residential	Residential Soil RSLs				Non-Residential Soil RSLs				(from Appendix A Table 13-24 in Shaw 2010) ⁽³⁾			(from Appendix A Table 2 in Shaw 2010) ⁽⁶⁾	(derived based on assumptions for worker exposures)				(from Appendix A Table 13-26 in Shaw 2010) ⁽⁵⁾			(from Appendix A Table 2 in Shaw 2010) ⁽⁶⁾								
			TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Non-cancer HI = 1	TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Non-cancer HI = 1	LOC ⁽⁴⁾	174SS-1C (0-1 ft bgs)	174SS-2A (0-1 ft bgs)	174MW-1A (0-1 ft bgs)	174SD-4 (Based on moisture content, sample representative of "soil")	TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Non-cancer HI = 1	Sediment LOC ⁽⁴⁾	174SD-1	174SD-2	174SD-3	Sediment LOC ⁽⁷⁾	174SD-5	174SD-6	174SD-7	174SD-8	174SD-9	
			5,600	560	56	360	96,000	9,600	960	3,100	1	0.012 U	0.012 U	0.017	-	97,400	9,740	974	4,250	760	0.012 U	0.025 B	0.012 U	-	-	-	-	-	-	-
Methylene chloride	34	97	5,600	560	56	360	96,000	9,600	960	3,100	1	0.012 U	0.012 U	0.017	-	97,400	9,740	974	4,250	760	0.012 U	0.025 B	0.012 U	-	-	-	-	-	-	
Toluene	6,300	91,000	-	-	-	5,000	-	-	-	45,000	-	-	-	-	-	-	-	-	56,600	0.67	0.00078 U	0.0014	0.00078 U	-	-	-	-	-	-	
Trichlorofluoromethane	23,000	340,000	-	-	-	790	-	-	-	3,400	-	-	-	-	-	-	-	-	212,000	610,000	0.0059 U	0.012	0.0059 U	-	-	-	-	-	-	
2,4,6-Trinitrotoluene	-	-	1,900	190	19	36	7,900	790	79	420	-	-	-	-	6,030	603	60.3	323	-	-	-	-	-	-	-	-	-	-	-	
Aminodinitrotoluene	-	-	-	-	-	150	-	-	-	1,900	-	-	-	-	-	-	-	1,380	-	-	-	-	-	-	-	-	-	-	-	
Anthracene	17,000	30,000	-	-	-	17,000	-	-	-	170,000	-	-	-	-	-	-	-	153,000	-	-	-	-	0.03162	0.05 J	-	-	-	-	-	
Benzo(a)anthracene	0.6	2	15	1.5	0.15	-	210	21	2	-	-	-	-	-	195	20	1.95	-	-	-	-	0.0317	0.18 J	0.09 J	-	-	-	-	-	
Benzo(a)pyrene	0.2	0.2	1.5	0.15	0.015	-	21	2.1	0.21	-	-	-	-	-	20	2	0.195	-	-	-	-	0.0319	0.17 J	0.07 J	-	-	-	-	-	
Benzo(b)fluoranthene	0.6	2	15	1.5	0.15	-	210	21	2	-	-	-	-	-	195	20	1.95	-	-	-	-	0.0272	0.26 J	0.1 J	-	-	-	-	-	
Benzo(g,h,i)perylene	380,000	30,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15,300	-	-	-	-	0.29	0.13 J	0.05 J	-	-	-	-	-
Benzo(k)fluoranthene	6	23	150	15	1.5	-	2,100	210	21	-	-	-	-	-	1,950	195	19.5	-	-	-	-	0.0272	0.12 J	0.05 J	-	-	-	-	-	
Bis(2-ethylhexyl)phthalate	35	140	-	-	35	1,200	12,000	1,200	120	12,000	-	-	-	-	10,900	1,090	109	10,900	2	0.62 U	1	0.62 U	-	-	-	-	-	-	-	
Butyl Benzyl Phthalate	1,200	14,000	-	-	260	12,000	91,000	9,100	910	120,000	-	-	-	-	80,200	8,020	802	109,000	-	-	-	-	11	0.05 J	-	-	-	-	-	
Carbazole	24	96	-	-	-	-	-	-	-	-	-	-	-	-	7,620	762	76.2	-	-	-	-	140	0.04 J	-	-	-	-	-	-	
Chrysene	62	230	1,500	150	15	-	21,000	2,100	210	-	-	-	-	-	19,500	1,950	195	-	-	-	-	0.0571	0.26 J	0.11 J	-	-	-	-	-	
Dibenz(a,h)anthracene	0.2	0.2	-	-	0.015	-	21	2	0	-	-	-	-	-	20	2	0.195	-	-	-	-	0.00622	0.04 J	-	-	-	-	-	-	
Di-n-butyl phthalate	6,100	68,000	-	-	-	6,100	-	-	-	62,000	-	-	-	-	-	-	-	54,500	-	-	-	11	0.12 J	-	-	-	-	-	-	
1,2-Dichlorobenzene	5,300	59,000	-	-	-	1,900	-	-	-	9,800	-	-	-	-	-	-	-	63,700	-	-	-	0.34	0.04 J	0.1 J	-	-	-	-	-	
1,3-Dichlorobenzene	5,300	59,000	240	24	2.4	1,900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7	-	0.09 J	-	-	-	-		
1,4-Dichlorobenzene	5	13	240	24	2.4	3,500	1,200	120	12	25,000	-	-	-	-	14,500	1,450	145	49,600	-	-	-	0.35	0.12 J	0.16 J	-	-	-	-		
Fluoranthene	2,300	24,000	-	-	-	2,300	-	-	-	22,000	-	-	-	-	-	-	-	20,400	-	-	-	0.06423	0.38 J	0.22 J	-	-	-	-		
Fluorene	2,300	24,000	-	-	-	2,300	-	-	-	22,000	-	-	-	-	-	-	-	20,400	-	-	-	-	-	-	-	-	-	-		
Indeno(1,2,3-cd)pyrene	0.6	2	15	1.5	0.2	-	210	21	2	-	-	-	-	-	195	20	1.95	-	-	-	-	-	-	0.11 J	-	-	-	-		
2-Methylnaphthalene	230	2,400	-	-	-	230	-	-	-	2,200	-	-	-	-	-	-	-	2,040	-	-	-	0.0202	0.09 J	-	-	-	-	-	-	
4-Methylphenol	31	340	-	-	-	6,100	-	-	-	62,000	-	-	-	-	-	-	-	54,500	-	-	-	-	-	-	-	-	-	-	-	
Naphthalene	6	17	360	36	3.6	1,800	180	18	18	620	-	-	-	-	34,300	3,430	343	10,200	-	-	-	0.48	0.06 J	-	-	-	-	-	-	
Phenanthrene	-	300,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pyrene	1,700	18,000	-	-	-	1,700	-	-	-	17,000	-	-	-	-	-	-	-	15,300	0.0419	0.033 U	0.057	0.033 U	0.0419	0.26 J	0.12 J	-	-	-	-	
4,4'-DDD	3	13	200	20	2.0	-	720	72	7	-	-	-	0.23 JD	635	64	6.35	1,090	15,300	0.053	0.033 U	0.085	0.075	0.053	0.37 J	0.16 J	-	-	-		
4,4'-DDE	2	9	140	14	1.4	-	510	51	5	-	-	-	-	448	45	4.48	-	15,300	0.00354	0.033 U	0.055 C	-	0.00354	0.04 D	0.03 JD	-	-	-		
4,4'-DDT	2	8	170	17	1.7	36	700	70	7	430	-	-	5.2 D	535	54	5.35	325	15,300	0.00142	-	0.0294 C	-	0.00142	0.37 D	0.06 D	-	-	-		
Aluminum	78,000	-	-	-	-	77,000	-	-	-	990,000	2,000,000	5,680	9,490	6,990	-	-	-	708,000	2,000,000	4,370	6,950	17,900	-	-	-	-	-	3,500	3,610	
Antimony	31	450	-	-	-	31	-	-	-	410	340	0.347	0.1 U	0.741	-	-	-	283	2	0.1 U	0.333	0.1 U	-	-	-	-	1.2 U	1.3 U		
Arsenic	19	19	61	6.1	0.6	34	240	24	2.4	380	20	3.7	6.92	121	12	1.21	195	16	6.6	8.07	35	-	-	-	-	-	9.7	2.3		
Barium	16,000	59,000	-	-	-	15,000	-	-	-	190,000	47,000	31.8	72.4	48.9	-	-	-	142,000	140,000	150	73.9	76	-	-	-	52.4	23 J			
Beryllium	16	140	140,000	14,000	1,400	160	690,000	69,000	6,900	2,000	2	1 U	0.907	0.5 U	26,400,000	2,640,000	264,000	1,420	4,100	0.5 U	131	1.08	-	-	-	1.1	0.38 J			
Boron	-	-	-	-	-	16,000	-	-	-	200,000	-	-	-	-	-	-	-	142,000	180,000	5.91 U	11.3	5.91 U	-	-	-	-	-	-		
Cadmium	78	78	180,000	18,000	1,800	70	930,000	93,000	9,300	800	-	-	-	-	35,200,000	3,520,000	352,000	632	-	-	-	-	-	-	-	-	0.79	0.33		
Calcium	-	-	-	-	-	-	-	-	-	4,000,000	1,300	1,940	5,510	-	-	-	-	4,000,000	1,400	2,020	6,480	-	-	-	-	-	806	525 JE		
Chromium (III)	120,000	-	-	-	-	120,000	-	-	-	1,500,000	6,100	9.8	18.8	35.7	-	-	-	26	8.18	22.1	19.7	-	-	-	-	3.6	3			
Chromium (VI)	240	6,100	29	2.9	0.3	230	560	56	6	3,100	-	9.8	18.8	35.7	396	40	3.96	2,120	8.18	22.1	19.7	-	-	-	-	3.6	3			
Cobalt	1,600	590	37,000	3,700	370	23	190,000	19,000	1,900	300	41,000	5.49	18.6	8.69	7,050,000	705,000	70,500	212	41,000	35.8	16.5	11.2	-	-	-	8.9	3.6 J			
Copper	3,100	45,000	-	-	-	3,100	-	-	-	41,000	600	19.5	25.7	23.4	-	-	-	28,300	27.2	5.32	26.1	31.6	-	-	-	17.4	13.4			
Iron	-	-	-	-	-	55,000	-	-	-	720,000	610,000	15,200	22,300	16,100	-	-	-	496,000	67,600	19,800	14,400	23,800	-	-	-	29,500	8,820			
Lead	400	800	-	-	-	400	-	-	-	800	600	19.5	10.6	59.6	23,300	2,330	233	-	38.8	10	38.1	8.59	-	-	-	18.9	9			
Magnesium	-	-	-	-	-	-	-	-	-	800,000	1,980	2,630	3,190	-	-	-	-	800,000	1,060	1,460	6,510	-	-	-	-	852	794			
Manganese	11,000	5,900	-	-	-	-	-																							

