US Army Corps of Engineers ®

DRAFT FINAL SITE INSPECTION REPORT
Atlantic City Naval Air Station (Skeet Range)

Atlantic County, New Jersey

FUDS Project No. C02NJ097705

Site Inspections at Multiple Sites
North Atlantic Division
Formerly Used Defense Sites
Military Munitions Response Program

Contract No. W912DR-05-D-0026
Delivery Order No. 0050

March 2012

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Formerly Used Defense Sites
Military Munitions Response Program

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List of Acronyms and Abbreviations

°F	degrees Fahrenheit
ACIA	Atlantic County Improvement Authority
ACMUA	Atlantic City Municipal Utilities Authority
amsl	above mean sea level
ASR	*Archives Search Report*
ASTM	ASTM International
AVGAS	aviation gasoline
bgs	below ground surface
CAIS	chemical agent identification sets
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CES	Critical Environmental Sites
CFR	Code of Federal Regulations
CSM	conceptual site model
CWM	chemical warfare materiel
DERP	Defense Environmental Restoration Program
DMM	discarded military munitions
DoD	Department of Defense
DQO	data quality objective
EcoSSL	Ecological Soil Screening Level
EDR	Environmental Data Resources, Inc.
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
ER	Engineer Regulation
ESV	ecological screening value
FAA	Federal Aviation Administration
FR	Federal Register
ft	foot or feet
FUDS	Formerly Used Defense Site(s)
FUDSMIS	Formerly Used Defense Sites Management Information System
GIS	Geographic Information System
gpm	gallons per minute
GPS	global positioning system
HCS	Historic and Cultural Sites
HRS	Hazard Ranking System
Hunter	Hunter Research, Inc.
IEP	Important Ecological Place
INPR	*Inventory Project Report*
JP-4	jet fuel
MC	munitions constituents
MD	munitions debris
MDC	maximum detected concentration
MEC	munitions and explosives of concern
µg/L	microgram(s) per liter

List of Acronyms and Abbreviations (Cont.)

mg/kg	milligram(s) per kilogram
mm	millimeter
MMRP	Military Munitions Response Program
MRA	Munitions Response Area
MRS	Munitions Response Site
MRSPP	Munitions Response Site Prioritization Protocol
NAB	North Atlantic Division Baltimore District
NAN	North Atlantic Division New York District
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDAI	No Department of Defense Action Indicated
Newfields	Newfields Environmental Forensics Practice, LLC
NJANG	New Jersey Air National Guard
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
OE	ordnance and explosives
PAH	polycyclic aromatic hydrocarbon
Parsons	Parsons, Inc.
PQL	practical quantitation limit
PRG	Preliminary Remediation Goal
QA/QC	quality assurance/quality control
RI/FS	Remedial Investigation/Feasibility Study
RSL	Regional Screening Level
Shaw	Shaw Environmental, Inc.
SI	Site Inspection
SJTA	South Jersey Transportation Authority
SSWP	*Site-Specific Work Plan*
TPP	Technical Project Planning
TRC	TRC Solutions (originally The Research Corporation of New England)
URS	URS Group, Inc. (originally United Research Services)
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
UTL	upper tolerance limit
UTM	Universal Transverse Mercator
UXO	unexploded ordnance
Weston	Weston Solutions, Inc.
WSI	Wackenhut Services, Inc.
WWII	World War II

Glossary of Terms

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) – Also known as "Superfund," this congressionally enacted legislation provides the methodology for the removal of hazardous substances resultant from past / former operations. Response actions must be performed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (USACE, 2003). CERCLA was codified as 42 USC 9601 et seq., on December 11, 1980, and amended by the Superfund Amendments and Reauthorization Act (SARA) on October 17, 1986.

Defense Sites – Locations that are or were owned by, leased to, or otherwise possessed or used by the Department of Defense (DoD). The term does not include any operational range, operating storage, or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions (10 USC 2710(e)(1)).

Discarded Military Munitions (DMM) – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed consistent with applicable environmental laws and regulations (10 USC 2710(e)(2)).

Explosive Ordnance Disposal (EOD) – The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded ordnance and of other munitions that have become an imposing danger, for example, by damage or deterioration (DoD Manual, No. 6055.09-M, Vol. 8, Feb. 29, 2008, reissued Aug. 4, 2010).

Formerly Used Defense Site (FUDS) – Properties previously owned, leased, or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense; or manufacturing facilities for which real property accountability rested with DoD but were operated by contractors (Government-owned, contractor-operated) and which were later legally disposed of. FUDS is a subprogram of the Defense Environmental Restoration Program (DERP). Restoration of military land was extended to formerly used sites in 1983 under Public Law 98-212 (DoD Appropriations Act of 1984).

Military Munitions – Ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the DoD, the U.S. Coast Guard, the U.S. Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives, and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunitions, small arms ammunition,

grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components of the above.

The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 USC 2011 et seq.) have been completed (10 USC 101(e)(4)(A) through (C)).

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

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

Munitions and Explosives of Concern (MEC) – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks means: (A) Unexploded ordnance (UXO), as defined in 10 USC 101(e)(5); (B) Discarded military munitions (DMM), as defined in 10 USC 2710(e)(2); or (C) Munitions constituents (e.g., TNT, RDX), as defined in 10 USC 2710(e)(3), present in high enough concentrations to pose an explosive hazard (DoD Manual, No. 6055.09-M, Vol. 8, Feb. 29, 2008, reissued Aug. 4, 2010).

Munitions Response Area (MRA) – Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples are former ranges and munitions burial areas. An MRA comprises one or more munitions response sites (32 CFR§179.3).

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

Munitions Response Site Prioritization Protocol (MRSPP) – The MRSPP was published as a rule on October 5, 2005. This rule implements the requirement established in section 311(b) of the National Defense Authorization Act for Fiscal Year 2002 for the Department of Defense (DoD) to assign a relative priority for munitions responses to each location in the DoD's inventory of defense sites known or suspected of containing unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC). The DoD adopted the MRSPP under the authority of 10 USC 2710(b). Provisions of 10 USC 2710(b) require that the Department assign to each defense site in the inventory required by 10 USC 2710(a) a relative priority for response activities based on the overall conditions at each location and taking into consideration various factors related to safety and environmental hazards (70 FR 58016).

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

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

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

Executive Summary

The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) under the Defense Environmental Restoration Program to address DoD sites suspected of containing munitions and explosives of concern (MEC) or munitions constituents (MC). Under the MMRP, the U.S. Army Corps of Engineers (USACE) is conducting environmental response activities at Formerly Used Defense Sites (FUDS) for the Army, DoD's Executive Agent for the FUDS program. Shaw Environmental, Inc. (Shaw) is responsible for conducting Site Inspections (SIs) at select FUDS in the North Atlantic region contracted by and under the technical direction of the Baltimore District Military Munitions Design Center.

SI Objectives and Scope

The primary objective of the MMRP SI is to determine whether a FUDS project warrants further response action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The SI collects the minimum amount of information necessary to make this determination, as well as it (i) determines the potential need for a removal action; (ii) collects or develops additional data, as appropriate, for Hazard Ranking System scoring by the U.S. Environmental Protection Agency (EPA); and (iii) collects data, as appropriate, to characterize the release for effective and rapid initiation of the Remedial Investigation and Feasibility Study (RI/FS). An additional objective of the MMRP SI is to collect the additional data necessary to complete the Munitions Response Site Prioritization Protocol.

The scope of the SI reported herein is restricted to evaluation of the presence of MEC or MC related to historical use of the FUDS prior to transfer. Potential releases of hazardous, toxic, or radioactive wastes are not addressed within the current scope. The intent of the SI is to confirm the presence or absence of MEC and/or associated MC.

Background

This report presents the results of an SI conducted at the Skeet Range (FUDS Project Number C02NJ097705) located on the former Atlantic City Naval Air Station (NAS) in Atlantic County, New Jersey. The FUDS is located on the northern portion of the Egg Harbor Township, approximately 9 miles northwest of Atlantic City. Today the majority of the property is owned by the Federal Aviation Administration (FAA) and occupied by the William J. Hughes Technical Center and the Atlantic City International Airport, operated by the South Jersey Transportation Authority (SJTA). The Skeet Range first appeared on Atlantic City NAS base maps in 1947 and was used until 1958. The range may have been built sometime in 1944 when a skeet range located in another area was closed. The *Archives Search Report*, prepared by the USACE Rock Island District in 1996, stated that the Skeet Range was located in "Area D," a 5.4-acre area that also included a Pistol/Machine Gun Range.

Technical Project Planning

The approach for the SI was developed by Shaw in consultation with site stakeholders. The Technical Project Planning (TPP) meeting for the Atlantic City NAS FUDS was conducted on November 4, 2010, at the FAA Technical Center located near the Atlantic City airport in Atlantic City, New Jersey. Representatives from the FAA, SJTA, USACE North Atlantic Division New York District, New Jersey Department of Environmental Protection, EPA Region 2, U.S. Fish and Wildlife Service, and Shaw were in attendance. Additionally, representatives from TRC Solutions (TRC), URS Group, Inc. (URS), and TASC, Inc. were present at the meeting; these representatives provide environmental and engineering support to the FAA.

The TPP meeting included discussions on the findings of previously conducted environmental investigations of polycyclic aromatic hydrocarbon (PAH) compounds performed at Area 41. Area 41 overlaps about 12 acres of the skeet range that is the subject of this SI. This area previously contained a fuel tank farm, a photographic shop and laboratory, a coal storage area, and an associated railroad spur. CERCLA investigations have been performed at Area 41 as early as 1983. More recent investigations performed by URS in 2002 to 2003 and supplemented by TRC in 2007 to 2009 documented the presence of PAH compounds in soil at concentrations above the human health industrial screening levels that are being applied as part of this SI.

Stakeholders agreed to address MC data gaps by sampling surface soil, sediment, and surface water samples for lead analysis. The stakeholders agreed that the soil sample results would be compared to the EPA industrial soil screening level for lead. Stakeholders also agreed that PAH samples should be collected within a portion of the Skeet Range MRS (an airport parking area located north of an intermittent creek) because previous investigations did not include sampling in this area. The stakeholders were in general agreement with the approach and the decision rules that were developed. TPP meeting results were documented in the *TPP Memorandum* after incorporating comments from stakeholders.

SI Field Activities

SI field activities, conducted in September 2011, included visual site reconnaissance to look for evidence of MEC. No MEC or evidence of MEC was observed, nor was any munitions debris observed, such as spent shotgun shells or firing caps. Clay pigeon target fragments were not observed at the Skeet Range MRS.

Sampling performed at the Skeet Range MRS consisted of the collection of 19 surface soil samples and two collocated sediment and surface water samples to determine whether there has been a release of MC to site media from prior skeet range use. Sixteen surface soil samples were collected within the MRS for lead analysis. Additionally, three surface soil samples were collected within the SJTA parking area located north of an intermittent creek and analyzed for PAH compounds.

The results of the surface soil sampling performed on the MRS show that one sample had a concentration of lead (1,070 milligrams per kilogram) that exceeds the human health industrial soil screening value. The sample was located in a position on the MRS consistent with impact from shotfall from the former shooting arc. Previous investigations have established that MMRP-related constituents (PAHs) from pitch-based clay pigeon target fragments exceeded human health industrial soil screening values. The results of the sediment/surface water sampling show that concentrations of lead in the sediment samples did not exceed the background threshold value. In surface water, one sample had a concentration of total (and dissolved) lead greater than the background threshold value and the ecological screening value. The human health screening level was exceeded in the total lead fraction but not in the dissolved fraction. Lead concentrations in five surface soil samples collected at the SJTA parcel did not exceed the background screening level. Further, the concentration of PAH compounds in three surface soil samples collected at the SJTA parcel did not exceed human health screening values.

SI Recommendations

Results of the SI provide the basis for conclusions and/or recommendations for further actions at the MRS. Based on historical evidence and results from the 2011 SI field activities, evidence of MEC is not present at the MRS. Therefore, further investigation or removal action is not required regarding the presence of MEC at the Skeet Range MRS.

Surface soil sampling analytical results indicate that concentrations of MC (lead) and MMRP-related constituents (PAH compounds sampled and analyzed during previous investigations) exceed background and human health screening levels within the FAA portion (approximately 25 acres) of the Skeet Range MRS. Therefore, an RI/FS is recommended regarding the presence of MC and MMRP-related constituents at the Skeet Range MRS. Further investigation is not warranted regarding the presence of MC at the SJTA parking lot portion of the MRS. Therefore, it is recommended that the MRS boundaries be revised to exclude the SJTA portion of the MRS.

1.0 Introduction

This Site Inspection (SI) Report presents the results of an SI conducted at the Atlantic City Naval Air Station (NAS) Formerly Used Defense Site (FUDS) located near Atlantic City, New Jersey. The subject of this SI is the Skeet Range Munitions Response Site (MRS). Shaw Environmental, Inc. (Shaw) has prepared this report for the U.S. Army Corps of Engineers (USACE) in accordance with Delivery Order 0050, issued under USACE Contract No. W912DR-05-D-0026. Shaw is responsible for conducting SIs at select FUDS in the North Atlantic Division managed by the USACE – North Atlantic Division, Baltimore District (NAB) Military Munitions Design Center as directed by the Performance Work Statement (Appendix A). Shaw has prepared this SI Report for the USACE NAB with project management provided by the USACE North Atlantic Division New York District (NAN), the local geographic USACE district assisting stakeholders in the execution of the SI. The technical approach is based on the *Formerly Used Defense Sites, Military Munitions Response Program* (MMRP), *Site Inspections, Program Management Plan* (USACE, 2005) and the *FUDS MMRP Site Inspection Program Supplemental Execution Guidance, Military Munitions Center of Expertise Interim Guidance Document (IGD) 07-04* (USACE, 2007).

1.1 Project Authorization

The Department of Defense (DoD) has established the MMRP to address DoD sites suspected of containing munitions and explosives of concern (MEC) or munitions constituents (MC). Under the MMRP, the USACE is conducting environmental response activities at FUDS for the Army, DoD's Executive Agent for the FUDS program.

Pursuant to USACE's Engineer Regulation (ER) 200-3-1 (USACE, 2004) and the *Management Guidance for the Defense Environmental Restoration Program* (DERP) (Office of the Deputy Under Secretary of Defense [Installations and Environment], September 2001), USACE is conducting FUDS response activities in accordance with the DERP statute (10 USC 2701 et seq.), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 USC 9601), Executive Orders 12580 and 13016, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300). As such, USACE is conducting remedial SIs, as set forth in the NCP, to evaluate hazardous substance releases or threatened releases from eligible FUDS.

While not all MEC/MC constitute CERCLA hazardous substances, pollutants, or contaminants, the DERP statute provides DoD the authority to respond to releases of MEC/MC, and DoD policy states that such responses shall be conducted in accordance with CERCLA and the NCP.

1.2 Site Name and Location

The Atlantic City NAS FUDS (Property Number C02NJ0977) is located in Atlantic County, New Jersey, on the northern portion of the Egg Harbor Township. The FUDS is located approximately 9 miles northwest of Atlantic City, New Jersey, near the Atlantic City International Airport (Figure 1-1). The Atlantic City NAS originally consisted of approximately 2,437 acres during the World War II (WWII) era (USACE, 1996). Today, the majority of the property is owned by the Federal Aviation Administration (FAA) and occupied by the William J. Hughes Technical Center and the Atlantic City International Airport, which is operated by the South Jersey Transportation Authority (SJTA) (the FAA Technical Center now occupies approximately 5,000 acres).

The Skeet Range MRS (Project 05) was first included in the MRS Inventory in the *Defense Environmental Programs Annual Report to Congress Fiscal Year 2010* (DoD, 2010). However, the MRS Inventory does not provide a mapped location for the Skeet Range MRS that is the subject of this SI. The following information is provided in the 2010 Annual Report to Congress:

Site ID	MRSPP Score	Nearest City	County	MRS Acreage	Land Use Restrictions	Land Use Access Controls
05OEW	Evaluation Pending	Egg Harbor Township	Atlantic	No data available	None Specified	None Specified

According to the FUDS Management Information System (FUDSMIS) database (USACE, 2010), the Atlantic City NAS FUDS (Federal Facility ID No. NJ29799F895900) includes the following information for the Skeet Range MRS:

Project No.	MRS Name	FUDS Property No.	Munitions Response Area ID	MRS Area	UTM Zone 18 (NAD83) Coordinates*
05	Skeet Range	C02NJ0977	C02NJ097705R01	30 acres	UTM X: 536566.61 UTM Y: 4366268.40

* Coordinates for the range are in Universal Transverse Mercator (UTM) Zone 18N, North American Datum 83 (meters). The coordinates shown represent the MRS midpoint.

1.3 Purpose, Scope, and Objectives of the Site Inspection

The primary objective of the MMRP SI is to determine whether a FUDS project warrants further response action under CERCLA or not. The SI collects the minimum amount of information necessary to make this determination, as well as it (i) determines the potential need for a removal action; (ii) collects or develops additional data, as appropriate, for Hazard Ranking System (HRS) scoring by the U.S. Environmental Protection Agency (EPA); and (iii) collects data, as appropriate, to characterize the release for effective and rapid initiation of the Remedial Investigation and Feasibility Study (RI/FS). An additional objective of the MMRP SI is to

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

The scope of the SI reported herein is restricted to evaluation of the presence of MEC or MC related to historical use of the FUDS prior to transfer. Potential releases of hazardous, toxic, or radioactive wastes are not addressed within the current scope. The intent of the SI is to confirm the presence or absence of contamination from MEC and/or MC. The general approach for each SI is to conduct records review and site reconnaissance to evaluate the presence or absence of MEC, and to collect samples at locations where MC might be expected based on the conceptual site model (CSM). The following decision rules are used to evaluate the results of the SI:

Is No DoD Action Indicated (NDAI)? An NDAI recommendation may be made if:

- There is no indication of MEC; and
- MC contamination does not exceed screening levels determined from Technical Project Planning (TPP).

Is an RI/FS warranted? An RI/FS may be recommended if:

- There is evidence of MEC hazard. MEC hazard may be indicated by direct observation of MEC during the SI, by indirect evidence (e.g., a crater potentially caused by impact of unexploded ordnance [UXO]), or by a report of MEC being found in the past without record that the area was subsequently cleared; or
- MC contamination exceeds screening levels determined from TPP.

Is a removal action warranted? A removal action may be needed if:

- High MEC hazard is identified. An example of a high hazard might be finding sensitive MEC at the surface in a populated area with no barriers to restrict access; or
- Unacceptable MC risk is identified. Identification of an imminent threat to human health, safety, or the environment would trigger notification of affected stakeholders. Data would be presented at a second TPP meeting regarding the possible need for a removal action.

1.4 Munitions Response Site Prioritization Protocol

The MRSPP was published as a rule on October 5, 2005 (70 FR 58028). This rule implements the requirement established in section 311(b) of the National Defense Authorization Act for Fiscal Year 2002 for the DoD to assign a relative priority for munitions responses to each location in the DoD's inventory of defense sites known or suspected of containing UXO, discarded military munitions, or MC (70 FR 58016).

This report includes draft MRSPP scoring sheets for the munitions response sites identified in this SI Report (Appendix K). The MRSPP scoring will remain draft after this SI Report is finalized, pending Army MRSPP Quality Assurance Panel review. The scoring will be reviewed on an annual basis and reapplied as necessary to incorporate new information.

2.0 Property Description and History

Historical information contained in this report was obtained from the *Inventory Project Report* (INPR) (USACE, 1995), the *Archives Search Report* (ASR) *Findings for the Former Atlantic City Naval Air Station* (USACE, 1996), and general project information generated from FUDSMIS (USACE, 2010). One other notable report was reviewed: *Documentation of Contamination Associated with Department of Navy Activities – Skeet Range and Coal Storage at Area 41, Former Atlantic City Naval Air Station* (TRC Solutions [TRC], 2009). This report, and an update to the report (TRC, 2010), provided significant additional information.

2.1 Historical Military Use

In August 1942, the Secretary of the Navy approved the acquisition of lands for the establishment of a station to accommodate a carrier group at the Atlantic City Airport. This station became the Atlantic City NAS. Land clearing and construction began in December 1942, and the Atlantic City NAS was formally commissioned in April 1943. By the end of WWII, the facility consisted of 2,437 acres. The Atlantic City NAS began operations with a mission of combat readiness for air groups consisting of fighters, bombers, and torpedo squadrons and their crews. In August 1943, the Atlantic City NAS became a fighter squadron base. The mission shifted to fighter training consisting of high and low altitude gunnery tactics, field carrier landings, arrested landings, catapult launchings, dive glide and live bombing, and formation tactics, among others (USACE, 1996).

The Navy closed the Atlantic City NAS in July of 1958. At this time, most of the property of the Atlantic City NAS was transferred to the FAA (formerly the Airways Modernization Board) for use as the National Aviation Facilities Experimental Center. Since the closure of the Atlantic City NAS, the facility has been expanded to about 5,000 acres with a primary mission of responding and contributing to FAA research and development programs; testing and evaluating aviation concepts, procedures, and equipment; and assisting agency research, development, and implementation. The facility also accommodates air traffic, airway facilities, systems research and development, and flight inspection personnel of the FAA; an office of the National Weather Service; the 177th Fighter-Interceptor Group of the New Jersey Air National Guard (NJANG); and serves as the Atlantic City International Airport (USACE, 1996).

The Skeet Range first appeared on Atlantic City NAS base maps in 1947 and was used until 1958. The range may have been built sometime in 1944 when the skeet range located in another area was closed (USACE, 1996). Figures 2-1 and 2-2 depict the FUDS and the MRS on 1951 and 2010 aerial photographs, respectively. The ASR, prepared by the USACE Rock Island District in 1996, stated that the Skeet Range was located in "Area D," one of several designations made for purposes of grouping features in the report. Area D was an unofficial designation for a 5.4-acre area that also included a Pistol/Machine Gun Range (Figure 2-1). The acreage did not

account for the Skeet Range safety fan, only the shooting arc and immediate vicinity and does not have common boundaries with the Skeet Range MRS. The Pistol/Machine Gun Range is being investigated separately.

2.2 Munitions Information

Munitions used at the Skeet Range were small arms munitions, specifically shotguns. Although the 12-gauge shotgun was standard, other gauges may have been used (.410 bore and 16- or 20-gauge). No. 7½, 8, and 9 lead shot were used for clay pigeon target shooting. The shotgun shells consist of projectiles (lead shot), propellant (smokeless powder, nitrocellulose, graphite, and minute amounts of explosives compounds that are largely dispersed in the air upon firing), and the cartridge casing and firing cap (cardboard and brass). Table 2-1 summarizes the munitions information for the Skeet Range MRS.

Standard military range specifications for skeet ranges from this period indicated a safety fan consisting of a semicircle with a 900-foot (ft) radius. Shooters fired from several stations positioned around a semicircle with a 63-ft radius. Skeet shooting results in a wide distribution of shot over a fan-shaped fall zone. The size of the potentially affected area for a single skeet range is 30 acres. Skeet ranges were used to train gunners to lead aerial targets. Typically, the targets used were clay pigeons, thrown toward the firing position for gunners to practice attacking an approaching target.

Although polycyclic aromatic hydrocarbons (PAHs) from pitch-based targets at skeet ranges are not MC, PAHs are being investigated under the MMRP because their presence could be the result of MMRP activities. Manufactured trap and skeet clay pigeon targets are composed predominately of dolomitic limestone and petroleum pitch, bound together under heat and pressure. Coal-tar pitch was used as the target binder prior to the use of petroleum pitch. Soils at skeet ranges have been shown to contain varying levels of PAHs as a result of the use of clay pigeons.

The likely distribution of lead and PAHs as predicted from a model for skeet ranges published by the Interstate Technology and Regulatory Council (2003) and supported by Shaw project experience occurs as follows:

- Lead: The highest density of lead shot is expected to fall between approximately 375 and 600 ft from the firing line, with the maximum range of a typical lead skeet load expected to be about 680 ft.
- PAHs: The highest density of clay pigeon target fragments, and therefore the greatest potential concentration of PAHs, is expected to fall from the firing line to a distance of approximately 600 ft, with a higher concentration within approximately 200 ft.

