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FINAL PRELIMINARY ASSESSMENT REPORT AUGUST 2007 NAS PENSACOLA FL
08/30/2007
MALCOLM PIRNIE



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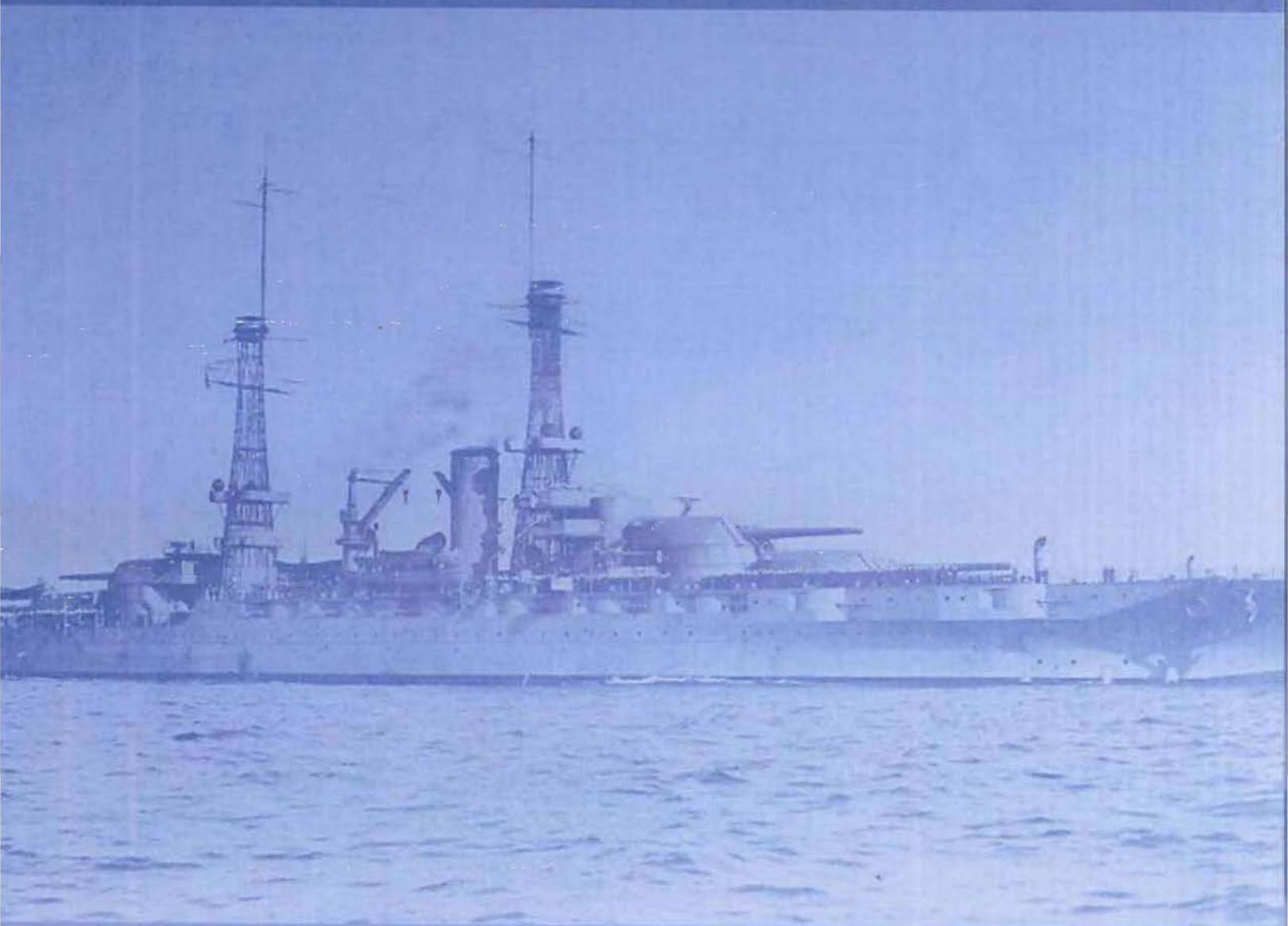
Preliminary Assessment

Naval Air Station Pensacola, Florida



COLM
RNIE

August 2007



August 30, 2007

Mr. William Hill
Commander, Naval Facilities Engineering Command, Southeast
2155 Eagle Drive
North Charleston, South Carolina 29406

Re: Final Preliminary Assessment Report
Naval Air Station Pensacola, Pensacola, Florida
Navy Preliminary Assessments on MRP Sites
Contract N62472-02-D-1300

Dear Mr. Hill:

Malcolm Pirnie is pleased to provide to the Naval Facilities Engineering Command, Southeast (NAVFAC Southeast) this **Final Preliminary Assessment (PA) Report** for **Naval Air Station (NAS) Pensacola, Pensacola, Florida**. This final PA report includes one MRP site: the Saufley Field Small Arms Range.

An electronic copy of this Final Report including maps and source data will be available approximately two weeks following submittal of the hard copies.

Thank you for the opportunity to work with you on this project. We look forward to continuing our relationship with the Naval Facilities Engineering Command, Southeast. Please call me at 914-641-2414 if you have any questions or comments.

Very truly yours,

MALCOLM PIRNIE, INC.



Terri L. Akbas, QEP
Project Manager

cc: Mr. Greg Campbell, NAS Pensacola

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**FINAL
PRELIMINARY ASSESSMENT
NAVAL AIR STATION PENSACOLA, FLORIDA**

August 2007

Prepared for:

NAVAL FACILITIES ENGINEERING COMMAND, SOUTHEAST
2155 Eagle Drive
North Charleston, South Carolina 29406

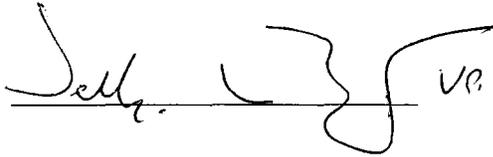
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**FINAL
PRELIMINARY ASSESSMENT
NAVAL AIR STATION PENSACOLA, FLORIDA**

DoD Contract Number: N62472-02-D-1300

Reviewed and Approved by:

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Terri Akbas, QEP
Team Leader
Malcolm Pirnie, Inc.

Malcolm Pirnie, Inc. prepared this report at the direction of Naval Facilities Engineering Command Atlantic. This document should be used only with the approval of Naval Facilities Engineering Command Atlantic. This report is based, in part, on information provided in other documents and is subject to the limitations and qualifications presented in the referenced documents.

August 2007

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ACRONYMS

AIPD1	Airfield Planning District 1
bgs	below ground surface
bsl	below sea level
CD	Compact Disc
CERCLA	Comprehensive Environmental Response, Compensation ,and Liability Act
CSM	Conceptual Site Model
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
EO	Explosive Ordnance
FDEP	Florida Department of Environmental Protection
FUDS	Formerly Used Defense Site
FY	Fiscal Year
IAS	Initial Assessment Study
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
ITRC	Interstate Technology and Regulatory Council
JLUS	Joint Land Use Study
MC	Munitions Constituents
MEC	Munitions and Explosives of Concern
MRP	Munitions Response Program
msl	mean sea level
NAAS	Naval Auxiliary Air Station
NAS	Naval Air Station
NASP	Naval Air Station Pensacola
NAVFAC	Naval Facilities Engineering Command
NAVFAC SE	Naval Facilities Engineering Command Southeast
NFA	No Further Action
NOLF	Navy Outlying Landing Field
PA	Preliminary Assessment

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RG	Record Group
SAR	Site Assessment Report
SARA	Superfund Amendments and Reauthorization Act
U.S.	United States
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
WWI	World War I
°F	degrees Fahrenheit

GLOSSARY OF TERMS

Base Realignment and Closure – A Department of Defense (DoD) program that focuses on compliance and cleanup efforts at military installations undergoing closure or re-alignment, as authorized by Congress in four rounds of base closures for 1988, 1991, 1993, and 1995. (DERP Management Guidance, September 2001)

Closed Range – A range that has been taken out of service as a range and that either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a DoD component. (DERP Management Guidance, September 2001)

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

Discarded Military Munitions – 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 U.S.C. 2710(e)(2))

Explosive Ordnance Disposal – The detection, identification, field evaluation, rendering-safe, recovery, and final disposal of unexploded explosive ordnance. It may also include the rendering-safe and/or disposal of explosive ordnance (EO) that has become hazardous by damage or deterioration, when disposal of such EO requires techniques, procedures, or equipment that exceeds the normal requirements for routine disposal. (OPNAVINST 8027.1G, 14 Feb 92)

Explosives Safety – A condition where operational capability and readiness, personnel, property, and the environment are protected from the unacceptable effects of an ammunition or explosives mishap. (DoD Directive 6055.9, July 1996)

Formerly Used Defense Site (FUDS) – Real property that was formerly owned by, leased by, possessed by, or otherwise under the jurisdiction of the Secretary of Defense or the components (including governmental entities that are the legal predecessors of the DoD or the components) and those real properties where accountability rested with the DoD, but where activities at the property were conducted by contractors (i.e., government-owned, contractor-operated properties) that were transferred from DoD control prior to October 17, 1986. The status of a site as a FUDS is irrespective of current ownership or current responsibility within the federal government. (DERP Management Guidance, September 2001)

Munitions and Explosives of Concern (MEC) – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means unexploded ordnance, discarded military munitions, or munitions constituents (e.g., trinitrotoluene [TNT], hexogen [RDX]) present in high enough concentrations to pose an explosive hazard. (OUSD (AT&L), 18 December 2003)

Munitions Constituents (MC) – Any materials originating from unexploded ordnance, discarded military munitions or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. 2710 (e)(3))

Operational Range – A range that is under the jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities or, although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to a new use that is incompatible with range activities. (10 U.S.C. 101(e)(3))

Other than Operational Range – This term encompasses closed, transferred, and transferring ranges.

Range – A designated land or water area set aside, managed, and used for range activities of the DoD. Ranges include 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, and airspace areas designated for military use in accordance with regulations

and procedures prescribed by the Administrator of the Federal Aviation Administration. (10 U.S.C. 101(e)(3))

Transferred Range – A property formerly used as a military range that is no longer under military control and had been leased by the DoD, transferred, or returned from the DoD to another entity, including federal entities. This includes a range that is no longer under military control but was used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager. (DERP Management Guidance, September 2001)

Transferring Range – A range that is proposed to be transferred or returned from the DoD to another entity, including federal entities. This includes a range that is used under the terms of a withdrawal, executive order, act of Congress, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager or property owner. An operational or closed range will not be considered a “transferring range” until the transfer is imminent. (DERP Management Guidance, September 2001)

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

EXECUTIVE SUMMARY

The Department of Defense (DoD) has established the Military Munitions Response Program under the Defense Environmental Restoration Program to address munitions and explosives of concern (MEC) (including unexploded ordnance and discarded military munitions) and munitions constituents (MC) at other than operational military ranges and other sites. Closed, transferred, and transferring military ranges and sites not located on an operational range are considered other than operational. This report addresses other than operational ranges and sites at an active installation. It may include transferring and/or transferred ranges and munition disposal sites associated with an active installation if they are not included in the Base Realignment and Closure or Formerly Used Defense Sites programs.

This report represents a Preliminary Assessment (PA) for the Naval Air Station Pensacola (NASP), located in Escambia County, Florida. The DoD, United States Navy, and United States Environmental Protection Agency guidance for conducting and documenting PAs were followed and tailored, where appropriate, to address the unique aspects of MEC and MC.

NASP is located in the northwest portion of the Florida Panhandle, approximately 13 miles south of Interstate 10 and 5 miles west of the city of Pensacola. Constructed in 1826, it was the world's first Naval Air Station and is known as the "Cradle of Naval Aviation." The NASP complex covers 8,423 acres, including NASP, Naval Outlying Field Bronson, Corry Station, Saufley Field, and Lexington Terrace Housing. The installation's mission is to "fully support the operational and training missions of tenants assigned; enhancing the readiness of the U.S. Navy, its sister armed services and other customers." Tenant commands at NASP include: Naval Education and Training Command, Naval Air Technical Training Center, Naval Operational Medicine Institute, and the Fleet Area Control and Surveillance Facility.

Two former ranges at NASP were identified for inclusion in this PA: the Bronson Field Firing Range and the Saufley Field Small Arms Range. The Bronson Field Firing Range is a former machine gun boresight range located approximately 800 feet east of the taxiway at Bronson Field. The machine gun butt, comprised of a 100-foot-long, 30-foot-wide, 30-foot-high mound, is located on the former range. Aircraft mechanics would fire .30- and .50- caliber bullets at the machine gun butt to test and align aircraft gun sites. The former range is shown on maps dated 1943 and 1948. Previous assessments of the former range have been conducted and include a

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1992 PA, a 1997 Phase I Environmental Site Assessment, and a 2001 Site Characterization Report Investigation. Analysis of soil and groundwater samples included volatile organic compounds, semivolatile organic compounds, pesticides, polychlorinated biphenyls, and metals. All tested parameters for the samples were below Florida Department of Environmental Protection (FDEP) standards, with the exception of aluminum and iron concentrations in groundwater. A letter dated 13 April 2001 from FDEP states, "Since the site was never used for its intended purpose and aluminum and iron do not exceed any health based Groundwater Cleanup target Levels, the FDEP concurs with the recommendation for no further action." The PA has been completed for the site and a No Further Action concurrence has been received; therefore, the Bronson Field Firing Range is not discussed further.

This PA summarizes the history of munitions use for one former range at NASP. The Saufley Field Small Arms Range consists of approximately 1.2 acres located 800 to 1,000 feet north and west of the two active runways at Saufley Field. A berm currently exists at the former range and is comprised of a clay hill approximately 100 feet long, 30 feet wide, and 20 feet high. Historical documents indicate fundamental gunnery instruction was given to pilots at Saufley Field as early as 1943. The Saufley Field Small Arms Range appears on archived maps dated 1946 through 1949. Typical munitions used at a small arms range include .38- and .45-caliber pistol ammunition and .22- and .30-caliber rifle ammunition. During the 1991 PA of Saufley Field, spent bullets were found scattered around and lodged in the berm. The bullets were lead, with some having steel or copper jackets. No spent bullets were observed during the 23 January 2007 site visit conducted for this PA.

Because the site was used only for small arms training and there is no historical or current evidence of explosives used at the site, there is no evidence of MEC. No soil sampling has occurred at the Saufley Field Small Arms Range; therefore, it is unknown if MC are present at the site. The site and surrounding area are undeveloped and currently are not used.

1. INTRODUCTION

The Department of Defense (DoD) has established the Military Munitions Response Program under the Defense Environmental Restoration Program (DERP) to address munitions and explosives of concern (MEC) (including unexploded ordnance and discarded military munitions) and munitions constituents (MC) at other than operational military ranges and other sites. Closed, transferred, and transferring military ranges and sites not located on an operational range are considered other than operational. This report addresses other than operational ranges and sites at an active installation. It may include transferring and/or transferred ranges and munition disposal sites associated with an active installation if they are not included in the Base Realignment and Closure or Formerly Used Defense Sites (FUDS) programs.

