

---

**FINAL  
PRELIMINARY ASSESSMENT  
NAVAL AUXILIARY LANDING FIELD WALDRON, TEXAS**

---

**April 2005**

Prepared for:

**Naval Air Station Corpus Christi  
Engineering Field Division, South**  
Public Works Department, CODE 186  
Environmental Office  
1101 D Street, Suite 143  
Corpus Christi, TX 78419-5021

Prepared by:

**MALCOLM PIRNIE, INC.**  
1700 West Loop South  
Suite 1450  
Houston, TX 77027

**FINAL  
PRELIMINARY ASSESSMENT  
NAVAL AUXILIARY LANDING FIELD WALDRON, TEXAS**

DoD Contract Number: N62472-02-D-1300

Reviewed and Approved by:

\_\_\_\_\_

Jeffrey R. Bennett, P.E., DEE  
Program Officer  
Malcolm Pirnie, Inc.

\_\_\_\_\_

Michael Madl, EIT  
Team Leader  
Malcolm Pirnie, Inc.

Malcolm Pirnie, Inc., prepared this report at the direction of Engineering Field Activity Northeast. This document should be used only with the approval of the Engineering Field Activity, Northeast. 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.

**April 2005**

**Table of Contents**

**ACRONYMS.....I**

**GLOSSARY OF TERMS..... III**

**EXECUTIVE SUMMARY ..... ES-1**

**1. INTRODUCTION..... 1-1**

**1.1. PURPOSE ..... 1-2**

**1.2. PROJECT DRIVERS..... 1-2**

**1.3. PROJECT MANAGEMENT..... 1-3**

**1.4. PRELIMINARY ASSESSMENT APPROACH ..... 1-4**

**2. INSTALLATION BACKGROUND..... 2-1**

**2.1. LOCATION AND SETTING..... 2-1**

**2.2. INSTALLATION HISTORY ..... 2-4**

**2.3. MUNITIONS RELATED TRAINING / STORAGE / USAGE ..... 2-6**

**3. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS..... 3-1**

**3.1. CLIMATE..... 3-1**

**3.2. TOPOGRAPHY ..... 3-1**

**3.3. GEOLOGY ..... 3-2**

**3.4. SOIL AND VEGETATION TYPES ..... 3-2**

**3.5. HYDROLOGY..... 3-3**

**3.6. HYDROGEOLOGY..... 3-3**

**3.7. CULTURAL AND NATURAL RESOURCES..... 3-4**

**3.8. ENDANGERED AND SPECIAL STATUS SPECIES..... 3-4**

**4. SUMMARY OF DATA COLLECTION EFFORT..... 4-1**

**4.1. HISTORICAL ARCHIVE REPOSITORIES (OFF-SITE)..... 4-1**

**4.2. PERSONAL INTERVIEWS ..... 4-4**

**4.3. ON-SITE DATA REPOSITORIES..... 4-5**

**4.4. VISUAL SURVEY..... 4-6**

**4.5. OFF-SITE DATA SOURCES ..... 4-6**

**5. SITE CHARACTERISTICS..... 5-1**

**5.1. SKEET RANGE..... 5-1**

**5.1.1. History and Site Description..... 5-1**

            5.1.1.1. Topography ..... 5-3

            5.1.1.2. Geology ..... 5-3

            5.1.1.3. Soil and Vegetation Types ..... 5-3

            5.1.1.4. Hydrology ..... 5-3

            5.1.1.5. Hydrogeology ..... 5-3

            5.1.1.6. Cultural and Natural Resources ..... 5-4

            5.1.1.7. Endangered and Special Status Species ..... 5-4

**5.1.2. Visual Survey Observations and Results..... 5-4**

**5.1.3. Munitions and Munitions Related Materials Associated with the Site ..... 5-7**

5.1.4. MEC Presence ..... 5-7

    5.1.4.1. Known MEC Areas..... 5-7

    5.1.4.2. Suspected MEC Areas ..... 5-8

    5.1.4.3. Areas Not Suspected to Contain MEC..... 5-8

5.1.5. Ordnance Penetration Estimates ..... 5-8

5.1.6. Munitions Constituents ..... 5-9

5.1.7. Contaminant Migration Routes..... 5-11

5.1.8. Receptors..... 5-12

    5.1.8.1. Nearby Populations..... 5-12

    5.1.8.2. Buildings Near/Within Site..... 5-13

    5.1.8.3. Utilities On/Near Site..... 5-13

5.1.9. Land Use ..... 5-13

5.1.10. Access Controls / Restrictions ..... 5-14

5.1.11. Conceptual Site Model..... 5-14

5.1.12. Summary ..... 5-26

APPENDICES

Appendix A: References

Appendix B: Project Source Data – General

Appendix C: Project Source Data – Site Specific  
C-1: SKEET RANGE

Appendix D: Ordnance Technical Data Sheets

MAPS

MAP 2.1-1: AREA LOCATION MEC SITES..... 2-3

MAP 5.1-1: VISUAL SURVEY: SKEET RANGE ..... 5-27

MAP 5.1-2: RANGE/SITE DETAILS: SKEET RANGE ..... 5-28

MAP 5.1-3: MUNITIONS CHARACTERIZATION: SKEET RANGE ..... 5-29

FIGURES

FIGURE 2.1-1: INSTALLATION LOCATION ..... 2-2

FIGURE 5.1-1: NALF WALDRON STATION MAP, JUNE 1945 ..... 5-2