Parsons, Inc. (Parsons) completed a chemical warfare materiel (CWM) SI for the former Atlantic City NAS Project No. 01 (Parsons, 2007). The CWM report indicated that chemical agent identification sets (CAIS) were delivered to the former Atlantic City NAS for chemical warfare

training during the WWII era. No evidence of CAIS remaining at the FUDS was found during the CWM SI. Because of the inability to define specific locations for training with CAIS or burials of CAIS, the report recommended that the Atlantic City NAS be removed from the CWM project inventory in accordance with USACE policy (Parsons, 2007).

2.3 Ownership History

In 1957, the Bureau of Aeronautics declared the Atlantic City NAS excess to the peacetime needs of the Navy and closed the NAS in 1958. Most of the property of the Atlantic City NAS was transferred to the FAA, and a portion of the facility served as the Atlantic City Municipal Airport. Subsequently, this parcel was sold to the State of New Jersey and the SJTA, which operates the current Atlantic City International Airport (USACE, 1996 and Parsons, 2007).

In 1964, a unit of the Air Defense Command was established on a 126-acre tract in the southwest quadrant of the property. In 1973, the Air Defense Command turned over its mission to the NJANG. Approximately 300 acres are permitted to the U.S. Air Force (FAA, 2008).

In 1977, the FAA, in cooperation with the City of Atlantic City, deeded approximately 99 acres of land to the Atlantic County Improvement Authority (ACIA) to allow the ACIA to construct an administrative complex (Building 300) for the FAA, renamed the FAA Technical Center in 1980. In 1992, the SJTA was created by the State of New Jersey to pursue transportation-related economic development projects throughout southern New Jersey. The FAA Technical Center was officially renamed the FAA William J. Hughes Technical Center in 1996 (FAA, 2008).

Today, most of the Skeet Range MRS is owned by the FAA; SJTA (operating the Atlantic City International Airport) leases a 4.7-acre portion of the MRS located to the northeast. Figure 2-3 depicts the parcel ownership as of September 2010.

2.4 Physical Setting

2.4.1 Topography and Vegetation

The Atlantic City NAS is located within the Embayed Region of the Atlantic Coastal Plain physiographic province. This region is characterized by a gently east-dipping, seaward-thickening wedge of sediments. Elevations at the FUDS range from approximately 10 ft above mean sea level (amsl) to 70 ft amsl. The elevations at the Skeet Range MRS range from approximately 40 to 60 ft amsl. The MRS generally slopes gently from the west to the east toward an intermittent creek that bisects the MRS (Figures 2-4 and 2-5).

The MRS is mostly covered with grass and small shrubs. An asphalt-paved parking area used by SJTA is located on the northeastern portion of the MRS. A densely wooded area containing deciduous and coniferous tree species is located along the southeastern portion of the MRS.

2.4.2 Land Use

The FAA's primary mission is contributing to FAA research and development programs; testing and evaluating aviation concepts, procedures, and equipment; and assisting other departments of

the agency with research, development, and implementation. The William J. Hughes Technical Center accommodates air traffic, airway facilities, systems research and development, flight inspection personnel of the FAA; offices of the U.S. Coast Guard and the National Weather Service; the U.S. Department of Homeland Security Transportation Security Laboratory; the 177th Fighter-Interceptor Group of the NJANG; and serves as the Atlantic City International Airport.

Based on the review of historical aerial photographs, much of the Skeet Range MRS has been disturbed by human activities (EDR, 2010; New Jersey Department of Environmental Protection [NJDEP], 2008; TRC, 2009). "Area 41" occupied much of the northwestern portion of the MRS. This area consisted of the former fuel tank farm and the photographic laboratory and was adjacent to an old rail yard. Substantial site disturbances have occurred since the WWII era from earthmoving activities in the central and northwestern portions of the MRS, particularly with regard to former surface water impoundments on the MRS. Therefore, roughly 24 of the 30 acres comprising the MRS have been disturbed following WWII. Only an approximate 6-acre wooded area to the southeast appears to be undisturbed.

An area within the SJTA portion of the MRS (northeast of chain link fencing) has been recently paved with asphalt for additional parking (approximately 4.7 acres). This portion of the MRS is located in the "Regional Growth Area" as defined by the NJDEP Geographic Information System (GIS) (NJDEP, 2008). Presently, the remainder of the MRS is undeveloped and covered with grass and natural shrubs or dense tree growth.

The SJTA has recently begun expansions to the existing airport facilities. This project will include additional passenger boarding bridges, additional airplane parking aprons, an expanded baggage claim area, and a federal inspection station for international flights (SJTA, 2010). It is not known whether the former Skeet Range MRS will be affected by this expansion.

2.4.3 Nearby Population

The Atlantic City NAS FUDS is located approximately 9 miles northwest of the city of Atlantic City in Atlantic County, New Jersey. The 2010 population of Atlantic City is 39,558 people. Atlantic County has a 2010 population of 274,549 and a population density of 494 persons present per square mile (U.S. Census, 2010). According to 2000 Census information, there are no residents, housing units or households within the FUDS boundary. Within 2 miles of the MRS, there is an estimated population of 5,979 individuals and 2,463 housing units (Figure 2-6). Six airports (including the Atlantic City International Airport) are located within a 4-mile radius of the FUDS. Additionally, approximately 12 schools, 10 churches, 7 parks, and 1 hospital are located within a 4-mile radius of the site (Figure 2-7).

2.4.4 Climate

The climate of the area is humid and temperate with tempering influences from the Atlantic Ocean (USACE, 1996). According to the Atlantic City International Airport weather station, the

highest monthly median temperature is only 75.3 degrees Fahrenheit (°F), occurring in the month of July. The highest mean daily temperature of 81.1°F occurs in July. The lowest mean temperature is 32.1°F occurring in January. Precipitation at the FUDS occurs throughout the year with the average annual precipitation approximately 40.59 inches (National Oceanic and Atmospheric Administration, 2009).

2.4.5 Area Water Supply

The Atlantic City reservoir system (consisting of two reservoirs) is operated by the Atlantic City Municipal Utilities Authority (ACMUA). Atlantic City's municipal water supply is provided by groundwater supply wells located north of the Upper Reservoir (approximately 1 mile east-southeast of the MRS) and by the water drawn directly from the Lower Reservoir (located approximately 2 miles east-southeast of the MRS). Both the South Branch Absecon Creek and the North Branch Absecon Creek traverse portions of the former Atlantic City NAS, feeding the Upper and Lower Reservoirs, respectively (Parsons, 2007).

According to the Safe Drinking Water Information System, there are 32 active community public water systems located in Atlantic County (EPA, 2010). Based on NJDEP records, 137 public community water system wells are located within Atlantic County, New Jersey. These community water systems serve 206,597 persons (NJDEP, 2006), for an average of 1,508 persons served per public water well. Sixty-eight public community water supply wells exist within a 4-mile radius of the former Atlantic City NAS boundary.

The ACMUA provides drinking water to customers in Atlantic City (37,000 served), through a combination of water from 12 groundwater wells and surface water from the Upper and Lower Atlantic City Reservoirs (Figure 2-8). The nearest public water supply well to the MRS is located approximately 4,500 ft to the east-southeast of the former shooting arc. This well is one of nine ACMUA wells located within the FAA Technical Center north of the Upper Reservoir. The wells are each 18 inches in diameter and approximately 200 ft deep and are screened in the Kirkwood-Cohansey water table aquifer system with reported pumping rates of 1,200 gallons per minute (gpm) (NJDEP, 2006). A wellhead protection area extends from the ACMUA wells near the Upper Reservoir across much of the Atlantic City NAS (Parsons, 2007).

Employees and tenants of the FAA Technical Center receive their potable water from a drinking water supply system located on the facility approximately 1,300 ft from the former shooting arc of the MRS (Figure 2-8). The FAA's potable water system supplies the daily water needs of approximately 3,000 people. In addition to drinking water, the system provides water for cooking, fire suppression, sanitary, and cooling purposes (FAA, 2012).

Currently, the system is comprised of two potable wells, Well 1R and Well 5. Well 1R was installed in 2001 and began pumping in 2003 producing a yield of 250 gpm (the well was installed as a replacement to Well 1, originally installed in 1943). The depth of Well 1R is 161 ft bgs and is screened in the Cohansey aquifer. A second well installed in 1943, Well 2, has been

taken offline after video inspection showed corrosion and entrained sand concerns. In 1982, Well 5 was installed and has a pumping capacity of 500 gpm. The well's depth is 163 ft bgs and is screened in the Cohansey aquifer. The FAA's potable water treatment plant has a capacity of 720,000 gallons per day (FAA, 2012).

2.4.6 Surface Water

Drainage on the former NAS property is divided between the North Branch Absecon Creek and the South Branch Absecon Creek. The South Branch Absecon Creek flows in a southeasterly to easterly direction along the southern boundary; wetlands are mapped along the creek within the FUDS. A perennial arm of the North Branch Absecon Creek is positioned northeast of the airport runway intersection and flows in a northeasterly direction into the main creek body. Wetlands are also located along the North Branch Absecon Creek just beyond the FUDS northeastern boundary. The northern and southern creek branches drain into the Atlantic City Reservoir system, located approximately 1,500 ft to the east-southeast of the FUDS western boundary (approximately 1 mile from the Skeet Range MRS). Drainage in the vicinity of the FUDS trends to the southeast towards the ocean embayments located approximately 5 miles southeast (Figure 2-5).

The Skeet Range MRS does not have any perennial surface water pathways. There are two existing intermittent creeks (drainage pathways) that cross the MRS (Figures 2-4 and 2-5). One flows from the southwest to the northeast along the southeastern edge of the former Area 41 and discharges into the second drainageway. The second drainageway flows from north-northwest to south-southeast, then turns in a more southeasterly direction, eventually flowing into the South Branch Absecon Creek.

2.4.7 Geologic and Hydrogeologic Setting

The following subsections provide information on the geology and hydrogeology of the FUDS.

2.4.7.1 Bedrock Geology

The unconsolidated deposits of the Coastal Plain dip to the southeast and range in age from the upper Lower Cretaceous to the Miocene (90 to 10 million years old). The edge of the coastal plain sediments is the farthest western extent of the continental margin sediments and covers igneous and metamorphic basement rock as well as Triassic rift basins (U.S. Geological Survey, 2004).

The FUDS is underlain by Cohansey Sand outcrops, which are characterized by layers of sand, gravely sand, and clay. The formation is generally unconsolidated but may contain layers of sand cemented by iron oxide. The clay layers in the Cohansey are generally from 10 to 30 ft thick, and the maximum known thickness of the Cohansey Formation is 265 ft at Atlantic City. In some areas of the FUDS, the Bridgeton Formation, a formation of fluvial sands and gravel derived from the Cohansey Sand, overlies the Cohansey Sand (TRC, 2003).

Previous borings completed on or in the vicinity of the former site have indicated that the Cohansey Sand consists of three sand and gravel layers separated by thinner clay layers. The sand layers are subdivided on their position relative to the clay layers and are referred to as the Upper, Middle, and Lower Cohansey Sands. The Upper Cohansey Clay is encountered at depths of 25 to 65 ft, is normally about 10 ft thick, and is not continuous throughout the site. The continuous, more extensive Lower Cohansey Clay is encountered at depths of 80 and 90 ft and ranges in thickness from 20 to 55 ft (USACE, 1996).

2.4.7.2 Overburden Soils

The soils at the FUDS consist primarily of sandy loams and include the following series: Downer loamy sand (0 to 5 percent slopes); Evesboro sand (0 to 5 percent slopes); Galloway loamy sand (0 to 5 percent slopes); Hammonton loamy sand (0 to 5 percent slopes); pits, sand, and gravel; Psamments (0 to 3 percent slopes); and Sassafrass (0 to 5 percent slopes).

The Skeet Range MRS is primarily comprised of the following soils: Downer loamy sand, 0 to 5 percent slopes; pits, sand, and gravel; and Psamments, 0 to 3 percent slopes. The Downer loamy sand is a well-drained soil that originates from loamy fluviomarine deposits and/or gravelly fluviomarine deposits. The typical soil profile is loamy sand from 0 to 16 inches, sandy loam from 16 to 36 inches, loamy sand from 36 to 48 inches, and stratified sand to sandy loam from 48 to 80 inches. The pits, sand, and gravel soil generally originates from sandy parent material disturbed by human activity. The Psamments soil is a well-drained soil that originates from sandy lateral spread deposits. From 0 to 6 inches, the soil is fine sand; from 6 to 30 inches, the soil is sand; and from 30 to 72 inches, the soil is coarse sand (U.S. Department of Agriculture [USDA], 2008). Each of the surface soil samples collected during the 2011 SI consisted of sand.

2.4.7.3 Hydrogeology

The New Jersey Coastal Plain aquifer system consists of five principal aquifers: the Kirkwood-Cohansey aquifer system, the Atlantic City 800-ft sand, the Wenonah-Mount Laurel aquifer, the Englishtown aquifer, and the Potomac-Raritan-Magothy aquifer system. All but the Kirkwood-Cohansey are confined except where they crop out or are overlain by permeable surficial deposits. The system has been designated as a sole source aquifer. The aquifers are recharged directly by precipitation in outcrop areas, by vertical leakage through confining beds, and by seepage from surface-water bodies (NJDEP, 2010c).

The Kirkwood-Cohansey aquifer is the primary aquifer at the FUDS and is comprised of the Kirkwood and Cohansey Formations (Lower, Middle, and Upper). Although the aquifer varies in thickness and lithology throughout the coastal plain, groundwater is generally stored in and transmitted through pores between sand grains and is well connected to the surface water bodies. The Kirkwood-Cohansey aquifer is highly permeable because of the dominance of well-sorted, medium-to-coarse-grained sand. Data on file with the NJDEP shows that this aquifer is prolific,

with measured yields up to 4,500 gpm and a mean yield of 400 gpm. The Lower Cohansey aquifer is a confined aquifer across the former Atlantic City NAS (NJDEP, 2010c).

According to the ASR, the water table at the site is within the unconfined Upper Cohansey Sand, and the depth ranges from 3 to 23 ft below ground surface (bgs). Isolated layers of clay or clayey silt within the Upper Cohansey Sand appear to perch the water table in some localized instances. The direction of groundwater flow in the Upper Cohansey Sand follows general topographic trends to the east. The ASR also stated that the favorable hydraulic characteristics of the Middle and Lower Cohansey Sands make them viable aquifers for domestic and municipal water supplies. Reported yields from the Cohansey Sand range from 20 to 1,440 gpm (USACE, 1996). During site investigation activities conducted from 1987 through 1989 at the Area 41 Fuel Farm (northwestern portion of the Skeet Range MRS); the water table was encountered at depths of 7 to 23 ft bgs (TRC, 1990).

As discussed in Section 2.4.5, the nearest public water supply well to the MRS is located approximately 4,500 ft to the east-southeast of the former shooting arc. The well is one of nine ACMUA wells located within the FAA Technical Center north of the Upper Reservoir. The wells are each 18 inches in diameter and approximately 200 ft deep and are screened in the Kirkwood-Cohansey water table aquifer system with reported pumping rates of 1,200 gpm (NJDEP, 2006). Employees and tenants of the FAA Technical Center receive their potable water from a drinking water supply system located approximately 1,300 ft from the MRS (Figure 2-8). Currently, the system is comprised of two potable wells. The wells produce yields that range from 250 to 500 gpm. Both wells are screened in the Cohansey aquifer at depths that range from 120 ft bgs to 160 ft bgs (FAA, 2012).

2.4.8 Sensitive Environments

The Office of Natural Lands Management, Natural Heritage Program indicated that one state-endangered bird and one state-threatened bird are listed on the Natural Heritage Database and occur on the MRS (NJDEP, 2010b). The Upland sandpiper inhabits grasslands, fallow fields, and meadows that are often associated with airports and the Cooper's hawk inhabits deciduous, coniferous, and mixed riparian forests. Therefore, the MRS provides suitable habitat for both of these species. Information regarding these species is shown on the table below:

Group	State Status	Common Name	Scientific Name
Birds	Endangered	Upland Sandpiper	*Bartramia longicauda*
Birds	Threatened	Cooper's Hawk	*Accipter cooperii*

The Natural Heritage Program listed four additional species in the Natural Heritage Database that are located within ¼ mile of the MRS (NJDEP, 2010b):

Group	State Status	Common Name	Scientific Name
Birds	Threatened	Grasshopper Sparrow	*Ammodramus savannarum*
Reptiles	Endangered	Corn Snake	*Elaphe g. guttata*
Reptiles	Threatened	Northern Pine Snake	*Pituophis m. melanoleucus*
Invertebrates	Threatened	Frosted Elfin (butterfly)	*Callophrys irus*

481 According to a Strategic Land Use Plan prepared by the Master Planning and Siting Board for
482 the FAA, these additional species may have habitat within the MRS (FAA, 2008):

Group	State Status	Common Name	Scientific Name
Birds	Endangered	Peregrine Falcon	*Falco peregrinus*
Bird	Endangered	Barred Owl	*Strix varia*
Amphibians	Threatened	Pine Barrens Treefrog	*Hyla andersonii*

483 According to the U.S. Fish and Wildlife Service (USFWS), the status of federally threatened or
484 endangered species in Atlantic County, Egg Harbor Township is provided in the table below:

Group	Federal Status	Common Name	Scientific Name
Birds	Threatened	Piping Plover	*Charadrius melodus*
Plants	Threatened	Seabeach Amaranth	*Amaranthus pumilus*
Plants	Threatened	Swamp Pink	*Helonias bullata*
Plants	Threatened	Knieskern's Beaked-rush	*Rhynchospora knieskernii*
Reptiles	Threatened	Bog Turtle	*Clemmys muhlenbergii*
Plants	Threatened	Sensitive Joint-vetch	*Aeschynomene virginica*

485 Suitable habitats for these federally listed species are unlikely to be found on the Skeet Range
486 MRS. Wetlands are not located within the MRS boundaries. The nearest wetlands to the MRS
487 are located along the South Branch Absecon Creek, approximately 2,100 ft to the southeast.

488 The former Atlantic City NAS, including the Skeet Range MRS, is located within the Pinelands
489 National Reserve created by Congress under the National Parks and Recreation Act of 1978.
490 The Pinelands Reserve encompasses approximately 1.1 million acres covering portions of seven
491 counties and all or parts of 56 municipalities in New Jersey. This represents 22 percent of the
492 total land area of New Jersey. The reserve is considered to be an important ecological region and
493 is underlain by aquifers containing 17 trillion gallons of water. In 1979, New Jersey formed a
494 partnership with the federal government to preserve, protect, and enhance the natural and cultural
495 resources of the reserve. In 1983, the area was designated a U.S. Biosphere Reserve by the
496 United Nations Educational, Scientific and Cultural Organization, and in 1988 it was recognized
497 as an International Biosphere Reserve (New Jersey Pinelands Commission, 2010).

498 Six state of New Jersey threatened and endangered species occur on the Atlantic City NAS
499 FUDS property. Additionally, the Skeet Range MRS is located within the Pinelands National
500 Reserve and likely contains habitat for two of these species. Therefore, the MRS qualifies as an
501 Important Ecological Place (IEP) or sensitive environment as defined by USACE (2006) or EPA

(1997) and described in Table 2-2. However, the 4.7-acre SJTA parcel is located in the Regional Growth Area and therefore is not considered an IEP.

The New Jersey State Development and Redevelopment Plan identifies the boundaries of Critical Environmental Sites (CES) and Historic and Cultural Sites (HCS) as submitted by county and local entities. These areas include environmentally or historically sensitive features recognized by the State Planning Commission. CES and HCS designations are used to help organize planning for new development or redevelopment by singling out the elements of natural systems, small areas of habitat, historical sites, and other features that should continue to be expressed in the future landscape through protection and restoration (NJDEP, 2008). No CES or HCS have been identified on the former Atlantic City NAS FUDS.

Archeological, architectural, and historical studies were undertaken by the FAA in 1994 and 1995 on the Atlantic City Airport property by Hunter Research, Inc. (Hunter, 1995). The survey was submitted to TRC, the FAA, New Jersey Pinelands Commission, and the New Jersey State Historic Preservation Office. Cultural resources were not identified at the Skeet Range MRS. The majority of the MRS (approximately 19 acres) was defined as "Areas of Very Low Potential for Cultural Resources." A centrally located area approximately 4 acres in size, where the surface impoundments previously existed, was defined as "Areas of No Potential for Cultural Resources." The wooded area in the southeastern portion of the MRS (approximately 7 acres) was defined as "Areas of Low Potential for Cultural Resources" (Hunter, 1995).

2.5 Previous Investigations for MC and MEC

2.5.1 Inventory Project Report (USACE, 1995)

The USACE NAN completed an INPR for the entire FUDS property in June 1995. The INPR determined that Atlantic City NAS was eligible under the DERP as a FUDS. The INPR stated "Small arms ammunition, both live and spent cartridges, were found in a swale near the east side of the 'built-up' area." The built-up area was located south of the original runways and east of the main facility buildings and included the pistol/machine gun range and the skeet range (USACE, 1995). Figure 2-1 depicts the cantonment portion of the installation. The referenced swale is located outside of and to the west of the Skeet Range MRS.

2.5.2 Archives Search Report (USACE, 1996)

An ASR was prepared by the USACE Rock Island District in December 1996 (USACE, 1996). The ASR stated that the Skeet Range MRS was located in the southern portion of the former Atlantic City NAS in an area described by the USACE as "Area D." Area D was a 5.4-acre area that also included a Pistol/Machine Gun Range (Figure 2-1). The acreage did not account for the Skeet Range safety fan, only the shooting arc and immediate vicinity. A site visit was performed as part the ASR that provided the following description:

> The assessment team found no evidence remaining of the former skeet or machine gun ranges. A 20mm [millimeter] target practice projectile (devoid of explosives) was discovered on a road in

> the vicinity of the former location of the machine gun range, but is not believed to have any relation to activities occurring on that range, it appears to have been just dropped there. This was the only OE [ordnance and explosives] found in these areas.

The ASR concluded that the Pistol/Machine Gun, and Skeet Range area, known as Area D, was "uncontaminated" with respect to "ordnance presence" (USACE, 1996). A separate project for the FUDS property has been established for the Pistol/Machine Gun Range.

2.5.3 Area 41, Various Investigations, 1983-2003

One area of concern investigated by the FAA under CERCLA is referred to as Area 41, an approximately 23-acre area that included the former Fuel Farm and Photographic Laboratory area. As shown on Figure 2-1, the Area 41 site boundaries overlap the northwestern portion of the Skeet Range MRS. The overlapping portion constitutes approximately 12 acres of the 30-acre Skeet Range MRS.

Initial environmental investigations of Area 41 were conducted in 1983 during an assessment of a proposed potable well field. Remedial investigations were conducted from 1987 through 1989 and were followed by quarterly ground water monitoring and supplemental ecological risk assessments. Based on the RI and associated risk assessments, it was determined that remedial actions were required to address the presence of polychlorinated biphenyls in soils and to address the presence of volatile organic compounds in groundwater.

Portions of Area 41 were historically used by the Navy during their operational years at the Atlantic City NAS. Area 41 is located in the oldest developed portion of the FAA property, near the facilities of the NJANG 177th Fighter-Interceptor Group (TRC, 2009). Based on historical aerial photographs, Area 41 was wooded and undeveloped prior to the early 1940s. By 1947, the Fuel Farm had been constructed in the northern portion of the area. While originally used for the underground storage of aviation gasoline (AVGAS), the Fuel Farm was later used for stockpiling No. 2 and No. 4 fuel oil. The Fuel Farm consisted of five concrete underground storage tanks installed in the mid-1940s, of which three had 50,000-gallon capacities and two had 100,000-gallon capacities. Closure of the tanks in accordance with NJDEP regulations was completed by the FAA in November 1999. An environmental investigation of the former Fuel Farm was one component of the Area 41 CERCLA remedial investigations (TRC, 2009).