Table B-5 - Site 174 - Building 3420, Old Sewage Treatment Plant - Analytical Surface Soil and Sediment Sample Results (mg/kg)
Record of Decision for 21 Sites
Picatunny Arsenal, Morris County, New Jersey

(1) New Jersey Soil Remediation Standard (SRS): New Jersey Administrative Code 7:26D, last amended 5/7/2012. Chromium Soil Cleanup Criteria based on Ingestion/Dermal pathways (http://www.state.nj.us/dep/srp/guidance/rs/chrome_criteria.pdf; April 2010)

(2) Regional screening level (RSL) column:

a) RSLs updated November 2013 and available at <http://www.epa.gov/region9/superfund/prg/>. Although RSLs were updated in May 2014, there were no changes to these RSLs based on revised understanding of toxicity. Rather the revised 2014 RSLs for the above compounds reflect changes in USEPA's default exposure assumptions and therefore, were not revised for this table, with the exception of mercury at EPA's request. The RSL for elemental mercury is from the May 2014 RSL table and is slightly lower than the 2013 RSL (10 mg/kg for residential soil and 43 mg/kg for nonresidential soil).

b) RSLs protective of noncarcinogenic effects reflect a hazard index (HI) of 1. RSLs based on carcinogenic endpoints are presented based on target cancer risk (TCR) within EPAs acceptable cancer risk range (10^{-6} to 10^{-4}).

c) "-" = RSL not available (NA)

d) Manganese RSL is not based on the manganese reference dose as listed on IRIS. USEPA has adjusted the IRIS reference dose for use in deriving a conservative RSL.

e) "Aminodinitrotoluene" compared to RSL for 2-amino-4,6-dinitrotoluene. 1,3-dichlorobenzene compared to 1,2-dichlorobenzene noncancer-based RSL and 1,4-dichlorobenzene cancer-based RSL.

f) Chromium concentrations were compared to Cr(III) and Cr(VI) RSLs

(3) Data from Appendix A Table 13-24 in Shaw 2010, PTA.TO19.0063C.

a) "-" = Not tested

(4) Levels of concern (LOCs) were obtained from the source of the analytical data. The LOCs included EPA Region 3 residential and non-residential criteria, New Jersey soil standards, and other Applicable or Relevant and Appropriate Requirements (ARARs) as appropriate.