The DoD and the United States (U.S.) Navy (Navy) are currently establishing policy and guidance for munitions response actions under the Navy Munitions Response Program (MRP). However, key program drivers developed to date conclude that munitions response actions will be conducted under the process outlined in the National Contingency Plan (40 Code of Federal Regulations 300), as authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 United States Code (U.S.C.) 9605, and amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Pub. L. 99-499 (hereinafter CERCLA). This report represents a Preliminary Assessment (PA) for the Naval Air Station Pensacola (NASP), located in Escambia County, Florida. The DoD, Navy, and U.S. Environmental Protection Agency (USEPA) guidance for conducting and documenting PAs were followed and tailored, where appropriate, to address the unique aspects of MEC and MC.

This PA report is organized into the following sections:

- Section 1 – Introduction
- Section 2 – Installation Background
- Section 3 – Physical and Environmental Characteristics
- Section 4 – Summary of Data Collection Effort
- Section 5 – Site Characteristics

The following supporting information is appended to this PA report:

- References (Appendix A)

- Project Source Data – General (Appendix B)
- Project Source Data – Site-Specific (Appendix C)
- Ordnance Technical Data Sheets (Appendix D)

Two interactive compact discs (CDs) will be included with the final version of this report. The first CD will include electronic files of the report text, tables, and figures; appendices; and project source data. The second CD will include interactive geographic information system maps of the installation and sites.

1.1. Purpose

This PA summarizes the history of munitions use for the following former range at the NASP: Saufley Field Small Arms Range. The PA provides an assessment of the current conditions with respect to MEC and MC. The PA provides the necessary information for Navy and regulatory decision-makers to: 1) eliminate from further consideration those MEC sites that pose minimal or no threat to public health or the environment; 2) differentiate MEC sites that may not require further munitions response actions from those that will require further investigation and/or munitions response actions; 3) determine if an imminent explosives safety hazard from MEC is present that warrants an accelerated response action; and 4) determine if an imminent hazard from MC to human health or the environment is present and warrants an accelerated response action.

1.2. Programmatic Framework

The regulatory structure for managing Navy MRP sites is guided by a complex mixture of federal, state, and local laws, as well as DoD and Navy regulations and guidance, and provides the necessary information for Navy decision-makers. The key legislation, policy, and guidance directing the program include, but are not limited to, the following:

Draft DoD Directive Military Munitions Response Policy on Other Than Operational Ranges

The Draft DoD Directive 4715.MRP (September 2003 version) states that munitions response will be conducted “in accordance with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan.”

Management Guidance for the Defense Environmental Restoration Program (DERP) - (September 2001)

The DERP Management Guidance establishes an MRP element for MEC and MC defense sites. The history of DERP dates back to the SARA of 1986¹. The scope of the DERP is defined in 10 U.S.C. §2701(b), which states that the:

Goals of the program shall include the following: ... (1) The identification, investigation, research and development, and cleanup of contamination from hazardous substances, and pollutants and contaminants. (2) Correction of other environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment ...

National Defense Authorization Act (Fiscal Year [FY] 02) (Sections 311-312)

Sections 311-312 of the National Defense Authorization Act of FY02 reinforced the DoD's 2001 DERP Management Guidance by tasking the DoD to develop and maintain an inventory of defense sites that are known or suspected to contain MEC and MC. Section 311 requires the DoD to develop a protocol for prioritizing defense sites for response activities in consultation with the states and tribes. Section 312 requires the DoD to create a separate program element to ensure that the DoD can identify and track munitions response funding.

The September 2001 Management Guidance for the DERP and the 2002 National Defense Authorization Act, described above, established the MRP. The DoD provides program guidance and methods for conducting a baseline inventory of defense sites containing, or potentially containing, MEC and/or MC. The Navy baseline inventory of sites was completed in FY02 and was used to establish the sites where PAs are needed to further evaluate the potential for MEC and MC.

1.3. Project Management

This PA has been coordinated and managed by Naval Facilities Engineering Command (NAVFAC) Atlantic. NAVFAC Atlantic performs engineering functions for Navy installations throughout the United States and is the program manager for this PA. Malcolm Pirnie, Inc., has been contracted to prepare this PA. NAVFAC Southeast provides technical guidance and management for environmental projects at NASP. The Navy Remedial Project Manager from

¹ SARA was signed into law on October 17, 1986, and amended the CERCLA of 1980, 42 U.S.C. §9601 et seq. Related sections in Title 10 of the U.S.C. (10 U.S.C. §§2702-2710 and §§2810-2811) further define the program.

NAVFAC Southeast (SE) and the installation point of contact for NASP provided valuable information and assistance throughout the PA data collection process.

1.4. PA Approach

The CERCLA implementing guidance, which was prepared for sites contaminated with hazardous substances, describes the PA as a limited-scope investigation based upon existing and available data. However, the guidance also states that the PA process developed under CERCLA is not equally applicable to all sites and all contaminants and that variation from the guidance may be necessary. Sites containing MEC are prime examples of sites where the generic CERCLA process is incomplete. Unique explosives safety issues associated with MEC cannot be assessed solely with the parameters developed for chemical and hazardous waste contaminants. While this PA generally follows CERCLA guidance, certain elements of the report have been tailored to address the unique explosives safety aspects of MEC.

The PA process for each of the sites involves collecting and reviewing existing and available information about the site. Data collection activities include off-site and on-site research and interviews. The process also includes a visual survey to assess physical evidence that might indicate the presence of MEC (e.g., discarded munitions items, ordnance penetration holes, scarred trees) and MC (e.g., ground scarring, stressed vegetation, chemical residue) at the site. The Malcolm Pirnie data collection team conducted the on-site portion of the data collection and the visual survey for NASP on 23 January 2007.

This PA is inclusive and makes use of all available data relating to munitions use at NASP, including historical records, field data, anecdotal evidence, interviews with site personnel, and professional knowledge and experience. It is based, in part, on information provided in documents referenced in Appendix A and is subject to the limitations and qualifications presented in the referenced documents.

2. INSTALLATION BACKGROUND

The following sections provide general information about NASP, including its location and setting; a brief history of the installation; its missions over time; and a history of munitions related training, storage, and usage.

2.1. Location and Setting

NASP is located in the northwest panhandle of Florida in Escambia County, 13 miles south of Interstate 10 and 5 miles west of the city of Pensacola. The NASP complex covers 8,423 acres and includes NASP, Bronson Field, Corry Station, Saufley Field, and Lexington Terrace Housing. The installation is bordered by Bayou Grande to the north and Big Lagoon to the south. Pensacola Bay surrounds NASP to the south and east. According to the 2003 Escambia County Joint Land Use Study (JLUS), which included 12,043 acres of land surrounding NASP, 65% of the land is vacant, while 25% is used for single-family housing. The remaining land uses include multifamily housing, churches, mixed use, and commercial use. Map 2.1-1 provides a topographic map that shows the general layout of the installation, as well as the location of the site discussed in this PA report.

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Naval Air Station Pensacola, Florida



MALCOLM
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Map 2.1-1
Area Location Map

Legend

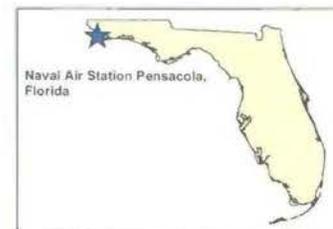
-  Installation Boundary
-  MRP Site

0 1,000 2,000 4,000
Meters

Data Source: NAS Pensacola GIS Data, 2006

Coordinate System: UTM Zone 18N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
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Date: August 2007



2.2. Installation History

In 1826, a Navy Yard was constructed on Pensacola Bay in the southern tip of Escambia County. Activities at the Navy Yard focused primarily on suppressing the slave trade and dealing with piracy in the Gulf of Mexico and the Caribbean Sea. During the Civil War, Confederate troops occupied the yard and eventually destroyed and abandoned it in an effort to prevent it from being captured by Union troops. It was rebuilt after the war, but a 1906 hurricane and tidal wave destroyed many of the rebuilt structures. The Navy Yard was decommissioned in 1911.

The establishment of an aviation training station in Pensacola was recommended to the Secretary of the Navy in 1913, and NASP was constructed at the abandoned Navy Yard. The installation was the first Naval Air Station (NAS) in the world and is now considered the “Cradle of Naval Aviation.” NASP became the hub of air training activities through World War I (WWI) and World War II. The growing aviation program required the additions of Saufley Field in 1940 and Elysson Field in 1941. Naval Auxiliary Air Station (NAAS) Barin Field and NAAS Bronson Field were commissioned in 1942, and NAS Whiting Field was commissioned in 1943. Barin Field was partially decommissioned in 1962 and currently belongs to the NAS Whiting Field complex of OLFs. The remaining auxiliary airfields currently remain part of the NASP complex. Table 2.2-1 provides a summary of the significant events in NASP’s history.

The primary mission of NASP is the training of student aviators, and its mission is also to “fully support the operational and training missions of tenants assigned; enhancing the readiness of the U.S. Navy, its sister armed services and other customers.” Tenant commands at NASP include: the Naval Education and Training Command; the Naval Air Technical Training Center; the Naval Operational Medicine Institute; and the Fleet Area Control and Surveillance Facility, which controls over 18,000 square miles of airspace.

Table 2.2-1: NAS Pensacola Timeline of Significant Events

Time Period	Significant Events
1825	President John Quincy Adams and Secretary of the Navy Samuel Southard make arrangements to build a Navy Yard in Escambia County, Florida.
1826	Construction of the Navy Yard begins April 1826. Activities at the Navy Yard primarily focus on suppression of the slave trade and piracy in the Gulf of Mexico and the Caribbean Sea.

Table 2.2-1: NAS Pensacola Timeline of Significant Events

Time Period	Significant Events
1862	Confederate troops occupy the Navy Yard during the Civil War. Fearing capture by Union forces, Confederate troops retreat from the Navy Yard and destroy most of the facilities.
1906	Many of the structures that were rebuilt after the Civil War are destroyed by a hurricane and tidal wave.
1911	The Navy Yard is decommissioned.
1913	Establishment of an aviation training station in Pensacola is recommended to Secretary of the Navy Josephus Daniels.
1914	NASP is established at the abandoned Navy Yard.
1916	NASP is the only NAS in the world and enters into WWI. Aviation training increases throughout the war.
1922	Corry Field is established and is the first auxiliary airfield to support flight training operations at Pensacola Flight School.
1927	Corry Field is closed and renamed Old Corry Field. Corry Station opens 3 miles north of NASP.
1940	The Navy acquires 867 acres northwest of NASP and opens Saufley Field.
1941	Ellyson Field, named after Lieutenant T.G. Ellyson, is commissioned.
1942	The Navy acquires 640 acres plus 26 adjoining acres on Perdido Bay and commissions NAAS Bronson Field, 12 miles west of NASP.
1942	The Navy acquires an airport in Foley, Alabama, plus 650 acres of adjoining property and commissions NAAS Barin Field, 23 miles west of NASP.
1943	The Navy acquires 2,960 acres and commissions Whiting Field, 6 miles north of Milton, Florida.
1946	NAAS Bronson Field is decommissioned to NOLF Bronson.
1962	Barin Field is sold to a private owner, and the airport is returned to the City of Foley.
1971	NASP is chosen as the Chief of Naval Education and Training headquarters.
2007	The NASP complex includes NASP, Bronson Field, Corry Station, Saufley Field, and Lexington Terrace Housing.

2.3. Munitions Related Training/Storage/Usage

Based on information included in the Navy Range Inventory Database, information obtained from archival records, and data collected during the site visit, the following other than operational ranges/sites were associated with NASP to support the installation mission:

The **Saufley Field Small Arms Range** is a 1.2-acre area containing a clay berm approximately 100 feet long, 30 feet wide, and 20 feet high. It is located 800 to 1,000 feet north and west of the operational runways at Saufley Field. The Small Arms Range is labeled as a pistol range on maps dated 1946 through 1949. Historical documents indicate Saufley Field was used for giving gunnery instruction to pilots as early as 1943. The exact time period during which the former range was operational is unknown. Munitions use may have included .38- and .45- caliber pistol ammunition and .22- and .30-caliber rifle ammunition, which are typical of small arms range usage. The site and surrounding area currently are undeveloped and unused. Spent bullets were observed in and scattered around the berm during the 1991 PA of Saufley Field. The bullets included lead bullets, some having steel or copper jackets. No bullets were observed during Malcolm Pirnie's visual survey of the Small Arms Range.

The **Bronson Field Firing Range** is a former machine gun boresight range located approximately 800 feet east of the taxiway at Bronson Field. The machine gun butt, comprised of a 100-foot-long, 30-foot-wide, 30-foot-high mound, is located on the former range. Aircraft mechanics would fire .30- and .50- caliber bullets at the machine gun butt to test and align aircraft gun sites. The former range is shown on maps dated 1943 and 1948. Previous assessments of the former range have been conducted and include a 1992 PA, a 1997 Phase I Environmental Site Assessment, and a 2001 Site Characterization Report Investigation. Analysis of soil and groundwater samples included volatile organic compounds, semivolatile organic compounds, pesticides, polychlorinated biphenyls, and metals. All tested parameters for the samples were below Florida Department of Environmental Protection (FDEP) standards, with the exception of aluminum and iron concentrations in groundwater. A letter dated 13 April 2001 from FDEP states, "Since the site was never used for its intended purpose and aluminum and iron do not exceed any health based Groundwater Cleanup target Levels, the FDEP concurs with the recommendation for no further action." The PA has been completed for the site and a No Further Action (NFA) concurrence has been received; therefore, the Bronson Field Firing Range is not discussed further.

Areas of Interest:

During the data collection effort, additional munitions and range related records, documents, and information sources were found. As a result, the following 26 additional areas of interest associated with NASP were identified:

The **Saufley Field Skeet Range** is located approximately 800 feet northeast of the Saufley Field Small Arms Range. It is denoted on maps dated 1943 and 1946 through 1949. The maps include structures that appear to be trap houses, but there are no trap ranges labeled. Remnants of former buildings (e.g., concrete pads) and clay target fragments in varying densities along the ground surface were observed during Malcolm Pirnie's limited visual survey of the former range area. The site is currently unused.

The **Saufley Field Bombing Targets** were located in the grassy area between Saufley Field runways 13 and 22. They are shown on maps dated 1943 and 1946 through 1949. Physical evidence of the bombing targets was not observed during Malcolm Pirnie's limited visual site survey.

The **Bronson Field Skeet Range** is denoted on maps dated 1943 1946 through 1949. The maps also show a skeet range house labeled Building 1145. During Malcolm Pirnie's limited visual survey of the former range area, clay target fragments were observed in varying densities along the ground surface of the wooded area southeast of runways 4 and 36 at Bronson Field. No evidence of Building 1145 was observed.

The **Bronson Field Berm** is labeled as a "butt" on maps dated 1943, 1944, 1946, 1948, and 1949. It is located east of the Bronson Field Firing Range. Four pintel mounts were observed south of the berm during Malcolm Pirnie's limited visual site survey. The area currently is overgrown and unused.

The **Corry Station Skeet Range** is denoted on historical maps dated 1947 through 1949 and 1951. It is also shown on an undated map obtained from the National Archives. The Naval Hospital at Corry Station was constructed above the skeet range in 1975. NASP personnel are unaware of any records of the former range being addressed during construction activities.