Based on interviews of NJANG personnel conducted under a separate NJANG study, more than 10,000 gallons of jet fuel (JP-4) and AVGAS may have been drained onto the ground from tank trucks during truck washing activities in the southern portion of Area 41. Subsurface petroleum contamination was detected in this general area during the CERCLA remedial investigations.

At one time, a photographic laboratory operated by the FAA was located to the west of the Fuel Farm. The laboratory discharged processed wastewater via an underground pipe to a drainage ditch that discharged into the unnamed pond until the mid-1970s. The former photographic

laboratory has since been demolished. An environmental investigation of the discharge from the photographic laboratory was one component of the Area 41 RIs.

A small area immediately adjacent and southwest of the Area 41 site was used by the Navy for coal storage. Coal storage areas are visible on historical aerial photographs at Area 41 as early as 1947. Figure 2-1 depicts the coal storage area on a 1951 photograph. In a 1957 aerial photograph, a railroad spur is visible entering the site from the south and bisecting the coal storage areas.

During an ecological risk assessment performed in 1996, lead was detected in surface soil inside Area 41 just outside of the Skeet Range MRS boundary at a concentration of 248 milligrams per kilogram (mg/kg) (USFWS, 1996). Investigations performed by URS Group, Inc. (URS) in 2002 and 2003 at Area 41 portions of the Skeet Range MRS documented the presence of PAH compounds in soil at concentrations above human health industrial screening levels (TRC, 2009).

2.5.4 Skeet Range and Coal Storage Area at Area 41 (TRC, 2009)

Lead shot and skeet fragments were identified during the site investigation performed by TRC at the Skeet Range and Coal Storage Area at Area 41 (which included a large portion of the Skeet Range MRS). TRC, using ITRC's guidance on skeet range characteristics and layout as discussed in Section 2.2, plotted the fan-shaped clay pigeon and lead shot fall zones over a series of historical aerial photographs to determine the orientation and layout of the MRS. The shooting arc forms the center of the southwestern boundary of the skeet range as exhibited on the 1951 historical aerial photograph (Figure 2-1).

Lead analysis was not performed during this investigation. PAHs were detected at concentrations exceeding screening criteria in soil samples collected at the MRS. These samples were confirmed through PAH "fingerprint" analyses that the concentrations of PAH detected above screening criteria are consistent with PAHs found on the MRS in skeet and coal fragments. The fingerprint analysis was performed Newfields Environmental Forensics Practice, LLC (Newfields).

PAH contamination was present in surface soil and in subsurface soil at the MRS to depths of approximately 78 inches bgs. The horizontal and vertical extent of PAH contamination in soil indicates that the site has been disturbed by earthmoving activities in the northwestern half of the Skeet Range MRS, particularly with regard to former surface water impoundments present at one time on the MRS, as shown on Figure 2-1. TRC recommended that further actions be taken at the Skeet Range MRS to remediate soils associated with the PAH contamination (TRC, 2009).

2.6 Other Land Uses that May Have Contributed to Contamination

Area 41 is one of the oldest and most heavily used portions of the former Atlantic City NAS. The area overlaps approximately 12 acres of the western portion of the 30-acre Skeet Range MRS and has been substantially altered by earthmoving activities during its operational history.

The area has included several surface impoundments in various positions and orientations that have received runoff from upslope activities that each present potential sources of lead and PAH contamination that may have contributed to MRS media. As discussed in Section 2.5.3, the area contains the former fuel farm in the northwestern corner of the MRS, the former photographic shop and laboratory at nearby buildings located upslope, and the former coal storage area and associated railroad spur located immediately adjacent to the southwest.

An approximately 4.7-acre area located within the northeastern portion of the MRS is currently used by the SJTA and has been recently paved with asphalt for a parking lot. Surface water runoff from precipitation events might contribute to PAH levels in surrounding media. Only an approximate 6-acre wooded area located in the southeastern part of the MRS appears to be historically undisturbed and undeveloped. Therefore, roughly 24 of the 30 acres comprising the Skeet Range MRS have been altered by human activities and may have been impacted by alternate sources of lead or PAHs since the WWII era.

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR) as a part of general background information gathering for this FUDS (EDR, 2010). The EDR report was designed to meet the search requirements of EPA's *Innocent Landowners, Standards for Conducting All Appropriate Inquiries* (40 CFR Part 312) and the ASTM International (ASTM) *Standard Practice for Environmental Site Assessments* (E 1527-05) (ASTM, 2007). Shaw uses the report to further evaluate potential environmental risks associated with the FUDS.

The EDR report identified the FAA Technical Center on the National Priorities List (NPL) site (see Section 2.7) and a second NPL site located to the southeast 2.3 miles from the Skeet Range MRS and beyond the FUDS. This NPL site (known as the Delilah Road sand mine/borrow pit) was converted into a solid waste landfill in 1971 and illegally received special wastes containing lead and trichloroethylene sludge. The groundwater was contaminated with mercury, chromium, lead, and methylene chloride as a result of these activities (located topographically downgradient of the MRS). The site was delisted in October 2009 (EDR, 2010). The EDR report identified many sites within a 3-mile radius of the former Skeet Range MRS from a wide variety of environmental databases; however, none of these sites appears to be in a position of potential influence to the MRS with regard to possible lead or PAH impacts.

2.7 Past Regulatory Activities

The FAA William J. Hughes Technical Center was included on the NPL on August 30, 1990 (CERCLIS ID NJ9690510020). Remedial investigation work has been ongoing at the FAA Technical Center since 1986, with over 25 individual areas of concern identified and investigated, and active remedial systems implemented at several of these areas (TRC, 2009).

2.8 Previous MEC Finds

There have been no previous reports of MEC within the Skeet Range MRS boundary. However, other areas of the FUDS property have had reports of various MEC/MD finds. These are summarized below for informational purposes only. According to the INPR, live small arms ammunition rounds were found in a swale near the eastern side of the Atlantic City NAS (USACE, 1995). During the site visit conducted in 1996 as part of the ASR, "a 20mm target practice projectile (devoid of explosives)" was found on a dirt road within the former Machine Gun boundary (immediately southwest of Skeet Range MRS shooting arc area). Because the 20mm target round was inert, it is considered MD rather than MEC. Both the INPR and the ASR documents refer to MD in the form of expended small arms ammunition casings found in the vicinity of the former Pistol/Machine Gun Range. Small arms ammunition, both live and spent cartridges, were found in a swale located outside of and to the west of the Skeet Range MRS (USACE, 1996).

The Final CWM SI Report identified previous MEC discoveries at nearby Burial Area A and Burial Area B as shown on Figures 2-1 and 2-2. URS completed removal actions at Burial Area A in 2001, removing one flare, two .50-caliber rounds, and fifty-one 20mm projectiles. MD discovered at Burial Area A included shipping plugs for 5-inch rockets, a 2.25-inch sub-caliber rocket head, and debris from AN-Mk23 and AN-Mk76 practice bombs (Parsons, 2007). URS recovered two 2.25-inch training rockets in June 2003 approximately 400 ft southeast of Burial Area A and about 300 ft southwest of the Skeet Range MRS shooting arc (URS, 2011).

At Burial Area B, .50-caliber bullets and two 20mm projectiles were found during a ramp expansion project performed in 1993 and a soil and debris removal project performed in 1995. An unfired 20mm projectile was found at Burial Area B during sampling performed by Parsons as part of the 2007 CWM SI. The SJTA stated that no MEC or MD was identified during a parking lot construction project at the location of Burial Area B. MD discovered at Burial Area B includes debris from a 5-inch rocket, one rocket nose section, inert rocket venturi, and debris from AN-Mk43 and AN-Mk76 practice bombs (Parsons, 2007).

3.0 Site Inspection Tasks

SI tasks conducted for this FUDS property involved compiling and reviewing historical reports and information, using this information in the TPP and overall SI process. Following the TPP meeting, the *Site-Specific Work Plan* (SSWP) was prepared to define the SI field activities necessary to collect the information needed to address the data gaps and data quality objectives (DQOs). Field work was conducted at the site September 26 to 30, 2011. Figure 3-1 shows the MRS on a 2010 aerial photograph.

3.1 Technical Project Planning

The TPP meeting for the Atlantic City NAS FUDS was conducted on November 4, 2010, at the FAA William J. Hughes Technical Center, located near the Atlantic City International Airport in Atlantic City, New Jersey. The focus of the meeting was the Skeet Range MRS. Representatives from the FAA, SJTA, USACE NAN, NJDEP, EPA Region 2, USFWS, and Shaw were in attendance. Additionally, representatives from TRC, URS, and TASC, Inc. were present at the meeting. These representatives provide environmental and engineering support to the FAA. After the meeting was completed, representatives from Shaw and the USACE NAN were escorted by the FAA on a driving tour of the Skeet Range MRS and immediate vicinity. The vehicular tour was conducted on gravel roads only; a site walk did not occur and photographs were not taken.

Shaw presented a summary of the findings of previously conducted environmental investigations of PAH compounds performed at the Skeet Range MRS and on the proposed SI approach for the Skeet Range MRS, addressing MEC reconnaissance and MC sampling. TPP participants agreed that any potential MEC hazard that might exist at the Skeet Range MRS relates only to intact or unfired small arms ammunition (which does not present a significant explosive hazard). Stakeholders agreed to a meandering-path MEC reconnaissance conducted by a UXO technician using a magnetometer and an all-metals detector.

Stakeholders agreed that further investigation of PAH compounds was not necessary as a part of this SI. However, the SJTA representative requested that PAH samples be collected within the SJTA airport parking area located north of the intermittent creek (previous investigations did not include sampling in this portion of the Skeet Range MRS). Therefore, Shaw proposed the collection of three surface soil samples, immediately east of the SJTA airport fencing, to be analyzed for PAH compounds.

TPP participants agreed that the most likely potential MC is lead from the lead shot contained in the shotgun shells fired at the former skeet range. Stakeholders agreed to the collection of surface soil samples and collocated sediment/surface water samples from the intermittent creek that bisects the range. The stakeholders agreed that the soil sample results would be compared to the EPA industrial soil screening level for lead (800 mg/kg).

The stakeholders were in general agreement with the approach and the decision rules that were developed. TPP meeting results were documented in the *TPP Memorandum* (Shaw, 2011a), which was issued final in April 2011 after incorporating comments from stakeholders. Based on comments provided by stakeholders, additional surface soil samples were added to the proposed approach (including both lead and PAH analysis), and the proposed locations of some background samples were re-positioned. The proposed technical approach was defined in the SSWP (Shaw, 2011b), which was issued final in August 2011 after incorporating comments from stakeholders.

A more complete discussion of the TPP meeting is contained in Appendix B. As discussed during the TPP meeting and documented in the *TPP Memorandum*, the following project objectives and DQOs were developed. No changes were made to the proposed DQOs and decision rules for the Skeet Range MRS.

Objective 1: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MEC.

DQO No. 1 – Using trained UXO personnel and handheld magnetometers, a visual search of the Skeet Range MRS will be conducted searching for physical evidence to indicate the presence of MEC (e.g., MEC or MD on the surface or ground scars). The visual search will consist of a meandering path within the MRS. The following decision rules will apply:

- If no evidence of MEC is found, the MRS will be recommended for NDAI relative to MEC.
- If evidence of MEC is confirmed, the MRS will be recommended for additional investigation.
- If there is indication of an imminent MEC hazard, the MRS may be recommended for a removal action.

For purposes of applying these rules, MEC associated with small arms is not considered to present a significant MEC hazard.

Objective 2: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MC of concern (PAHs) above screening values.

DQO No. 2 – Concentrations of PAHs resulting from clay pigeon target fragments have been previously demonstrated to be greater than background in soil at the MRS. These results were used to compare to screening values for human health and ecological risk assessment. The following decision rules applied:

- If sample results exceed human health screening values, the site may be recommended for additional investigation of PAHs in site media.

- If sample results do not exceed human health screening values but do exceed both ecological screening values (ESVs) and three times the background values (where available from previous studies), additional evaluation of the data will be conducted in conjunction with the stakeholders to determine whether additional investigation is warranted for PAHs in site media. SI sampling activities were conducted at the MRS to address these DQOs. The media sampled at the Skeet Range MRS were surface soil, sediment, and surface water.

Objective 3: Determine if the site requires additional investigation or can be recommended for NDAI based on the presence or absence of MC of concern (lead) above screening values.

DQO No. 3 – The extent of MC contamination from lead has not been determined at the MRS. Surface soil, sediment, and surface water samples will be collected and analyzed for lead. Analytical results will be compared to background values and to screening values for human health and ecological risk assessment. The following decision rules will apply:

- If sample results do not exceed the 95 percent upper tolerance limit (UTL) background value for soil (or three times the background threshold values for sediment and surface water), the site will be recommended for NDAI relative to the MC of concern (lead).
- If sample results exceed the 95 percent UTL background value for soil (or three times the background threshold values for sediment and surface water) but are less than human health and ecological screening values, the site will be recommended for NDAI relative to MC of concern (lead).
- If sample results exceed both human health screening values and background values, the site may be recommended for additional investigation of lead in site media.
- If sample results do not exceed human health screening values but do exceed both ESVs and background values, additional evaluation of the data will be conducted in conjunction with the stakeholders to determine if additional investigation is warranted for lead in site media.

3.2 Additional Records Research

3.2.1 Review of Cultural Resources

At the recommendation of the FAA, a previously completed cultural resources survey was reviewed as part of the activities for this SI. Archeological, architectural, and historical studies were undertaken by the FAA in 1994 and 1995 on the Atlantic City Airport property by Hunter (1995). The survey was submitted to TRC, the FAA, New Jersey Pinelands Commission, and the New Jersey State Historic Preservation Office. Cultural resources were not identified at the Skeet Range MRS. The majority of the MRS (approximately 19 acres) was defined as "Areas of Very Low Potential for Cultural Resources." A centrally located area approximately 4 acres in size, where the surface impoundments previously existed, was defined as "Areas of No Potential for Cultural Resources." The wooded area in the southeastern portion of the MRS

(approximately 7 acres) was defined as "Areas of Low Potential for Cultural Resources" (Hunter, 1995).

Further, a review of the online GIS maintained by the NJDEP was performed by Shaw in January 2011. No boundaries of historical or cultural sites were identified on the former Atlantic City NAS.

Reconnaissance and sampling activities performed as part of this SI had minimal impact on the environmental setting. Intrusive activities (e.g., large-scale digging or excavation) were not conducted as part of the field activities. Environmental samples were collected from within the areas of interest as proposed and included only surface soil, sediment, and surface water. Surface soil and sediment sampling occurred within a small discrete area at a shallow depth (upper 6 inches).

3.2.2 Coordination with New Jersey Pinelands Commission

The USACE NAN notified the New Jersey Pinelands Commission on April 7, 2011, of the proposed nature of the SI activities at the Skeet Range MRS. The Pinelands Commission did not express any concerns regarding historical, archeological, or cultural resources that may be present at the Skeet Range MRS.

3.2.3 Coordination Regarding Natural Resources

The Office of Natural Lands Management, Natural Heritage Program indicated that one state-endangered bird and one state-threatened bird are listed on the Natural Heritage Database and occur on the MRS (NJDEP, 2010b).

A review of the online GIS maintained by the NJDEP (2008) was performed by Shaw in January 2011. No boundaries of critical environmental sites were identified on the former Atlantic City NAS. The Supervising Zoologist with the New Jersey Division of Fish & Wildlife did not identify any conflicts with the work proposed at the MRS (NJDEP, 2011).

3.2.4 Review of Historical Aerial Photographs

A review of historical aerial photographs of the MRS was completed as part of preparation for the proposed field activities. Photographs were reviewed from 1951, 1954, 1957, 1959, 1962, 1974, 1977, and 1984. The shooting arc for the Skeet Range is clearly visible on photographs taken in 1951, 1954, 1957, and 1962 (the resolution in the 1959 photograph is poor). The Pistol/Machine Gun Range located nearby is clearly visible in these photographs. Coal storage bins located to the west of the MRS appear to contain coal in photographs taken in 1951, 1954, and 1957. By 1962, the bins appear empty. A large surface impoundment located in the central portion of the MRS is evident in differing configurations on photographs taken in 1951 and 1957. These photographs demonstrate that site disturbances and earthmoving activities have occurred at the MRS. The Skeet Range shooting arc or site disturbances are no longer evident on the 1974, 1977, and 1984 photographs.

3.2.5 Environmental Database Search

A search of available environmental records was conducted by EDR as a part of general background information gathering for this FUDS (EDR, 2010). The EDR report was designed to meet the search requirements of EPA's *Innocent Landowners, Standards for Conducting All Appropriate Inquiries* (40 CFR Part 312) and the ASTM *Standard Practice for Environmental Site Assessments (E 1527-05)* (ASTM, 2007). Shaw uses the report to further evaluate potential environmental risks associated with the FUDS.

The EDR report identified the FAA Technical Center on the NPL. The report identified many sites within a 3-mile radius of the former Skeet Range MRS from a wide variety of environmental databases; however, none of these sites appears to be in a position of potential influence to the MRS with regard to possible lead or PAH impacts. Additional information on the databases searched and the results for surrounding properties is included in the EDR report found in Appendix L.

3.2.6 Rights-of-Entry

Prior to mobilizing to the site, the Project Manager from the USACE NAN office coordinated with the SJTA for the rights-of-entry for the field crew.

3.3 Field Work

Prior to mobilizing to the site, and at the request of the FAA, Shaw coordinated with Wackenhut Services, Inc. (WSI) for the services of a security escort. During the field effort, and on a daily basis throughout the field effort, the WSI escort met the Shaw field team each morning at the Security Operation Center at the FAA Technical Center and accompanied them throughout the day while working on the property.

SI field activities, conducted September 26 to 30, 2011, included site reconnaissance, collection of surface soil, sediment, and surface water samples at the Skeet Range MRS and at background locations outside of the MRS in areas that did not appear to be impacted by military munitions use. The following conditions were recorded in the field log book (Appendix D) and/or by digital photographs (Appendix E):

- Presence or absence of evidence of MEC;
- Changes, if any, in sample location because of field constraints;
- Vegetative cover; and
- Presence or absence of water for surface water samples, surface water field parameters, and any other conditions encountered that impacted sample collection.

3.4 Sampling and Analysis

Sampling performed at the Skeet Range MRS consisted of the collection of 19 surface soil samples and two collocated sediment and surface water samples to determine whether there has been a release of lead (and PAH compounds at the SJTA parcel) to site media from prior skeet

range use. Sixteen surface soil samples were collected within the MRS for lead analysis. Additionally, three surface soil samples were collected within the SJTA parking area located north of the intermittent creek and analyzed for PAH compounds.

Two collocated sediment and surface water sample pairs were collected from the intermittent creeks within the MRS. Surface water samples included both total (unfiltered) and dissolved (filtered) fractions. Typically, the dissolved fraction is used for ecological screening, and the total fraction is used for human health screening.

Ten background surface soil samples were collected from the undisturbed wooded area located southeast of the Skeet Range MRS from an area not expected to be impacted by past site operations. One collocated sediment/surface water background sample pair was collected from an upstream location outside of the Skeet Range MRS boundary. The background samples were collected using the same procedures and compared to the results from the MRS samples, and locations are depicted on Figure 3-2. Samples were collected and analyzed in accordance with the SSWP (Shaw, 2011b) and are summarized in Table 3-1. In addition, surface soil samples were analyzed for aluminum, iron, manganese, calcium, and magnesium for possible geochemical evaluation. The analytical methods used were:

- Lead and manganese by EPA SW-846 Method 6020;
- Aluminum, calcium, iron, and magnesium by EPA SW-846 Method 6010B; and
- PAH compounds by EPA SW-846 Method 8270C (low level).

Samples were passed through an ASTM No. 10 (2mm) wire mesh sieve at the laboratory prior to analysis for lead in order to remove coarser particles and foreign objects (such as clay pigeon target fragments), including large metallic lead fragments from bullets, which have a low degree of bio-availability (Interstate Technical and Regulatory Council, 2003).

3.5 Screening Values

The following subsections describe the development of screening values for this SI. These project-specific background screening values are presented in Tables 3-2, 3-3, and 3-4.

3.5.1 Background Screening

3.5.1.1 Soil Background Screening

Ten background surface soil samples were collected from the undisturbed wooded area located southeast of the Skeet Range MRS from an area not expected to be impacted by past site operations. The background samples were collected using the same procedures and compared to the results from the MRS samples, and locations are depicted on Figure 3-2.

For lead, a comparison of site sample data to background data was performed to distinguish a munitions related release from ambient conditions resulting from naturally occurring or anthropogenic sources (Appendix L). Where the body of background data is sufficient (in this

case, surface soil), a background threshold comparison of site concentrations to the corresponding background 95th UTL is made (EPA, 1989, 1992, 1994, and 2002). If one or more site samples exceed background screening values, the following tests may also be applied:

- A nonparametric comparison of the central tendencies or medians of the site and background distributions, using the Wilcoxon rank sum test (EPA, 1994, 2002, and 2006; U.S. Navy, 2002 and 2003).
- A geochemical evaluation including correlation plots of trace element versus reference (major) element concentrations (EPA, 1995c; Myers and Thorbjornsen, 2004; Thorbjornsen and Myers, 2007), for any element that fails either of the above two statistical tests. Additional elements such as aluminum, iron, manganese, calcium, and magnesium will be analyzed for the geochemical evaluations.

For PAH compounds, Newfields collected one surface soil sample as part of their Soil PAH Forensic Investigation (Newfields, 2008). The sample was collected from the upper 12 inches of soil at a reference area located outside of the Skeet Range MRS (to the north and outside of Area 41). The results were attributed to background levels. For the purpose of this SI, an observed release is established when the MRS sample measurements are three times or more above the background concentration, in accordance with HRS criteria (40 CFR Appendix A to Part 300). This background sample location is depicted on Figure 3-2, and the screening values are shown in Table 3-5.

3.5.1.2 Sediment/Surface Water Background Screening

One collocated sediment/surface water background sample pair was collected from an upstream location outside of the Skeet Range MRS boundary. The background samples were collected using the same procedures and compared to the results from the MRS samples, and locations are depicted on Figure 3-2. The background threshold value for sediment, for comparison to site data per the above HRS criteria, is three times the maximum detected background concentration, or 117.6 mg/kg (Table 3-5).

During the Analytical Data Quality Assurance/Quality Control (QA/QC) process, the laboratory documented the presence of sediment in the filtered fractions of the background surface water sample ACSR6001 (Figure 3-2). The laboratory concluded that the presence of sediment in the filtered samples may introduce a high bias for dissolved lead results, and the dissolved lead results were "R" qualified (i.e., rejected). Therefore, as a conservative practice, the background threshold value for the dissolved lead fraction is established at 3.0 micrograms per liter (µg/L), equivalent to the laboratory's practical quantitation limit (PQL) (Table 3-4).

During the preparation of the SSWP, Shaw was provided with background threshold values for surface water (and collocated sediment) as determined by Weston Solutions, Inc. (Weston). Weston collected two collocated surface water/sediment samples in March 2011 from the South Branch Absecon Creek located approximately 1.7 miles west-northwest (and upstream) of the Skeet Range MRS as part of a Site Investigation at FUDS Area W (Weston, 2011). Dissolved

lead was not detected in either of the surface water background samples above the laboratory's PQL of 3.0 µg/L.

Where the body of background data is limited (in this case, lead in sediment/surface water and PAHs in soil), the site-to-background comparison is performed according to guidance for SI activities and HRS scoring (EPA, 1992). Background concentrations for analytes are taken to be the maximum values observed in the limited background data set (EPA, 1995b). A comparison is then made to determine if a hazardous substance in the media is "significantly above the background level" according to the HRS criteria (EPA, 1990):

1. If the sample measurement is less than or equal to the sample quantitation limit, no observed release is established.
2. If the sample measurement is greater than or equal to the sample quantitation limit, then:
    - If the background concentration is not detected, an observed release is established when the sample equals or exceeds the sample quantitation limit.
    - If the background concentration equals or exceeds the detection limit, an observed release is established when the sample is three times or more above the background concentration.