(5) Data from Appendix A Table 13-26 in Shaw 2010, PTA.TO19.0063C.

a) LOCs = See the "ARARs and Other Guidance to be Considered for Picatunny Arsenal Phase II Surface and Subsurface Soil" table for a complete list of LOC values

b) PTA.TO19.0063C; Shaw 2005. Report on the Investigation of Sumps and Dry Wells with Previously Identified COCs at Various Sites. June. The report states that "results for the post-excavation confirmation samples for Site 174 are shown in Table 3-29" and that "[p]ost-excavation samples indicated no LOC exceedances in any of the excavations or the excavated soil". Additionally, "[a] the conclusion of the investigation, the site was restored using rock to fill the excavated channel...". There is no potential for exposure to these materials and no need to include these samples in the table. Samples not presented in the table include: 174EX-B-1, 174EX-B-2, 174EXN-1, 174EX-SWE-1, 174EXSWE-2, 174EXSWE-3, 174EXSWE-4, 174EXSWE-6, 174EXSWW-1, 174EXSWW-2, 174EXSWW-3, 174EXSWW-4, 174EXSWW-6, 174EXSWW-7.

(6) Data from Appendix A Table 2 in Shaw 2010, PTA.TO19.0063C.

(7) For soil samples, EPA ecological soils screening levels (eco-SSL) were selected as the LOC, when available. In the absence of SSLs, eco-based preliminary remediation goals (PRGs) developed by Oak Ridge National Laboratory (ORNL) were used as the soil LOC. In the absence of eco-screening values, human health-based soil standards were used. For sediment samples, the lower of the Threshold Effects Levels (TELs), Interim Sediment Quality Guidelines (ISQGs) and Effects Range-Low values (ER-Ls) were selected first as the LOC, if available. In the absence of these values, the lower of USEPA's sediment quality criteria (SQC), sediment quality benchmarks (SQBs), ORNLs Equilibrium Partitioning Benchmarks (EqPs), and NYSDEC Criteria were selected. In cases where the selected screening value was less than the background level, the background level was chosen as the LOC.

(8) Risk-based criteria protective of potential exposures to sediment by an outdoor worker. Criteria were derived using Oak Ridge National Laboratory (ORNL) Risk Assessment Information System (RAIS) online calculator. The exposure assumptions for the worker are presented on the following page.

a) Benzo(g,h,i)perylene and phenanthrene levels compared to pyrene's sediment criteria.

b) Cesium-137 levels compared to Cesium-137+D risk-based criteria

c) Uranium-238 levels compared to uranium-238+D risk-based criteria.

d) Uranium-235 levels compared to uranium-235+D risk-based criteria.

Bold type = concentration exceeds the 2013 Non-Residential RSL for soil or for sediment the criteria for outdoor workers at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Italic type = concentration exceeds 2013 Residential RSL for soil or for sediment the criteria for outdoor workers at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Shading indicates concentration exceeds NJ Non-Residential SRS (soil only).

Data Flags/Qualifiers

B = Analyte found in the blanks as well as the sample

C = Analysis is confirmed

D = Compound identified in an analysis at a secondary dilution factor.

I = Low spike recovery is high

J = estimated concentration

M = The high spike recovery is high

N = High spike recovery is low

U = Non-detect, value is the detection limit

Table B-6 - Site 174 - Building 3420, Old Sewage Treatment Plant - Analytical Surface Water Sample Results (µg/L)
Record of Decision for 21 Sites
Picatunny Arsenal, Morris County, New Jersey

Chemical	Risk-based Criteria Protective of Worker Exposures to Surface Water ⁽¹⁾				LOC ⁽²⁾	Analytical Results ⁽³⁾		
	TCR = 1x10 ⁻⁶	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁴	HQ 1		174SW-1	174SW-2	174SW-3
Volatiles:								
Toluene	-	-	-	84,600	6,800	0.5 U	0.49	0.5 U
Inorganics:								
Aluminum	-	-	-	4,380,000	190	97.1	313	27.5
Arsenic	8.18	81.8	818	1,310	1.38	1.53	1 U	1.88
Barium	-	-	-	481,000	1,000	19.3	26.9	26.4
Boron	-	-	-	-	3,300	63.6	50 U	50 U
Calcium	-	-	-	-	400,000	16,900	21,100	21,000
Iron	-	-	-	3,070,000	1,790	194	360	39.9
Lead	-	-	-	-	3.2	1 U	1.51	1 U
Magnesium	-	-	-	-	80,500	4,700	7,260	5,860
Manganese	-	-	-	42,300	383	21.3	40.8	5.97
Potassium	-	-	-	-	100,000	1,330	1,460	1,340
Sodium	-	-	-	-	100,000	47,700	42,100	56,200
Strontium	-	-	-	2,630,000	22,000	85.5	118	126
Titanium	-	-	-	-	150,000	2 U	10.5	2.06
Anions:								
Chloride	-	-	-	-	230,000	82,000	97,000	110,000
Nitrate, Nitrite	-	-	-	438,000	3,700	290	125	680
Phosphate	-	-	-	-	NA	18.6	95.1	13.3 U
Sulfate	-	-	-	-	250,000	19,000	18,000	20,000
Radiological Parameters (pCi/L):								
Gross alpha	-	-	-	-	NA	NT	0.858	NT
Gross beta	-	-	-	-	NA	NT	6.29	NT
Cesium-137	210	2,100	21,000	-	NA	NT	3.44	NT
Cobalt-60	406	4,060	40,600	-	NA	NT	2.46	NT
Radium-226	16.6	166	1,660	-	NA	NT	70.6	NT

Notes

(1) Risk-based criteria protective of potential exposures to surface water by an outdoor worker. Criteria were derived using Oak Ridge National Laboratory (ORNL) Risk Assessment Information System (RAIS) online calculator. The exposure assumptions for the worker are presented on the following page.

(2) LOC is Region 3 RBC as presented in Appendix A Table 13-27 in Shaw 2010, PTA.TO19.0063C.

(3) Data obtained from Appendix A Table 13-27 in Shaw 2010, PTA.TO19.0063C. In addition, surface water sample 174SW-6, collected in August 2006, was evaluated for radiologic parameters, but all were non-detect (Table 1 Shaw Appendix A).

LOC = Level of Concern

NA and "-" = Not available

NT = Not tested

U = Data validation code indicating compound not detected above reporting limit, which is the number preceding the "U".