The **Corry Station Firing Range** is denoted on one undated map obtained from the National Archives. It is located between runways 11 and 16 in the location of the new Army Reserve Center construction site. Based on personal interviews, the U.S. Army Corps of Engineers (USACE) is handling the contract management for the construction, and NASP has not been informed of any reported munitions (bullets / bullet fragments) or range features found during construction thus far.

Table 2.3-1 lists the remaining 20 areas of concern for NASP and the historical maps on which they were identified. No other information regarding the ranges was obtained. The MRP-eligible ranges will be investigated under a separate delivery order with NAVFAC Atlantic.

Table 2.3-1: Additional Areas of Interest Associated with NAS Pensacola	
Range	Historical Maps
Fort Barrancas / Forrest Sherman Field	
Rifle range firing northwest	1893
Rifle range firing southeast	1910
Rifle range north of Big Lagoon	1951
Boresighting range	1951, 1952
National Cemetery - Gunnery Area	
Machine gun range (Installation Restoration Program [IRP])	1933, 1939, 1940, 1942, 1944, 1946, 1947, 1949, 1950, 1952, 1954
Rifle range	1933, 1939, 1940, 1942
Skeet range	1940
Two pistol ranges	1940, 1941; only one range shown on 1947 and 1948 maps
Trap range	1941, 1942
Bombing target	1933
Target range	1944
Chevalier Field	
Pistol range northwest of field	1940
Machine gun butt north of field	1939, 1941, 1942, 1943
Fort Redoubt	
Gunnery range (skeet)	1930 as "Army Range", 1949-1952, 1954
Gulf of Mexico	

Table 2.3-1: Additional Areas of Interest Associated with NAS Pensacola

Range	Historical Maps
13 bombing targets (Six FUDS sites in Florida, two FUDS sites in Alabama, five Alabama sites with unknown status)	1941, 1942, 1945, 1946, 1949
Three strafing targets, Alabama	1945
Gulf Beach Gunnery Range (FUDS property)	1942, 1944, 1945, 1949, 1954
Bayou Grande	
Skeet range (IRP)	1942, 1946, 1949, 1950
Santa Rosa Island	
Navy rifle range	1949, 1957, 1970, 1987
Gun mounts	1918-1920

3. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

The following sections provide general information for NASP, including its climate, topography, geology, soil and vegetation types, hydrology, hydrogeology, cultural and natural resources, and endangered species.

3.1. Climate

The climate at NASP is characterized by short, mild winters and long, warm-temperature summers. January is the coldest month, with an average temperature of 50.5 degrees Fahrenheit (°F), and July is the hottest month, with the average temperature being 82.0°F. The average annual temperature is 67.6°F. There are an average of nine freezes per year, but temperatures in the area rarely fall below 15°F - 20°F. Winds are controlled by the Atlantic Bermuda High Pressure area and ocean-land heating differentials. Southerly winds from the Bermuda High warm the land during summer days, resulting in amplified sea breezes. As land masses cool, the sea breeze reverses to a land breeze. The net effect is a clockwise rotation of surface wind every 24 hours during the summer season. During the winter season, the influence of the Bermuda High is negligible, and northerly winds prevail (NEESA, 1983).

Pensacola receives 63 inches of rainfall per year. Snowfall rarely occurs, and hailstorms infrequently occur in very restricted areas. Rainfall is well-distributed but peaks during the months of July and August. Summer rain occurs in near-daily showers and thunderstorms over small areas, followed by broader areas of light rains in the winter. Infrequent rain events with moderate to high precipitation occur during the spring and fall seasons. Severe weather includes thunderstorms, tornadoes, tropical storms, and hurricanes. Hurricane season is June through November, but the greatest frequency of hurricanes in the Gulf of Mexico occurs between August and October. The Florida Panhandle averages one hurricane every 17 years and is impacted by fringe effects of hurricanes every 5 years. The last hurricanes to affect the Pensacola area were Hurricanes Erin and Opal in 1995, Hurricane Ivan in 2004, and Hurricane Dennis in 2005.

3.2. Topography

NASP lies within the Gulf Coastal Lowlands physiographic region. The topography of NASP is basically flat, with the exception of Saufley Field, which is located on a ridge approximately 85

feet above mean sea level (msl). Elevations at NASP and Bronson Field range from 0 to 40 feet above msl, and elevations at Corry Station range from 20 to 30 feet above msl. Elevations at Saufley Field drop from 85 feet above msl to 25 feet above msl north toward Eightmile Creek and to 10 feet msl south toward Perdido Bay. Natural and man-made drainages direct runoff to Bayou Grande to the north or Pensacola Bay to the south (2000-2010 INRMP).

3.3. Geology

The surface geology of the Pensacola region of the Gulf Coastal Lowlands is characterized by limestone, organics, and clastics. According to the 1983 Initial Assessment Study (IAS) of NASP, 10 formations lie below NASP. Table 3.3-1 describes each formation in ascending order.

Table 3.3-1: Geologic Formations Beneath NAS Pensacola

Geologic Formation	Description
Hatchetigbee Formation	Located 1,270-2,730 feet below sea level (bsl); 220-420 feet thick Is characterized by predominantly gray to dark gray, silty micaceous clay that is fossiliferous and calcareous with little pyrite.
Tallahatta Formation	Located 1,040-2,230 feet bsl; 170-foot minimum thickness below Pensacola Is characterized by predominantly hard, light gray, calcareous shale and siltstone with interbeds of gray limestone and fine to pebbly sand.
Lisbon Equivalent	Located 510-2,090 feet bsl; 345-600 feet thick Is characterized by shaley limestone with colors from dark gray to very light-grayish cream. Lower shale zone consisting of a 60- to 90-foot thick bed of shale lies below NASP.
Ocala Group	Located 290-1,940 feet bsl; 90-235 feet thick Upper portion changes downward from a light gray to a chalky white limestone, but all limestone in the NASP area may be white. Consists mostly of large foraminifers and other fossils.
Bucatunna clay member, Byram Formation	Located 200-1,760 feet bsl; 45-215 feet thick Escambia County well samples are characterized by dark gray, soft, calcareous, silty to sandy clay with occasional flecks of carbonized wood and little pyrite.
Chickasawhay Limestone	Thickness of 30-130 feet Is characterized by gray to light gray, hard, highly porous limestone and dolomitic limestone. Is interbedded with light brown, hard, dolomitic limestone with porosity varying from vesicular to compact. Also is interbedded with dolomite with a distinctive sugary texture.

Table 3.3-1: Geologic Formations Beneath NAS Pensacola

Geologic Formation	Description
Tampa Formation	Maximum thickness of 270 feet Is characterized by hard, light gray to grayish-white beds of clay
Pensacola Clay	Located 135-1,000 feet bsl; 380-1,000 feet thick Is characterized by tough, dark to light-gray clay, which grades into a clayey siltstone in the NASP area. Upper formation contains mollusk shells and thick shell beds in southern Escambia County.
Miocene Coarse Clastics	Thickness of 70 to 500 feet Is characterized by light brown to light gray, poorly sorted, fine to very coarse sand and granules of small pebbles of quarts. Distinctive feature is the large portion of shell beds of minute mollusks that comprise a large portion of the formation.
Citronelle Formation	Combines with terrace deposits to form a layer 30-790 feet thick. Is comprised of quartz sand containing lenses, beds, and stringers of clay and gravel. Distinctive feature is limonite-cemented sandstone (“hardpan”), which occurs throughout.

3.4. Soil and Vegetation Types

According to the Integrated Natural Resources Management Plan (INRMP), NASP has a 30- to 40-inch-thick surface of sand or loamy sand that is underlain by sandy loam to sandy clay substrata. Surface soils are strongly acidic and range from somewhat drained to excessively drained. Table 3.4-1 describes the various surface types found at NASP based on the 1983 IAS.

Table 3.4-1: Soil Complexes Found at NAS Pensacola

Soil Complex	Description
Alluvial	Silt loam to sand textures, gray to black depending on amount of organic matter, variable internal drainage, very slow surface runoff
Tidal Marsh	Coastal areas often covered by salt or brackish water at high tide; includes tidal flats that are barren due to salt; includes mixed sand, silt, clay, and various quantities of organic matter
Coastal Beach	Comprised of sand deposited along the coast by wave action; very thin layers of organic matter present in locations where ponding occurs for months at a time (i.e., depressions)
Swamp	Mixture of soils and materials varying in color, texture, composition, and thickness of layers; organic matter of varying

Table 3.4-1: Soil Complexes Found at NAS Pensacola

Soil Complex	Description
	thickness
Lakeland (0% - 5% slopes)	Acid throughout, low fertility, low organic matter, somewhat
Lakeland (5% - 8% slopes)	excessively drained
Leon (0% - 2% slopes)	Acid throughout the profile, low natural fertility
Klej (0% - 5% slopes)	Acid throughout, low natural fertility, low organic matter, somewhat poorly drained
Rutlege (0% - 2% slopes)	Acid in reaction throughout the profile, poorly and very poorly drained, much organic matter in surface soils
St. Lucie (0% - 5% slopes)	Located between beaches or swamps, better drained soils
Lakewood (0% - 5% slopes)	Acid throughout the profile, extremely low fertility, little organic matter, excessively drained
Lakewood (5% - 12% slopes)	
Plummer (0% - 2% slopes)	Acid throughout the profile, little natural fertility, little organic matter, poorly drained

Vegetation at NASP includes marine and estuarine plant communities, as well as terrestrial plant communities. Seagrasses and coastal marsh are the two main marine and estuarine plant communities found in the vicinity of NASP. The most common types of seagrasses include turtle grass (*Thalassia testudinum*), shoal grass (*Halodule beaudettei*), and manatee grass (*Cymodocea filiformis*). Coastal marsh is separated into three zones, respectively dominated by grass (*Spartina alterniflora*), black needle rush (*Juncus roemerianus*) or grasses (*Distichlis spicata* and *Spartina patens*). Terrestrial plant communities include the coastal strand and the scrub. The coastal strand is made up of beaches and sand dunes with vegetation such as sea oats (*Uniuola paniculata*). Trees in the scrub community are dominated by the sand pine (*Pinus clausa*) and include twin live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*), and chapman oak (*Quercus chapmanii*). Scrub community understory includes rosemary (*Ceratiola ericoides*) and saw-palmetto (*Serenoa repens*) (NEESA, 1983).

3.5. Hydrology

The NASP complex lies south of Bayou Grande and north of Big Lagoon and the Intracoastal Waterway. Perdido Bay is located west of the complex, Pensacola Bay is to the south and east, and the Gulf of Mexico lies farther south. NASP is within the Perdido-Escambia River Basin and drains directly into the Pensacola Bay and Perdido Bay systems, which are connected by the

Intracoastal Waterway and Big Lagoon (2000-2010 INRMP). Water in these systems ultimately flows into the Gulf of Mexico.

Surface water on the installation includes Elevenmile Creek and Eightmile Creek at northwest Saufley Field. A small, unnamed stream and beaver pond are located on the southwest portion of Bronson Field, and small streams and ponds are located on the NASP golf courses (2000-2010 INRMP). Throughout the complex, man-made drainageways and storm drains direct flow to short, intermittent streams, which empty to the surrounding bays and bayous (NEESA, 1983). There are 99 wetlands that total 650 acres at the NASP complex (EDAW, 2003).

3.6. Hydrogeology

The sand-and-gravel aquifer is located from 220 to 330 feet below ground surface (bgs) in southern Escambia County, and it contains water under water table or perched water table conditions (2000-2010 INRMP). Over 99% of potable and industrial water in the region is obtained from this aquifer. Beneath the aquifer lies the Intermediate System, which is a 550- to 1,200-foot-thick confining system with low permeability. The Floridan aquifer system underlies the Intermediate System between 1,100 and 1,500 feet bgs. The sand-and-gravel aquifer is recharged with rainwater, and the Floridan aquifer is subsequently recharged where the two are in contact in northern Escambia County. The main source of potable water for NASP is a well field located at Corry Station, located north of Bayou Grande.

No groundwater data for the main NASP complex could be obtained, but the 1983 IAS cites two studies that indicate groundwater flow at NASP has a vertical, downward component. The 1992 PA report of Bronson Field states movement of groundwater flow in the Sand-and-Gravel aquifer is generally toward nearby streams, with an average velocity of 100 feet per year in the Pensacola area (NEESA, 1992). Monitoring wells indicate groundwater flow at Bronson Field is southwest toward Perdido Bay, has an estimated horizontal hydraulic conductivity of 0.6130 feet per day, and has an average linear groundwater velocity of 0.0088 feet per day (Campbell, 1998). Monitoring wells at Saufley Field show that groundwater flow ranges from southwest to northeast, with estimated groundwater velocities from 0.336 to 4.8 feet per day, depending on the depth to groundwater (Tetra Tech NUS, 2005).

3.7. Cultural and Natural Resources

Wetlands cover 650 acres of the NASP complex. The southwest portion of the installation along the shoreline of Big Lagoon has been designated a protected area based on its recreational value and beach-dune natural communities (EDAW, 2003).

3.8. Endangered and Special Status Species

Protected species that are known to, or have the potential to, inhabit NASP based on 2006 data from the U.S. Fish and Wildlife Service are listed in Table 3.8-1.

Table 3.8-1: Summary of Protected Species Known or Potentially on NAS Pensacola

Ecological Receptors	Species
Federal Endangered	Green turtle (<i>Chelonia mydas mydas</i>), leatherback turtle (<i>Dermochelys coriacea</i>), hawksbill turtle (<i>Eretmochelys imbricata imbricata</i>), Kemp's ridley turtle (<i>Lepidochelys kempfi</i>), wood stork (<i>Mycteria americana</i>), red-cockaded woodpecker (<i>Picoides borealis</i>), Perdido Key beach mouse (<i>Peromyscus polionotus trissyllepsis</i>), West Indian manatee (<i>Trichechus manatus latirostris</i>)
Federal Threatened	Gulf sturgeon (<i>Acipenser oxyrinchus desotoi</i>), flatwoods salamander (<i>Ambystoma cingulatum</i>), loggerhead turtle (<i>Caretta caretta</i>), eastern indigo snake (<i>Drymarchon corais couperi</i>), piping plover (<i>Charadrius melodus</i>), bald eagle (<i>Haliaeetus leucocephalus</i>)
State Endangered	Green turtle (<i>Chelonia mydas mydas</i>), leatherback turtle (<i>Dermochelys coriacea</i>), hawksbill turtle (<i>Eretmochelys imbricata imbricata</i>), Kemp's ridley turtle (<i>Lepidochelys kempfi</i>), Arctic peregrine falcon (<i>Falco peregrinus tundrius</i>), wood stork (<i>Mycteria americana</i>), Perdido Key beach mouse (<i>Peromyscus polionotus trissyllepsis</i>), West Indian manatee (<i>Trichechus manatus latirostris</i>), aster (<i>Aster hemisphericus</i>), buckthorn (<i>Bumelia thornei</i>), sweet shrub (<i>Calycanthus floridus</i>), Cruise's golden-aster (<i>Chrysopsis gossypina cruiseana</i>), trailing arbutus (<i>Epigaea repens</i>), panhandle lily (<i>Lilium iridollae</i>), hummingbird flower (<i>Macranthera flammea</i>), primrose-flower butterwort (<i>Pinguicula primulifolia</i>), yellow fringeless orchid (<i>Plantanthera integra</i>), orange azalea (<i>Rhododendron austrinum</i>), white-top pitcher plant (<i>Sarracenia leucophylla</i>), silky camellia (<i>Stewartia malacodendron</i>)
State Threatened	Crystal darter (<i>Ammocrypta asprella</i>), loggerhead turtle (<i>Caretta caretta</i>), eastern indigo snake (<i>Drymarchon corais couperi</i>), southeastern snowy plover (<i>Charadrius alexandrinus tenuirostris</i>), piping plover (<i>Charadrius melodus</i>), southeastern kestrel (<i>Falco sparverius paulus</i>), bald eagle (<i>Haliaeetus leucocephalus</i>), least tern (<i>Sterna antillarum</i>), Florida black bear (<i>Ursus americanus floridanus</i>), Curtiss' sandgrass (<i>Calamovilfa curtissii</i>), Baltzell's sedge (<i>Carex</i>)

Table 3.8-1: Summary of Protected Species Known or Potentially on NAS Pensacola

Ecological Receptors	Species
	<p><i>baltzellii</i>), spoon-leaved sundew (<i>Drosera intermedia</i>), heartleaf (<i>Hexastylis arifolia</i>), Florida anise (<i>Illicium floridanum</i>), mountain laurel (<i>Kalmia latifolia</i>), southern red lily (<i>Lilium catesbaei</i>), Gulf Coast lupine (<i>Lupinus westianus</i>), Chapman’s butterwort (<i>Pinguicula planifolia</i>), yellow fringed orchid (<i>Platanthera ciliaris</i>), large-leaved jointweed (<i>Polygonella macrophylla</i>), parrot pitcher plant (<i>Sarracenia psittacina</i>), decumbant pitcher plant (<i>Sarracenia purpurea</i>), red-flowered pitcher plant (<i>Sarracenia rubra</i>), Harper’s yellow-eyed grass (<i>Xyris scabrifolia</i>)</p>
Other Ecological Receptors	None

4. SUMMARY OF DATA COLLECTION EFFORT

Five primary sources of information were researched as part of the data collection effort for this PA. The sources of data include the following:

- 1) Historical archives
- 2) Personal interviews
- 3) Installation data repositories
- 4) Visual survey observations
- 5) Off-site data sources and repositories, such as local libraries and museums

These five sources of data are discussed below, along with their relative application to this PA.