3.5.2 Human Health Screening

Site sample data that exceed the background screening value (for lead) were compared to the appropriate human health screening criteria to determine whether additional investigation should be recommended. The human health screening criteria used for lead in soil and sediment at the MRS are based on the EPA industrial soil screening level (800 mg/kg). The human health screening criteria recommendation for lead in surface water at the MRS is 5.0 µg/L (New Jersey Surface Water Quality Criteria, New Jersey Administrative Code, 2010). Because of the setting near the airport taxiways, the surface water drainage pathways were not sampled for PAHs.

The maximum detected concentrations (MDCs) of existing (historical) PAH data from soil samples collected from the MRS have been compared to the recommended human health screening levels (EPA Regional Screening Levels [RSLs] for Industrial Soil, 2011).

3.5.3 Ecological Screening

Site sample data that exceed the background threshold value (for lead) were compared to the appropriate ESVs to determine whether additional investigation should be recommended. The ESVs recommended for lead in soil (11 mg/kg) and sediment (35.8 mg/kg) are based on EPA ecological screening criteria (Table 3-6). For total (unfiltered) surface water, the recommended ESV (5.4 µg/L) is based on the NJDEP ecological screening criteria for surface water. For dissolved (filtered) surface water, the recommended ESV (2.5 µg/L) is based on the EPA Region 3 Freshwater Benchmarks.

The MDCs of existing PAH data from soil samples collected from the MRS have been compared to the recommended ESVs (see Section 4.2.4). The following hierarchy was used to select the screening benchmarks for PAHs:

1. NJDEP Ecological Screening Criteria (2009); hierarchy = Ecological Soil Screening Level (EcoSSL), then lower of the Wildlife Preliminary Remediation Goals (PRGs) or Terrestrial Plant Toxicity Benchmarks;
2. EPA EcoSSL (plants, invertebrates, wildlife);
3. Oak Ridge National Laboratory (1997) PRGs (plants, invertebrates, wildlife);
4. EPA Region 3 Biological Technical Assistance Group Soil Benchmarks (1995a); and
5. Los Alamos National Laboratory (2010) (various endpoints).

3.6 Second TPP Meeting

A second TPP meeting is planned to present the SI findings to stakeholders and reach consensus regarding conclusions.

3.7 Public Notice

A public notice is scheduled for publication in the *Press of Atlantic City* on March 28, 2012 and in *The Current of Egg Harbor Township* on March 29, 2012. Per MRSPP requirements, the notice informs the local community stakeholders about participation in the MRSPP. The public notice also informs the stakeholders that a copy of the Draft Final SI Report is available for public review at the Atlantic County Library, Mays Landing Branch, in Mays Landing, New Jersey. Copies of the public notices are provided in Appendix C.

4.0 Skeet Range MRS

4.1 History and Land Use

The Secretary of the Navy approved the acquisition of lands for the establishment of a station to accommodate a Carrier Group at the Atlantic City Airport in 1942. This station became the Atlantic City NAS, and by the end of WWII, the facility consisted of 2,437 acres. The Atlantic City NAS began operations with a mission of combat readiness for air groups consisting of fighters, bombers, and torpedo squadrons and their crews. The mission shifted to fighter training consisting of high and low altitude gunnery tactics, field carrier landings, arrested landings, catapult launchings, dive glide and live bombing, and formation tactics, among others.

The Skeet Range first appeared on Atlantic City NAS base maps in 1947 and was used until 1958 (the range may have been built sometime in 1944 when the skeet range located in Area J was closed). The Navy closed the Atlantic City NAS in 1958. Most of the property of the Atlantic City NAS was transferred to the FAA, and a portion of the facility served as the Atlantic City Municipal Airport. Subsequently, this parcel was sold to the State of New Jersey and the SJTA, which operates the current Atlantic City International Airport.

Since the closure of the Atlantic City NAS, the facility has been expanded to about 5,000 acres with a primary mission of responding and contributing to FAA research and development programs; testing and evaluating aviation concepts, procedures, and equipment; and assisting others of the agency with research, development, and implementation. The facility also accommodates air traffic, airway facilities, systems research and development, and flight inspection personnel of the FAA; an office of the National Weather Service; the 177th Fighter-Interceptor Group of the NJANG; and serves as the Atlantic City International Airport.

In 1977, the FAA, in cooperation with the city of Atlantic City, deeded land for the construction of an administrative complex which was renamed the FAA Technical Center in 1980. In 1992, the SJTA was created by the state of New Jersey to pursue transportation-related economic development projects throughout southern New Jersey. The FAA Technical Center was officially renamed the FAA William J. Hughes Technical Center in 1996. Today, most of the Skeet Range MRS is owned by the FAA; SJTA (operating the Atlantic City International Airport) leases a 4.7-acre portion of the MRS located on its northeastern side.

4.2 MEC Evaluation

4.2.1 Preliminary Conceptual Site Model Summary for MEC

The preliminary CSM developed for the MRS identified small arms ammunition (12-gauge shotgun shells) as the munitions used at the Skeet Range MRS, and determined that discarded shotgun shells may be present at the range. The SI confirmed that both historical and physical evidence indicate that only small arms were used at the MRS during the period of military use.

Small arms ammunition does not pose a unique explosive hazard, and therefore small arms ranges are evaluated only for the potential MC hazard they pose (Dept. of the Army, 2009). As a result, the pathway for human exposure to MEC was identified as incomplete. A revised CSM based on the SI findings at the MRS is presented in Appendix J.

4.2.2 Field Observations and Historical Evidence of MEC

SI field activities were completed at the Skeet Range during the week of September 26, 2011. A visual reconnaissance of the Skeet Range MRS was conducted to identify evidence of former range activities (e.g., surface debris, stressed vegetation) prior to sample collection. The reconnaissance team documented conditions with respect to site access, general site conditions, land use, and evidence of range activities. Field notes are included in Appendix D. The visual reconnaissance was conducted by a two-person team that included a qualified UXO technician and was supplemented with a Schonstedt magnetometer and an all-metals detector. The path walked during the visual reconnaissance was recorded using a hand-held Global Positioning System (GPS) unit (Figure 4-1). The total distance walked was approximately 22,140 ft (within the MRS, approximately 19,000 ft). A log of waypoints collected using the GPS unit is included in Appendix H. Digital photographs were taken to document site conditions and are included in Appendix E. Photograph locations are shown on Figure 4-1.

As discussed, in Section 2.8, there have been no previous reports of MEC within the Skeet Range MRS boundary. The ASR noted that the Skeet Range MRS was located in a 5.4-acre area that also included a Pistol/Machine Gun Range (the area did not account for the Skeet Range safety fan, only the shooting arc and immediate vicinity). During the site visit conducted in 1996 as part of the ASR, “a 20mm target practice projectile (devoid of explosives)” was found on a dirt road within the former machine gun range (immediately southwest of the shooting arc for the Skeet Range MRS). Because the 20mm target round was inert, it is considered MD rather than MEC. The ASR concluded that the Pistol/ Machine Gun Range and the Skeet Range were “uncontaminated ordnance sub-sites.” Both the INPR and the ASR documents refer to “small arms ammunition, both live and spent cartridges,” found in the vicinity of the former Pistol/Machine Gun Range (USACE, 1996). This range is a separate project under the Atlantic City NAS FUDS property.

Approximately 25 acres of the 30-acre MRS has restricted access that requires a daily pass from the Security Operation Center at the FAA Technical Center. Approximately 2.5 acres of the 4.7-acre SJTA portion of the MRS (northeast of chain link fencing) is paved with asphalt for a parking lot. Fill material was observed near the former shooting arc of the MRS (Appendix E, Photographs 1 and 4). Fencing along the former Fuel Tank Farm Area boundary was observed in the northwestern portion of the MRS (Appendix E, Photograph 3). Signage labeled "Habitat Management Area Do Not Mow" was observed near the northwestern corner of SJTA parking lot parcel (Appendix E, Photograph 22). The remainder of the MRS is undeveloped and covered

with grass and natural shrubs or dense tree growth, particularly near the surface water features (Appendix E, Photographs 2, 35, and 39).

No evidence of MEC, MD, or skeet range features (such as former shooting arc or trap houses) was observed by the 2011 SI field team. Range-related debris (such as lead shot or clay pigeon target fragments) was not observed at the MRS.

4.2.3 MEC Risk Assessment

The following section presents a qualitative assessment of the risk associated with potential MEC at the Skeet Range MRS. This assessment is based on historical documentation, prior investigation, and visual inspection conducted during this SI. A MEC assessment is provided to convey relative risk on a scale from low to high and is not intended to be a thorough risk assessment as would be conducted for an RI/FS.

The Skeet Range MRS is no longer under DoD control. Most of the MRS is owned by the FAA; SJTA (operating the Atlantic City International Airport) leases a small portion of the MRS located to the northeast. Access to the Skeet Range MRS requires a daily pass acquired at the Security Operation Center at the FAA Technical Center. Human receptors at the MRS include FAA, SJTA, and NJANG workers and approved contractors. The general public does not have access to 25.3 acres of the 30-acre parcel (the 4.7-acre SJTA parcel located in the northeastern part of the MRS contains a parking lot accessible to the general public).

Historical and physical evidence indicates that small arms ammunitions (shotgun shells) were the only munitions used at the MRS during the period of military use. One MD item from a 20mm target round was found immediately southwest of the skeet range shooting arc; the inert item is not considered MEC.

Components of expended shotgun shells (lead shot, casings) contain no explosive components. Complete shotgun shells contain a propellant. A deliberate effort, requiring application of considerable force to a very specific point would be required to make a shot gun shell function. For this reason, small arms ammunition is considered to present no unique explosive hazard. Because the MRS was historically used only for small arms, a MEC hazard has not been identified.

4.3 Munitions Constituents Evaluation

4.3.1 Preliminary Conceptual Site Model Summary for Munitions Constituents

The preliminary CSM developed for the MRS identified the primary MC associated with shotgun shell ammunition as lead. PAHs are also addressed by the SI as constituents potentially associated with former range use. Soil is identified as the medium that would have been directly impacted by former military munitions activity. Other potentially complete pathways present at the MRS include surface water and sediment pathways (an intermittent creek is present on the MRS) and groundwater. Human and ecological receptors are present at the MRS.

Surface soil, sediment, and surface water are the primary potential pathways for human and ecological receptors to be exposed to MC. The highest concentrations of MC at the Skeet Range MRS are predicted to be present in the fall zones typical of a skeet range. Identified primary potential human receptors at the MRS include FAA, SJTA, and NJANG workers and approved contractors. The only portion accessible to the general public is the 4.7-acre parcel to the northeast that is separated from the rest of the MRS by a chain-link fence. Potential ecological receptors would include a wide variety of biota that could be present in the Pinelands National Reserve. Groundwater is relatively shallow beneath the MRS and is considered a potential pathway to MC but was not included in the sampling effort as part of this SI. Air is not a pathway of concern because inhalation of MC in vapor form will not occur for non-volatile MC under normal environmental conditions. Potential inhalation of soil particles is considered in the development of health-based screening levels for soil.

4.3.2 Historical MC Investigations

Previous investigations conducted at Area 41 by URS and TRC form the basis of the MC investigation at the Skeet Range MRS. Lead shot and skeet fragments were identified during the site investigation performed by TRC in 2007 at Area 41 (this included a large portion of the Skeet Range MRS). Lead analysis was not performed in the soil medium as part of this investigation. In December 2007, TRC conducted additional field investigations to determine whether PAHs were present in the Area 41 soil and to verify that the PAHs detected in the soil could be linked to clay pigeon skeet fragments or to coal materials found at the site. The 2002 to 2003 samples were confirmed through these PAH "fingerprint" analyses. The concentrations of PAH detected above screening criteria are consistent with PAHs found on the MRS in both skeet and coal fragments. PAH contamination was present in surface soil and in subsurface soil at the MRS to depths of approximately 78 inches bgs. The samples collected during the forensic investigation contained small particles of skeet target and coal fragments. The 2009 TRC report states that "the presence of skeet and/or coal fragments, even at small particle sizes, can have a marked influence on the soil characterization and could readily explain the elevated PAH concentrations within Area 41 soils, as well as differences in PAH concentrations between the 2002 to 2003 investigations, 2007 investigations and Skeet Range Double soil concentrations" (TRC, 2009).

PAHs collected at the MRS during the URS (and TRC) investigations were detected at concentrations exceeding the EPA RSLs for industrial soil samples (EPA, 2011). The MDCs of PAH compounds in surface soil at the Skeet Range MRS are compared to the background screening values, the EPA RSLs (industrial soil), and to the recommended ESVs, as shown in Table 4-1. The MDCs of PAH compounds in surface soil at the MRS were found in two samples (locations I-NK32 and I-D32) (shown on Figure 4-3). The concentration of each of these 16 PAH compounds exceeded their respective background threshold values (Table 4-1). The

concentrations of five PAH compounds exceeded their respective EPA RSLs for industrial soil. Eight PAH compounds also exceeded the ESVs.

During the environmental forensics investigation conducted by TRC in 2007, one surface soil sample collected (location I-NE32) contained clay pigeon target fragments that exhibited MDCs for PAH compounds (shown on Figure 4-3). The concentration of each of the 16 PAH compounds exceeded their respective background threshold screening values (Table 4-1). The concentrations of eight PAH compounds exceeded their respective EPA RSLs for industrial soil. Fifteen PAH compounds exceeded the ESVs.

These investigations performed from 2002 through 2007 at portions of the Skeet Range MRS documented the presence of PAH compounds in soil at concentrations above human health screening levels as shown on Figure 4-3 as the Approximate Area of PAH Contamination (TRC, 2009).

4.3.3 Soil Exposure Pathway

Between September 27 and 29, 2011, the Shaw SI field team collected 19 surface soil samples from the Skeet Range MRS. Samples were collected in the approximate locations as proposed in the SSWP (Shaw, 2011b). GPS data for sample locations is provided in Appendix H.

Table 4-2 shows the analytical results for surface soil compared to background and human health screening levels. The MC, lead, was detected in 16 surface soil samples at concentrations ranging from 7.46 mg/kg to 1,070 mg/kg. Sample locations and analytical results for lead are shown on Figure 4-2.

Sixteen PAH compounds (potential constituents associated with range-related debris [skeet targets]) were detected at varying concentrations in three surface soil samples collected just inside the fencing for the SJTA parking lot parcel located in the northeastern portion of the MRS. Sample locations and analytical results for PAHs are shown on Figure 4-3.

As previously discussed, portions of the former Area 41 overlap the northwestern portion of the Skeet Range MRS. During an ecological risk assessment performed at Area 41 in 1996, lead was detected in surface soil just outside of the Skeet Range MRS boundary, at a concentration of 248 mg/kg (USFWS, 1996). While at the time of the investigation, lead was not considered a contaminant of concern with respect to the CERCLA work conducted at the site, the levels of lead historically detected at Area 41 did exceed the ecological screening level and 90th percentile lead background level (50 mg/kg and 144 mg/kg, respectively) used by USACE in determining that another skeet range at the facility was worthy of a formal RI/FS.

4.3.3.1 Comparison to Background Data

Ten background surface soil samples were collected from locations outside of the MRS from areas believed to be unaffected by former military munitions activities (Figure 3-2). The background samples were collected in the same manner as the MRS samples and analyzed for

lead and PAHs. Additional reference metals, including aluminum, calcium, iron, magnesium, and manganese, were analyzed to support a geochemical evaluation of background screening values. However, a geochemical evaluation was not warranted for the background screening values, and the additional reference metals data were not used in the MRS evaluation. The reference metal data is provided along with the MRS data in Appendix G.

Two of the 16 surface soil samples (ACSR0005 and ACSR0006) collected for lead analysis exceeded the calculated 95 percent UTL background screening level for lead (45 mg/kg) with concentrations of 411 mg/kg and 1,070 mg/kg (Figure 4-2 and Table 4-2). PAH compounds were not identified above background screening levels in the three samples collected at the SJTA parcel (Figure 4-3 and Table 4-2).

The investigations previously performed by URS and TRC at portions of the Skeet Range MRS document the presence of PAH compounds in soil at concentrations above background screening levels. This area is shown on Figure 4-3 as the Approximate Area of PAH Contamination.

4.3.3.2 Comparison to Human Health Screening Values

Because the MC, lead, was detected above the background screening level, a comparison to the human health screening level was conducted. The maximum lead concentration detected in the 16 surface soil samples (1,070 mg/kg) also exceeded the human health screening level of 800 mg/kg for lead in surface soil in industrial settings. The MDC of lead was identified in sample ACSR0006 (Figure 4-2).

4.3.3.3 Comparison to Ecological Screening Values

Chemical concentrations in surface soil that exceeded background screening levels were compared to ESVs (Table 4-2). The two samples (ACSR0005 and ACSR0006) that exceeded the background screening level for lead (45 mg/kg) also exceeded the ESV (11 mg/kg). PAH samples collected in the SJTA parking lot parcel were not compared to ESVs because the parcel is located in the Regional Growth Area and has limited available ecological habitat (therefore it is not considered an IEP).

The investigations previously performed by URS and TRC at portions of the Skeet Range MRS document the presence of PAH compounds in soil at concentrations above the ESVs. This area is shown on Figure 4-3 as the Approximate Area of PAH Contamination.

4.3.4 Sediment/Surface Water Pathway

Surface soil is considered a potential source of MC (lead) or MMRP-related constituents (PAHs) that could influence the surface water/sediment migration pathway. There are two existing drainageways that cross the MRS. One flows from the southwest to the northeast along the southeastern edge of the former Area 41 and discharges into the second drainageway. The second drainageway flows from north-northwest to south-southeast, then turns in a more southeasterly direction, eventually flowing into the South Branch Absecon Creek. MC has the potential to migrate from surface soil to surface water via surface runoff at the MRS.

Two collocated sediment/surface water samples (and one field duplicate) were proposed and collected at the Skeet Range (Figure 4-2). The samples were analyzed using EPA SW-846 Method 6020 methodology for MC (lead). Surface water samples were collected both as total (or unfiltered) samples and as dissolved (or filtered) samples. Tables 4-3 and 4-4 show the analytical results of detected metals in sediment and surface water, respectively. The results are compared to the background screening values, the human health screening criteria, and the ecological screening criteria.

4.3.4.1 Comparison to Background Data

One background collocated surface water/sediment sample was collected upstream and outside of the MRS (Figure 3-2). The background sample was collected in the same manner as the MRS samples and analyzed for lead. The concentrations of lead in the two sediment samples collected at the MRS did not exceed the background threshold value (118 mg/kg) in either sample (Table 4-3).

As stated in Section 3.5.1, during the analytical QA/QC process, the laboratory documented the presence of sediment in the filtered fractions of the background surface water sample ACSR6001 and rejected the result (6.53 µg/L). Therefore, as a conservative practice, the background threshold value for the dissolved lead fraction was established at 3.0 µg/L, equivalent to the laboratory's PQL.

Site-specific data were compared from the Skeet Range MRS to the background screening values for surface water [total (unfiltered) and dissolved (filtered)] for lead as shown below:

Munitions Constituent	Surface Water Background Threshold Value - Total (µg/L)	Surface Water Background Threshold Value - Dissolved (µg/L)
Lead	41.1	3.0

µg/L = micrograms per liter

The concentration of lead exceeds the background threshold value (41.1 µg/L) in the total (unfiltered) portion of sample ACSR2002 (52.8 µg/L). The concentration of lead exceeds the background threshold value (3.0 µg/L) in the dissolved (filtered) portion of sample ACSR2002 (4.77 µg/L).

4.3.4.2 Comparison to Human Health Screening Values

Sediment analytical results were only compared to human health screening values if the background threshold value was exceeded. The concentrations of lead did not exceed the background threshold value in either of the sediment samples (Table 4-3).

Surface water analytical results were only compared to human health screening values if the background threshold value for lead was exceeded (Table 4-4). The concentration of total (unfiltered) lead in sample ACSR2002 (52.8 µg/L) exceeded the human health screening value (5.0 µg/L).

It is worth noting that the locations of the two collocated sediment/surface water samples within the MRS and the upstream background sediment/surface water sample pair are situated in positions of influence from runoff from the airport runways and aprons. The apparent completed pathway for lead in surface water is difficult to fully evaluate with these limited analytical results from these locations.

4.3.4.3 Comparison to Ecological Screening Values

Sediment analytical results were only compared to the ESV if the background threshold value was exceeded. The concentrations of lead did not exceed the background threshold value in either of the sediment samples (Table 4-3).

Surface water analytical results were only compared to ESVs if background threshold values were exceeded (Table 4-4). The concentration of dissolved (filtered) lead (4.77 µg/L) exceeding the background threshold value (3.0 µg/L) in sample ACSR2002 exceeded the ESV (2.5 µg/L). Comparisons to surface water ESVs are based on the dissolved (filtered) concentrations, which are considered to be bioavailable and thus more important for aquatic receptors rather than the total (unfiltered) results that are not bioavailable (Suter et al., 2000).

4.3.5 Groundwater Pathway

As discussed in Section 2.4.7.3, the water table in the vicinity of Area 41 is located within the unconfined Upper Cohansey Sand with anticipated depths ranging from 3 to 23 ft bgs. Isolated layers of clay or clayey silt within the Upper Cohansey Sand appear to perch the water table in some localized instances. During site investigation activities conducted from 1987 through 1989 at the Area 41 Fuel Farm, the water table was encountered at depths of 7 to 23 ft bgs (TRC, 1990).

Although groundwater sampling was not proposed during the TPP process for this SI, the groundwater pathway is considered to be potentially complete because of the potential presence of shallow perched groundwater at the site. In the review of historical investigations performed for Area 41, Shaw was unable to locate any lead or PAH groundwater data from monitoring wells within the Skeet Range MRS.

4.3.6 Air Pathway

Air is not considered to be a significant exposure medium for potential receptors because inhalation of MC in vapor form is not an exposure route for non-volatile MC under normal environmental conditions. The potential inhalation of soil particles is included in the development of health-based screening values for soil. The pathway from air to potential human or ecological receptors is incomplete.

5.0 Summary and Conclusions

The SI addressed the Atlantic City NAS FUDS (Property Number C02NJ0977) located in Atlantic County, New Jersey, on the northern portion of the Egg Harbor Township. Atlantic City NAS is included in the MRS Inventory in the *Defense Environmental Programs Annual Report to Congress Fiscal Year 2010* (DoD, 2010), under Federal Facility Identification Number NJ29799F895900. The Skeet Range first appeared on Atlantic City NAS base maps in 1947 and was used until 1958. The range may have been built sometime in 1944 when a skeet range located elsewhere on the NAS was closed. The ASR stated that the Skeet Range was located in Area D, a 5.4-acre area that also included a Pistol/Machine Gun Range. The acreage did not account for the Skeet Range safety fan, only the shooting arc and immediate vicinity. Today, most of the Skeet Range MRS is owned by the FAA. SJTA leases an approximate 4.7-acre portion of the MRS located to the northeast for use as a parking lot.

The former Atlantic City NAS, including the Skeet Range MRS, is located within the Pinelands National Reserve. Six state of New Jersey threatened and endangered species occur on the FUDS property. The New Jersey Natural Heritage Program has indicated that one state-endangered bird and one state-threatened bird occur on the MRS. The Upland Sandpiper inhabits grasslands, fallow fields, and meadows that are often associated with airports and the Cooper's hawk inhabits deciduous, coniferous, and mixed riparian forests. Therefore, the MRS qualifies as an IEP or sensitive environment as defined by USACE and EPA.

One area of concern investigated by the FAA under CERCLA is referred to as Area 41, an approximately 23-acre area that included the former Fuel Farm and Photographic Laboratory area. The Area 41 site boundaries overlap the northwestern portion of the Skeet Range MRS. The overlapping portion constitutes approximately 12 acres of the 30-acre Skeet Range MRS. A small area immediately adjacent and southwest of the Area 41 site was used by the Navy for coal storage. Coal storage areas are visible on historical aerial photographs at Area 41 as early as 1947. Investigations performed in 2002 to 2003 and again in 2007 to 2009 at Area 41 documented the presence of PAH compounds in soil at concentrations above the human health industrial screening levels applied under this SI. Recommendations were made in 2009 for further actions at the Skeet Range MRS to remediate soils associated with the PAH contamination.