TCR = Target cancer risk

HQ = Hazard quotient

**Table B-6 - Site 174 - Building 3420, Old Sewage Treatment Plant -
Analytical Surface Water Sample Results**

Record of Decision for 21 Sites

Picatinny Arsenal, Morris County, New Jersey

**Risk Assessment Information System
Worker Equation Inputs for Surface Water**

Variable	Value
TR (target cancer risk) unitless	0.000001
ED _{out} (exposure duration - worker) years	25
THQ (target hazard quotient) unitless	1
LT (lifetime - outreator) yr	70
EF _{out} (exposure frequency) d/yr	125
ET _{out} (exposure time) hours/day	1
Apparent thickness of stratum corneum (cm)	0.001
BW _a (body weight - adult) kg	80
SA _{out} (skin surface area - adult) cm ²	3300
IRW _{out} (water intake rate - adult) L/day	0.05
BW ₁₆₋₃₀ (body weight) kg	80
ED ₁₆₋₃₀ (exposure duration) year	25
EF ₁₆₋₃₀ (exposure frequency) day/year	125
ET _{outw16-30} (exposure time) hour/event	1
EV ₁₆₋₃₀ (events) events/day	1
IRW ₁₆₋₃₀ (water intake rate) L/hour	0.05
SA ₁₆₋₃₀ (skin surface area) cm ²	3300
ED _{outwa} (exposure duration - adult) year	25
EF _{outwa} (adult exposure frequency) day/year	125
ET _{outwa} (adult exposure time) hour/event	1
EV _{outwa} (adult) events/day	1
BW _{outwa} (body weight - adult) kg	80
SA _{outwa} (skin surface area - adult) cm ²	3300
IRW _{outwa} (water intake rate - adult) L/hr	0.05

Output generated 10SEP2014:18:03:50

**Table B-8 - Site 172 - Parking Area Across from Building 3328 - Analytical Soil Sample Results (mg/kg)
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Constituent	Current NJ SRS (mg/kg) ¹		2013 RSLs (mg/kg) ²								Surface Soil Data (mg/kg) for Site 172 Building (from Appendix A Table 13-9 in Shaw, 2010) ³					
	Residential	Non-Residential	Residential Soil RSLs				Non-Residential Soil RSLs				Former Levels of Concern ^a	172SS-1C	172SS-2C	172SS-3A	172SS-4A	172SS-5A
			TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1	TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1						
Di-n-Butylphthalate	6,100	68,000	NA	NA	NA	6,100	NA	NA	NA	62,000	100	4	4	5	4	3 U
Fluoranthene	2,300	24,000	NA	NA	NA	2,300	NA	NA	NA	22,000	100	2	0.7 U	0.7 U	2	5
Phenanthrene	NA	300,000	NA	NA	NA	1,700	NA	NA	NA	17,000	61,000	0.7 U	0.3 U	0.3 U	0.8	3
Pyrene	1,700	18,000	NA	NA	NA	1,700	NA	NA	NA	17,000	100	2	0.3 U	0.5	2	4
Aroclor 1260	0.2	1	22	2.2	0.22	NA	74	7.4	0.74	NA	2	0.134 C	0.0804 U	0.0804 U	0.0804 U	0.0804 U

(1) New Jersey Soil Remediation Standard (SRS): New Jersey Administrative Code 7:26D, last amended 5/7/2012. Chromium Soil Cleanup Criteria based on Ingestion/Dermal pathways (http://www.state.nj.us/dep/srp/guidance/rs/chrome_criteria.pdf; April 2010). The NJ SRS for values for residential and non-residential exposure to polychlorinated biphenyls (PCBs) were used to evaluate Aroclor 1260.

(2) Regional screening level (RSL) column:

a) Values represent RSLs updated November 2013 and available at <http://www.epa.gov/region9/superfund/prg/>. Although RSLs were updated in May 2014, there were no changes to these RSLs based on revised understanding of toxicity. Rather the revised 2014 RSLs for the above compounds reflect changes in USEPA's default exposure assumptions and therefore, were not revised for this table, with the exception of mercury at EPA's request. The RSL for elemental mercury is from the May 2014 RSL table and is slightly lower than the 2013 RSL (10 mg/kg for residential soil and 43 mg/kg for nonresidential soil).

b) RSLs protective of noncarcinogenic effects reflect a hazard index (HI) of 1. RSLs based on carcinogenic endpoints are presented based on target cancer risk (TCR) within EPA's acceptable cancer risk range (10⁻⁶ to 10⁻⁴).

c) "NA" = RSL not available (NA)

d) Phenanthrene concentrations were compared to the RSL for pyrene because an RSL for phenanthrene is not currently available.

(3) Data from Shaw, 2010, Appendix A Table 13-9.

a) Former levels of concern (LOCs) were obtained from the source of the analytical data. See the "ARARs and Other Guidance to be Considered for Picatinny Arsenal Phase II Surface Soil" table for complete list of LOC values.

Bold type = concentration exceeds the 2013 Non-Residential RSL for soil or for sediment the criteria for outdoor workers at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Italic type = concentration exceeds 2013 Residential RSL for soil or for sediment the criteria for outdoor workers at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Shading indicates concentration exceeds NJ Non-Residential SRS (soil only).

Data Flags/Qualifiers

B = Analyte found in the blanks as well as the sample

C = Analysis is confirmed

D = Compound identified in an analysis at a secondary dilution factor.

I = Low spike recovery is high

J = estimated concentration

M = The high spike recovery is high

N = High spike recovery is low

U = Non-detect, value is the detection limit

**Table B-9 - Site 175 - Building 3801, Helicopter Support Facility - Analytical Soil Sample Results (mg/kg)
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Constituent	Current NJ SRS (mg/kg) ¹		2013 RSLs (mg/kg) ²								Soil Data (mg/kg) for Site 175, Location 3801 (from Appendix A Table 1 in Shaw, 2010) ³					Surface Soil and Subsurface Soil Data (mg/kg) For Site 175, Building 3801 (from Appendix A Table 12-4 in Shaw, 2010) ⁴					
	Residential	Non-Residential	Residential Soil RSLs				Non-Residential Soil RSLs				SS1-3801-0404	SS2-3801-0404	SS3-3801-404	SS4-3801-404	SS5-3801-404	Former Levels of Concern ^a	175MW-1A	175MW-1B	175MW-2A	175MW-2B	175MW-3A
			TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1	TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1											
Trichlorofluoromethane	23,000	340,000	NA	NA	NA	790	NA	NA	NA	3,400	NA	NA	NA	NA	610,000	0.0059 U	0.0099	NT	NT	0.0059 U	
Antimony	31	450	NA	NA	NA	31	NA	NA	NA	410	ND	ND	ND	ND							
Arsenic	19	19	61	6.1	0.61	34	240	24	2	380	3.4	5.03	2.3	4.28	4.56						
Beryllium	16	140	140,000	14,000	1,400	160	690,000	69,000	6,900	2,000	0.68 J	0.037 J	0.5 J	0.61 J	0.72 J						
Barium	16,000	59,000	NA	NA	NA	15,000	NA	NA	NA	190,000	NA	NA	NA	NA							
Cadmium	78	78	180,000	18,000	1,800	70	930,000	93,000	9,300	800	ND	ND	ND	ND	ND						
Chromium(III), Insoluble Salts	120,00	NA	NA	NA	NA	120,000	NA	NA	NA	1,500,000	9.8	1.1	7.2	10.0	9.0						
Chromium(VI)	240	6,100	29	2.9	0.29	230	560	56	6	3,100	9.8	1.1	7.2	10.0	9.0						
Copper	3,100	45,000	NA	NA	NA	3,100	NA	NA	NA	41,000	15.0	1.5	11.1	16.7	14.3						
Lead	400	800	NA	NA	NA	400	NA	NA	NA	800	27.4	2.8	18.5	30.4	25.3						
Mercury	23	65	NA	NA	NA	9.4	NA	NA	NA	40	0.246	0.165	0.15	0.16	ND						
Nickel	1,600	23,000	1,300,000	130,000	13,000	1,500	6,400,000	640,000	64,000	20,000	8.8	0.58 J	6.6 J	8.1 J	6.9 J						
Selenium	390	5,700	NA	NA	NA	390	NA	NA	NA	5,100	0.57 J	0.66 J	0.44 J	0.51 J	0.35 J						
Silver	390	5,700	NA	NA	NA	390	NA	NA	NA	5,100	ND	ND	ND	ND	ND						
Thallium	5	79	NA	NA	NA	1	NA	NA	NA	10	ND	ND	ND	ND	ND						
Zinc	23,000	110,000	NA	NA	NA	23,000	NA	NA	NA	310,000	42.5	4.2	25.7	41.9	32.1						