4.1. Historical Archive Repositories (Off-Site)

The data collection team reviewed archival records located at the National Archives in College Park, Maryland, and Washington DC, as well as records located at the Naval Historical Center in Washington DC, and regional archives in Pensacola, Florida. The data collection team researched the following records and record groups (RGs) for documents relating to munitions usage at NASP. An asterisk (*) indicates the material was photocopied.

Textual Records:

RG 18, Army Air Forces

- Entry 168 (NM53), Central Decimal Files, 1917-38, Boxes 2319*, 2320
- Entry 292 (NM53), Unclassified Decimal Files, 1942-44, Box 1488
- Entry 294, Bulky Files, 1942-44, Boxes 839, 931
- Entry 295, Project Files, Camps and Forts, 1939-42, Box 1017*

RG 38, Chief of Naval Operations

- Entry 1 (NM63), Name and Subject Index, 1942-43, Boxes 34, 42
- Entry 1(NM63), Name and Subject Index, 1943-44, Boxes 77, 78, 86, 87
- Entry 2 (NM63), General Correspondence, 1942-43, Box 132
- Entry 2 (NM63), General Correspondence, 1943-44, Boxes 256*, 277
- Entry 2 (NM63), General Correspondence, 1944-45, Boxes 702, 713, 719, 743

RG 51, Bureau of the Budget

- Entry 149-A, War Projects Unit, General Records, Boxes 30, 42, 45, 46, 59-61
- Entry 149-B, Inspection Reports, Boxes 45, 232*, 233*, 427

RG 71, Bureau of Yards and Docks

- Entry 24-A (UD), Unprocessed Naval Property Case Files, Box 19
- Entry 1001, Naval Property Case Files, Boxes 300, 301*, 302*, 303*, 304, 305, 306*, 307*, 308, 309, 310*, 311, 312*, 313, 314*, 315*, 316*, 317*, 318*, 319*, 320*
- Entry1016, Land Acquisition Receipt, 1940-43, Box 1
- Entry1017, Land Purchase Progress Reports, 1942-45, Box 1
- Entry1019, Miscellaneous Reports Land Investigations, Boxes 1-4
- Entry 1030, Army Facilities Acquired, 1944-45, Box 1
- Entry 1037, Lease Files, Boxes 1*, 2-33

RG 72, Bureau of Aeronautics:

- Entry 17-A, Confidential General Correspondence, 1922-44, Box 1158*
- Entry 62B,(NM52), General Correspondence, 1943-45, Boxes 3378*, 3379*, 3450, 3461
- Entry 62B (NM52), General Correspondence, 1946, Boxes 424, 489
- Entry 62B (NM52), General Correspondences, 1947, Boxes 382, 383*, 384, 385
- Entry 67 (NM52), Confidential Correspondence, 1922-24, Box 1202*
- Entry 67 (NM52), Confidential Correspondence, 1945-47, Boxes 285, 300, 653, 654
- Entry 1001-A, Unclassified General Correspondence, 1948-49, Boxes 384*, 385*, 386, 387, 388*, 389*
- Entry 1001-B, Unclassified General Correspondence, 1950, Boxes 204*, 205*, 206
- Entry 1001-C, Unclassified General Correspondence, 1951, Boxes 169*, 170*, 171
- Entry 1001-E, Unclassified General Correspondence, 1953, Boxes 248*, 249*
- Entry 1001-F, Unclassified General Correspondence, 1954, Boxes 184*, 202, 209*, 210*
- Entry 1001-G, Unclassified General Correspondence, 1955, Boxes 225*, 226*
- Entry 1001-H, Unclassified General Correspondence, 1956, Boxes 214*, 215*
- Entry 1001-I, Unclassified General Correspondence, 1957, Boxes 217, 218
- Entry 1001-J, Unclassified General Correspondence, 1958, Boxes 154, 168, 169*
- Entry 1001-K, Unclassified General Correspondence, 1959, Boxes 145, 156*, 157

RG 74, Bureau of Ordnance:

- Entry 25-I, General Correspondence, 1942, Confidential, Boxes 200, 201*, 209

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- Entry 25-J, General Correspondence, 1942, Restricted, Boxes 429*, 430*, 449, 455
- Entry 25-M, General Correspondence, 1943, Confidential, Boxes 364, 375, 386
- Entry 25-O, General Correspondence, 1943, Restricted, Boxes 461*, 514
- Entry 25-U, General Correspondence, 1944, Confidential, Boxes 500, 527, 549
- Entry 25-V, General Correspondence, 1944, Restricted, Boxes 821*, 871, 911, 912
- Entry 1002A (1529), Construction and Procurement Subject Files, 1945, Boxes 1195*, 1282
- Entry 1002B (4444), Construction and Procurement Subject Files, 1946, Boxes 253, 278, 286
- Entry 1002C (5595), Construction and Procurement Subject Files, 1947, Boxes 189*, 203, 208
- Entry 1003A (A1), General Correspondence, Unclassified and Confidential, 1948, Boxes 572*, 586
- Entry 1003A (A1), General Correspondence, Unclassified and Confidential, 1949, Box 572

RG 80, General Records of Department of Navy, 1798-1947

- Entry 156 MM (A-1), Name and Subject Index 1944-1945, Boxes 1-20
- Entry 255 (PC31), Reports from Shore Establishments, Boxes 33, 47, 154, 170, 182, 192
- Entry 256 (PC-31), Index to Reports from Shore Establishments, 1943-1944, Boxes 1-3

RG 121, Public Buildings Service

- Entry 13, Real Property, Box 2*

RG 127, USMC

- Entry 37 (UD-WW), Correspondence, 1975, Box 22
- Entry 50 (UD-UP), Real Estate Legal Correspondence File, 1918-76, Boxes 1-12
- Entry 62 (UD-WW), Correspondence, 1967, Box 27
- Entry 83 (UD-WW), Fleet Marine Correspondence, 1957-58, Box 1
- Entry 86 (UD-WW), Fleet Marine Correspondence, 1957, Box 1
- Entry 93, Facilities and Services, 1938-75, Boxes 1-3
- Entry 102 (UD-WW), General Correspondence, 1950-58, Boxes 267-271

RG 165, War Department General and Special Staffs

- Entry 310, Historical Files, 1900-41, Boxes 1, 354

RG 225, Joint Army and Navy Boards and Committees

- Entry 6, Army/Navy Munitions Board, 1942, Boxes 1-4

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- Entry 7, Army-Navy Munitions Board Correspondence, 1943-45, Boxes 1-5

RG 269, General Services Administration

- Entry 5(UD), Administrator's General Subject File, 1962-64, Box 19

RG 270, War Assets Administration

- Entry 3, Office of Information, 1946-49, Boxes 87*, 88
- Entry 9, Subject File, Central Office of Real Property, 1946-49, Boxes 67-70, 86

RG 291, Federal Property Resources Service

- Entry 1 (UD-WW), Real Property Disposal Case Files, Boxes 72*, 74, 75, 80, 81
- Entry 5 (A1), Real Property Disposal Case Files, 1949-62, Boxes 46*, 47, 48, 51-53
- Entry 6, (UD-WW), 1970-71, Box 9

RG 330, Office of Secretary of Defense

- Entry 5, 1995 BRAC Commission, Boxes 10*, 35, 87, 112*, 179, 188*, 192, 193, 217, 255-257
- Entry 7, 2005-2006 BRAC Commission, Box 32

RG 334, Records of Interservice Agencies

- Entry 15, Armed Services Explosives Safety Board, Explosion Reports, 1939-48, Boxes 1, 4, 18, 19

RG 384, Office of Navy Material

- Entry 9 (UD-UP), Historical Files 1968-1976, Box 1
- Entry 42 (UD-UP), Naval Shore Establishments 1951-1957, Box 2
- Entry 53 (UD-UP), Alphabetical Subject Files, Boxes 1-3
- Entry 54, Subject Files 1952-1953, Boxes 1-6

RG 428, General Records of Department of Navy 1947

- Entry 1, Confidential Correspondence, Naval Operations, 1948, Box 1117
- Entry 2, Formerly Classified General Correspondence of Deputy Chief of Naval Operations 1948-1951, Boxes 539, 575, 604, 967, 971
- Entry 234, Central Subject Files, Office of Information, 1940-58, Boxes 4, 33
- Entry 240 (UD-WW), Industrial Relations Subject File, 1947, Boxes 4, 8
- Entry 272 (UD-WW), Industrial Relations subject File, 1948, Boxes 3-5, 7

RG 429, Federal Property Council

- Entry 12, Central Real Property Surveys, Boxes 65-A*, 68*, 69*, 72*
- Entry 16, Central Subject File, Boxes 21*, 23-25

Cartographic Records:

RG 23, Coast and Geodetic Survey

- Folders for Charts 1265*

RG 37, Hydrographic Office

- Hydrographic Charts

RG 38, Chief of Naval Operations

- Plans of Major Navy Yards

RG 57, USGS

- 7.5 Minute Quads: Ft. Barrancas*, Gulf Breeze, Pensacola, West Pensacola, Oriole Beach

RG 71, Bureau of Yards and Docks

- Maps for facilities 800*, 805
- Series II microfilm, Reels 621*, 622*, 629*, 631*, 634*, 1385*

RG 77, Chief of Engineers

- AMS, V-747:3544*; V-847: 3544*
- Fortification Map Files, Drawers, 77, 78*, 80*, 128, 254
- War Department Map Collection, 33-Florida
- Real Estate Division, Ft. Pickens (Pensacola)*

RG 92, Quartermaster General

- Blueprint File, Ft. Barrancas*
- General Bound Volumes of Plans, U.S., 1904-05, Ft. Pickens*

RG 94, National Defense Board

- Enclosures to Report 418*

RG 385, Naval Facilities Engineering Command, 1917-1989

- Restricted Access, Architectural and Engineering Plans, Boxes S-6, S-7, S-8, S-22, S-44, S-45, S-46, S-49, S-53*

Aerial Photos:

RG 145, ASCS

- Cans 1284*, 1286, ON30457, ON30458, ON37513*, ON37514, ON37516*, ON37517*

Still Photos:

RG 71, General Records of Bureau of Yards and Docks

- Entry 71-CA
- Entry 71-CB
- Entry 71-CF
- Entry 71-CP

- Entry 71-GS

RG 80-CF, General Records of Department of Navy

- Boxes 96*, 97*

RG 80-G, General Records of Department of Navy

- Boxes 114*, 171*, 198*, 264, 268, 270, 283, 411*, 485, 530*, 691*, 1110, 1203*, 1896*, 1900*, 1910*, 1930, 1943*, 1954*, 1971*, 1972, 1973, 1974*, 1976*, 1989*, 1995*, 2380, 2624

RG 428, General Records of Department of Navy

- Entry 428-GX
- Entry 428-GXA

The archive data search produced one document (*History Naval Air Bases Gunnery Department, 1941-1944*) that describes munitions related activities at Saufley Field, but the document does not specifically include the Saufley Field Small Arms Range. Official correspondence regarding the official closure and NFA status of the Bronson Field Firing Range was collected. Archival maps provided information about the areas of the installation where the sites are located, including the general layout, location, and number of structures and improvements in these areas over time. The archival maps also showed other former munitions areas associated with NASP, including 26 additional areas of interest.

4.2. Personal Interviews

Malcolm Pirnie's data collection team interviewed the following personnel for information relating to munitions use and history at the Small Arms Range.

Ms. Pamela Boudreaux, Cultural Resource Manager, NAVFAC SE Public Works Department Pensacola - Ms. Boudreaux has been employed by NASP for 11 years and has been the Cultural Resource Manager for four years. Ms. Boudreaux indicated that there are no known archaeological sites at Saufley Field. Additionally, she indicated that the Small Arms Range is located outside of the historical district. Ms. Boudreaux provided the data collection team with a copy of the Integrated Cultural Resources Management Plan (ICRMP).

Mr. Chuck Brevik, Real Property Management, NAVFAC SE Public Works Department Pensacola - Mr. Brevik has been employed at NASP for three years and was previously

employed at NAS Whiting Field for three years. Mr. Brevik provided the data collection team with information regarding property acquisition dates and property boundaries.

Mr. Richard Callaway, Cultural Resource Manager (retired), NASP - Mr. Callaway was employed at NASP continuously from 1979 until his retirement in 1997. Mr. Callaway was interviewed via telephone following the site visit. He provided general historical information regarding the installation.

Mr. Gregory Campbell, Environmental Engineer, NASP Environmental Department – Mr. Campbell is the primary point of contact at NASP. Mr. Campbell provided the data collection team with access to various documents and coordinated the site visits and interviews.

Mr. Mark Gibson, Natural Resource Manager, NASP Environmental Department - Mr. Gibson has been employed by NASP since 1985. Mr. Gibson provided natural resource information related to Saufley Field. Specifically, he mentioned that gopher tortoises, as well as denning animals such as foxes and bears, may be found on the Small Arms Range. Mr. Gibson informed the data collection team that the Bronson Field Firing Range had received closure from the State of Florida.