Historical evidence indicates that the only military munitions used at the MRS were small arms ammunition associated with a skeet range (i.e., shotguns of various gauges). SI field activities, conducted in September 2011, included a visual site reconnaissance to look for evidence of MEC, surface soil, and sediment/surface water sampling for MC. No MEC or evidence of MEC was identified. No MD, in the form of spent shotgun shells or firing caps, was observed near the

former Skeet Range shooting arc. Clay pigeon target fragments were not observed at the Skeet Range.

A total of 16 surface soil samples was collected and analyzed for lead at the MRS (five of these were collected from the SJTA parcel). Additionally, three surface soil samples were collected and analyzed for PAHs at the SJTA parcel. Lead concentrations in the five surface soil samples collected at the SJTA parcel do not exceed the background screening level. Further, the concentration of PAH compounds in three surface soil samples collected at the SJTA parcel does not exceed human health screening values. Ecological screening was not performed for the samples collected at the approximate 4.7-acre SJTA parking lot parcel because of the nature of the site (i.e., located within the Regional Growth Area) and the limited ecological habitat available.

The results of the surface soil sampling performed on the MRS show that one sample had a concentration of lead (1,070 mg/kg) that exceeds the human health industrial soil screening value. The sample was located in a position on the MRS consistent with impact from shotfall from the former shooting arc. MMRP-related constituents (PAHs) from pitch-based clay pigeon target fragments exceeded human health industrial soil screening values as established in previous investigations.

Two collocated sediment/surface water samples were collected from intermittent streams within the MRS and sampled for lead. These lead concentrations were compared to background threshold values and human health and ecological screening values. Concentrations of lead in the sediment samples did not exceed the background threshold value. In surface water, one sample had a concentration of total and dissolved lead greater than the background threshold value and the ESV. The human health screening level was exceeded in the total lead fraction but not in the dissolved fraction. It is worth noting that the locations of the two collocated sediment/ surface water samples within the MRS and the upstream background sediment/surface water sample pair are situated in positions of influence from runoff from the airport runways and aprons. Further, the surface water sample with elevated lead concentrations did not have associated elevated lead concentration in the collocated sediment sample. The apparent completed pathway for lead in surface water is difficult to fully evaluate with these limited analytical results from these locations.

Based on historical evidence and results from the 2011 SI field activities, no evidence of MEC, is present at the Skeet Range MRS. Surface soil sampling results indicate that concentrations of MC (lead) and MMRP-related constituents (PAH compounds sampled and analyzed during previous investigations) exceed background, human health, and ecological screening criteria on the FAA portion (25.3 acres) of the Skeet Range MRS. These results appear to be consistent with the CSM for skeet ranges regarding the distribution of lead and clay pigeon target fragments in the fall zones. Concentrations of lead and PAHs from surface soil samples collected on the

SJTA parking lot parcel (approximately 4.7 acres) did not exceed background or human health screening values.

6.0 Recommendations

Results of the SI provide the basis for conclusions and/or recommendations for further actions at the MRS. Based on historical evidence and results from the 2011 SI field activities, evidence of MEC is not present at the MRS. Therefore, further investigation or removal action is not required regarding the presence of MEC at the Skeet Range MRS.

Surface soil sampling analytical results indicate that concentrations of MC (lead) and MMRP-related constituents (PAH compounds sampled and analyzed during previous investigations) exceed background and human health screening values within the FAA portion (25.3 acres) of the Skeet Range MRS. Therefore, an RI/FS is recommended regarding the presence of MC and MMRP-related constituents at the Skeet Range MRS. Further investigation is not warranted regarding the presence of MC at the SJTA parking lot portion of the MRS. Therefore, it is recommended that the MRS boundaries be revised to exclude the SJTA portion of the MRS.

Results of the SI field activities provide the basis for identifying MRSs and for scoring the MRS using the MRSPP (Appendix K). One MRS was identified at the FUDS, the Skeet Range. The Skeet Range MRS is included in the MRS Inventory in the 2010 Annual Report to Congress (DoD, 2010). Shaw has verified that the location and size (30 acres) of the Skeet Range MRS are correct as described in FUDSMIS.

7.0 References

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Figures

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520000 528000 536000 544000 552000

4381000 4374000 4367000 4360000 4353000

Hammonton
Second Branch
Pine Creek
Landing Creek
Turtle Creek
Jobs Creek
Ballinger Creek
Burlington County
Ocean County
Elwood-Magnolia
Indian Cabin Creek
Egg Harbor City
Egg Harbor City Lake
Teal Creek
Tarkiln Branch
Broad Creek
Mystic Island
Makepeace Lake
Union Creek
Elliots Creek
Big Creek
Port Republic
Big Goose Pond
Little Goose Pond
Watering Race Branch
Clarks Mill Stream
Mill Pond
Mattix Run
Wigwam Creek
Oyster Creek
Moss Mill Lake
Morses Mill Stream
Babcock Creek
Jack Pudding Branch
Mare Run
Babcock Swamp
Lenape Lake
Pomona
Atlantic County
Atlantic City International Airport
Mays Landing
Atlantic City Reservoir
Skeet Range
South River
Gravelly Run
Absecon
Mill Branch
Cedar Branch
Miry Run
Maple Lake
Blackmans Branch
Stephen Lake
Pleasantville
Brigantine
Patcong Lake
Stephen Creek
English Creek
Northfield
Atlantic City
Bargaintown Pond
Atlantic City Muni/Bader Field
Estell Manor
English Creek Pond
Gibson Creek
Lakes Creek
Linwood
Ventnor City
Margate City
Griscom Swamp
Atlantic Ocean
Somers Point
Middle River
Longport
Corbin City

Legend

- Atlantic City Naval Air Station FUDS Boundary
- Skeet Range Boundary

NOTES:
1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Topographic map (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.

N

0 1 2 4 Miles

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 1-1

SITE LOCATION

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

Shaw®

535100 536400 537700 539000 540300

4369400 4368300 4367200 4366100 4365000

Skeet Range

Cantonment Area

Area 41 (Fuel Tank Farm)

Burial Area B

Burial Area A

Surface Water Impoundment

Coal Storage Area

ASR Area D

Pistol/Machine Gun Range

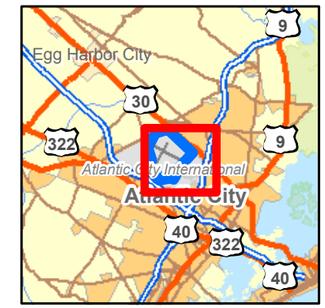
0 250 500 Feet

Legend

- Atlantic City Naval Air Station FUDS Boundary
- Skeet Range Boundary
- Area 41 (Former Fuel Tank Farm)
- Former Burial Areas
- ASR Area D

NOTES:

1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Former Burial Area boundaries were derived from Figure 4.1 of the Site Inspection Report, Atlantic City Naval Air Station (Parsons, 2007).
3) Area D boundary was derived from Plate 3 of the ASR (USACE, 1996).
4) Main map aerial photograph was obtained from the U.S. Geological Survey and is dated April 22, 1951.
5) Inset map aerial photograph was obtained from Appendix A of the following report: Documentation of Contamination Associated With Department of Navy Activities-Skeet Range and Coal Storage at Area 41, Former Atlantic City Naval Air Station (TRC, 2009), and is dated 1951.



N

0 875 1,750 3,500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 2-1

1951 AERIAL PHOTOGRAPH

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

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OFFICE	DRAWN BY		DRAWING NUMBER
DEN	M. Mireiter	9/20/11	AtlanticCityNAS_002_Fig2_1951Aerial_TPP

OFFICE	DRAWN BY		DRAWING NUMBER
DEN	M. Mireiter	9/20/11	AtlanticCityNAS_019_Fig2_2_2010Aerial_SI

535100 536400 537700 539000 540300

4369400 4368300 4367200 4366100 4365000

Pomona Rd
S Pomona Rd
W Park Ave
Oak Dr
Todd Ave
S English Creek Rd
English Creek Rd
English Creek Ave
Ramp
Apple Dr
Donna Dr
Dante Ave
AVE D
AVE C
AVE B
AVE A
S Zenia Ave
Yam Ave
Xanthus Ave
S Willow Ave
Vine Ave
Filmore Ave
Upas St
Tulip Ave
Redwood Ave
Quince Ave
Poplar Ave
Garfield Ave
S Nectar Ave
Maple Ave
Linden Ave
Coolidge Ave
W Buchanan Dr
Pomona
Chris Gaupp Dr
Juniper Ave
Laurel Ave
Filmore Ave
W Hayes Ave
Holly Ave
Ebony Tree Ave
Damson Ave
Chestnut Ave
Ironwood Ave
Orange Tree Ave
Spruce Ave
S Genista Ave
Fir Ave
Johnson Ave
Abraham Ave
W Mckinley Ave
Polk Ave
Roosevelt Ave
W Morton Ave
Morton Ave
Taylor Ave
Beech Ave
Ash Ave
Ramp
S 1st Ave
E Crestview Ave
Sterling Dr
S 2nd Ave
E Magnolia Ave
3rd Ave
4th Ave
Oakborne Ave
Ramp
3rd Ave
North Branch Absecon Creek
South Branch Absecon Creek
Atlantic City International Airport
Access Rd
Atlantic Ave
Delilah Rd
Ramp
Ramp
Ramp
Tremont Ave
Nursery Dr
Charles Dr
Queen St
York St
Ridge Ave
Kingsley Dr
Shankey Pl
Donna Pl
Russell Pl
Bolton Pl
Delilah Rd
S Carolina Ave
N Carolina Ave
Idaho Ave
3rd St
1st St
Wellington Ave
30
563
446
444

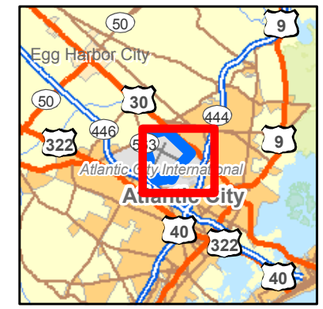
Skeet Range

Area 41 (Former Fuel Tank Farm)
Former Burial Area B
Former Burial Area A
Former Coal Storage Area
Skeet Range
ASR Area D
Former Pistol/Machine Gun Range
0 250 500 Feet

Legend

- Atlantic City Naval Air Station FUDS Boundary
- Skeet Range Boundary
- Area 41 (Former Fuel Tank Farm)
- Former Burial Areas
- ASR Area D

NOTES:
1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Former Burial Area boundaries were derived from Figure 4.1 of the Site Inspection Report, Atlantic City Naval Air Station (Parsons, 2007).
3) Area D boundary was derived from Plate 3 of the ASR (USACE, 1996).
4) Aerial photograph (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.



N

0 875 1,750 3,500 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 2-2

2010 AERIAL PHOTOGRAPH

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

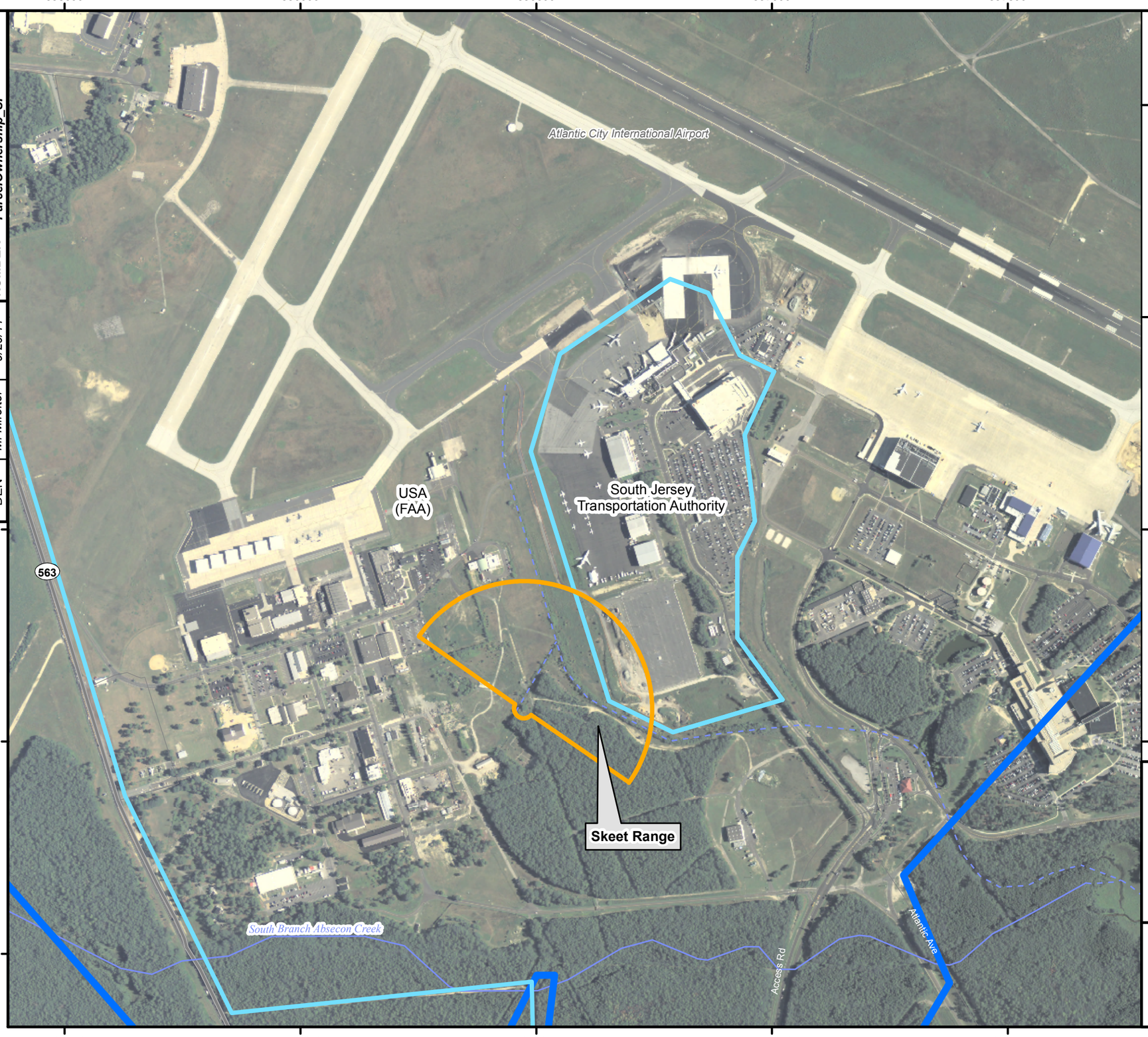
US Army Corps of Engineers®

Shaw®

OFFICE	DRAWN BY		DRAWING NUMBER
DEN	M. Mireiter	9/20/11	AtlanticCityNAS_020_Fig2_3_ParcelOwnership_SI

535500 536000 536500 537000 537500

4367500 4367050 4366600 4366150 4365700



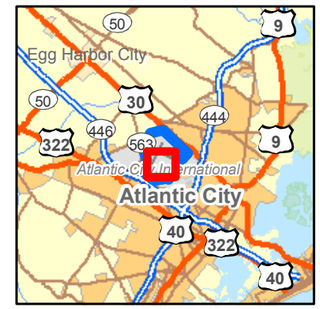
Legend

- Atlantic City Naval Air Station FUDS Boundary
- Skeet Range Boundary
- Taxlot Parcel

NOTES:

1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Parcel data was obtained from the Atlantic County Assessor's Office website: http://njgin.aclink.org/maps/AtlanticCountyViewer/viewer.htm.
3) Aerial photograph (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.

N



0 350 700 1,400 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 2-3

PARCEL OWNERSHIP

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

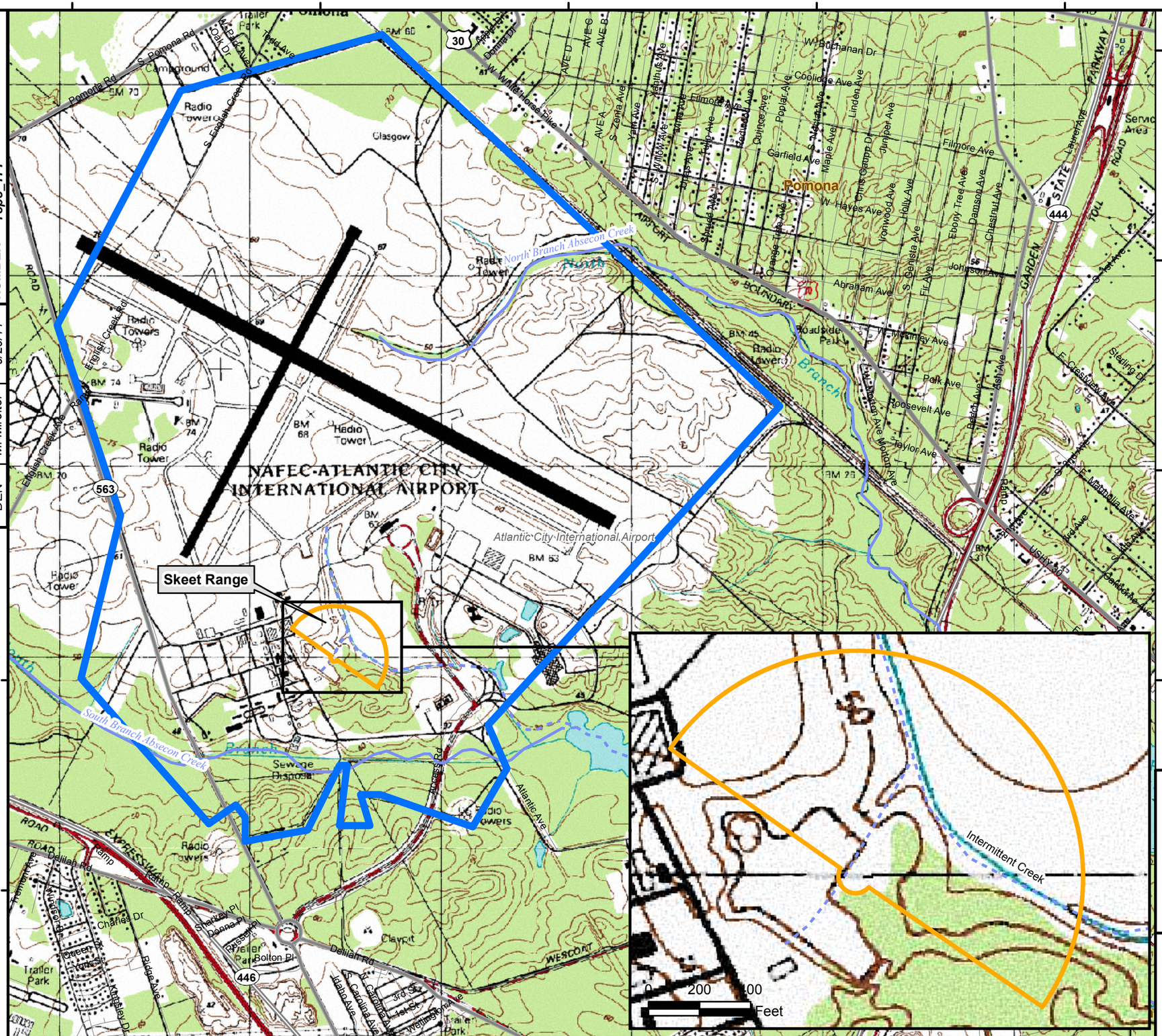
US Army Corps of Engineers®

Shaw®

OFFICE	DRAWN BY		DRAWING NUMBER
DEN	M. Mireiter	9/20/11	AtlanticCityNAS_005_Fig5_Topo_TPP

535100 536400 537700 539000 540300

4369400 4368300 4367200 4366100 4365000



Legend

- Atlantic City Naval Air Station FUDS Boundary
- Skeet Range Boundary

NOTES:
1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Topographic map (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.

N

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 2-4

TOPOGRAPHIC MAP

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

Shaw®

DRAWING NUMBER AtlanticCityNAS_022_Fig2_5_RegSW_SI

DRAWN BY M. Mireiter 9/20/11

OFFICE DEN

Skeet Range

Pomona

Atlantic City International Airport

Atlantic City Reservoir

Chesilhurst
Williamstown
Hammonton
Collings Lakes
Folsom
Elwood-Magnolia
Egg Harbor City
Buena
Vineland
Mays Landing
Estell Manor
Corbin City
Woodbine
Port Republic
Beach Haven
Absecon
Brigantine
Pleasantville
Northfield
Atlantic City
Linwood
Ventnor City
Margate City
Somers Point
Longport
Ocean City

New Brooklyn Lake
Hobb Lake
Clark Branch
Gun Branch
Great Swamp
Penn Swamp Pond
Martha
Harrisville Pd
Anchor Lake Two
Hammonton Muni
Great Egg Harbor River
Bull Creek
Batsto Lake
Spruce Lake
Sunset Lake
Nescochague Lake
Hammonton Lake
Penny Pot Stream
Cranes Lake
Diamond Lake
Petties Branch
Lucas Branch
First Branch
Negro Creek
Pine Creek
Landing Creek
Mullica River
Lake Albert
Cedar Lake
Marsh Lake
Indian Branch
Tarkiln Branch
Egg Harbor City Lake
Makepeace Lake
Deep Run
Big Goose Pond
Ellis Creek
Babcock Creek
Mill Pond
Oyster Creek
Matrix Run
Moss Mill Lake
Memorial Park Pond
Mare Run
South River
Jack Pudding Branch
Babcock Swamp
Lenape Lake
Sharps Branch
Big Neal Branch
Cedar Branch
Gravelly Run
Cordery Creek
Stephen Creek
Miry Run
Maple Lake
Blackmans Branch
Stephen Lake
Patcong Lake
Cumberland Pond
Tuckahoe River
English Creek Pond
English Creek
Bargaintown Pond
Atlantic City Muni Bader Field
Atlantic Ocean
Muskee Creek
Slab Branch
Warners Mill Pond
Griscom Swamp
Little Mill Creek
Mill Creek
West Creek
Back Run
Tuckahoe Lake
Ocean City Muni
Great Cedar Swamp
Hands Millpond
Lake Nummy
Cedar Swamp Creek
Pickle Factory Pond
Woodbine Muni
South Branch Absecon Creek
North Branch Absecon Creek

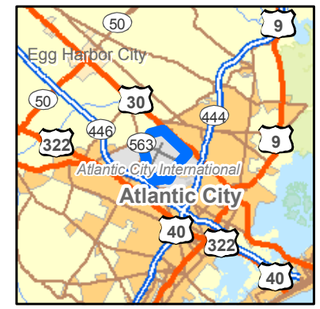
512500 525000 537500 550000 562500

4387000 4376000 4365000 4354000 4343000

Legend

- Atlantic City Naval Air Station FUDS Boundary
- 15-Mile Radius from FUDS Boundary
- Intermittent Stream
- Perennial Stream

NOTES:
1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Topographic maps (Atlantic and Cape May Counties) were obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.