(1) New Jersey Soil Remediation Standard (SRS): New Jersey Administrative Code 7:26D, last amended 5/7/2012. Chromium Soil Cleanup Criteria based on Ingestion/Dermal pathways (http://www.state.nj.us/dep/srp/guidance/rs/chrome_criteria.pdf; April 2010)

(2) Regional screening level (RSL) column:

a) Values represent RSLs updated November 2013 and available at <http://www.epa.gov/region9/superfund/prg/>. Although RSLs were updated in May 2014, there were no changes to these RSLs based on revised understanding of toxicity. Rather the revised 2014 RSLs for the above compounds reflect changes in USEPA's default exposure assumptions and therefore, were not revised for this table, with the exception of mercury at EPA's request. The RSL for elemental mercury is from the May 2014 RSL table and is slightly lower than the 2013 RSL (10 mg/kg for residential soil and 43 mg/kg for nonresidential soil).

b) RSLs protective of noncarcinogenic effects reflect a hazard index (HI) of 1. RSLs based on carcinogenic endpoints are presented based on target cancer risk (TCR) within EPA's acceptable cancer risk range (10⁻⁶ to 10⁻⁴).

c) "NA" = RSL not available (NA)

d) Chromium concentrations were compared to Cr(III) and Cr(VI) RSLs

e) The RSLs for the following compounds are not based on toxicity data presented in IRIS but from other sources (provisional toxicity or state-derived values): hexavalent chromium, copper, and nickel.

(3) Data from Appendix A Table 1 in Shaw, 2010.

(4) Data from Appendix A Table 12-4 in Shaw, 2010.

a) Former levels of concern (LOCs) were obtained from the source of the analytical data. See the "ARARs and Other Guidance to be Considered for Picatinny Arsenal Phase II Surface and Subsurface Soil" table for a complete list of LOC values.

Bold type = concentration exceeds the 2013 Non-Residential RSL for soil or for sediment the criteria for outdoor workers at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Italic type = concentration exceeds 2013 Residential RSL for soil or for sediment the criteria for outdoor workers at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Shading indicates concentration exceeds NJ Non-Residential SRS (soil only).

Data Flags/Qualifiers

B = Analyte found in the blanks as well as the sample

C = Analysis is confirmed

D = Compound identified in an analysis at a secondary dilution factor.

I = Low spike recovery is high

J = estimated concentration

M = The high spike recovery is high

N = High spike recovery is low

ND = Not detected

NT = Not tested

U = Non-detect, value is the detection limit

**Table B-10 - Site 185 - Building 350, Concepts and Applications Laboratory - Analytical Soil Sample Results (mg/kg)
Record of Decision for 21 Sites
Picatinny Arsenal, Morris County, New Jersey**