Mr. Frank Fritz, Director of Engineering (retired), NASP - Mr. Fritz was employed at NASP from 1955 until his retirement in 1993. Mr. Fritz was interviewed via telephone following the site visit. He provided general historical information regarding the installation.

Mr. Ron Joyner, Environmental Engineer, NAS Whiting Field - Mr. Joyner was an Environmental Engineer at NASP from 1990 until 2000. Mr. Joyner was contacted via telephone during the site visit. Mr. Joyner provided information regarding the Bronson Field Firing Range closure.

Mr. Buddy Macon, Deputy Director, Naval Aviation Museum – Mr. Macon has been employed at NASP for more than 30 years. Mr. Macon provided general historical information regarding the installation but did not provide specific information relating to the Saufley Field Small Arms Range.

Mr. Harry White, NASP Public Affairs Officer – Mr. White has been employed at NASP since 1989. Mr. White provided the data collection team with contact information for former NASP personnel who may be able to provide information on munitions use at the installation.

4.3. On-Site Data Repositories

Several environmental reports and related documents were available from the Public Works Department. The site closure documents for Bronson Field and the ICRMP were also available. Installation-specific information obtained during the records search was helpful in developing general physical profiles regarding the areas where the sites are located. The documents, as well as interviews with installation personnel and observations made during the visual survey, served as the primary sources of site-specific information for this PA.

4.4. Visual Survey

The data collection team conducted a visual survey of each site/range as part of the data collection effort for the PA. The purpose of the visual survey was to identify MEC and ordnance related materials (e.g., expended rounds, fragmentation, range debris, old targets), evidence of MC (e.g., ground scarring, stressed vegetation, chemical residue), and/or surface features (e.g., firing points, targets, buildings) that could provide additional information to aid in the characterization of the site. The visual survey was also used to enhance, augment, or confirm the archival data and, in some cases, provide new data to the team. A description of the areas surveyed and the results of the survey are provided in Section 5.

The type of range and weapons known or suspected to have been used on the site drives the materials and/or features that the data collection team looked for during the visual survey. For the Saufley Field Small Arms Range, the data collection team looked for evidence of former firing lines, target stands, backstop berms, and expended small arms ammunition (i.e., bullets and bullet fragments). A handheld Global Positioning System receiver was used to track and capture location data. Photographs were taken to document observations made. Because of the thick vegetation on the site, the data collection team was able to walk approximately 20% of the site and visually observe at least 70% of the site from the path walked.

4.5. Off-Site Data Sources

The data collection team visited the National Museum of Naval Aviation at NASP to obtain additional historical information regarding the installation and the MRP ranges/sites. A personal interview with Mr. Macon was conducted, but no documents were obtained.

5. SITE CHARACTERISTICS

The following sections provide site-specific information about the PA site located at NASP that is the focus of this PA report, including history and site description, land use, access controls and restrictions, visual survey observations and results, contaminant migration routes, and potential receptors.

5.1. Saufley Field Small Arms Range

5.1.1. History and Site Description

Saufley Field is an 878-acre outlying field with two 4,000 ft runways. It was commissioned as Saufley Field on 26 August 1940 in honor of Lieutenant Richard Caswell Saufley, designated Naval Aviator No. 14. An instrument flying school and the first primary training squadron was based there. The student population increased with the outbreak of WWI, and Saufley Field was commissioned as NAAS Saufley Field. Gunnery staffs were set up at NAAS Saufley Field in 1943 to give fundamental gunnery instruction to pilots. The mission of Saufley Field was revised to provide support for training squadrons VT-1 and VT-5 in 1960. NAAS Saufley was recommissioned as NAS Saufley Field in 1968. The training squadrons were decommissioned in late 1976, and the field was decommissioned to NOLF Saufley. Saufley Field was reactivated in 1979 when Naval Educational and Training Program Management Support Activity moved from Ellyson Field. Its current mission is to support Training Air Wings 5 and 6 and to serve as home for several DoD and other U.S. government organizations as a joint use facility.

The Saufley Field Small Arms Range is currently a 1.2-acre area with a clay berm located on the northwestern corner of Saufley Field. The first mention of range activity at Saufley Field occurs in *History, Naval Air Training Bases Gunnery Department*, which covers the period from 7 December 1941 through 1 November 1944. According to the document, gunnery staffs were set up at Saufley Field in August 1943 to give fundamental gunnery instruction to pilots. The document also states that 962 students waiting for suitable flying weather between April and June 1945 were given a specialized training syllabus. The specialized syllabus included lectures in target force analysis, sighting review and analysis, bombing, boresighting review and problems, and attack problems. Activities on the syllabus also included “150 rounds of Shotgun Firing” and “150 rounds of 38 Cal. Pistol Firing.” The Small Arms Range appears on National Archives

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maps each year from 1946 through 1949. The maps show the location and relative size of the range, but do not include details of its basic layout or orientation. No information regarding the exact dates of operation or reason for closure could be obtained.

A small arms range is defined by NAVAER 00-100-504 as “an area for practice firing of small arms, particularly the .38 or .45 caliber pistol and the .22 and .30 caliber rifles.” According to Army Technical Manuals (referenced as AR 750-10 and TM 9-855) and the *Navy Programming Guide* (1958), a typical pistol range was approximately 30 yards wide by 50 yards deep. The range was comprised of the firing line, targets, earthen berm (backstop berm), and an area behind the firing line that included the ammunition issue point and administrative area. The backstop berm typically was constructed along the backside of the range, approximately 5 feet to the rear of the targets. A five-degree angle-of-fire extended from the firing line downrange a distance of 4,800 feet, with an additional 25-degree safety fan (on both sides) extending downrange 3,600 feet. The surface danger zone, which included the downrange hazard area and the safety fan, was roughly diamond-shaped and contained approximately 224 acres.

A PA of Saufley Field was conducted by the Naval Energy and Environmental Support Activity (NEESA) in July 1991. The 1992 PA report discusses the findings of a pistol range (the Small Arms Range) comprised of a clay hill approximately 100 feet in length, 30 feet in width, and 20 feet high (NEESA, 1992). Large amounts of spent bullets were found in the hill and surrounding area. The bullets were lead, with some having copper or steel jackets. The Small Arms Range and berm were located during the 23 January 2007 site visit to Saufley Field, but no bullets were observed in the area. The 1.2-acre site includes the clay berm and surrounding area.

5.1.1.1. Topography

Saufley Field lies on a low ridge approximately 85 feet above msl; it gently slopes to 25 feet above msl to the north of Eightmile Creek, and it slopes to 10 feet above msl southward to the edge of Perdido Bay (INRMP 2000-2010). According to a 1998 Site Assessment Report (SAR) of Saufley Field, topography is level to gently sloping with less than 8% slope, with a few exceptions to the northern boundary of the property. The topography of the Small Arms Range is relatively flat. Drainage flows toward Eightmile Creek and Elevenmile Creek, which drain toward Perdido Bay.

5.1.1.2. Geology

Saufley Field is located in the Gulf Coastal Lowlands physiographic region, which consists of relatively undissected, nearly level plains lying less than 100 feet above msl (SAR 1998). Limestones, organics, and clastics are the three main components of surface geology at the site. Ten geologic formations lie below NASP; each is discussed in Section 3.3.

5.1.1.3. Soil and Vegetation Types

The Small Arms Range is located within the vicinity of the airfield, which is characterized by generally well-drained sandy and loamy soils (INRMP 2000-2010). Based on the soil map of Saufley Field included in the 1998 SAR, the following soil types are present on the northwest corner of Saufley Field at or near the location of the former range: Klej loamy sand, level phase; mixed alluvial land, poorly drained; Myatt very fine sandy loam, level phase; Lakeland loamy sand, level phase; Lakeland loamy sand, very gently sloping phase; and Rutlege sand. Surface sediments at Saufley Field have been classified with the Eustis, fresh water swamp, Klej, Lakeland, mixed alluvial land, Myatt, Norfolk, Plummer, Red Bay, and Rutlege associations (NEESA, 1992).

According to the 2003 Escambia County JLUS, the Small Arms Range is located in an area containing floodplain forests and unique longleaf and mixed pineforests. Wetlands are located north of the site along Eightmile and Elevenmile creeks. During the visual survey of the site, the range was vegetated with thick brush and low lying shrubs. Mature trees (pine and oak) were growing on and around the berm. The thick vegetation on and around the berm makes access to the entire site difficult, but access is not prevented.

5.1.1.4. Hydrology

Elevenmile and Eightmile creeks are located in the northwest portion of Saufley Field and drain southwest into Perdido Bay. A 100-year floodplain follows each creek, but neither floodplain encroaches upon developed areas (NEESA, 1992). Over 100 acres of wetlands are present at Saufley Field, most of which are associated with the Elevenmile Creek and Eightmile Creek floodplains (EDAW, 2003). No surface water features or wetlands are located on the Small Arms Range.

5.1.1.5. Hydrogeology

NASP is underlain by the sand-and-gravel aquifer and the Floridan aquifer system. Beneath Saufley Field, the two aquifers are separated by a thick clay unit of Miocene age. An extensive clay bed formed by the Bucatanna clay member of the Byram Formation lies beneath the upper limestone of the Floridan aquifer, creating an aquiclude throughout the area (NEESA, 1992). Impermeable clay and shale lie beneath the lower limestone of the Floridan aquifer, preventing other aquifers from forming beneath it. Over 99% of potable and industrial water in the region is obtained from the sand-and-gravel aquifer. The main source of potable water for Saufley Field is a well field located at Corry Station, located north of Bayou Grande.

No monitoring wells or groundwater information exists for the Small Arms Range, but groundwater data were collected for a portion of Saufley Field approximately 2,000 feet southeast of the site. Shallow, intermediate, and deep site monitoring wells were installed during a Site Assessment of Underground Storage Tank (UST) Site 2406, Saufley Field. Addendum 2 of the 2003 SAR shows deep groundwater flow is southwest, intermediate groundwater flow is west and southwest, and shallow groundwater flow is northwest and northeast. The estimated groundwater velocity was 0.336 feet per day in the shallow zone and 4.8 feet per day in the deeper zone. Water level elevations were recorded between 75.42 and 100.60 feet (Tetra Tech NUS, 2005).

5.1.1.6. Cultural and Natural Resources

No cultural or natural resources were identified at the Saufley Field Small Arms Range. Over 100 acres of wetlands are located northwest of the range along Elevenmile and Eightmile creeks.

5.1.1.7. Endangered and Special Status Species

Threatened, endangered, and special status species for NASP are discussed in Section 3.8. Currently, there are no known threatened or endangered species on the Small Arms Range. The gopher tortoise has special species status in the state of Florida, and the species has been observed at Saufley Field, based on the 2000-2010 INRMP.

5.1.2. Visual Survey Observations and Results

Malcolm Pirnie team members (Ms. Terri Akbas, Ms. Angela Nolan, and Mr. Dan Hains) conducted a visual survey of the Saufley Field Small Arms Range on 23 January 2007. Navy representatives (Mr. Campbell and escort, Ensign Chuck Boehmer) were also present. During the visual survey, the team used a meandering path to walk around the perimeter and along the accessible portions of the remaining berm. The berm was located in a thickly wooded area and was vegetated with thick brush and matures trees. The vegetation prohibited access across the top of the berm, as well as from the front of the berm facing the runways (Figure 5.1-2). No structures exist at the site or in the immediate vicinity. Piles of sand were present along the side of the berm facing the runways (Figure 5.1-3). No MEC, munitions debris, or bullets / bullet fragments were observed during the visual survey. A visual depiction of the site reconnaissance is provided on Map 5.1-1 located at the end of Section 5.1. Additional range/site details are illustrated on Map 5.1-2, also located at the end of Section 5.1.



Figure 5.1-1: View of vegetation on berm



Figure 5.1-2: View of berm behind sand mounds

5.1.3. Munitions and Munitions Related Materials Associated with the Site

This section describes the munitions or munitions related materials known or suspected to be at the site, including the types and estimated maximum penetration depths. This includes both MEC and nonhazardous munitions related scrap (e.g., fragmentation, base plates, inert mortar fins). Potential ordnance concentration areas are presented, along with a discussion on the presence of special consideration ordnance.

Based on NAVAER 00-100-504, the munition types associated with a typical small arms range include .38- and .45- caliber pistol ammunition and .22- and .30- caliber rifle ammunition. Large amounts of bullets were discovered in and around the existing berm during the 1992 PA of Saufley Field. The PA report states that many of the bullets were lead, some with copper or steel jackets. The sizes and types of the bullets were not documented in the report, and no documents have been obtained from NASP that give any indication of the types or quantity of bullets used at

the Small Arms Range. Based on the information obtained during the data collection process, the Small Arms Range is not suspected to contain chemical warfare materiel filled munitions, electrically fuzed munitions, or depleted uranium associated munitions.

5.1.4. MEC Presence

The entire site has been subdivided and categorized into one of three levels of MEC presence, including: Known MEC Areas, Suspected MEC Areas, and Areas Not Expected to Contain MEC to indicate that MEC are known or are suspected to be at the site. The MEC presence is discussed below.

Map 5.1-3 illustrates the munitions characterization of the Saufley Field Small Arms Range and is provided at the end of Section 5.1.

5.1.4.1. Known MEC Areas

Because the site was used only for small arms training and there is no historical or known evidence of explosives used at the site, there is no evidence of MEC. As such, there are no known MEC areas associated with the Saufley Field Small Arms Range.

5.1.4.2. Suspected MEC Areas

There are no suspected MEC areas associated with the Saufley Field Small Arms Range.

5.1.4.3. Areas Not Suspected to Contain MEC

Based on observations made and data collected during the PA process, the entire 1.2-acre Small Arms Range site is not suspected to contain MEC.

5.1.5. Ordnance Penetration Estimates

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munition, the velocity at impact, and site-specific environmental conditions. Over the years, the DoD has studied and modeled munitions penetration depths and has issued various guidance and technical documents on the

subject. The technical documents, however, apply to air dropped and indirect fire weapons and do not apply to small arms ranges.

By design, a small arms range is a directed fire training range and normally has a backstop (impact) berm located behind the target area that receives/contains the projectiles (bullets) expended on the range. Depending on berm composition, the penetration depths into the backstop berm range from surface to 12 inches. Because the range was designed such that small arms ammunition was fired toward targets and retained on-site by the backstop berm, expended rounds are not expected to have penetrated the ground surface or accumulated beyond the former location of the backstop berm. Because the backstop berm was comprised of clay, the majority of the ammunition fired at the targets and the berm were retained in the clay.

For small arms ranges, the Interstate Technology and Regulatory Council (ITRC) has prepared *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges*, dated January 2003, to provide information on the general layout of small arms ranges, as well as information on areas that may be impacted by MC and/or MEC as a result of range use and the characteristics of the munitions used. According to the ITRC guidance, the penetration depth of small arms on the range floor is 1 foot or less. The document states that rounds that impact the range floor are typically a flat trajectory that fell short of or missed the target or those resulting from ricochet, and these fragments are usually found within the top 6 inches of soil.

5.1.6. MC

Small arms ammunition is mainly comprised of lead (approximately 85% by weight of the projectile). As such, the primary MC of concern associated with small arms ranges is lead. Metallic lead is insoluble in water, but in the geochemical environment of most ranges it may slowly convert to other oxidized forms. Depending on the environment (e.g., soil characteristics, pH, organic matter present), oxidation products can become mobile. However, lead mobility is effectively controlled by adsorption under the majority of conditions found on small arms ranges. In general, an exponential decline in lead concentrations has been observed in very short vertical distances due to adsorption or exchange reactions with clays, metal oxides, or organic matter in the soil.