N

0 1.75 3.5 7 Miles

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 2-5

REGIONAL SURFACE WATER DRAINAGE WITHIN A 15-MILE RADIUS

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

Shaw®

2000 CENSUS DATA				
Population		Housing Units	Households	Highest Census Block Group Density Per Square Mile
Within 2 Miles of the Skeet Range Boundary	5,979	2,463	2,296	2,524.8

2000 CENSUS DATA			
Population		Housing Units	Households
Within FUDS Boundary	0	0	0
FUDS + 1/4 Mile	300	126	122
FUDS + 1/2 Mile	2,201	877	824
FUDS + 1 Mile	6,587	2,512	2,357
FUDS + 2 Miles	18,415	6,545	6,199
FUDS + 3 Miles	33,306	11,895	11,254
FUDS + 4 Miles	67,698	25,560	23,972

Legend

- Atlantic City Naval Air Station FUDS Boundary
- Skeet Range Boundary

2005 Census Block Group Population

- 0 - 1300
- 1301 - 2600
- 2601 - 3900
- 3901 - 5200
- Census Block Centroid Unit
- XX Number of People Per Square Mile Within Census Block Group

NOTES:

1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Census data were obtained from StreetMap (ESRI, 2006).
3) The 2005 population of Atlantic County was 489.2 people per square mile.
4) The Census Block Centroid Units represent centroids of the smallest entities for which the Census Bureau tabulates census information, bounded on all sides by visible features such as streets, streams, and railroad tracks, and/or invisible boundaries such as city, town, and county limits. The population assigned to a centroid unit may be a positive integer or zero. The centroid populations were summed within defined distances from the FUDS boundary to generate population totals presented on the inset table.
5) Aerial photograph (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.

N

0 3,750 7,500 15,000 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 2-6

CENSUS DATA WITHIN A 4-MILE RADIUS

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

Shaw®

DRAWING NUMBER: AtlanticCityNAS_023_Fig2_6_Census_SI

DRAWN BY: M. Mireiter 9/20/11

OFFICE: DEN

Egg Harbor City
Port Republic
Pomona
Atlantic City International Airport
Skeet Range
Mays Landing
Absecon
Pleasantville
Brigantine
Atlantic City
Northfield
1/4-Mile Radius
1/2-Mile Radius
1-Mile Radius
2-Mile Radius
3-Mile Radius
4-Mile Radius
525000
530000
535000
540000
545000
550000
4376500
4372000
4367500
4363000
4358500

DRAWING NUMBER AtlanticCityNAS_024_Fig2_7_SensRec_SI

DRAWN BY M. Mireiter 9/20/11

OFFICE DEN

528300 533000 537700 542400 547100

4372600

4368400

4364200

4360000

4355800

Egg Harbor City
Big Goose Pond
Little Goose Pond
Elliots Creek
Clarks Mill Stream
Port Republic
Mill Pond
Wigwam Creek
Moss Mill Lake
Morses Mill Stream
Babcock Creek
Mon Killer Branch
Jack Pudding Branch
Babcock Swamp
Mattix Run
Pomona
Atlantic City International Airport
Skeet Range
North Branch Absecon Creek
South Branch Absecon Creek
Cordery Creek
Atlantic City Reservoir
Absecon
Absecon Creek
Ingersolls Branch
Mays Landing
Gravelly Run
Cedar Branch
Miry Run
Blackmans Branch
Mill Branch
Patcong Lake
Patcong Creek
Pleasantville
Northfield
Bargaintown Pond
Lakes Creek
Linwood
Margate City

0 350 700 Feet

Legend

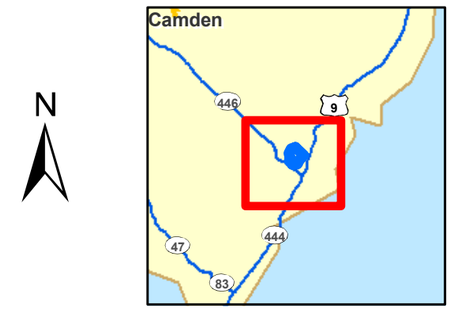
- Atlantic City Naval Air Station FUDS Boundary
- 4-Mile Radius from FUDS Boundary
- Skeet Range Boundary
- Wetland Area
- Airport
- Church
- Hospital
- Park
- School

Pinelands National Reserve Land Use

- Agricultural Production Area
- Forest Area
- Pinelands Town
- Pinelands Village
- Preservation Area
- Regional Growth Area
- Rural Development Area

NOTES:

1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Wetlands data was obtained from the U.S. Fish and Wildlife Service, May 2006, NWIDBA.CONUS_wet_poly: Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31., U.S. Fish and Wildlife Service, Branch of Habitat Assessment, Washington, D.C.
3) Topographic map (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.



0 3,500 7,000 14,000 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 2-7

SENSITIVE RECEPTOR LOCATIONS WITHIN A 4-MILE RADIUS

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

Shaw®

DRAWING NUMBER: AtlanticCityNAS_025_Fig2_8_GWWells_SI

DRAWN BY: M. Mireiter 9/20/11

OFFICE: DEN

443557 456680 469803 482927 496050

247991 235852 223713 211574 199435

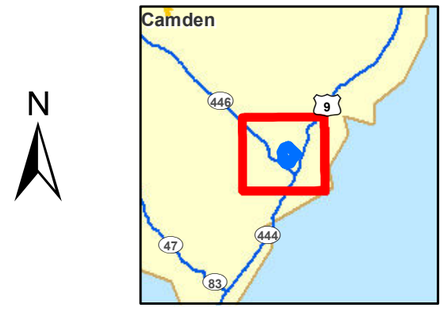
Well 2
Well 1R
Well 5
0 300 600 Feet

Port Republic
Elliots Creek
Clarks Mill Stream
Nacote Creek
Mill Pond
Moss Mill Lake
Morses Mill Stream
Jack Pudding Branch
Babcock Swamp
Pomona
Mullica Run
Atlantic City International Airport
Skeet Range
Mays Landing
South Branch Absecon Creek
Atlantic City Reservoir
Cordery Creek
Gravelly Run
Absecon Creek
Ingersolls Branch
Mill Branch
Cedar Branch
Absecon
Miry Run
Blackmans Branch
Patcong Creek
Pleasantville
Atlantic City
Patcong Lake
Northfield
English Creek

Legend

- Atlantic City Naval Air Station FUDS Boundary
- 4-Mile Radius from FUDS Boundary
- Skeet Range Boundary
- Public Water Supply Groundwater Well
- Non-Community Groundwater Well

NOTES:
1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Non-community groundwater well data was obtained from the New Jersey Department of Environmental Protection GeoWeb website: http://www.nj.gov/dep/gis/geowebsplash.htm.
3) Public water supply groundwater well data was obtained from the New Jersey Geological Survey Geodata website: http://www.state.nj.us/dep/njgs/geodata/dgs97-1.htm.
4) Topographic map (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies, 1999.



N

0 3,000 6,000 12,000 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 2-8

GROUNDWATER WELL LOCATIONS WITHIN A 4-MILE RADIUS

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

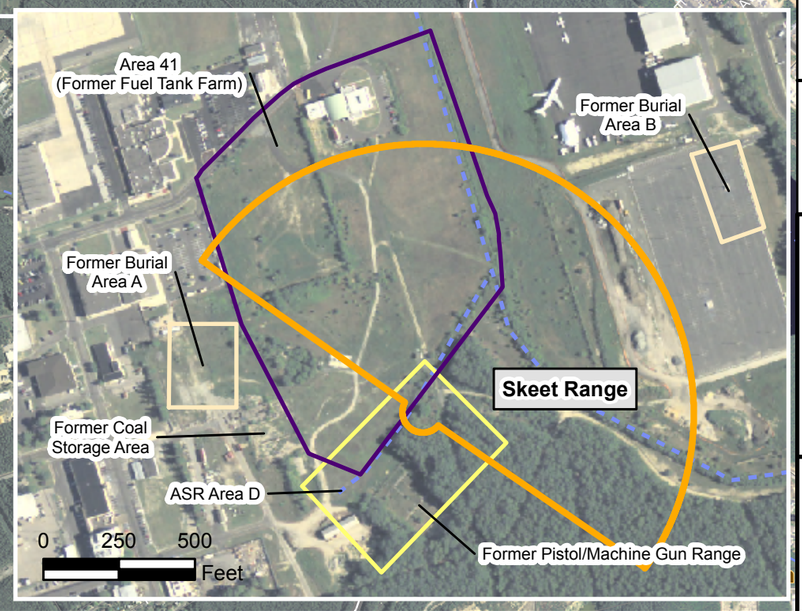
Shaw®

OFFICE DEN | DRAWN BY M. Mireiter 9/20/11 | DRAWING NUMBER AtlanticCityNAS_026_Fig3_1_SIMRS_SI

535100 536400 537700 539000 540300

4369400 4368300 4367200 4366100 4365000

Pomona Rd
S Pomona Rd
W Park Ave
Oak Dr
Todd Ave
S English Creek Rd
English Creek Rd
English Creek Ave
Ramp
Apple Dr
Donna Dr
Dante Ave
AVE D
AVE C
AVE B
AVE A
S Zenia Ave
Yam Ave
Xanthus Ave
S Willow Ave
Vine Ave
Filmore Ave
Upas St
Tulip Ave
Redwood Ave
Quince Ave
Poplar Ave
Garfield Ave
S Nectar Ave
Maple Ave
Linden Ave
Coolidge Ave
W Buchanan Dr
Chris Gaupp Dr
Juniper Ave
Spruce Ave
Orange Tree Ave
W Hayes Ave
Holly Ave
Ironwood Ave
Ebony Tree Ave
Damson Ave
Chestnut Ave
Filmore Ave
Laurel Ave
Pomona
Abraham Ave
S Genista Ave
Fir Ave
Johnson Ave
W Mckinley Ave
Polk Ave
Roosevelt Ave
W Morton Ave
Morton Ave
Taylor Ave
Beech Ave
Ash Ave
Ramp
2nd Ave
3rd Ave
4th Ave
E Magnolia Ave
E Crestview Ave
Sterling Dr
1st Ave
S 1st Ave
30
444
563
446
North Branch Absecon Creek
South Branch Absecon Creek
Atlantic City International Airport
Skeet Range
Access Rd
Atlantic Ave
Tremont Ave
Delilah Rd
Ramp
Ramp
Ramp
Sharkey Pl
Donna Pl
Russell Pl
Bolton Pl
Delilah Rd
Lundgren Dr
Charles Dr
Queen St
York St
Ridge Ave
Kingsley Dr
S Carolina Ave
N Carolina Ave
Idaho Ave
3rd St
1st St
Wellington Ave



Legend

- Atlantic City Naval Air Station FUDS Boundary
- Skeet Range Boundary
- Area 41 (Former Fuel Tank Farm)
- Former Burial Areas
- ASR Area D

NOTES:

1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Former Burial Area boundaries were derived from Figure 4.1 of the Site Inspection Report, Atlantic City Naval Air Station (Parsons, 2007).
3) Area D boundary was derived from Plate 3 of the ASR (USACE, 1996).
4) Aerial photograph (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.

N

0 875 1,750 3,500
Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

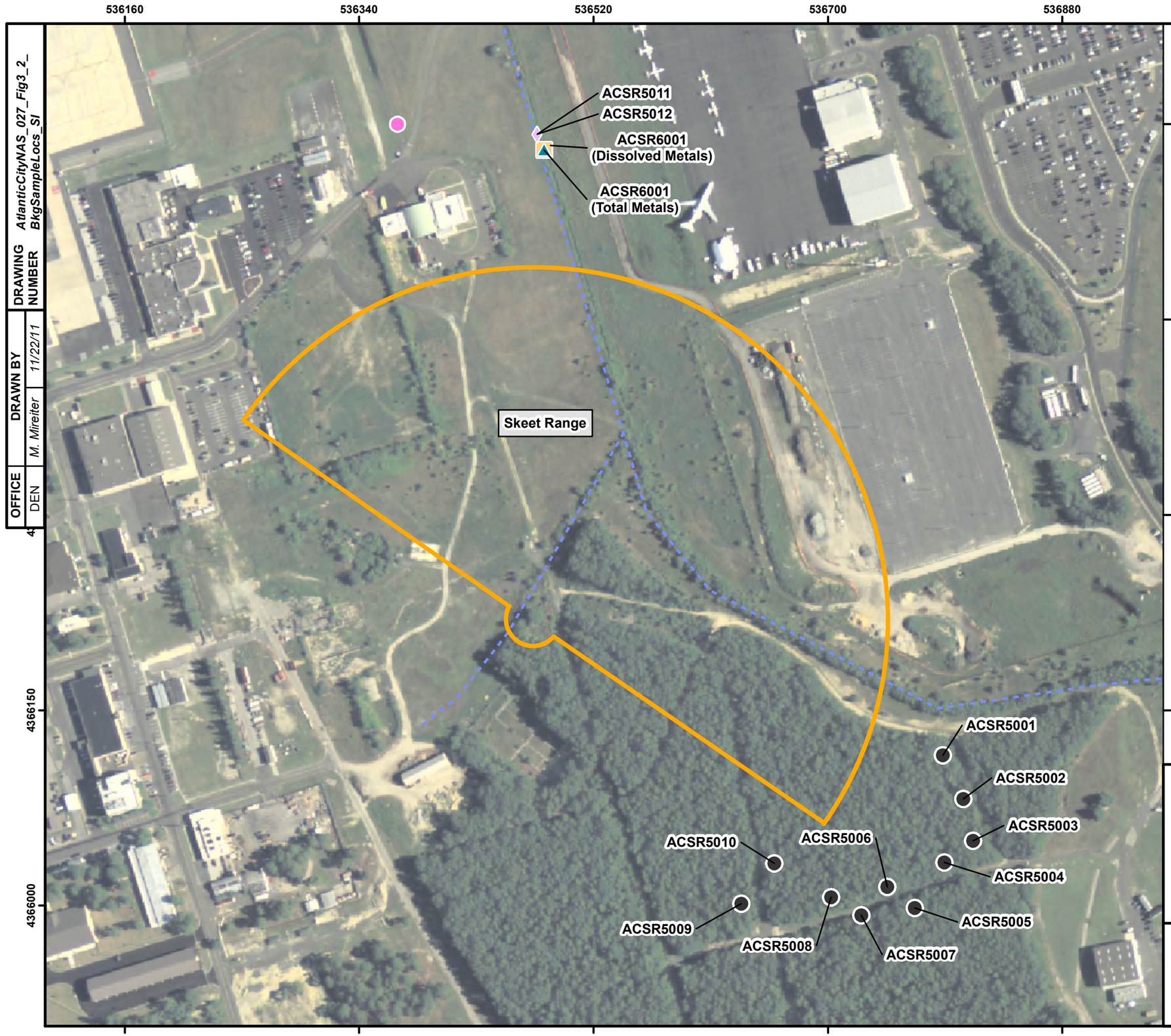
FIGURE 3-1

SITE INSPECTION MUNITIONS RESPONSE SITE

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

Shaw®



DRAWING NUMBER: *AtlanticCityNAS_027_Fig3_2_BkgSampleLocs_SI*

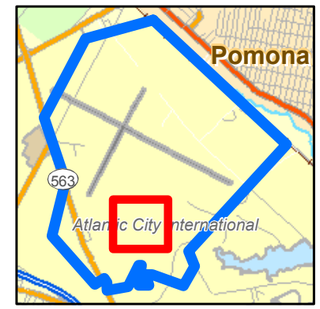
DRAWN BY: *M. Mireiter* *11/22/11*

OFFICE: DEN

Legend

- Skeet Range Boundary
- Background Metals Soil Sample Location
- Background PAH Soil Sample Location (NewFields, 2008)
- Background Lead Sediment Sample Location
- Background Dissolved Lead Surface Water Sample Location
- Background Total Lead Surface Water Sample Location

NOTES:
1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Aerial photograph (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.



N

0 125 250 500
Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 3-2

BACKGROUND SAMPLE LOCATIONS

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

Shaw®

DRAWING NUMBER: AtlanticCityNAS_028_Fig4_1_Recon_SI

DRAWN BY: M. Mireiter 11/22/11

OFFICE: DEN

536180 536320 536460 536600 536740

4366600 4366480 4366360 4366240 4366120

Area 41 (Former Fuel Tank Farm)

Former Burial Area B

South Jersey Transportation Authority

Former Burial Area A

Former Coal Storage Area

Intermittent Creek

ASR Area D

Former Pistol/Machine Gun Range

Skeet Range

Fence

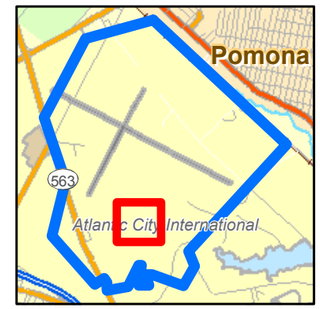
39 22 3 2 1 4 35

Legend

- Skeet Range Boundary
- Area 41 (Former Fuel Tank Farm)
- Former Burial Areas
- ASR Area D
- Reconnaissance Path
- Photograph Location
- Photograph Number

NOTES:

1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Former Burial Area boundaries were derived from Figure 4.1 of the Site Inspection Report, Atlantic City Naval Air Station (Parsons, 2007).
3) Area D boundary was derived from Plate 3 of the ASR (USACE, 1996).
4) Aerial photograph (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.



N

0 100 200 400 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 4-1

SITE INSPECTION RECONNAISSANCE

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

Shaw®

OFFICE	DRAWN BY		DRAWING NUMBER
DEN	M. Mireiter	11/22/11	AtlanticCityNAS_029_Fig4_2_MetalsResults_SI

Soil Sample Lead Results Greater Than Background and Human Health Screening Values

Soil Sample Metals Results Greater Than Background and Ecological But Less Than Human Health Screening Values

Soil Sample Metals Results Less Than Background Screening Values

Sediment Sample Lead Results Less Than Background Screening Values

Surface Water Total Lead Results Greater than Background, Ecological, and Human Health Screening Values

Surface Water Total Lead Results Less Than Background Screening Values

Surface Water Dissolved Lead Sample Results Greater Than Ecological, Background, and Human Health Screening Values

Surface Water Dissolved Lead Sample Results Less Than Background Screening Values

Area 41 (Former Fuel Tank Farm)

Estimated Lead Shot Fall Zone

Estimated Target Fragments and Lead Shot Fall Zone

Estimated Target Fragments Fall Zone

ACSR0001
ACSR0002
ACSR0003
ACSR0004
ACSR0005
ACSR0006
ACSR0007
ACSR0008
ACSR0009
ACSR0010
ACSR0011
ACSR0012
ACSR0013
ACSR0014
ACSR0015
ACSR0016
ACSR0020
ACSR1001
ACSR1002
ACSR2001 (Dissolved Metals)
ACSR2001 (Total Metals)
ACSR2002/2003 (Dissolved Metals)
ACSR2002/2003 (Total Metals)

Former Burial Area A

Former Burial Area B

Former Coal Storage Area

ASR Area D

Former Pistol/Machine Gun Range

Skeet Range

South Jersey Transportation Authority

Fence

536320 536460 536600 536740 536880

4366600 4366480 4366360 4366240 4366120

Legend

- Skeet Range Boundary
- Area 41 (Former Fuel Tank Farm)
- Former Burial Areas
- ASR Area D

Skeet Range Estimated Shotfall Zones[4]

- Lead Shot
- Target Fragments
- Target Fragments and Lead Shot

NOTES:
1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Former Burial Area boundaries were derived from Figure 4.1 of the Site Inspection Report, Atlantic City Naval Air Station (Parsons, 2007).
3) Area D boundary was derived from Plate 3 of the ASR (USACE, 1996).
4) Shotfall zone boundaries are based on previous skeet range investigations (adapted from the ITRC *Characterization and Remediation of Soils at Closed Small Arms Ranges*, ITRC, 2003).
5) Aerial photograph (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.

N

0 100 200 400 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 4-2

SAMPLE LOCATIONS AND METALS RESULTS

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

Shaw®

DRAWING NUMBER: AtlanticCityNAS_030_Fig4_3_PAHResults_SI

DRAWN BY: M. Mireiter 11/22/11

OFFICE: DEN

536320 536460 536600 536740

4366600 4366480 4366360 4366240 4366120

Area 41 (Former Fuel Tank Farm)

Former Burial Area B

Estimated Lead Shot Fall Zone

Estimated Target Fragments and Lead Shot Fall Zone

Estimated Target Fragments Fall Zone

I-NK32

I-NE32

I-D32

ACSR0017

ACSR0021

ACSR0018

ACSR0019

South Jersey Transportation Authority

Former Burial Area A

Former Coal Storage Area

ASR Area D

Former Pistol/Machine Gun Range

Fence

Skeet Range

Legend

- Skeet Range Boundary
- Area 41 (Former Fuel Tank Farm)
- Former Burial Areas
- ASR Area D
- Approximate Area of PAH Contamination (TRC, 2009)

Skeet Range Estimated Shotfall Zones[4]

- Lead Shot
- Target Fragments
- Target Fragments and Lead Shot
- Historical Soil Sample PAH Results Greater Than Both Background and Human Health Screening Values
- Soil Sample PAH Results Less Than Background Screening Values

NOTES:

1) Property and range boundaries were obtained from the Atlantic City Naval Air Station MMRP Realignment FUDSMIS Data Summary (USACE, 2010).
2) Former Burial Area boundaries were derived from Figure 4.1 of the Site Inspection Report, Atlantic City Naval Air Station (Parsons, 2007).
3) Area D boundary was derived from Plate 3 of the ASR (USACE, 1996).
4) Shotfall zone boundaries are based on previous skeet range investigations (adapted from the ITRC *Characterization and Remediation of Soils at Closed Small Arms Ranges*, ITRC, 2003).
5) Historical sample locations and results from URS, 2003; TRC, 2007.
6) Aerial photograph (Atlantic County) was obtained from the U.S. Department of Agriculture, Service Center Agencies; photograph is from the USDA-APFO National Agriculture Imagery Program (NAIP), 2010.

N

0 100 200 400 Feet

REFERENCE/PROJECTION: NAD 83 UTM Zone 18N

FIGURE 4-3

SAMPLE LOCATIONS AND PAH RESULTS

SKEET RANGE
ATLANTIC CITY NAVAL AIR STATION
PROJECT NUMBER C02NJ097705

US Army Corps of Engineers®

Shaw®

Tables

Table 2-1
Munitions Information
Atlantic City NAS, New Jersey
Skeet Range MRS

Small Arms Munitions/ MMRP-Related Items	Component	Constituents	Site Inspection Analytes
12-gauge shotgun was standard. Other gauges that may have been used: .410, 16, or 20 gauges.	Projectile	Lead shot	Lead
	Propellant	Smokeless powder, nitrocellulose, diphenylamine, graphite, dinitrotoluene	None[a]
	Cartridge or shell casing with firing cap	Cardboard or brass	None
Clay pigeon targets		Petroleum pitch-based binder containing PAHs	PAHs[b]

Notes:
MMRP = Military Munitions Response Program
MRS = munitions response site
NAS = Naval Air Station
PAHs = polycyclic aromatic hydrocarbons

The basis for excluding munitions constituents is summarized in the footnotes provided below:

[a] Propellant is largely dispersed in the air upon firing and involves limited potential quantities.
[b] PAHs from the pitch-based clay pigeon targets used at the MRS are not munitions constituents; however, they are addressed under the MMRP as constituents potentially associated with former range use. The presence of PAH compounds in soil resulting from clay pigeon target fragments has been previously established at the MRS.