Constituent	Current NJ SRS (mg/kg) ¹		2013 RSLs (mg/kg) ²								Soil Data (mg/kg) for Site 185/PICA-188 (From Building 350's Acid Neutralization Tank) (from Appendix A Table D-4 in Shaw, 2010) ³				Surface Soil Data (mg/kg) for Site 185 (from Appendix A Table 10-26 in Shaw, 2010) ⁴							
	Residential	Non-Residential	Residential Soil RSLs				Non-Residential Soil RSLs				Former Levels of Concern ^a			PICA-350-1S	Former Levels of Concern ^a					Analytical Results 18SSS-1A 10/14/2004 0.0 - 1.0 ft.		
			TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1	TCR = 1x10 ⁻⁴	TCR = 1x10 ⁻⁵	TCR = 1x10 ⁻⁶	Noncancer HI = 1	NJ Non-Residential	NJ Impact to GW	DERP Value		NJNR ^b	NJIGW ^c	IRBC ^d	NJR ^e	BG Threshold ^f			
Benz(a)anthracene	0.6	2	15	1.5	0.15	NA	210	21	2.1	NA	NA	NA	NA	NA	4	500	7.8	0.9	NA	0.0330	J	
Benzo(a)pyrene	0.2	0.2	1.5	0.15	0.015	NA	21	2.1	0.21	NA	NA	NA	NA	NA	0.66	100	0.78	0.66	NA	0.0380	J	
Benzo(b)fluoranthene	0.6	2	15	1.5	0.15	NA	210	21	2.1	NA	NA	NA	NA	NA	4	50	7.8	0.9	NA	0.0720	J	
Benzo(g,h,i)perylene	380,000	30,000	NA	NA	NA	1,700	NA	NA	NA	17,000	NA	NA	NA	NA	NA	NA	61,000	NA	NA	0.0500	J	
Benzo(k)fluoranthene	6	23	150	15	2	NA	2,100	210	21	NA	NA	NA	NA	NA	4	500	78	0.9	NA	0.0210	J	
Butylbenzyl phthalate	1,200	14,000	26,000	2,600	260	12,000	91,000	9,100	910	120,000	NA	NA	NA	NA	10,000	100	410,000	1,100	NA	0.270	J	
Chrysene	62	230	1,500	150	15	NA	21,000	2,100	210	NA	NA	NA	NA	NA	40	500	780	9	NA	0.0550	J	
Bis(2-Ethylhexyl)phthalate	35	140	3,500	350	35	1,200	12,000	1,200	120	12,000	210	100	3,200	6.8	D,B	210	100	410	49	NA	0.110	J
Fluoranthene	2,300	24,000	NA	NA	NA	2,300	NA	NA	NA	22,000	NA	NA	NA	NA	10,000	100	82,000	2,300	NA	0.0700	J	
Pyrene	1,700	18,000	NA	NA	NA	1,700	NA	NA	NA	17,000	NA	NA	NA	NA	10,000	100	61,000	1,700	NA	0.0800	J	
beta-BHC	0.4	2	27	2.7	0.27	NA	96	10	1.0	NA	NA	NA	NA	NA	NA	NA	3.2	NA	NA	0.00280	JD	
gamma-Chlordane	0.2	1	160	16.0	1.6	35	650	65	6.5	400	NA	NA	NA	NA	NA	NA	16	NA	NA	0.00110	JD	
4,4'-DDE	2	9	140	14	1.4	NA	510	51	5.1	NA	NA	NA	NA	NA	9	50	17	2	NA	0.00130	JD	
Endosulfan sulfate	470	6,800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12,000	NA	NA	0.00200	JD	
Aroclor 1260	0.2	1	22	2.2	0.22	NA	74	7.4	0.7	NA	NA	NA	NA	NA	2	50	2.9	0.49	NA	0.0260	J	
Aluminum	78,000	NA	NA	NA	NA	77,000	NA	NA	NA	990,000	NA	NA	NA	NA	NA	NA	2,000,000	NA	20,500	9,830	J	
Arsenic	19	19	61	6.1	0.61	34	240	24	2.4	380	20	NA	22	2.9	20	NA	3.8	20	9.23	20.0	D	
Antimony	31	450	NA	NA	NA	31	NA	NA	NA	410	340	NA	31	0.60	NA	NA	NA	NA	NA	NT		
Barium	16,000	59,000	NA	NA	NA	15,000	NA	NA	NA	190,000	47,000	NA	5,300	41	47,000	NA	140,000	700	157	56.7	JGED	
Cadmium	78	78	180,000	18,000	1,800	70	930,000	93,000	9,300	800	NA	NA	NA	NA	100	NA	2,000	39	0.660	0.890	JGD	
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4,000,000	NA	8,500	14,200	D	
Chromium(III), Insoluble Salts	120.00	NA	NA	NA	NA	120,000	NA	NA	NA	1,500,000	NA	NA	3,000	11	6100	NA	6,100	240	32	14.6	D	
Chromium(VI)	240	6,100	29	2.9	0.29	230	560	56	5.6	3,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	15	D	
Cobalt	1,600	590	37,000	3,700	370	23	190,000	19,000	1,900	300	NA	NA	NA	NA	NA	NA	41,000	NA	10	7.2	JGD	
Copper	3,100	45,000	NA	NA	NA	3,100	NA	NA	NA	41,000	600	NA	2,800	33	600	NA	82,000	600	36	50	D	
Iron	NA	NA	NA	NA	NA	55,000	NA	NA	NA	720,000	NA	NA	NA	NA	NA	NA	610,000	NA	26,500	22,700	ED	
Lead	400	800	NA	NA	NA	400	NA	NA	NA	800	600	NA	400	23	600	NA	400	400	75	47	ED	
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	800,000	NA	2,440	6,640	ED	
Manganese	11,000	5,900	NA	NA	NA	1,800	NA	NA	NA	26,000	NA	NA	NA	NA	NA	NA	41,000	NA	1,250	183	ED	
Mercury	23	65	NA	NA	NA	9.4	NA	NA	NA	40	270	NA	23	11	270	NA	200	14	0.30	0.21		
Nickel	1,600	23,000	1,300,000	130,000	13,000	1,500	6,400,000	640,000	64,000	20,000	250	NA	1,500	13	2400	NA	41,000	250	20	12.7	JGD	
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,000,000	NA	742	3,580	D	
Vanadium	78	1,100	NA	NA	NA	390	NA	NA	NA	5,100	NA	NA	NA	NA	7100	NA	14,000	370	46	26	JGD	
Zinc	23,000	110,000	NA	NA	NA	23,000	NA	NA	NA	310,000	1,500	NA	23,000	130	1500	NA	610,000	1500	77	282	ED	

(1) New Jersey Soil Remediation Standard (SRS): New Jersey Administrative Code 7:26D, last amended 5/7/2012. Chromium Soil Cleanup Criteria based on Ingestion/Dermal pathways (http://www.state.nj.us/dep/srp/guidance/rs/chrome_criteria.pdf; April 2010)

(2) Regional screening level (RSL) column:

a) RSLs updated November 2013 and available at <http://www.epa.gov/region9/superfund/prg/>. Although RSLs were updated in May 2014, there were no changes to these RSLs based on revised understanding of toxicity. Rather the revised 2014 RSLs for the above compounds reflect changes in USEPA's default exposure assumptions and therefore, were not revised for this table, with the exception of mercury at EPA's request. The RSL for elemental mercury is from the May 2014 RSL table and is slightly lower than the 2013 RSL (10 mg/kg for residential soil and 43 mg/kg for nonresidential soil).

b) RSLs protective of noncarcinogenic effects reflect a hazard index (HI) of 1. RSLs based on carcinogenic endpoints are presented based on target cancer risk (TCR) within EPA's acceptable cancer risk range (10⁻⁶ to 10⁻⁴).

c) "NA" = RSL not available (NA)

d) Benzo(g,h,i)perylene concentrations were compared to the RSL for pyrene because an RSL for benzo(g,h,i)perylene is not currently available.

e) Manganese RSL is not based on the manganese reference dose as listed on IRIS. USEPA has adjusted the IRIS reference dose for use in deriving a conservative RSL.

f) Chromium concentrations were compared to Cr(III) and Cr(VI) RSLs

g) The RSLs for the following compounds are not based on toxicity data presented in IRIS but from other sources (provisional toxicity or state-derived values): aluminum, hexavalent chromium, cobalt, copper, iron, and nickel.

(3) Data from Appendix A Table D-4 in Shaw, 2010.

a) Former levels of concern (LOCs) were obtained from the source of the analytical data and include New Jersey Soil Cleanup Standards and Defense Environmental Restoration Program preliminary restoration goals from RRSE Primer (DERP).