Other MC may include antimony, arsenic, copper, zinc, and constituents associated with black or smokeless powder. However, these constituents are less likely to be of concern since they are either present in the ammunition item in only minor amounts/concentrations or typically consumed when the item is fired. Based on discussions with installation personnel, surface soil sampling at the Small Arms Range has not occurred. No monitoring wells exist on the site, but groundwater monitoring wells currently are being used approximately 2,000 feet south of the former range at UST Site 2406.

5.1.7. Contaminant Migration Routes

Migration of MC from the Saufley Field Small Arms Range may occur naturally due to soil erosion, surface runoff, infiltration and leaching, or plant/animal uptake. Human activities, including maintenance (e.g., mowing) and grading, can cause MC migration. Future construction, excavation, or other site work could also serve as a migration/release mechanism. The main source of potable water for Saufley Field is a well field located at Corry Station, north of Bayou Grande. No activities are conducted at the Small Arms Range that would result in contact with groundwater; therefore, contaminant migration to groundwater is not expected. Air migration of contaminants could occur if soil particles become airborne. The thick vegetation and high precipitation in the area minimizes the mobility of soil; therefore, air migration of contaminants is not expected.

5.1.8. Receptors

Potential receptors at the Small Arms Range include human and ecological receptors possibly contacting and disturbing or removing soil impacted by the lead bullets and bullet fragments at the site. Potential human receptors include Navy personnel, contractors, visitors, and trespassers. Terrestrial ecological receptors may include mammals (e.g., foxes, bears, squirrels), reptiles (e.g., tortoises), terrestrial plants, and a variety of bird species. Aquatic ecological receptors in nearby surface water may include various species of fish, amphibians, and aquatic/wetland vegetation. Currently, there are no known threatened or endangered species on the Small Arms Range. The gopher tortoise has special species status in the state of Florida, and the species has been observed at Saufley Field, based on the 2000-2010 INRMP.

Human receptors may come into direct contact with MC while performing environmental or ecological studies (Navy personnel and contractors) or while hiking (trespassers and naturalists).

Ecological receptors may come into direct contact with MC in surface soil while foraging or burrowing. Ecological receptors may also come into contact with MC that have been incorporated into the food chain (bioaccumulated in plants and small animals).

5.1.8.1. Nearby Populations

Saufley Field is located in Escambia County, Florida. According to the 2003 JLUS for Escambia County, approximately three-quarters of the land within a 1-mile radius of Saufley Field is vacant. The remaining land contains mostly single-family housing. According to 2000 U.S. Census Bureau statistics, the population of Escambia County is 294,410, with a population density of 444.7 people per square mile. Pensacola is the nearest city and has a population of approximately 56,255 (2000 U.S. Census). Approximately 1,356 personnel were employed at Saufley Field in FY03.

5.1.8.2. Buildings Near/Within Site

There are no buildings on or near the Saufley Field Small Arms Range. A clay berm approximately 100 feet in length, 30 feet in width, and 20 feet in height is the only remaining structure located at the site. Two active runways are located 800 to 1,000 feet south and east of the berm.

5.1.8.3. Utilities On/Near Site

A primary utilities line for airfield lighting is located southeast of the site within 600 feet of the former range. No other utilities are located on or in the immediate vicinity of the Small Arms Range.

5.1.9. Land Use

The Small Arms Range is currently closed and has no currently designated land use. Two active runways at Saufley Field are located approximately 800 to 1,000 feet to the south and east of the Small Arms Range. NAS Whiting Field pilots use two of the airstrips for touch-and-go landing exercises. Approximately 75% of the land within a 1-mile radius of Saufley Field is vacant, and the remaining primarily supports single-family housing. According to the 2003 JLUS of Escambia County, land outside of the boundary of Saufley Field in the vicinity of the Small Arms

Range is designated for future low-density residential development. Land where the Small Arms Range is located is designated for public use.

5.1.10. Access Controls/Restrictions

The Small Arms Range is located within the boundary of Saufley Field, which is surrounded by a perimeter security fence. Access to Saufley Field is limited by a security checkpoint, but access to the site is not directly restricted past the checkpoint. Access to the berm is constrained, but not prevented, by thick vegetation.

All of Saufley Field, including the Small Arms Range, is designated as an Airfield Planning District One (AIPD1) by the 2003 JLUS. Areas designated AIPD1 contain airfield clear zones and accident potential zones. Future development in an AIPD1 is restricted to one single-family dwelling unit per 2.5 acres. Schools, churches, hospitals, multifamily residential units, and other buildings that concentrate people in compact areas are prohibited in an AIPD1.

5.1.11. Conceptual Site Model

This Conceptual Site Model (CSM) was developed following guidance documents issued by the USEPA for hazardous waste sites and the USACE for ordnance and explosives sites. Guidance documents include the USEPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (EPA/540/G-89/004) and the *Final USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental Ordnance and Explosives Sites* (USACE, 2003).

The CSM describes the site and its environmental setting. The CSM presents information regarding: 1) MEC and/or MC known or suspected to be at the site; 2) current and future reasonably anticipated or proposed uses of the real property; and 3) actual, potentially complete, or incomplete exposure pathways linking them. The CSM is the basis for the prioritization and remediation cost estimate.

The CSM is presented in a series of information profiles that provide information about the site. The information profiles are included in Table 5.1-1.

Table 5.1-1: CSM Information Profiles – Saufley Field Small Arms Range

Profile Type	Information Needs	PA Findings
Range/Site Profile	Installation Name	Naval Air Station Pensacola
	Installation Location	Escambia County, Florida
	Range/Site Name	Saufley Field Small Arms Range
	Range/Site Location	Saufley Field is located 10 miles north of NASP in Escambia County, Florida. It lies east of Perdido Bay, west of Pensacola Bay, and north of the Gulf of Mexico.
	Range/Site History	The range is shown on maps dated 1943 through 1949. No other information regarding the range history was reviewed.
	Range/Site Area and Layout	The Small Arms Range is a 1.2-acre site located in the western portion of Saufley Field; two runways are located approximately 800 to 1,000 feet east and south of the range.
	Range/Site Structures	The range berm is a large clay hill approximately 100 feet in length, 30 feet in width, and 20 feet high. No other structures exist at the site or in the immediate vicinity.
	Range/Site Boundaries	N: Woods, Elevenmile Creek located approximately 1,000 feet to the north S: Woods, airfield, and runways E: Trees, airfield, and runways W: Woods, Saufley Field property
	Range/Site Security	A security checkpoint must be passed to gain access to Saufley Field. A fence surrounds the airfield, but access to the site is not directly restricted from areas within Saufley Field.
Munitions/Release Profile	Munitions Types	Specific ordnance types used at the range were not documented; however, typical small arms used for practice include .38- and .45-caliber pistols and the .22- and .30-caliber rifles.
	Maximum Probability Penetration Depth	Maximum penetration depth into the berm is estimated to be 12 inches.

Table 5.1-1: CSM Information Profiles – Saufley Field Small Arms Range

Profile Type	Information Needs	PA Findings
	MEC Density	Based on historical documentation, the Saufley Field Small Arms Range was used only for small arms training. MEC are not suspected to be present at the site.
	MEC Scrap/Fragments	No evidence of munitions debris was identified during the visual survey.
	Associated MC	The primary MC associated with small arms ammunition is lead. Other MC may include antimony, arsenic, copper, zinc and constituents associated with black and/or smokeless powder. Soil sampling at the Small Arms Range has not been conducted.
	Migration Routes / Release Mechanisms	Migration of MC from the Saufley Field Small Arms Range may occur naturally due to soil erosion, surface runoff, infiltration and leaching, or plant/animal uptake. Human activities, including maintenance (e.g., mowing) and grading, can cause MC migration. Future construction, excavation, or other site work could also serve as a migration/release mechanism.
Physical Profile	Climate	The climate at NASP is characterized by short, mild winters and long, warm summers. January is the coldest month, with an average temperature of 50.5°F, and July is the hottest month, with the average temperature being 82.0°F. The average annual temperature is 67.6°F. There are an average of nine freezes per year, but temperatures in the area rarely fall below 15°F - 20°F. Pensacola receives 63 inches of rainfall per year. Severe weather includes thunderstorms, tornadoes, tropical storms, and hurricanes. Hurricane season is June through November. The last hurricanes to affect the Pensacola area were Hurricanes Erin and Opal in 1995, Hurricane Ivan in 2004, and Hurricane Dennis in 2005.
	Topography	Saufley Field lies on a low ridge approximately 85 feet above msl. It gently slopes to 25 feet above msl to the north of Eightmile Creek, and it slopes to 10 feet above msl southward to the edge of Perdido Bay. The Small Arms Range is relatively flat.

Table 5.1-1: CSM Information Profiles – Saufley Field Small Arms Range

Profile Type	Information Needs	PA Findings
	Geology	<p>The site is located in the Gulf Coastal Lowlands physiographic region. Limestones, organics, and clastics are the three main components of surface geology at the site. Ten geologic formations lie below NASP:</p> <p>Hatchetigbee Formation Tallahatta Formation Lisbon Equivalent Ocala Group Bucatunna clay member of the Byram Formation Chickasawhay Limestone Tampa Formation Pensacola Clay Miocene Coarse Clastics Citronelle Formation</p>
	Soil	<p>Soils within the vicinity of the airfield and northeast of the field are generally well-drained sandy and loamy soils. The areas northwest of the airfield are characterized by poorly drained sandy soils and muck. Soils in the northwest portion of Saufley Field include Klej loamy sand, Lakeland loamy sand, mixed alluvial land, Myatt very fine sandy loam, and Rutlege sand (Campbell, 1998). Surface sediments at Saufley Field have been classified with the Eustis, fresh water swamp, Klej, Lakeland, mixed alluvial land, Myatt, Norfolk, Plummer, Red Bay, and Rutlege associations (NEESA, 1992).</p>

Table 5.1-1: CSM Information Profiles – Saufley Field Small Arms Range

Profile Type	Information Needs	PA Findings
	Hydrogeology	<p>NASP is underlain by the sand-and-gravel aquifer and the Floridan aquifer system. Beneath Saufley Field, the two aquifers are separated by a thick clay unit of Miocene age. An extensive clay bed formed by the Bucatanna clay member of the Byram Formation lies beneath the upper limestone of the Floridan aquifer, creating an aquiclude throughout the area (NEESA, 1992). Impermeable clay and shale lie beneath the lower limestone of the Floridan aquifer, preventing other aquifers from forming beneath it. Over 99% of potable and industrial water in the region is obtained from the sand-and-gravel aquifer. The main source of potable water for Saufley Field is a well field located at Corry Station, located north of Bayou Grande.</p> <p>No monitoring wells or groundwater information exists for the Small Arms Range, but groundwater data were collected for a portion of Saufley Field. Shallow, intermediate, and deep site monitoring wells were installed during a Site Assessment of UST Site 2406, Saufley Field. Addendum 2 of the 2003 SAR shows deep groundwater flow is southwest, intermediate groundwater flow is west and southwest, and shallow groundwater flow is northwest and northeast. The estimated groundwater velocity was 0.336 feet per day in the shallow zone and 4.8 feet per day in the deeper zone. Water level elevations were recorded between 75.42 and 100.60 feet (Tetra Tech NUS, 2005).</p>
	Hydrology	<p>Elevenmile and Eightmile creeks are located in the northwest portion of Saufley Field. A 100-year floodplain follows each creek, but neither floodplain encroaches upon developed areas. Saufley Field has 100.7 acres of wetlands.</p> <p>No surface water features are located at the Small Arms Range. Surface water runoff from the site drains north toward the creeks, which flow southwest from Saufley Field.</p>
	Vegetation	<p>The entire range is vegetated with thick brush and low lying shrubs. Mature trees (pine and oak) are growing on and around the berm.</p>

Table 5.1-1: CSM Information Profiles – Saufley Field Small Arms Range

Profile Type	Information Needs	PA Findings
Land Use and Exposure Profile	Current Land Use	The Small Arms Range currently is closed and has no designated or future planned land use. Two active runways at Saufley Field are located approximately 800 to 1,000 feet to the south and east of the Small Arms Range. NAS Whiting Field pilots use two of the airstrips for touch-and-go landing exercises.
	Current Human Receptors	Current human receptors include Navy personnel, contractors, visitors, hikers, and trespassers. Navy personnel and contractors may access the site to perform environmental or ecological studies. Trespassers may include hikers or naturalists who can access the site from Saufley Field.
	Current Activities (frequency, nature of activity)	Current activities include infrequent environmental/ecological investigations by Navy personnel and/or contractors and hiking by trespassers.
	Potential Future Land Use	No change in land use is planned.
	Potential Future Human Receptors	Potential future human receptors consist of the current receptors, as no change in land use is planned.
	Potential Future Land Use Related Activities	No change in land use is planned.
	Zoning / Land Use Restrictions	There are no zoning / land use restrictions at the Saufley Field Small Arms Range.
	Demographics/Zoning	The population density for Escambia County is 444.7 people per square mile (2000). Approximately 1,356 personnel are employed at Saufley Field (FY2003).
	Beneficial Resources	There are no beneficial resources located at the Saufley Field Small Arms Range. Over 100 acres of wetlands are located north of the range along Elevenmile and Eightmile creeks.
Ecological Profile	Habitat Type	According to the 2003 Escambia County JLUS, the Small Arms Range is located in an area containing floodplain forests and unique longleaf and mixed pineforests. The Small Arms Range is mostly covered by mature trees, thick underbrush, and small shrubs.
	Degree of Disturbance	The current and future land uses of the Small Arms Range result in a low degree of disturbance to the habitat or ecological receptors.

Table 5.1-1: CSM Information Profiles – Saufley Field Small Arms Range

Profile Type	Information Needs	PA Findings
	Ecological Receptors and Species of Special Concern	<p>Terrestrial ecological receptors may include mammals (e.g., foxes, bears, squirrels), reptiles (e.g., tortoises), terrestrial plants, and a variety of bird species.</p> <p>Aquatic ecological receptors in nearby surface water may include various species of fish, amphibians, and aquatic/wetland vegetation. Currently, there are no known threatened or endangered species on the Small Arms Range. The gopher tortoise has special species status in the state of Florida, and the species has been observed at Saufley Field, based on the 2000-2010 INRMP.</p>
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	<p>Flora may assimilate MC in surface and/or subsurface soil via plant uptake. Fauna may be exposed to MC in surface soil through ingestion, dermal contact, and inhalation or by ingesting vegetation or prey organisms that may assimilate or bioaccumulate MC.</p>

A key element of the CSM is the exposure pathway analysis. For MEC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MEC are expected to be found); 2) access (e.g., controlled or uncontrolled access, items on the surface or within the subsurface); 3) an activity (e.g., nonintrusive grounds maintenance, intrusive construction); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors). It is important to recognize that environmental mechanisms (e.g., erosion) and/or human intervention may result in the repositioning of MEC.

For MC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MC are expected to be found); 2) an exposure medium (e.g., surface soil); 3) an exposure route (e.g., dermal contact); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors). If the point of exposure is not at the same location as the source, the pathway may also include a release mechanism (e.g., erosion) and a transport medium (e.g., surface water).