Table 2-2
Army Checklist for Important Ecological Places[a]
Atlantic City NAS, New Jersey
Skeet Range MRS

		Yes / No	Comments
1	Locally important ecological place identified by the Integrated Natural Resource Management Plan, BRAC Cleanup Plan or Redevelopment Plan, or other official land management plans	☐ / ☒	
2	Critical habitat for Federal designated endangered or threatened species	☐ / ☒	
3	Marine Sanctuary	☐ / ☒	
4	National Park	☐ / ☒	
5	Designated Federal Wilderness Area	☐ / ☒	
6	Areas identified under the Coastal Zone Management Act	☐ / ☒	
7	Sensitive Areas identified under the National Estuary Program or Near Coastal Waters Program	☐ / ☒	
8	Critical areas identified under the Clean Lakes Program	☐ / ☒	
9	National Monument	☐ / ☒	
10	National Seashore Recreational Area	☐ / ☒	
11	National Lakeshore Recreational Area	☐ / ☒	
12	Habitat known to be used by Federal designated or proposed endangered or threatened species	☐ / ☒	
13	National preserve	☒ / ☐	The MRS is located within the Pinelands National Reserve.
14	National or State Wildlife Refuge	☐ / ☒	
15	Unit of Coastal Barrier Resources System	☐ / ☒	
16	Coastal Barrier (undeveloped)	☐ / ☒	
17	Federal land designated for protection of natural ecosystems	☐ / ☒	
18	Administratively Proposed Federal Wilderness Area	☐ / ☒	
19	Spawning areas critical for the maintenance of fish/shellfish species within river, lake, or coastal tidal waters	☐ / ☒	
20	Migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which fish spend extended periods of time	☐ / ☒	

Table 2 (Cont.)
Army Checklist for Important Ecological Places[a]
Atlantic City NAS, New Jersey
Skeet Range MRS

		Yes / No	Comments
21	Terrestrial areas utilized for breeding by large or dense aggregations of animals	☐ / ☒	
22	National river reach designated as Recreational	☐ / ☒	
23	Habitat known to be used by state designated endangered or threatened species	☒ / ☐	New Jersey Department of Environmental Protection Natural Heritage Program identified two species (Cooper's Hawk [NJ threatened] and Upland Sandpiper [NJ endangered]) with habitat occurrence on the MRS.
24	Habitat known to be used by species under review as to its Federal endangered or threatened status	☐ / ☒	
25	Coastal Barrier (partially developed)	☐ / ☒	
26	Federally designated Scenic or Wild River	☐ / ☒	
27	State land designated for wildlife or game management	☐ / ☒	
28	State-designated Scenic or Wild River	☐ / ☒	
29	State-designated Natural Areas	☒ / ☐	The MRS is located within the New Jersey Pinelands management area.
30	Particular areas, relatively small in size, important to maintenance of unique biotic communities	☐ / ☒	
31	State-designated areas for protection or maintenance of aquatic life	☐ / ☒	
32	Wetlands	☐ / ☒	
33	Fragile landscapes, land sensitive to degradation if vegetative habitat or cover diminishes	☐ / ☒	

Notes:
NAS = Naval Air Station
MRS = munitions response site
[a] Based on EPA, 1990, 55 FR 51624, Table 4-23 – Sensitive Environments Rating Values, Dec. 14, 1990; EPA, 1997, ERAGS, Exhibit 1-1 List of Sensitive Environments.

Table 3-1
Sample Collection and Analysis Summary
Atlantic City NAS, New Jersey
Skeet Range MRS

Location ID	Sample Number	Sample Purpose	Sample Type	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Laboratory Sample ID	Lead by SW-846 6020A	Lead and Manganese by SW-846 6020A	Aluminum, calcium, iron, and magnesium by SW-846 6010B	PAHs by SW-846 8270C (Low Level)
Skeet Range MRS											
ACSR01	ACSR0001	REG	SS	27-Sep-11	0	0.5	280-20928-1		X	X	
	ACSR0020	FR	SS	29-Sep-11	0	0.5	280-20928-17		X	X	
ACSR02	ACSR0002	REG	SS	27-Sep-11	0	0.5	280-20928-2		X	X	
ACSR03	ACSR0003	REG	SS	29-Sep-11	0	0.5	280-20928-3		X	X	
ACSR04	ACSR0004	REG	SS	29-Sep-11	0	0.5	280-20928-4		X	X	
ACSR05	ACSR0005	REG	SS	27-Sep-11	0	0.5	280-20928-5		X	X	
ACSR06	ACSR0006	REG	SS	27-Sep-11	0	0.5	280-20928-6		X	X	
ACSR07	ACSR0007	REG	SS	29-Sep-11	0	0.5	280-20928-7		X	X	
ACSR08	ACSR0008	REG	SS	29-Sep-11	0	0.5	280-20928-8		X	X	
ACSR09	ACSR0009	REG	SS	27-Sep-11	0	0.5	280-20928-9		X	X	
ACSR10	ACSR0010	REG	SS	27-Sep-11	0	0.5	280-20928-10		X	X	
ACSR11	ACSR0011	REG	SS	29-Sep-11	0	0.5	280-20928-11		X	X	
ACSR12	ACSR0012	REG	SS	29-Sep-11	0	0.5	280-20928-12		X	X	
ACSR13	ACSR0013	REG	SS	29-Sep-11	0	0.5	280-20928-13		X	X	
ACSR14	ACSR0014	REG	SS	29-Sep-11	0	0.5	280-20928-14		X	X	
ACSR15	ACSR0015	REG	SS	29-Sep-11	0	0.5	280-20928-15		X	X	
ACSR16	ACSR0016	REG	SS	29-Sep-11	0	0.5	280-20928-16		X	X	
ACSR17	ACSR0017	REG	SS	29-Sep-11	0	0.5	280-20928-28				X
	ACSR0021	FD	SS	29-Sep-11	0	0.5	280-20928-31				X
ACSR18	ACSR0018	REG	SS	29-Sep-11	0	0.5	280-20928-29				X
ACSR19	ACSR0019	REG	SS	29-Sep-11	0	0.5	280-20928-30				X
	ACSR0019-MS	MS	SS	29-Sep-11	0	0.5	280-20928-30MS				X
	ACSR0019-MSD	MSD	SS	29-Sep-11	0	0.5	280-20928-30MSD				X
ACSR20	ACSR1001	REG	SD	29-Sep-11	0	0.5	280-20928-32	X			
	ACSR2001	REG	SW	29-Sep-11	---	---	280-20928-36	X			
ACSR21	ACSR1002	REG	SD	29-Sep-11	0	0.5	280-20928-33	X			
	ACSR2002	REG	SW	29-Sep-11	---	---	280-20928-37	X [1]			
	ACSR2003	FD	SW	29-Sep-11	---	---	280-20928-38	X [1]			

Table 3-1 (Cont.)
Sample Collection and Analysis Summary
Atlantic City NAS, New Jersey
Skeet Range MRS

Location ID	Sample Number	Sample Purpose	Sample Type	Sample Date	Start Depth (ft bgs)	End Depth (ft bgs)	Laboratory Sample ID	Lead by SW-846 6020A	Lead and Manganese by SW-846 6020A	Aluminum, calcium, iron, and magnesium by SW-846 6010B	PAHs by SW-846 8270C (Low Level)
Background											
ACSR22	ACSR5001	REG	SS	29-Sep-11	0	0.5	280-20928-18		X	X	
	ACSR5001-MS	MS	SS	29-Sep-11	0	0.5	280-20928-18MS		X	X	
	ACSR5001-MSD	MSD	SS	29-Sep-11	0	0.5	280-20928-18MSD		X	X	
ACSR23	ACSR5002	REG	SS	29-Sep-11	0	0.5	280-20928-19		X	X	
ACSR24	ACSR5003	REG	SS	29-Sep-11	0	0.5	280-20928-20		X	X	
ACSR25	ACSR5004	REG	SS	29-Sep-11	0	0.5	280-20928-21		X	X	
ACSR26	ACSR5005	REG	SS	29-Sep-11	0	0.5	280-20928-22		X	X	
ACSR27	ACSR5006	REG	SS	29-Sep-11	0	0.5	280-20928-23		X	X	
ACSR28	ACSR5007	REG	SS	29-Sep-11	0	0.5	280-20928-24		X	X	
ACSR29	ACSR5008	REG	SS	29-Sep-11	0	0.5	280-20928-25		X	X	
ACSR30	ACSR5009	REG	SS	29-Sep-11	0	0.5	280-20928-26		X	X	
ACSR31	ACSR5010	REG	SS	29-Sep-11	0	0.5	280-20928-27		X	X	
ACSR32	ACSR5011	REG	SD	29-Sep-11	0	0.5	280-20928-34	X			
	ACSR5012	FD	SD	29-Sep-11	0	0.5	280-20928-35	X			
	ACSR6001	REG	SW	29-Sep-11	---	---	280-20928-39	X [1]			
	ACSR6001-MS	MS	SW	29-Sep-11	---	---	280-20928-39MS	X [1]			
	ACSR6001-MSD	MSD	SW	29-Sep-11	---	---	280-20928-39MSD	X [1]			

Notes:

X - Indicates a sample was collected and analyzed for the given parameter

X [1] - The sample was analyzed for total and dissolved lead

FD - field duplicate sample
FR - field replicate sample
ft bgs - feet below ground surface
ID - identification
MRS - Munitions Response Site
MS - matrix spike
MSD - matrix spike duplicate
NAS - Naval Air Station
PAHs - polycyclic aromatic hydrocarbons
REG - regular field sample
SD - sediment
SS - surface soil (0 - 0.5 ft below ground surface)
SW - surface water

Table 3-2
Background Surface Soil Concentrations
Atlantic City NAS, New Jersey
Skeet Range MRS

Location			ACSR22				ACSR23				ACSR24				ACSR25				ACSR26			
Sample Number			ACSR5001				ACSR5002				ACSR5003				ACSR5004				ACSR5005			
Sample Date			29-Sep-11				29-Sep-11				29-Sep-11				29-Sep-11				29-Sep-11			
Sample Depth (ft bgs)			0 to 0.5				0 to 0.5				0 to 0.5				0 to 0.5				0 to 0.5			
Sample Purpose			REG				REG				REG				REG				REG			
Fraction	**Parameter**	**Units**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals	Lead	mg/kg	18	0.8	0.0182	J	20.1	0.762	0.0173		33.2	0.784	0.0178		11.7	0.784	0.0178		13.5	0.777	0.0177	

Notes:
ft bgs - feet below ground surface
MDL - method detection limit
mg/kg - milligrams per kilogram
MRS - Munitions Response Site
NAS - Naval Air Station
PQL - practical quantitation limit
REG - regular field sample
VQ - validation qualifier

Validation Qualifier Definition:
J - The compound/analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.

Table 3-2 (Cont.)
Background Surface Soil Concentrations
Atlantic City NAS, New Jersey
Skeet Range MRS

Location			ACSR27				ACSR28				ACSR29				ACSR30				ACSR31			
Sample Number			ACSR5006				ACSR5007				ACSR5008				ACSR5009				ACSR5010			
Sample Date			29-Sep-11				29-Sep-11				29-Sep-11				29-Sep-11				29-Sep-11			
Sample Depth (ft bgs)			0 to 0.5				0 to 0.5				0 to 0.5				0 to 0.5				0 to 0.5			
Sample Purpose			REG				REG				REG				REG				REG			
Fraction	**Parameter**	**Units**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals	Lead	mg/kg	5.33	0.777	0.0177		6.33	0.784	0.0178		26	0.777	0.0177		26.6	0.8	0.0182		23	0.777	0.0177	

Notes:
ft bgs - feet below ground surface
MDL - method detection limit
mg/kg - milligrams per kilogram
MRS - Munitions Response Site
NAS - Naval Air Station
PQL - practical quantitation limit
REG - regular field sample
VQ - validation qualifier

Validation Qualifier Definition:
J - The compound/analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.

Table 3-3
Background Sediment Concentrations
Atlantic City NAS, New Jersey
Skeet Range MRS

Location			**ACSR32**				**ACSR32**			
Sample Number			**ACSR5011**				**ACSR5012**			
Sample Date			**29-Sep-11**				**29-Sep-11**			
Sample Depth (ft bgs)			**0 to 0.5**				**0 to 0.5**			
Sample Purpose			**REG**				**FD**			
Fraction	**Parameter**	**Units**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals	Lead	mg/kg	39.2	0.777	0.0177		27.6	0.762	0.0173	

Notes:
FD - field duplicate sample
ft bgs - feet below ground surface
MDL - method detection limit
mg/kg - milligrams per kilogram
MRS - Munitions Response Site
NAS - Naval Air Station
PQL - practical quantitation limit
REG - regular field sample
VQ - validation qualifier

Table 3-4
Background Surface Water Concentrations
Atlantic City NAS, New Jersey
Skeet Range MRS

Location				ACSR32			
Sample Number				ACSR6001			
Sample Date				29-Sep-11			
Sample Purpose				REG			
Fraction	**Parameter**	**Filtered**	**Units**	**Result**	**PQL**	**MDL**	**VQ**
Metals - Total	Lead	N	µg/L	13.7	3	0.18	
Metals - Dissolved	Lead	Y	µg/L	6.53	3	0.18	R*

Notes:
MDL - method detection limit
µg/L - micrograms per liter
MRS - Munitions Response Site
NAS - Naval Air Station
PQL - practical quantitation limit
REG - regular field sample
VQ - validation qualifier

Validation Qualifier Definitions:
R - The reported sample results are rejected due to the following: 1. Severe deficiencies in the supporting quality control data; 2. anomalies noted in the sampling and/or analysis process which could affect the validity of the reported data; 3. the presence or absence of the constituent cannot be verified based on the data provided; 4. to indicate not to use a particular result in the event of a reanalysis.

* Because the dissolved sample has been qualified as "R," the Background Threshold Level is established at the laboratory's PQL.

Table 3-5
Background and Human Health Screening Levels
Atlantic City NAS, New Jersey
Skeet Range MRS

Analyte	Soil Screening Levels		Sediment Screening Levels		Surface Water Screening Levels		
	95% UTL (Lead) Background Threshold Value (PAHs)[a]	EPA RSL Industrial Soil[b]	Background Threshold Value[c]	EPA RSL Industrial Sediment[b]	Background Threshold Value[c]	EPA RSL MCL	NJ SWQC, N.J.A.C. 7:9B Human Health
Munitions Constituents	**mg/kg**		**mg/kg**		**µg/L**		
Lead	45.0	800	117.6	800	41.1	15.0	5.0
Related Constituents (PAHs)							
Acenaphthene	0.042	33000	NS	NS	NS	NS	NS
Acenaphthylene	0.0174	17000	NS	NS	NS	NS	NS
Anthracene	0.069	170000	NS	NS	NS	NS	NS
Benz[a]anthracene	0.36	2.1	NS	NS	NS	NS	NS
Benzo[a]pyrene	0.39	0.21	NS	NS	NS	NS	NS
Benzo[b]fluoranthene	0.45	2.1	NS	NS	NS	NS	NS
Benzo[k]fluoranthene	0.42	21	NS	NS	NS	NS	NS
Benzo[g,h,i]perylene	0.33	17000	NS	NS	NS	NS	NS
Chrysene	0.48	210	NS	NS	NS	NS	NS
Dibenz[a,h]anthracene	0.084	0.21	NS	NS	NS	NS	NS
Fluoranthene	0.96	22000	NS	NS	NS	NS	NS
Fluorene	0.033	22000	NS	NS	NS	NS	NS
Indeno[1,2,3-cd]pyrene	0.39	2.1	NS	NS	NS	NS	NS
Naphthalene	0.0144	18	NS	NS	NS	NS	NS
Phenanthrene	0.48	17000	NS	NS	NS	NS	NS
Pyrene	0.81	17000	NS	NS	NS	NS	NS

Notes:

EPA = U.S. Environmental Protection Agency
MCL = Maximum Contaminant Level
µg/L = micrograms per liter
mg/kg = milligrams per kilogram
MRS = munitions response site
NAS = Naval Air Station
NS = not sampled (PAHs not sampled in this media)
N.J.A.C. = New Jersey Administrative Code (January 2010)
PAH = polycyclic aromatic hydrocarbon
RSL = Regional Screening Level
SI = Site Inspection
SWQC = surface water quality criteria
UTL = upper tolerance limit

Table 3-5 (Cont.)
Background and Human Health Screening Levels
Atlantic City NAS, New Jersey
Skeet Range MRS

[a] Ten surface soil samples were collected as a background dataset for lead as part of this SI. A 95 percent UTL was calculated using the data. The background threshold values shown for the PAH compounds are based on one background sample collected for the *Soil PAH Forensic Investigation* (Newfields, 2008). An observed release (for the PAH compounds) is established when a site sample concentration is three times or more above the background concentration, in accordance with HRS criteria (40 CFR Appendix A to Part 300).

[b] Human health soil values based on EPA Regional Screening Levels (RSLs) for Industrial Soil for Chemical Contaminants at Superfund Sites, November 2011. The values provided for acenaphthylene, benzo[g,h,i]perylene, and phenanthrene are based on pyrene as a surrogate.

[c] The background threshold values shown for sediment and surface water are based on the result from one upstream sample collected as part of this SI. An observed release is established when a site sample concentration is three times or more above the background concentration, in accordance with HRS criteria (40 CFR Appendix A to Part 300). The background threshold value shown for surface water is derived from the total, or undissolved, concentration.

Table 3-6
Ecological Screening Values for Lead
Atlantic City NAS, New Jersey
Skeet Range MRS

Analyte	Ecological Soil Screening		Ecological Sediment Screening		Ecological Surface Water Screening			
	NJDEP Ecological Screening Criteria for Soil [a]	EPA EcoSSL [b]	NJDEP Ecological Screening Criteria for Sediment [a]	EPA Region 3 Freshwater Sediment Benchmark [c]	NJDEP Ecological Screening Criteria for Surface Water (Chronic) [a]	NJ SWQS Chronic Aquatic Life [d]	EPA National Recommended Water Quality Criteria - CCC [e]	EPA Region 3 Freshwater Surface Water Benchmark [f g]
Metals	mg/kg		mg/kg		µg/L			
Lead	11	11	35.8	35.8	5.4	5.4	2.5	2.5

Notes:

CCC = Criterion Continuous Concentration
EcoSSLs = ecological soil screening levels
EPA = U.S. Environmental Protection Agency
µg/L = micrograms per liter
mg/kg = milligrams per kilogram
MRS = Munitions Response Site
NAS = Naval Air Station
NJ SWQS = New Jersey Surface Water Quality Standards
NJDEP = New Jersey Department of Environmental Protection

[a] NJDEP Ecological Screening Criteria (NJDEP, 2009).
[b] Ecological Soil Screening Levels (EcoSSLs) (EPA, 2007), lowest value presented.
[c] EPA Region 3, 2007, Online *Ecological Risk Assessment Freshwater Sediment Screening Benchmarks,* http://www.epa/reg3hwmd/risk/eco/btag/fwsed/screenbench.htm.
[d] New Jersey Administrative Code 7:9B, *Surface Water Quality Standards for Freshwater,* January 2010.
[e] EPA, *National Recommended Water Quality Criteria* , 4304T, criteria for freshwater, 2009.
[f] EPA Region 3, 2007, Online *Ecological Risk Assessment Freshwater Surface Water Screening Benchmarks,* http://www.epa.gov/reg3hwmd/risk/eco/index.htm.
[g] 2.5 µg/L is used for dissolved (filtered) concentrations.

Table 4-1
Maximum Detected Concentrations of PAHs in Surface Soil (Previous Investigations)
Atlantic City NAS, New Jersey
Skeet Range MRS

Polycyclic Aromatic Hydrocarbon (PAH) Compounds	Background Screening Value	Human Health Screening Value EPA RSL Industrial Soil	Recommended Ecological Screening Value (ESV)	MDC at Surface Soil Samples I-NK32 & I-D32 (URS, 2003)	Surface Soil/Skeet Fragment Sample I-NE32 (TRC, 2007)
Acenaphthene	0.042	33,000	29	**1.0**	**230**
Acenaphthylene *	0.174	17,000	29	**1.7 U**	**1.4**
Anthracene	0.069	170,000	29	**2.0**	**580**
Benz[a]anthracene	0.36	2.1	1.1	**17**	**4100**
Benzo[a]pyrene	0.39	0.21	1.1	**14**	**4900**
Benzo[b]fluoranthene	0.45	2.1	1.1	**20**	**4200**
Benzo[g,h,i]perylene *	0.33	17,000	1.1	**5.8**	**2800**
Benzo[k]fluoranthene	0.42	21	1.1	**8.0**	**3700**
Chrysene	0.48	210	1.1	**19**	**4400**
Dibenz[a,h]anthracene	0.084	0.21	1.1	**1.9**	**810**
Fluoranthene	0.96	22,000	29	**22**	**6800**
Fluorene	0.033	22,000	29	**0.37**	**110**
Indeno[1,2,3-cd]pyrene	0.39	2.1	1.1	**6.0**	**3400**
Naphthalene	0.0144	18.0	29	**0.6**	**140**
Phenanthrene *	0.48	17,000	29	**7.8**	**2100**
Pyrene	0.81	17,000	1.1	**20**	**6100**

Notes:

All results shown are milligrams per kilogram (mg/kg).
* The value used (17,000 mg/kg) is based on pyrene as a surrogate.
ESVs are based on rationale presented in Section 3.5.3.
Bolded values exceed the background threshold values.
Underlined values exceed EPA RSLs for industrial soil.
Gray highlighted values exceed the ESVs.

EPA = U.S. Environmental Protection Agency
ESV = Ecological Screening Level
MDC = maximum detected concentration
MRS = Munitions Response Site
NAS = Naval Air Station
RSL = Regional Screening Level

Table 4-2
Surface Soil Comparison
Atlantic City NAS, New Jersey
Skeet Range MRS

Location						ACSR01				ACSR01				ACSR02			
Sample Number						ACSR0001				ACSR0020				ACSR0002			
Sample Date						27-Sep-11				29-Sep-11				27-Sep-11			
Sample Depth (ft bgs)						0 to 0.5				0 to 0.5				0 to 0.5			
Sample Purpose						REG				FR				REG			
Fraction	**Parameter**	**Units**	**95% UTL (Lead) Background Threshold Value (PAHs) [a]**	**Site Inspection Ecological Screening Level**	**Site Inspection Human Health Screening Level**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals	Lead	mg/kg	45.0	11.0	800	*31.4*	0.8	0.0182		*28.4*	0.777	0.0177		*14.2*	0.784	0.0178	
PAHs	Acenaphthene	mg/kg	0.0420 [a]	No criteria	33000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Acenaphthylene	mg/kg	0.0174 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Anthracene	mg/kg	0.069 [a]	No criteria	170000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(a)anthracene	mg/kg	0.360 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(a)pyrene	mg/kg	0.390 [a]	No criteria	0.210	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(b)fluoranthene	mg/kg	0.450 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(ghi)perylene	mg/kg	0.330 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(k)fluoranthene	mg/kg	0.420 [a]	No criteria	21.0	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Chrysene	mg/kg	0.480 [a]	No criteria	210	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Dibenzo(a,h)anthracene	mg/kg	0.0840 [a]	No criteria	0.21	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Fluoranthene	mg/kg	0.960 [a]	No criteria	22000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Fluorene	mg/kg	0.0330 [a]	No criteria	22000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	0.390 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Naphthalene	mg/kg	0.0144 [a]	No criteria	18.0	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Phenanthrene	mg/kg	0.480 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Pyrene	mg/kg	0.810 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---

Notes:

[**Bold Face**] - Result exceeds 95% UTL (Lead) Background Threshold Value (PAHs).

[*Italicized*] - Result exceeds Site Inspection Ecological Screening Level.

[Underlined] - Result exceeds Site Inspection Human Health Screening Level.

a - Ten surface soil samples were collected as a background dataset as part of this SI. A 95 percent UTL was calculated using the data. The background threshold values shown for the PAH compounds are based on one background sample collected for the *Soil PAH Forensic Investigation* (Newfields, 2008). Each PAH concentration is multiplied by a factor of three per EPA guidance (EPA, 1990, 1992, 1995).

" ---" - Sample was not analyzed for target analyte.

EPA - U.S. Environmental Protection Agency
FD - field duplicate sample
FR - field replicate sample
ft bgs - feet below ground surface
MDL - method detection limit
mg/kg - milligrams per kilogram
MRS - Munitions Response Site
NAS - Naval Air Station
PAHs - polycyclic aromatic hydrocarbons
PQL - practical quantitation limit
REG - regular field sample
UTL - upper tolerance limit
VQ - validation qualifier

Validation Qualifier Definitions:

U - Not detected. The compound/analyte was analyzed for, but not detected above the associated method detection limit.
J - The compound/analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.