(4) Data from Appendix A Table 10-26 in Shaw, 2010.

a) Former levels of concern (LOCs) = See the "ARARs and Other Guidance to be Considered for Picatinny Arsenal Surface and Subsurface Soil" table for a complete list of LOC values. Surface soil samples were compared to the NJDEP Non-Residential Direct Contact Soil Cleanup Criteria (NJNR). If NJNR criteria were not available, USEPA Region III Industrial (noncarcinogenic or carcinogenic 109 Soil RBCs) were used for comparison. NJDEP Residential Direct Contact Soil Cleanup Criteria were shown for informational purposes only.

b) NJNR = NJDEP Non-Residential Direct Contact Soil Cleanup Criteria

c) NJIGW = NJDEP Impact to Groundwater Cleanup Criteria

d) IRBC = USEPA Region III Industrial Surface Soil Risk Based Concentration

e) NJR = NJDEP Residential Direct Contact Soil Cleanup Criteria

f) BG Threshold = Surface Soil Background Threshold value

Bold type = concentration exceeds the 2013 Non-Residential RSL for soil or for sediment the criteria for outdoor workers at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Italic type = concentration exceeds 2013 Residential RSL for soil or for sediment the criteria for outdoor workers at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Shading indicates concentration exceeds NJ Non-Residential SRS (soil only).

Data Flags/Qualifiers

B = Analyte found in the blanks as well as the sample

C = Analysis is confirmed

D = Compound identified in an analysis at a secondary dilution factor.

I = Low spike recovery is high

J = estimated concentration

M = The high spike recovery is high

N = High spike recovery is low

ND = Not detected

NT = Not tested

U = Non-detect, value is the detection limit

Appendix C

Qualitative Human Health Risk
Assessment for Sites 119, 120,
and 121

MEMO

To:
Larry Tannenbaum
USAAIPH

Copies:
Mary Ellen Maly (AEC)
Ted Gabel (Picatinny)
Nancy Flaherty (USACE)

From:
Tom Crone
Kimberly Panhorst

Date:
17 September 2014

ARCADIS Project No.:
GP06PICA

Subject:
Qualitative Human Health Risk Assessment for Sites 119, 120, and 121
Picatinny Arsenal, New Jersey

This memorandum provides the results of a qualitative risk evaluation of historical data for Sites 119, 120, and 121 because quantitative risk assessments were not conducted for these sites during the Preliminary Assessment/Remedial Investigation phase of work.

Sites 119, 120 and 121 are located adjacent to one another in Area P, and are immediately adjacent to railroad lines. These three sites were associated with historical storage of propellants in magazines, including Buildings 46, 47, and 48 at Site 119, Building 50 at Site 120, and Building 57 at Site 121. In addition, propellant surveillance samples were historically packed in the building at Site 120. In the mid-1960s, the building at Site 121 was converted for packing and shipping use. Between the 1950s and 1970s, an asphalt road was built accessing each of these sites. By 1978, all storage of explosive materials at Picatinny Arsenal was consolidated to another area (lower portion of the installation), and no explosives were stored or were present in any of the buildings at these three sites as noted in inspections conducted at this time. The buildings in these three sites are currently used for storage of general office supplies and furniture (Sites 119 and 120) and packing and shipping of non-hazardous materials (Site 121). Although the railroad tracks are still present, rail service is not active at any of these sites. (ICFKE, 1998)

There were a limited number of soil samples (see Table 1) collected at each of these three sites (ICFKE, 1998), and all soil samples were surface soil samples collected from 0 to 1 feet below ground surface. All samples were collected immediately adjacent to the buildings in the area between the historic loading

docks and the railroad tracks. The soil samples were analyzed for volatile organic compounds, semivolatile organic compounds, including polynuclear aromatic hydrocarbons (PAHs), explosives, pesticides and polychlorinated biphenyls (PCBs), and target analyte metals. The detected analytes included two explosive compounds (2,4,6-TNT and aminodinitrotoluene), PAHs and metals.

The attached Table 1 compares the concentrations detected soil samples collected at Sites 119, 120 and 121 to risk-based criteria, including:

- Levels of Concern (LOC) for soil representing residential and non-residential land uses; based on New Jersey Administrative Code 7:26D as reported in ICF 1998 (PTA.TO01.0014).
- New Jersey Soil Remediation Standards for soil representing residential and non-residential land uses (NJ SRS; New Jersey Administrative Code 7:26D, last amended 5/7/2012). The values presented for hexavalent chromium are New Jersey soil cleanup criteria (accessed via http://www.state.nj.us/dep/srp/guidance/rs/chrome_criteria.pdf; April 2010).
- U.S. Environmental Protection Agency (U.S. EPA) Regional Screening Levels (RSLs) for soil representing residential and non-residential land uses. Although RSLs were updated in May 2014, there was no change to the relevant RSLs based on any revised understanding of toxicity for the detected analytes at these sites. Rather, the revised 2014 RSLs for these analytes solely reflect recent changes to the USEPA's default exposure assumptions. Because the exposure assumptions used in human health risk assessments conducted at Picatinny sites differ from the USEPA's current default exposure assumptions, the May 2014 revisions to RSLs were not used for this evaluation.

As noted in Table 1, the maximum detected concentrations of some PAHs in soil were detected at levels above the risk-based criterion protective of non-residential exposure, including benzo(a)pyrene at all three sites, benzo(b)fluoranthene, and benzo(k) fluoranthene at Sites 120 and 121, and benzo(a)anthracene at Site 121. No other analytes were detected at levels above the non-residential soil criteria. In addition, some PAHs in soil were detected at levels above the risk-based criterion protective of residential exposure (U.S. EPA residential RSL) including benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene. Given the nature of the sampling locations, the detections of PAHs likely reflect conditions related to the railroad tracks and the proximity to asphalt (Shaw, 2003), which contains PAHs. (See photographs).

At Sites 119, 120, and 121, the conclusions from the various investigations summarized in the Feasibility Study (Shaw 2010) were that there is limited potential for exposure at these sites and maintaining existing land use is sufficient to restrict future potential exposures.

Site 119, Buildings 46, 47, 48



Site 120, Building 50



Site 121, Building 57



References

ICF Kaiser Engineers (ICFKE), 1998. Preliminary Assessment/Site Inspection Report for Non-Evaluated Phase III RI Concept Plan Sites and Additional Sites within RI Concept Plan Area L Delivery Order 0001. January. (PTA.TO01.0014.pdf)

Shaw Environmental Inc. (Shaw), 2003. Picatinny Arsenal Task Order 17 Engineering Controls Waiver Document. June. (PTA.TO17.0069)

Table

Table 1
Sites 119, 120, 121
Analytical Results for Soil Samples (mg/kg)