The potential interactions between the source and receptors are assessed differently for MEC and MC. For MEC, interaction between the potential receptors and an MEC source has two components. The receptor must have access to the source and must engage in some activity that results in contact with individual MEC items within the source area. For MC, interaction

between the source and receptors involves a release mechanism for the MC, an exposure medium that contains the MC, and an exposure route that places the receptor into contact with the contaminated medium.

Figure 5.1-3, included at the end of this section, provides a graphical representation of the current understanding of the Saufley Field Small Arms Range and identifies the exposure pathways where site receptors could come in contact with, or be impacted by, MC and/or MEC. Based on the information obtained during the site visit, including observations made during the visual survey and data collected during the site visit, the potential for MEC does not exist at the site. No complete exposure pathways exist for MEC; therefore, an Exposure Pathway Analysis Figure for MEC was not created. However, information obtained and visual observations indicate that the potential for MC exists.

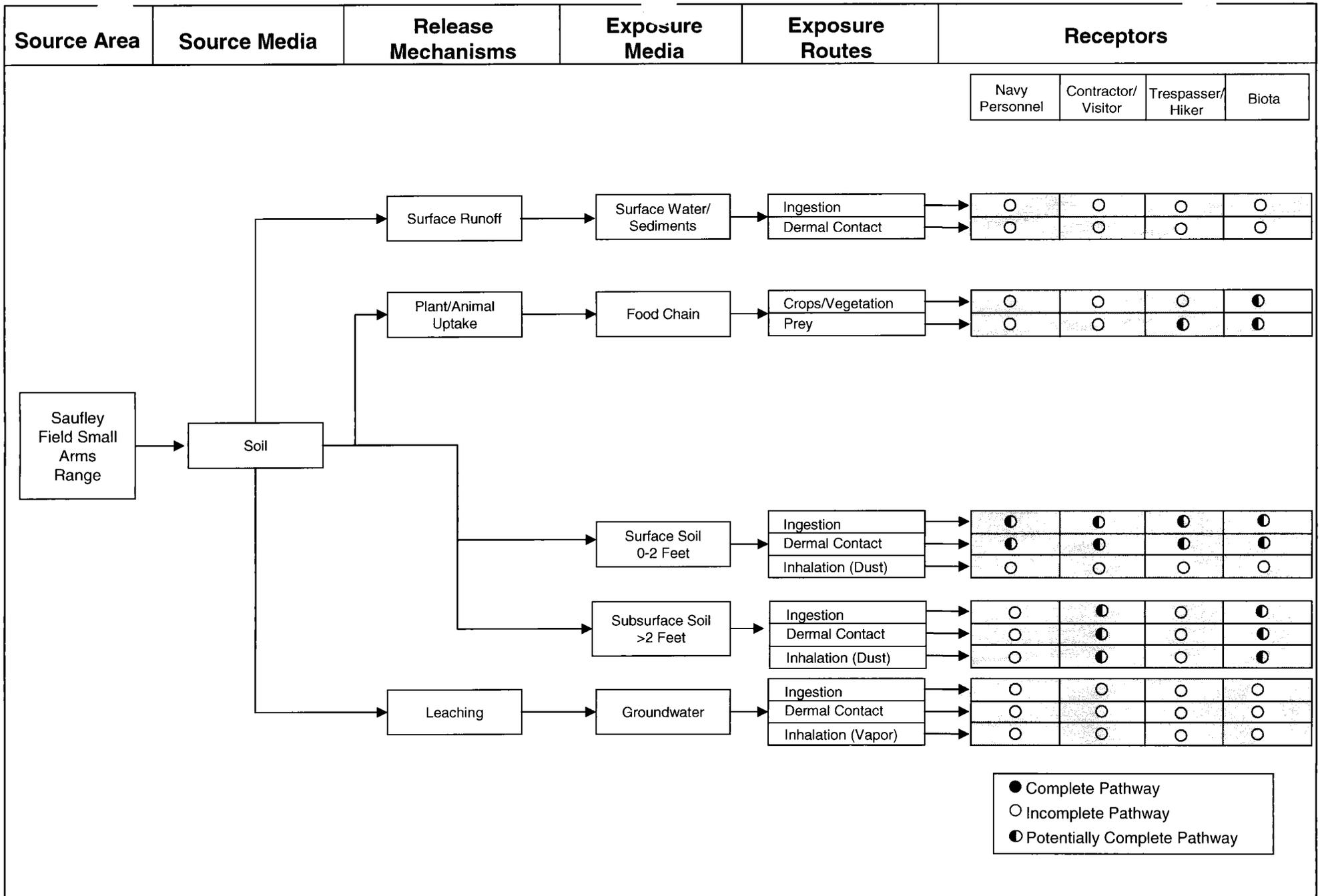
MC-contaminated soil in the berm represents a potential source medium, as illustrated in the MC Exposure Pathway Analysis Figure (Figure 5.1-3). Potential human receptors include Navy personnel, contractors, and visitors conducting environmental or ecological studies on the range and trespassers (e.g., naturalists and hikers). Potential ecological receptors include terrestrial receptors (e.g. mammals, reptiles, terrestrial plants) that may construct burrows or forage on the former range and aquatic receptors (e.g., fish, amphibians, aquatic/wetland vegetation) in nearby surface water. Potentially complete exposure pathways exist for surface soil through ingestion and dermal contact for both human and ecological receptors. Due to the thick vegetation and high precipitation in the area, dust and wind is minimized, and inhalation of MC in dust is unlikely. Thus, MC exposure pathways via inhalation of surface soil are considered incomplete for all receptors.

MC may also be present in subsurface soil due to migration from the overlying surface soil via leaching mechanisms. A potentially complete exposure pathway exists for contractors/visitors who may be exposed to MC in the subsurface soil during future construction or environmental investigations that include intrusive activities (e.g., subsurface drilling, soil excavation). Potentially complete exposure pathways exist for biota via ingestion, dermal contact, and inhalation during intrusive activities such as burrowing. Subsurface soil exposure pathways for Navy personnel and trespassers/hikers are considered incomplete because they are not expected to conduct intrusive activities at the former range.

Soil also represents a source medium when considering release mechanisms such as groundwater contamination via leaching and plant/animal uptake. MC contamination of groundwater via leaching mechanisms may occur; however, no activities are conducted at the site that would result in contact with groundwater. The depth to groundwater at Saufley Field is approximately 80 to 100 feet bgs, and the main source of potable water for Saufley Field is a well field located at Corry Station. Therefore, groundwater exposure pathways are considered incomplete for all receptors.

There is no surface water on the site. The closest surface water body is the Elevenmile Creek located approximately 720 feet north of the site. The site is heavily vegetated with mature trees, thick underbrush, and small shrubs. Any surface water on the site would likely infiltrate into the ground before running off the site. Therefore, surface water and sediment are not considered to be source media for MC.

MC in soil may be assimilated by plants or consumed by animals foraging on the range, resulting in MC bioaccumulation. Potentially complete exposure pathways exist for biota that may be exposed to MC through the food chain.



5.1.12. Summary

The Saufley Field Small Arms Range consists of 1.2 acres located 800 to 1,000 feet north and west of the active runways at Saufley Field. A clay berm approximately 100 feet in length, 30 feet in width, and 20 feet high currently remains at the former range. The entire site, including the berm, is densely vegetated with thick brush and mature trees. The former range and surrounding area are not being used currently.

Based on information collected from NASP, Saufley Field was used for giving fundamental gunnery instruction to pilots as early as 1943. The Small Arms Range is shown on maps dated 1946 through 1949 and is labeled as a "pistol range." The exact usage and period of operation of the range are unknown. Specific ordnance types used at the range were not documented; however, typical small arms used for practice include .38- and .45- caliber pistols and .22- and .30-caliber rifles. Spent bullets were observed in and around the berm in a 1991 PA of Saufley Field. The bullets were lead, with some having steel or copper jackets, but the sizes of the bullets were not reported.

Information obtained during the site visit and observations made during the visual survey provided no evidence of MEC. No bullets or bullet fragments were observed at the site. The potential for MC exists at the site. The primary MC of concern is lead. Other MC associated with the ammunition include antimony, arsenic, copper, nickel, and zinc, as well as constituents associated with black or smokeless powder. MC, if present, would likely be concentrated within and in the immediate vicinity of the berm. Based on information obtained from the installation, surface soil sampling at the range has not been conducted.

Preliminary Assessment
Naval Air Station Pensacola, Florida



MALCOLM
PIRNIE

Map 5.1-1
Visual Survey
Small Arms Range

Legend

-  Installation Boundary
-  Small Arms Range
-  Site Reconnaissance

0 100 200
Meters

Data Source: Florida GIS Clearinghouse, Aerial, 2006
NAS Pensacola, GIS Data, 2006

Coordinate System: UTM Zone 16N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
Edition: Final Preliminary Assessment
Date: August 2007



Preliminary Assessment
 Naval Air Station Pensacola, Florida



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 PIRNIE**

Map 5.1-2
 Range/Site Details
 Small Arms Range

Legend

-  Installation Boundary
-  Small Arms Range



Data Source: Florida GIS Clearinghouse, Aerial, 2006
 NAS Pensacola, GIS Data, 2006

Coordinate System: UTM Zone 16N
 Datum: NAD 83
 Units: meters

Contract: N62472-02-D-1300
 Edition: Final Preliminary Assessment
 Date: August 2007



Preliminary Assessment
 Naval Air Station Pensacola, Florida



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Map 5.1-3
 Munitions Characterization
 Small Arms Range

Legend

-  Installation Boundary
-  Small Arms Range
- MEC Presence*
-  Known
-  Suspect

*There is no evidence of MEC Presence as determined through historical documentation, interview, and visual survey. Visual observations and/or historical documentation indicate that MC may be present at the site, but MC Presence has not been confirmed by sampling or other means.



Data Source: Florida GIS Clearinghouse, Aerial, 2006
 NAS Pensacola, GIS Data, 2006

Coordinate System: UTM Zone 16N
 Datum: NAD 83
 Units: meters

Contract: N62472-02-D-1300
 Edition: Final Preliminary Assessment
 Date: August 2007



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Memos

16 August 2004 from William Hill to Mark Gibson and others, No Further Action correspondence received from Florida Department of Environmental Protection.

1 March 2000 letter from Florida Department of Environmental Protection to Mr. Bill Hill, Regarding Draft Site Characterization Report, Sites 100 and 102, Outlying Landing Field Bronson, Pensacola, Florida.

FINAL PRELIMINARY ASSESSMENT

13 April 2001 letter from Florida Department of Environmental Protection to Mr. Bill Hill, Regarding Site Characterization Report Addendum, Site 102, Outlying Landing Field Bronson, Pensacola, Florida.

Web sites

NAS Pensacola. 2007. Installation History. http://www.naspensacola.navy.mil/index.cfm/fa/base_info.history. (Accessed January 2007).

Pensacola Area Flight Watch, Inc. n.d. History of NASP and outlying airfields. <http://www.pafw.com/nasp.htm>. (Accessed 16 March 2007).

Maps

Pensacola, FL, Naval Auxiliary Air Station Saufley Field, Prepared by: NAS Pensacola Department of Public Works, 30 June 1943.

Pensacola, FL, Naval Auxiliary Air Station Saufley Field, Prepared by: NAS Pensacola Department of Public Works, 30 June 1946.

Guidance Documents

Navy Bureau of Aeronautics. 1958. *U.S. Naval Aeronautical Shore Facilities Programming Guide, NAVAER 00-100-504*.

Appendix B: Project Source Data – General

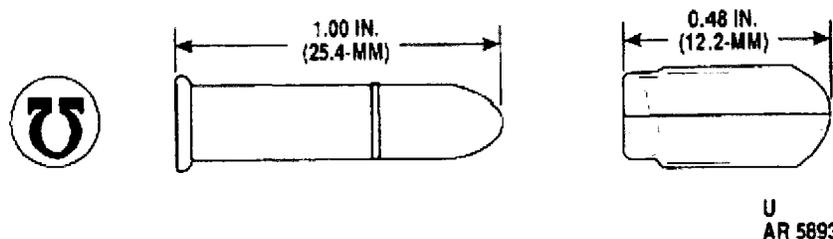
Appendix C: Project Source Data – Site-Specific

Appendix C-1: Saufley Field Small Arms Range

Appendix D: Ordnance Technical Data Sheets

Ordnance Technical Data Sheet

.22 Caliber, Pistol, Long Range, Match



Nomenclature:	.22 Caliber, Pistol, Long Range, Match
Ordnance Family:	Small Arms
DODIC:	A093
Propellant:	Single or Double Base Powder*
Filler:	Lead bullet
Filler weight:	1.66 g (2.5 gr)
Item weight:	26.96 g (416 gr)
Projectile Weight:	2.624 g (40.5 gr)
Diameter:	5.58 mm (.22 in)
Length:	25.4 mm (1 in)
Maximum Range:	1609 m (1,760 yds)
Fuze:	Percussion

Usage: Pistols for gallery practice and training purposes.

Description: BALL Cartridge. The cartridge is identified by a plain bullet tip.

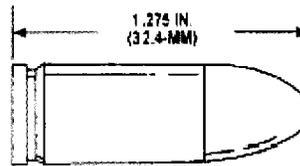
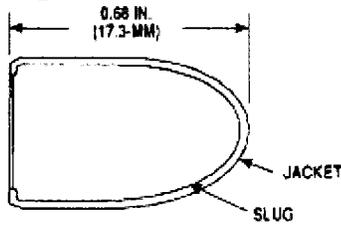
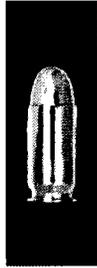
Reference: Midas, Army Technical Manuel TM 43-0001-27

***Single Base Propellant:** Single base propellants contain nitro cellulose as their chief ingredient. Single-base compositions are used as low-pressure propellants, such as those used in small arms ammunition. They may contain a stabilizer, inorganic nitrates, nitrocompounds, metallic salts, metals, carbohydrates and dyes.

Double Base Propellant: Double base propellants contain nitrocellulose and a liquid organic nitrate, such as nitroglycerine. As with single base, stabilizers and additives may be present. Double base propellants are used in cannon, small arms, mortars, rockets, and jet propulsion units.

Ordnance Technical Data Sheet

Cartridge Ball .45 Caliber M1911



Nomenclature:	Cartridge Ball .45 caliber M1911
Ordnance Family:	Small Arms
DODIC:	A 475
Propellant:	Propellant SR 7970 *
Filler:	Lead and copper cladding
Filler weight:	7.00 g (.2469 oz)
Item weight:	332.00 g (11.32 oz)
Diameter:	11.43 mm (.45 in)
Length:	32.40 mm (1.275 in)
Maximum Range:	Not Provided
Fuze:	Percussion

Usage: Submachine Gun, Caliber .45 M3A1 and Pistol Caliber .45, M1911A1. The cartridge is intended for use against personnel.

Description: BALL Cartridge is identified by a plain bullet tip.