Table 4-2 (Cont.)
Surface Soil Comparison
Atlantic City NAS, New Jersey
Skeet Range MRS

Location						ACSR03				ACSR04				ACSR05			
Sample Number						ACSR0003				ACSR0004				ACSR0005			
Sample Date						29-Sep-11				29-Sep-11				27-Sep-11			
Sample Depth (ft bgs)						0 to 0.5				0 to 0.5				0 to 0.5			
Sample Purpose						REG				REG				REG			
Fraction	**Parameter**	**Units**	**95% UTL (Lead) Background Threshold Value (PAHs) [a]**	**Site Inspection Ecological Screening Level**	**Site Inspection Human Health Screening Level**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals	Lead	mg/kg	45.0	11.0	800	*13.2*	0.792	0.018		9.82	0.784	0.0178		***411***	0.792	0.018	
PAHs	Acenaphthene	mg/kg	0.0420 [a]	No criteria	33000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Acenaphthylene	mg/kg	0.0174 a	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Anthracene	mg/kg	0.069 [a]	No criteria	170000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(a)anthracene	mg/kg	0.360 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(a)pyrene	mg/kg	0.390 [a]	No criteria	0.210	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(b)fluoranthene	mg/kg	0.450 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(ghi)perylene	mg/kg	0.330 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(k)fluoranthene	mg/kg	0.420 [a]	No criteria	21.0	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Chrysene	mg/kg	0.480 [a]	No criteria	210	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Dibenzo(a,h)anthracene	mg/kg	0.0840 [a]	No criteria	0.21	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Fluoranthene	mg/kg	0.960 [a]	No criteria	22000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Fluorene	mg/kg	0.0330 [a]	No criteria	22000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	0.390 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Naphthalene	mg/kg	0.0144 [a]	No criteria	18.0	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Phenanthrene	mg/kg	0.480 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Pyrene	mg/kg	0.810 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---

Notes:

[**Bold Face**] - Result exceeds 95% UTL (Lead) Background Threshold Value (PAHs).

[*Italicized*] - Result exceeds Site Inspection Ecological Screening Level.

[Underlined] - Result exceeds Site Inspection Human Health Screening Level.

a - Ten surface soil samples were collected as a background dataset as part of this SI. A 95 percent UTL was calculated using the data. The background threshold values shown for the PAH compounds are based on one background sample collected for the *Soil PAH Forensic Investigation* (Newfields, 2008). Each PAH concentration is multiplied by a factor of three per EPA guidance (EPA, 1990, 1992, 1995).

" ---" - Sample was not analyzed for target analyte.

EPA - U.S. Environmental Protection Agency
FD - field duplicate sample
FR - field replicate sample
ft bgs - feet below ground surface
MDL - method detection limit
mg/kg - milligrams per kilogram
MRS - Munitions Response Site
NAS - Naval Air Station
PAHs - polycyclic aromatic hydrocarbons
PQL - practical quantitation limit
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Table 4-2 (Cont.)
Surface Soil Comparison
Atlantic City NAS, New Jersey
Skeet Range MRS

Location						ACSR06				ACSR07				ACSR08			
Sample Number						ACSR0006				ACSR0007				ACSR0008			
Sample Date						27-Sep-11				29-Sep-11				29-Sep-11			
Sample Depth (ft bgs)						0 to 0.5				0 to 0.5				0 to 0.5			
Sample Purpose						REG				REG				REG			
Fraction	**Parameter**	**Units**	**95% UTL (Lead) Background Threshold Value (PAHs) [a]**	**Site Inspection Ecological Screening Level**	**Site Inspection Human Health Screening Level**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals	Lead	mg/kg	45.0	11.0	800	***1070***	0.792	0.018		8.92	0.792	0.018		*14.5*	0.8	0.0182	
PAHs	Acenaphthene	mg/kg	0.0420 [a]	No criteria	33000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Acenaphthylene	mg/kg	0.0174 a	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Anthracene	mg/kg	0.069 [a]	No criteria	170000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(a)anthracene	mg/kg	0.360 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(a)pyrene	mg/kg	0.390 [a]	No criteria	0.210	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(b)fluoranthene	mg/kg	0.450 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(ghi)perylene	mg/kg	0.330 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(k)fluoranthene	mg/kg	0.420 [a]	No criteria	21.0	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Chrysene	mg/kg	0.480 [a]	No criteria	210	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Dibenzo(a,h)anthracene	mg/kg	0.0840 [a]	No criteria	0.21	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Fluoranthene	mg/kg	0.960 [a]	No criteria	22000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Fluorene	mg/kg	0.0330 [a]	No criteria	22000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	0.390 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Naphthalene	mg/kg	0.0144 [a]	No criteria	18.0	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Phenanthrene	mg/kg	0.480 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Pyrene	mg/kg	0.810 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---

Notes:

[**Bold Face**] - Result exceeds 95% UTL (Lead) Background Threshold Value (PAHs).

[*Italicized*] - Result exceeds Site Inspection Ecological Screening Level.

[Underlined] - Result exceeds Site Inspection Human Health Screening Level.

a - Ten surface soil samples were collected as a background dataset as part of this SI. A 95 percent UTL was calculated using the data. The background threshold values shown for the PAH compounds are based on one background sample collected for the *Soil PAH Forensic Investigation* (Newfields, 2008). Each PAH concentration is multiplied by a factor of three per EPA guidance (EPA, 1990, 1992, 1995).

" ---" - Sample was not analyzed for target analyte.

EPA - U.S. Environmental Protection Agency
FD - field duplicate sample
FR - field replicate sample
ft bgs - feet below ground surface
MDL - method detection limit
mg/kg - milligrams per kilogram
MRS - Munitions Response Site
NAS - Naval Air Station
PAHs - polycyclic aromatic hydrocarbons
PQL - practical quantitation limit
REG - regular field sample
UTL - upper tolerance limit
VQ - validation qualifier

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J - The compound/analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.

Table 4-2 (Cont.)
Surface Soil Comparison
Atlantic City NAS, New Jersey
Skeet Range MRS

Location						ACSR09				ACSR10				ACSR11			
Sample Number						ACSR0009				ACSR0010				ACSR0011			
Sample Date						27-Sep-11				27-Sep-11				29-Sep-11			
Sample Depth (ft bgs)						0 to 0.5				0 to 0.5				0 to 0.5			
Sample Purpose						REG				REG				REG			
Fraction	**Parameter**	**Units**	**95% UTL (Lead) Background Threshold Value (PAHs) [a]**	**Site Inspection Ecological Screening Level**	**Site Inspection Human Health Screening Level**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals	Lead	mg/kg	45.0	11.0	800	7.46	0.769	0.0175		*15.8*	0.792	0.018		*12*	0.769	0.0175	
PAHs	Acenaphthene	mg/kg	0.0420 [a]	No criteria	33000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Acenaphthylene	mg/kg	0.0174 a	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Anthracene	mg/kg	0.069 [a]	No criteria	170000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(a)anthracene	mg/kg	0.360 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(a)pyrene	mg/kg	0.390 [a]	No criteria	0.210	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(b)fluoranthene	mg/kg	0.450 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(ghi)perylene	mg/kg	0.330 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(k)fluoranthene	mg/kg	0.420 [a]	No criteria	21.0	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Chrysene	mg/kg	0.480 [a]	No criteria	210	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Dibenzo(a,h)anthracene	mg/kg	0.0840 [a]	No criteria	0.21	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Fluoranthene	mg/kg	0.960 [a]	No criteria	22000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Fluorene	mg/kg	0.0330 [a]	No criteria	22000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	0.390 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Naphthalene	mg/kg	0.0144 [a]	No criteria	18.0	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Phenanthrene	mg/kg	0.480 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Pyrene	mg/kg	0.810 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---

Notes:

[**Bold Face**] - Result exceeds 95% UTL (Lead) Background Threshold Value (PAHs).

[*Italicized*] - Result exceeds Site Inspection Ecological Screening Level.

[Underlined] - Result exceeds Site Inspection Human Health Screening Level.

a - Ten surface soil samples were collected as a background dataset as part of this SI. A 95 percent UTL was calculated using the data. The background threshold values shown for the PAH compounds are based on one background sample collected for the *Soil PAH Forensic Investigation* (Newfields, 2008). Each PAH concentration is multiplied by a factor of three per EPA guidance (EPA, 1990, 1992, 1995).

" ---" - Sample was not analyzed for target analyte.

EPA - U.S. Environmental Protection Agency
FD - field duplicate sample
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J - The compound/analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.

Table 4-2 (Cont.)
Surface Soil Comparison
Atlantic City NAS, New Jersey
Skeet Range MRS

Location						ACSR12				ACSR13				ACSR14			
Sample Number						ACSR0012				ACSR0013				ACSR0014			
Sample Date						29-Sep-11				29-Sep-11				29-Sep-11			
Sample Depth (ft bgs)						0 to 0.5				0 to 0.5				0 to 0.5			
Sample Purpose						REG				REG				REG			
Fraction	**Parameter**	**Units**	**95% UTL (Lead) Background Threshold Value (PAHs) [a]**	**Site Inspection Ecological Screening Level**	**Site Inspection Human Health Screening Level**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals	Lead	mg/kg	45.0	11.0	800	*20.5*	0.8	0.0182		*16.7*	0.777	0.0177		*12.9*	0.8	0.0182	
PAHs	Acenaphthene	mg/kg	0.0420 [a]	No criteria	33000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Acenaphthylene	mg/kg	0.0174 a	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Anthracene	mg/kg	0.069 [a]	No criteria	170000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(a)anthracene	mg/kg	0.360 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(a)pyrene	mg/kg	0.390 [a]	No criteria	0.210	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(b)fluoranthene	mg/kg	0.450 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(ghi)perylene	mg/kg	0.330 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Benzo(k)fluoranthene	mg/kg	0.420 [a]	No criteria	21.0	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Chrysene	mg/kg	0.480 [a]	No criteria	210	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Dibenzo(a,h)anthracene	mg/kg	0.0840 [a]	No criteria	0.21	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Fluoranthene	mg/kg	0.960 [a]	No criteria	22000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Fluorene	mg/kg	0.0330 [a]	No criteria	22000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	0.390 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Naphthalene	mg/kg	0.0144 [a]	No criteria	18.0	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Phenanthrene	mg/kg	0.480 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Pyrene	mg/kg	0.810 [a]	No criteria	17000	---	---	---	---	---	---	---	---	---	---	---	---

Notes:

[**Bold Face**] - Result exceeds 95% UTL (Lead) Background Threshold Value (PAHs).

[*Italicized*] - Result exceeds Site Inspection Ecological Screening Level.

[Underlined] - Result exceeds Site Inspection Human Health Screening Level.

a - Ten surface soil samples were collected as a background dataset as part of this SI. A 95 percent UTL was calculated using the data. The background threshold values shown for the PAH compounds are based on one background sample collected for the *Soil PAH Forensic Investigation* (Newfields, 2008). Each PAH concentration is multiplied by a factor of three per EPA guidance (EPA, 1990, 1992, 1995).

" ---" - Sample was not analyzed for target analyte.

EPA - U.S. Environmental Protection Agency
FD - field duplicate sample
FR - field replicate sample
ft bgs - feet below ground surface
MDL - method detection limit
mg/kg - milligrams per kilogram
MRS - Munitions Response Site
NAS - Naval Air Station
PAHs - polycyclic aromatic hydrocarbons
PQL - practical quantitation limit
REG - regular field sample
UTL - upper tolerance limit
VQ - validation qualifier

Validation Qualifier Definitions:

U - Not detected. The compound/analyte was analyzed for, but not detected above the associated method detection limit.
J - The compound/analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.

Table 4-2 (Cont.)
Surface Soil Comparison
Atlantic City NAS, New Jersey
Skeet Range MRS

Location						ACSR15				ACSR16				ACSR17			
Sample Number						ACSR0015				ACSR0016				ACSR0017			
Sample Date						29-Sep-11				29-Sep-11				29-Sep-11			
Sample Depth (ft bgs)						0 to 0.5				0 to 0.5				0 to 0.5			
Sample Purpose						REG				REG				REG			
Fraction	**Parameter**	**Units**	**95% UTL (Lead) Background Threshold Value (PAHs) [a]**	**Site Inspection Ecological Screening Level**	**Site Inspection Human Health Screening Level**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals	Lead	mg/kg	45.0	11.0	800	10.5	0.8	0.0182		8.2	0.777	0.0177		---	---	---	---
PAHs	Acenaphthene	mg/kg	0.0420 [a]	No criteria	33000	---	---	---	---	---	---	---	---	0.00628	0.00938	0.0003	J
PAHs	Acenaphthylene	mg/kg	0.0174 a	No criteria	17000	---	---	---	---	---	---	---	---	0.00234	0.00938	0.000319	J
PAHs	Anthracene	mg/kg	0.069 [a]	No criteria	170000	---	---	---	---	---	---	---	---	0.0115	0.00938	0.00135	
PAHs	Benzo(a)anthracene	mg/kg	0.360 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	0.0645	0.00938	0.00169	
PAHs	Benzo(a)pyrene	mg/kg	0.390 [a]	No criteria	0.210	---	---	---	---	---	---	---	---	0.075	0.00938	0.00139	
PAHs	Benzo(b)fluoranthene	mg/kg	0.450 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	0.136	0.00938	0.00225	
PAHs	Benzo(ghi)perylene	mg/kg	0.330 [a]	No criteria	17000	---	---	---	---	---	---	---	---	0.0631	0.00938	0.00206	
PAHs	Benzo(k)fluoranthene	mg/kg	0.420 [a]	No criteria	21.0	---	---	---	---	---	---	---	---	0.0443	0.00938	0.00188	
PAHs	Chrysene	mg/kg	0.480 [a]	No criteria	210	---	---	---	---	---	---	---	---	0.104	0.00938	0.00188	
PAHs	Dibenzo(a,h)anthracene	mg/kg	0.0840 [a]	No criteria	0.21	---	---	---	---	---	---	---	---	0.0187	0.00938	0.00244	
PAHs	Fluoranthene	mg/kg	0.960 [a]	No criteria	22000	---	---	---	---	---	---	---	---	0.232	0.00938	0.00188	
PAHs	Fluorene	mg/kg	0.0330 [a]	No criteria	22000	---	---	---	---	---	---	---	---	0.00448	0.00938	0.000881	J
PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	0.390 [a]	No criteria	2.10	---	---	---	---	---	---	---	---	0.0776	0.00938	0.00206	
PAHs	Naphthalene	mg/kg	0.0144 [a]	No criteria	18.0	---	---	---	---	---	---	---	---	0.00367	0.00938	0.000611	J
PAHs	Phenanthrene	mg/kg	0.480 [a]	No criteria	17000	---	---	---	---	---	---	---	---	0.0814	0.00938	0.00206	
PAHs	Pyrene	mg/kg	0.810 [a]	No criteria	17000	---	---	---	---	---	---	---	---	0.176	0.00938	0.00206	

Notes:

[**Bold Face**] - Result exceeds 95% UTL (Lead) Background Threshold Value (PAHs).

[*Italicized*] - Result exceeds Site Inspection Ecological Screening Level.

[Underlined] - Result exceeds Site Inspection Human Health Screening Level.

a - Ten surface soil samples were collected as a background dataset as part of this SI. A 95 percent UTL was calculated using the data. The background threshold values shown for the PAH compounds are based on one background sample collected for the *Soil PAH Forensic Investigation* (Newfields, 2008). Each PAH concentration is multiplied by a factor of three per EPA guidance (EPA, 1990, 1992, 1995).

" ---" - Sample was not analyzed for target analyte.

EPA - U.S. Environmental Protection Agency
FD - field duplicate sample
FR - field replicate sample
ft bgs - feet below ground surface
MDL - method detection limit
mg/kg - milligrams per kilogram
MRS - Munitions Response Site
NAS - Naval Air Station
PAHs - polycyclic aromatic hydrocarbons
PQL - practical quantitation limit
REG - regular field sample
UTL - upper tolerance limit
VQ - validation qualifier

Validation Qualifier Definitions:

U - Not detected. The compound/analyte was analyzed for, but not detected above the associated method detection limit.
J - The compound/analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.

Table 4-2 (Cont.)
Surface Soil Comparison
Atlantic City NAS, New Jersey
Skeet Range MRS

Location						ACSR17				ACSR18				ACSR19			
Sample Number						ACSR0021				ACSR0018				ACSR0019			
Sample Date						29-Sep-11				29-Sep-11				29-Sep-11			
Sample Depth (ft bgs)						0 to 0.5				0 to 0.5				0 to 0.5			
Sample Purpose						FD				REG				REG			
Fraction	**Parameter**	**Units**	**95% UTL (Lead) Background Threshold Value (PAHs) [a]**	**Site Inspection Ecological Screening Level**	**Site Inspection Human Health Screening Level**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals	Lead	mg/kg	45.0	11.0	800	---	---	---	---	---	---	---	---	---	---	---	---
PAHs	Acenaphthene	mg/kg	0.0420 [a]	No criteria	33000	0.00626	0.00997	0.000319	J	0.00128	0.00485	0.000155	J	0.00176	0.00971	0.000311	J
PAHs	Acenaphthylene	mg/kg	0.0174 a	No criteria	17000	0.003	0.00997	0.000339	J	0.00285	0.00485	0.000165	J	0.00242	0.00971	0.00033	J
PAHs	Anthracene	mg/kg	0.069 [a]	No criteria	170000	0.0131	0.00997	0.00144		0.00585	0.00485	0.000699		0.00747	0.00971	0.0014	J
PAHs	Benzo(a)anthracene	mg/kg	0.360 [a]	No criteria	2.10	0.0725	0.00997	0.00179		0.0341	0.00485	0.000874		0.0533	0.00971	0.00175	J
PAHs	Benzo(a)pyrene	mg/kg	0.390 [a]	No criteria	0.210	0.0786	0.00997	0.00148		0.0389	0.00485	0.000718		0.0559	0.00971	0.00144	J
PAHs	Benzo(b)fluoranthene	mg/kg	0.450 [a]	No criteria	2.10	0.135	0.00997	0.00239		0.0705	0.00485	0.00117		0.101	0.00971	0.00233	J
PAHs	Benzo(ghi)perylene	mg/kg	0.330 [a]	No criteria	17000	0.0724	0.00997	0.00219		0.0361	0.00485	0.00107		0.0457	0.00971	0.00214	
PAHs	Benzo(k)fluoranthene	mg/kg	0.420 [a]	No criteria	21.0	0.0472	0.00997	0.00199		0.0235	0.00485	0.000971		0.0341	0.00971	0.00194	
PAHs	Chrysene	mg/kg	0.480 [a]	No criteria	210	0.113	0.00997	0.00199		0.0558	0.00485	0.000971		0.0885	0.00971	0.00194	J
PAHs	Dibenzo(a,h)anthracene	mg/kg	0.0840 [a]	No criteria	0.21	0.0221	0.00997	0.00259		0.0105	0.00485	0.00126		0.0147	0.00971	0.00252	
PAHs	Fluoranthene	mg/kg	0.960 [a]	No criteria	22000	0.257	0.00997	0.00199		0.112	0.00485	0.000971		0.142	0.00971	0.00194	
PAHs	Fluorene	mg/kg	0.0330 [a]	No criteria	22000	0.00465	0.00997	0.000937	J	0.00163	0.00485	0.000456	J	0.00147	0.00971	0.000913	J
PAHs	Indeno(1,2,3-cd)pyrene	mg/kg	0.390 [a]	No criteria	2.10	0.0915	0.00997	0.00219		0.045	0.00485	0.00107		0.0579	0.00971	0.00214	J
PAHs	Naphthalene	mg/kg	0.0144 [a]	No criteria	18.0	0.00377	0.00997	0.00065	J	0.00327	0.00485	0.000317	J	0.00183	0.00971	0.000633	J
PAHs	Phenanthrene	mg/kg	0.480 [a]	No criteria	17000	0.0873	0.00997	0.00219		0.0282	0.00485	0.00107		0.0345	0.00971	0.00214	
PAHs	Pyrene	mg/kg	0.810 [a]	No criteria	17000	0.192	0.00997	0.00219		0.0875	0.00485	0.00107		0.111	0.00971	0.00214	

Notes:

[**Bold Face**] - Result exceeds 95% UTL (Lead) Background Threshold Value (PAHs).

[*Italicized*] - Result exceeds Site Inspection Ecological Screening Level.

[Underlined] - Result exceeds Site Inspection Human Health Screening Level.

a - Ten surface soil samples were collected as a background dataset as part of this SI. A 95 percent UTL was calculated using the data. The background threshold values shown for the PAH compounds are based on one background sample collected for the *Soil PAH Forensic Investigation* (Newfields, 2008). Each PAH concentration is multiplied by a factor of three per EPA guidance (EPA, 1990, 1992, 1995).

" ---" - Sample was not analyzed for target analyte.

EPA - U.S. Environmental Protection Agency
FD - field duplicate sample
FR - field replicate sample
ft bgs - feet below ground surface
MDL - method detection limit
mg/kg - milligrams per kilogram
MRS - Munitions Response Site
NAS - Naval Air Station
PAHs - polycyclic aromatic hydrocarbons
PQL - practical quantitation limit
REG - regular field sample
UTL - upper tolerance limit
VQ - validation qualifier

Validation Qualifier Definitions:

U - Not detected. The compound/analyte was analyzed for, but not detected above the associated method detection limit.
J - The compound/analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.

Table 4-3
Sediment Comparison
Atlantic City NAS, New Jersey
Skeet Range MRS

Location						**ACSR20**				**ACSR21**			
Sample Number						**ACSR1001**				**ACSR1002**			
Sample Date						**29-Sep-11**				**29-Sep-11**			
Sample Depth (ft bgs)						**0 to 0.5**				**0 to 0.5**			
Sample Purpose						**REG**				**REG**			
Fraction	**Parameter**	**Units**	**Background Threshold Level**	**Site Inspection Ecological Screening Level**	**Site Inspection Human Health Screening Level**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals	Lead	mg/kg	117.6	35.8	800	16.5	0.792	0.018		28.1	0.755	0.0172	

Notes:

[**Bold Face**] - Result exceeds Background Threshold Level.

[*Italicized*] - Result exceeds Site Inspection Ecological Screening Level.

[Underlined] - Result exceeds Site Inspection Human Health Screening Level.

ft bgs - feet below ground surface
MDL - method detection limit
mg/kg - milligrams per kilogram
MRS - Munitions Response Site
NAS - Naval Air Station
PQL - practical quantitation limit
REG - regular field sample
VQ - validation qualifier

Table 4-4
Surface Water Comparison
Atlantic City NAS, New Jersey
Skeet Range MRS

Location							**ACSR20**				**ACSR21**				**ACSR21**			
Sample Number							**ACSR2001**				**ACSR2002**				**ACSR2003**			
Sample Date							**29-Sep-11**				**29-Sep-11**				**29-Sep-11**			
Sample Purpose							**REG**				**REG**				**FD**			
Fraction	**Parameter**	**Filtered**	**Units**	**Background Threshold Level**	**Site Inspection Ecological Screening Level**	**Site Inspection Human Health Screening Level**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**	**Result**	**PQL**	**MDL**	**VQ**
Metals - Total	Lead	N	µg/L	41.1	5.4	5.0	4.13	3	0.18		***52.8***	3	0.18		***50.8***	3	0.18	
Metals - Dissolved	Lead	Y	µg/L	3.0 [a]	2.5	5.0	1.97	3	0.18	J	***4.77***	3	0.18	J	***29.2***	3	0.18	R

Notes:

[**Bold Face**] - Result exceeds Background Threshold Level.

[*Italicized*] - Result exceeds Site Inspection Ecological Screening Level.

[Underlined] - Result exceeds Site Inspection Human Health Screening Level.

[a] - Background Threshold Level established at the laboratory's PQL

FD - field duplicate sample
MDL - method detection limit
µg/L - micrograms per liter
MRS - Munitions Response Site
NAS - Naval Air Station
PQL - practical quantitation limit
REG - regular field sample
VQ - validation qualifier

Validation Qualifier Definitions:

J - The compound/analyte was positively identified; the reported value is the estimated concentration of the constituent detected in the sample analyzed.

R - The reported sample results are rejected due to the following: 1. Severe deficiencies in the supporting quality control data; 2. anomalies noted in the sampling and/or analysis process which could affect the validity of the reported data; 3. the presence or absence of the constituent cannot be verified based on the data provided; 4. to indicate not to use a particular result in the event of a reanalysis.