FIGURE 5.1-2: FORMER SKEET RANGE LOOKING NORTH..... 5-5

FIGURE 5.1-3: FORMER SKEET RANGE LOOKING SOUTHWEST..... 5-5  
FIGURE 5.1-4: SKEET RANGE SHOT FALL ZONES ..... 5-9  
FIGURE 5.1-5: MC EXPOSURE PATHWAY ANALYSIS ..... 5-24  
FIGURE 5.1-6: SKEET RANGE GRAPHICAL ILLUSTRATION..... 5-25

**TABLES**

TABLE 2.2-1: SIGNIFICANT EVENTS AT NALF WALDRON..... 2-6  
TABLE 3.8-1: SUMMARY OF KNOWN OR POTENTIAL PROTECTED SPECIES ..... 3-4  
TABLE 5.1-1: CONCEPTUAL SITE MODEL INFORMATION PROFILES – SKEET  
RANGE..... 5-15

## ACRONYMS

°F	Degrees Fahrenheit
AICUZ	Air Installation Compatible Use Zone
bgs	Below Ground Surface
BRAC	Base Realignment and Closure
BUAER	Bureau of Aeronautics
BUDOCKS	Bureau of Yards and Docks
BUORD	Bureau of Ordnance
CD	Compact Disc
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNATRA	Chief of Naval Air Training
CSM	Conceptual Site Model
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
EFANE	Engineering Field Activity, Northeast
EOD	Explosive Ordnance Disposal
FUDS	Formerly Used Defense Site
FY	Fiscal Year
GIS	Geographic Information System
INRMP	Integrated Natural Resources Management Plan
LANTDIV	Atlantic Division
MEC	Munitions and Explosives of Concern
MC	Munitions Constituents
MMRP	Military Munitions Response Program
MSL	Mean Sea Level
NAAS	Naval Air Auxiliary Station
NAS	Naval Air Station
NALF	Naval Auxiliary Landing Field
NAVFAC	Naval Facilities Engineering Command
NCP	National Contingency Plan

**FINAL PRELIMINARY ASSESSMENT**

OE	Ordnance and Explosives
OESO	Ordnance and Environmental Support Office
OLF	Outlying Field
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbons
POC	Point of Contact
RG	Record Groups
RPM	Remedial Project Manager
SARA	Superfund Amendment and Reauthorization Act
SDZ	Surface Danger Zone
U.S.	United States
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USEPA	U.S Environmental Protection Agency
UXO	Unexploded Ordnance
WWII	World War II

## GLOSSARY OF TERMS

**Base Realignment and Closure (BRAC)** – 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 of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

**Explosive Ordnance Disposal (EOD)** – The detection, identification, field evaluation, rendering-safe, recovery, and final disposal of unexploded explosive ordnance (UXO). It may also include the rendering-safe and/or disposal of EO (explosive ordnance) which has become hazardous by damage or deterioration, when disposal of such EO requires techniques, procedures, or equipment which exceed 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 DoD or the Components) and those real properties where accountability rested with DoD but where activities at the property were conducted by contractors (i.e., government-owned, contractor-operated (GOCO) 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 Constituents (MC)** – Any materials originating from unexploded ordnance, discarded military munitions or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. 2710 (e)(4))

**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., TNT, RDX) present in high enough concentrations to pose an explosive hazard. (OUSD(AT&L) 18 December 2003)

**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** – 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 (UXO)** – 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 (DERP) to address munitions and explosives of concern (MEC) (including unexploded ordnance (UXO) and discarded military munitions (DMM)) 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 BRAC or FUDS.

This report represents a Preliminary Assessment (PA) for the Naval Auxiliary Landing Field (NALF) Waldron, Texas. The DoD, Navy, and United States Environmental Protection Agency guidance for conducting and documenting PAs was followed and tailored, where appropriate, to address the unique aspects of MEC and MC.