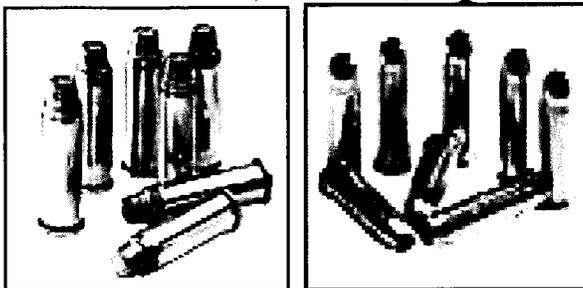
Reference: Army Technical Manuel TM-0001-27, Midas.

***Single Base Propellant:** Single base propellants contain nitro cellulose as their chief ingredient. Single-base compositions are used as low-pressure propellants, such as those used in small arms ammunition. They may contain a stabilizer, inorganic nitrates, nitrocompounds, metallic salts, metals, carbohydrates and dyes.

Double Base Propellant: Double base propellants contain nitrocellulose and a liquid organic nitrate, such as nitroglycerine. As with single base, stabilizers and additives may be present. Double base propellants are used in cannon, small arms, mortars, rockets, and jet propulsion units.

Ordnance Technical Data Sheet

.38 Caliber, Pistol, Special



Nomenclature:	.38 caliber pistol ammunition
Ordnance Family:	Small Arms
DODIC:	A408
Propellant:	Single or Double Base Powder*
Filler:	Lead bullet
Filler weight:	10.24 g (158 gr)
Item weight:	12.7 g (196 gr)
Projectile Weight:	10.24 g (158 gr)
Diameter:	9.65 mm (.38 in)
Length:	29.97 mm (1.8 in)
Maximum Range:	Not Provided
Fuze:	Percussion

Usage: Caliber .38 weapons. The cartridge is for CONUS-guard or security use.

Description: BALL Cartridge (un-jacketed lead). The cartridge is identified by a plain bullet tip.

Reference: Midas, Army Technical Manuel TM 43-0001-27

***Single Base Propellant:** Single base propellants contain nitro cellulose as their chief ingredient. Single-base compositions are used as low-pressure propellants, such as those used in small arms ammunition. They may contain a stabilizer, inorganic nitrates, nitrocompounds, metallic salts, metals, carbohydrates and dyes.

Double Base Propellant: Double base propellants contain nitrocellulose and a liquid organic nitrate, such as nitroglycerine. As with single base, stabilizers and additives may be present. Double base propellants are used in cannon, small arms, mortars, rockets, and jet propulsion units.

Ordnance Technical Data Sheet

SMALL-ARMS AMMUNITION

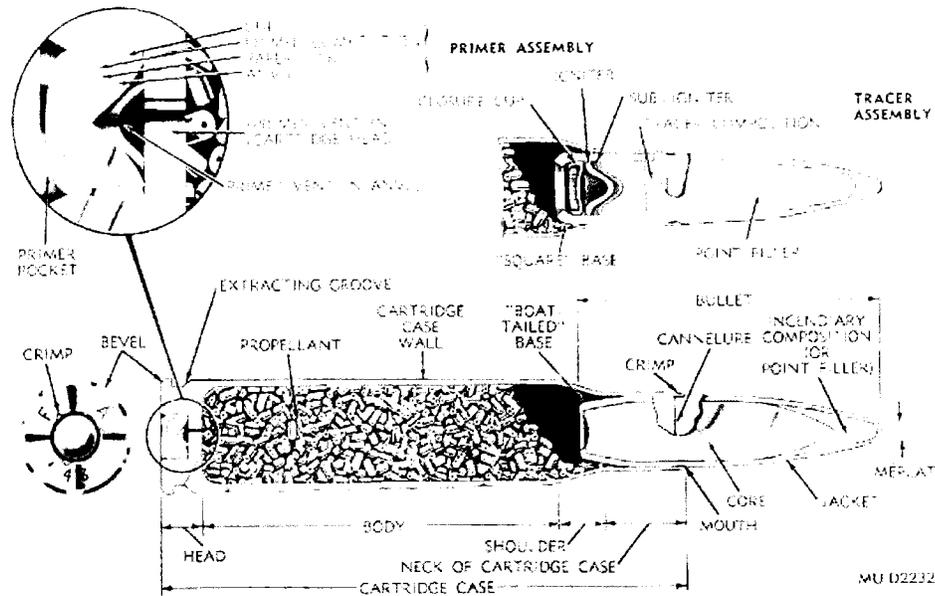
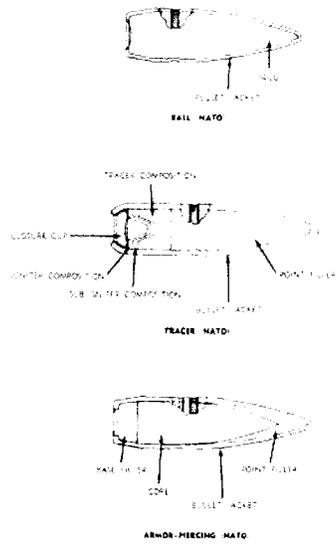


Figure 1. Typical cartridge (sectional)

General. Small-arms ammunition, as used herein, describes a cartridge or families of cartridges intended for use in various types of hand-held or mounted weapons through 30 millimeter. Within a caliber designation, these weapons may include one or more of the following: rifles (except recoilless), carbines, pistols, revolvers, machineguns and shotguns. For purposes of this publication, small-arms ammunition may be grouped as cartridges intended primarily for combat or training purposes (API, HEI, tracer or ball); for training purposes only (blank or dummy); or for special purposes (rifle grenade or spotter-tracer). Refer to TM 9-1306-200 for more detailed information on small-arms ammunition.

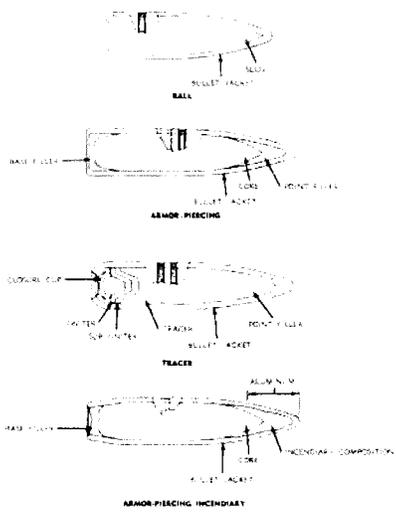
Cartridges. In general, a small-arms cartridge is identified as an assembly of a cartridge case, primer, a quantity of propellant within the cartridge case, and a bullet or projectile. Blank and rifle grenade cartridges are sealed with paper closure disks in lieu of bullets. Dummy cartridges are composed of a cartridge case and a bullet. Some dummy cartridges contain inert granular materials to simulate the weight and balance of live cartridges. A typical cartridge and the terminology of its components are shown in figure 1.

Case. Although steel, aluminum, zinc and plastic materials have been used experimentally, brass, a composition of 70 percent copper and 30 percent zinc, is the most commonly used material for cartridge cases. Steel, as well as brass, is an approved material for caliber .45 cartridge cases. Brass, paper and plastic are used for 12 gage shotshell bodies. Aluminum is used for military-type .410 gage shotshell bodies. Configurations of cartridges and bullets are illustrated in figures 2 through 11.



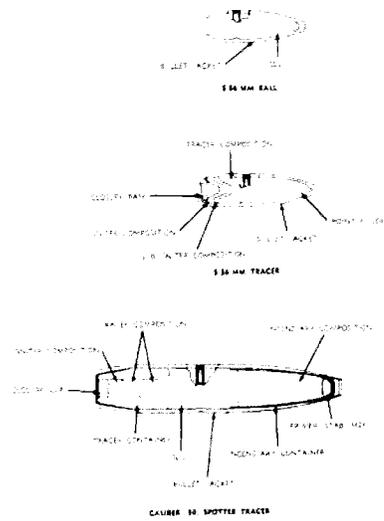
MIL-D-2233

Figure 2. NATO ammunition types.



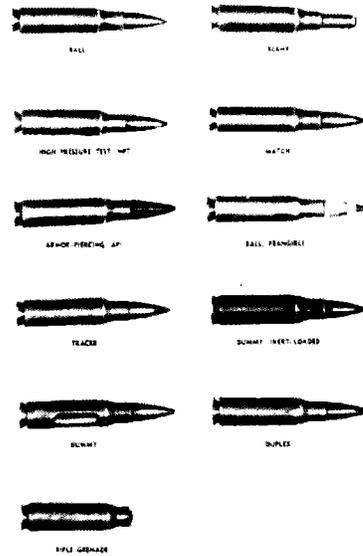
MIL-D-2234

Figure 3. NATO ammunition types.



MIL-D-2234

Figure 4. NATO ammunition types.



MIL-D-2234

Figure 5. NATO ammunition types.

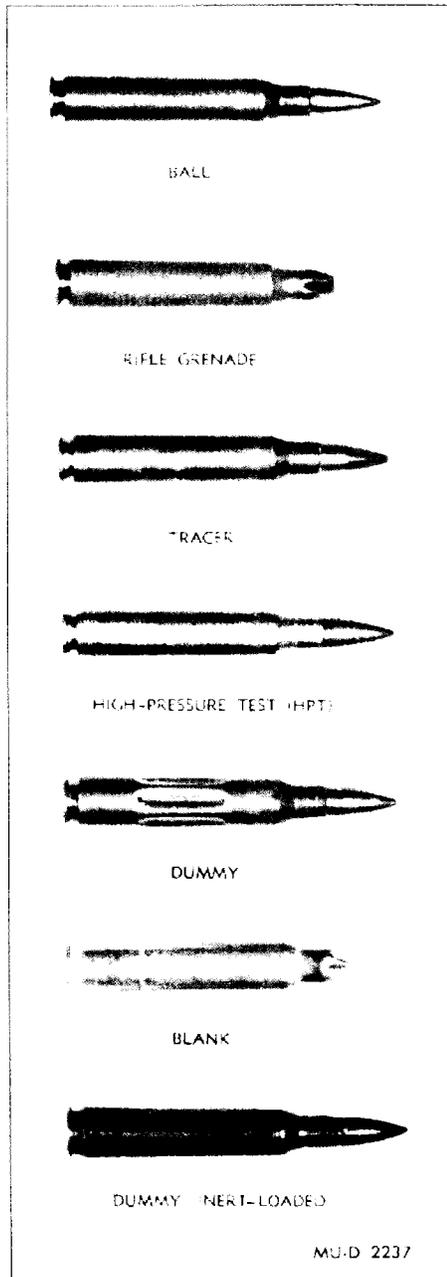


Figure 6. 5.56mm cartridges

Propellant. Cartridges are loaded with varying weights of propellant. This is to impart sufficient velocity (within safe pressures) to the projectile to obtain the required ballistic performance. These propellants are either of the single-base (nitrocellulose) or double-base (nitrocellulose and nitroglycerine) type. The propellant grain configuration may be cylindrical with a single, lengthwise perforation, spheroid (ball) or flake. Most propellants are coated with a deterrent (to assist in controlling the rate of combustion) and with a final coating of graphite (to facilitate flow of propellant and eliminate static electricity in loading cartridges).

Primer. Small-arms cartridges contain either a percussion or electric primer. The percussion primer consists of a brass or gilding metal cup that contains a pellet of sensitive explosive material secured by a paper disk and a brass anvil. The electric primer consists of an electrode button in contact with the priming composition, a primer cup assembly and insulator. A blow from the firing pin of the weapon on the center of the percussion primer cup base compresses the primer composition between the cup and the anvil. This causes the composition to explode. The function of the electric primer is accomplished by a firing pin with electrical potential, which contacts the electrode button. This allows current to flow through the energy-sensitive priming composition to the grounded primer cup and cartridge case, exploding the priming composition. Holes or vents in the anvil or closure cup allow the flame to pass through the primer vent in the cartridge case and ignite the propellant. Rimfire ammunition, such as the caliber .22 cartridge, does not contain a primer assembly. Instead, the primer composition is spun into the rim of the cartridge case and the propellant is in intimate contact with the composition. On firing, the firing pin strikes the rim of the cartridge case, compressing the primer composition and initiating its explosion.

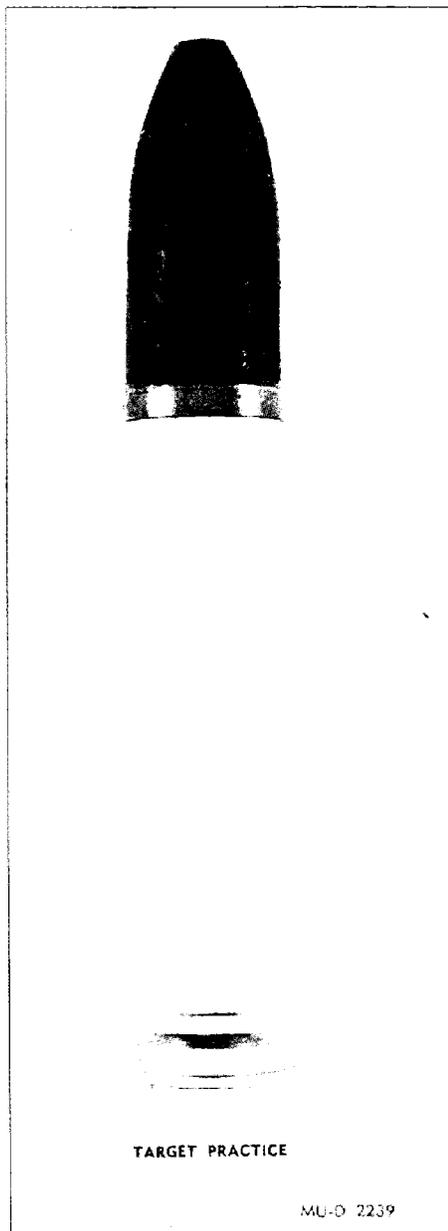


Figure 11. Typical 30mm projectile

Match Cartridge. The match cartridge is used in National and International Match Shooting competitions. The bullet consists of a gliding-metal jacket over a lead slug.

The cartridges are identified on the head face with the designation NM (National Match) or Match.

Armor-Piercing Cartridges. The armor-piercing cartridge is intended for use in machine-guns or rifles against personnel and light armored and unarmored targets, concrete shelters, and similar bullet-resisting targets. The bullet consists of a metal jacket and a hardened steel-alloy core. In addition, it may have a base filler and/or a point filler of lead.

Armor-Piercing-Incendiary Cartridge. The armor-piercing-incendiary cartridge is used in rifles or machineguns as a single combination cartridge in lieu of separate armor-piercing and incendiary cartridges. The bullet is similar to the armor-piercing bullet, except that the point filler is incendiary mixture instead of lead. Upon impact with the target, the incendiary mixture burst into flame and ignites flammable material.

Armor-Piercing-Incendiary Tracer Cartridge. The bullet of the armor-piercing-incendiary-tracer cartridge combines the features of the armor-piercing, incendiary, and tracer bullets and may be used to replace those cartridges. The bullet consists of a hard steel core with compressed pyrotechnic mixture in the cavity in the base of the core. The core is covered by a gilding-metal jacket with incendiary mixture between the core point and jacket. This cartridge is for use in caliber .50 weapons only.

Duplex Cartridge. The duplex cartridge contains two special ball type bullets in tandem. The front bullet is positioned partially in the case neck, similarly to a standard ball bullet. The rear bullet, positioned completely within the case, is held in position by a compressed propellant charge. The base of the rear bullet is angled so that in flight, it follows a path slightly dispersed from that of the front bullet.