Constituent	Former Levels of Concern for Soil Cleanup ⁽¹⁾			Current NJ SRS ⁽²⁾		2013 RSLs ⁽³⁾	Site 119 ⁽⁴⁾			Site 120 ⁽⁴⁾	Site 121 ⁽⁴⁾		
	Residential	Non-Residential	Impact to GW	Residential	Non-Residential	Non-Residential RSLs	46SS-A Surface Soil ⁽⁵⁾	47SS-A Surface Soil ⁽⁵⁾	48SS-A Surface Soil ⁽⁵⁾	50SS-A Surface Soil ⁽⁵⁾	57SS-A Surface Soil ⁽⁵⁾	57SS-B Surface Soil ⁽⁵⁾	
													Non-cancer HI = 1
2,4,6-Trinitrotoluene	NA	NA	NA	NA	NA	420	3.9	<0.27	0.64	<0.27	<0.27	<0.27	
Aminodinitrotoluene	NA	NA	NA	NA	NA	2044	<0.54	<0.54	0.62	<0.54	<0.54	<0.54	
Anthracene	10,000	10,000	100	17,000	30,000	170,000	<0.37	0.79	<0.37	2	NA	<0.37	
Benz(a)anthracene	1	4	500	0.6	2	NA	1.2	2.1	0.67	3.9	NA	21	
Benzo(a)pyrene	1	1	100	0.2	0.2	NA	1.1	1.6	0.54	3.7	NA	16	
Benzo(b)fluoranthene	1	4	50	0.6	2	NA	1.4	2.3	0.68	4.2	NA	23	
Benzo(g,h,i)perylene	NA	NA	NA	380,000	30,000	NA	<0.72	1.1	<0.72	2.3	NA	10	
Benzo(k)fluoranthene	1	4	500	6	23	NA	1.4	2.3	0.68	4.2	NA	23	
Chrysene	9	40	500	62	230	NA	1.6	2.4	0.78	4.4	NA	26	
Fluoranthene	2,300	10,000	100	2,300	24,000	22,000	2.4	3.4	1	502	NA	34	
Fluorene	2,300	10,000	100	2,300	24,000	22,000	<0.37	<0.37	<0.37	1	NA	<0.37	
Phenanthrene	NA	NA	NA	NA	NA	300,000	NA	1.7	1.8	0.57	3.9	NA	19
Pyrene	1,700	10,000	100	1,700	18,000	17,000	3.5	4.7	1.6	0.37	NA	49	
Aluminum	NA	NA	NA	78,000	NA	990,000	5830	6200	4450	5780	8540	6830	
Arsenic (a)	20	20	NA	19	19	380	6.7	2.5	1.4	1.7	3	6.9	
Barium	700	47,000	NA	16,000	59,000	190,000	75	40	52	62	51	62	
Beryllium	1	1	NA	16	140	2,000	0.38	0.39	0.48	0.52	0.62	0.45	
Cadmium	1	100	NA	78	78	800	1	0.95	0.94	1.3	1.3	3.4	
Calcium	NA	NA	NA	NA	NA	NA	4560	4190	4740	7380	1100	2510	
Chromium (b)	NA	NA	NA	120,000	NA	1,500,000	12	11	8.9	12	12	35	
Chromium (c)	NA	NA	NA	240	6,100	3,100	12	11	8.9	12	12	35	
Cobalt	NA	NA	NA	1,600	590	300	4.2	6.5	6.1	12	5.7	6.5	
Copper	600	600	NA	3,100	45,000	41,000	25	33	43	37	25	50	
Iron	NA	NA	NA	NA	NA	720,000	13100	16100	15550	16800	21500	22500	
Lead	400	600	NA	400	800	800	49	30	26	41	19	110	
Magnesium	NA	NA	NA	NA	NA	NA	2040	3270	3280	3750	2090	1940	
Manganese	NA	NA	NA	11,000	5,900	23,000	181	231	463	477	313	346	
Mercury ⁽⁶⁾	14	270	NA	23	65	43	0.19	0.23	0.32	0.15	0.15	0.17	
Nickel	250	2,400	NA	1,600	23,000	20,000	10	9.3	8.4	18	8.4	13	
Potassium	NA	NA	NA	NA	NA	NA	620	570	1100	960	790	720	
Selenium	63	3,100	NA	390	5,700	5,100	<6.79	14	<6.79	11			
Sodium	NA	NA	NA	NA	NA	NA	62	39	120	84	44	68	
Vanadium	370	7,100	NA	78	1,100	5,100	19	18	22	19	22	17	
Zinc	1,500	1,500	NA	23,000	110,000	310,000	150	84	65	100	57	247	

Notes:

- (1) Levels of Concern (LOC) based on New Jersey Administrative Code 7:26D as reported in ICF 1998 (PTA.TO01.0014)
- (2) NJ SRS: New Jersey Administrative Code 7:26D, last amended 5/7/2012. Chromium Soil Cleanup Criteria based on Ingestion/Dermal pathways (http://www.state.nj.us/dep/srp/guidance/rs/chrome_criteria.pdf; April 2010)
- (3) RSL column Notes:
 - a) RSLs updated November 2013 and available at <http://www.epa.gov/region9/superfund/prgl/>. Although RSLs were updated in May 2014, there was no changes to these RSLs based on revised understanding of toxicity. Rather the revised 2014 RSLs for the above compounds reflect changes in USEPA's default exposure assumptions and therefore, were not revised for this table.
 - b) RSLs protective of noncarcinogenic effects reflect a hazard index of 1
 - c) NA = No RSL available.
 - d) Manganese RSL is not based on the manganese reference dose as listed on IRIS. USEPA has adjusted the IRIS reference dose for use in deriving conservative RSLs.
 - e) TCR = Target Cancer Risk; HI = Hazard Index
 - f) The RSLs for the following compounds are not based on toxicity data presented in IRIS but from other sources (provisional toxicity or state-derived values): aluminum, hexavalent chromium, cobalt, copper, iron, and nickel. No RSL exists for aminodinitrotoluene; the value presented represents a Region 3 risk-based RSL.
 - g) May 2014 RSLs were used for elemental mercury.
- (4) The surface soil data presented in this table are from the following sources:
 - Site 119: Tables 5-1, 5-2 and 5-3 in ICF Kaiser, 1998 (PTA.TO01.0014)
 - Site 120: Tables 5-4 and 5-5 in ICF Kaiser, 1998 (PTA.TO01.0014)
 - Site 121: Table 5-5 in ICF Kaiser, 1998 (PTA.TO01.0014)
- a = background value for arsenic at Picatinny Arsenal is 9.23 mg/kg.
- b = Evaluated as Trivalent chromium (Cr+3). ICF 1998 and Shaw 2005 did not specify whether total, trivalent, or hexavalent chromium.
- c = Evaluated as Hexavalent chromium (Cr+6)
- (5) Surface Soil Samples were collected from 0 to 1 foot below ground surface.

Bold type = concentration exceeds the Non-Residential RSL at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Italic type = concentration exceeds 2013 Residential RSL at 1x10⁻⁴ Target Cancer Risk or HI of 1.

Shading indicates concentration exceeds NJ Non-Residential SRS.

HI = hazard index
 J = estimated concentration (validation qualifier)
 NA = Not Available or sampled

RSL = Regional Screening Levels
 SRS = Soil Remediation Standards
 TCR = target cancer risk level