NALF Waldron is an outlying field (OLF) that supports Naval air training operations out of Naval Air Station Corpus Christi (NASCC). NASCC, home to the Chief of Naval Air Training (CNATRA), maintains and operates facilities and provides services and material to support operations of aviation facilities of the Naval Air Training Command and other tenant activities. The general command assignment is pilot training, primarily focusing on primary and intermediate flight maneuvering and traffic pattern operations. Training Air Wing FOUR based at the main installation performs touch-and-go landing training between the main installation, NALF Waldron, and NALF Cabaniss, eight miles west of NASCC.

The former Skeet Range is an approximately 8.6-acre area located in the northeast corner of NALF Waldron. The skeet range was comprised of three skeet firing arcs facing north toward the installation fenceline, with “high” and “low” skeet houses positioned at the end of each arc. The Skeet Range was used for cadet and security personnel weaponry training and qualification, moving target orientation training of Naval aviators, and likely for recreation. Ammunition used at the site likely included 12-, 16-, and 20-gage and .410 caliber shotgun munitions and possibly other small arms ammunition. The range was constructed in March 1945 and demolished

## FINAL PRELIMINARY ASSESSMENT

sometime between June 1947 and July 1961. The area is currently covered in vegetation and is not used for military purposes. Future use is not expected to change.

There is no visual or historical evidence of MEC at the Skeet Range. Based on historical operations at the site, it is possible for MC contamination [lead, antimony, arsenic, copper, nickel, zinc, black powder, and polycyclic aromatic hydrocarbons (PAHs)] to exist in surface soil at the Skeet Range.

## 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 (UXO) and discarded military munitions (DMM)) 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 BRAC or FUDS.

The DoD and the United States 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 (NCP) (40 CFR 300) as authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 United States Code (U.S.C.) 9605, as 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 Auxiliary Landing Field (NALF) Waldron, Texas in Nueces County. 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:

- References ([Appendix A](#))

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

An interactive compact disc (CD) is included with this report. The CD includes electronic files of the report text, tables, and figures; appendices; project source data; additional site photographs; and interactive maps of the installation and site.

### **1.1. Purpose**

This PA summarizes the history of munitions use for the following former ranges at NALF Waldron: (1) Skeet 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, and 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 includes, but is not limited to, the following:

#### **Defense Environmental Restoration Program (DERP) Management Guidance (September 2001)**

The DERP Management Guidance establishes a MRP element for MEC and MC defense sites. The history of DERP dates back to the SARA of 1986<sup>1</sup>. 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)

---

<sup>1</sup> SARA was signed into law on October 17, 1986, and 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.

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 ...

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

The DoD Directive is scheduled to be finalized in fiscal year (FY) 2004 pending review and concurrence from the DoD services. 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 (NCP)”.

**National Defense Authorization Act (FY02) (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 Defense Authorization Act 2002, 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 FY 2002 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 is being coordinated and managed by the Navy Engineering Field Activity Northeast (EFANE), a component of the Atlantic Division (LANTDIV) of the Naval Facilities Engineering Command (NAVFAC). The EFANE performs engineering functions for Navy installations throughout the northeast U.S. and is the Program Manager for this PA. Malcolm Pirnie, Inc. has been contracted to prepare this PA. The Navy Remedial Project Manager (RPM) and the

installation point of contact (POC) for NALF Waldron provided valuable information and assistance throughout the PA data collection process.

#### **1.4. Preliminary Assessment Approach**

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 included off-site and on-site research and interviews. It also included 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 visual survey on July 28 and 29, 2003.

This PA is inclusive and makes use of all available data relating to munitions use at NALF Waldron, 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

NALF Waldron is an outlying field (OLF) that supports air training operations out of Naval Air Station Corpus Christi (NASCC). NASCC, home to the Chief of Naval Air Training (CNATRA), maintains and operates facilities and provides services and material to support operations of aviation facilities of the Naval Air Training Command and other tenant activities. The general command assignment is pilot training, primarily focusing on primary and intermediate flight maneuvering and traffic pattern operations. A major tenant is the Corpus Christi Army Depot, which performs overhaul, repair, modification, retrofit, and modernization for Army and numerous DoD rotary wing aircraft. Other tenants include the Mine Warfare Command, Helicopter Mine Countermeasures Squadron 15, the Mobile Mine Assembly Group, the U.S. Coast Guard Air Station Corpus Christi, the U.S. Customs Service Surveillance Support Center, and the Defense Distribution Depot.

NALF Waldron is located three miles south of NASCC on the Encinal Peninsula. The installation occupies 851 acres and was originally constructed with four 5,000-foot runways. Only two runways, oriented in north/south and northwest/southeast directions, are presently active and maintained. The primary role of the installation is to support flight training operations originating from NASCC. Training Air Wing FOUR based at the main installation performs touch-and-go landing training between the main installation, NALF Waldron, and NALF Cabaniss, eight miles west of NASCC. NALF Waldron also contains numerous recreational facilities including softball, baseball, and soccer fields.

The following sections provide general information about NALF Waldron, 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

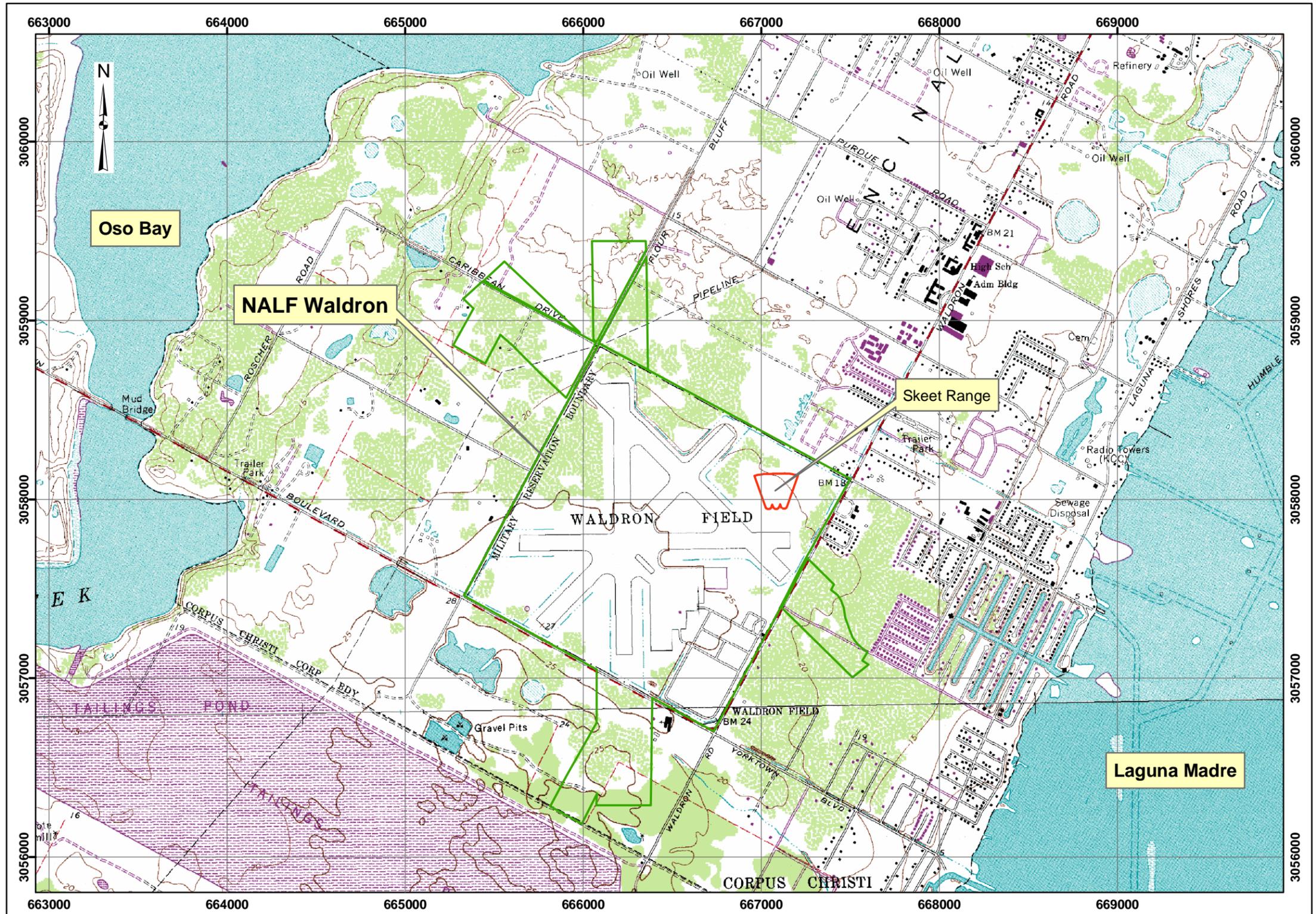
NALF Waldron is located in the far eastern side of Nueces County, Texas, and lies approximately three miles south of NASCC. NALF Waldron is situated on the southern end of the Encinal Peninsula and is bounded to the east by Waldron Road; the south by Yorktown Road; the west by Flour Bluff Road; and to the north by a fenceline separating the installation from a wooded area and a residential community.

NALF Waldron is covered with tall grasses, shrubs, trees, and other low-lying vegetation. Grasses and other vegetation near the operational runways are maintained through periodic mowing in support of flight training operations. The installation encompasses a total of 851 acres and lies within the corporate bounds of the City of Corpus Christi. This area includes Air Installation Compatible Use Zone (AICUZ) lands that extend north, east, and south from the main acreage of the installation. These AICUZ lands are Navy property acquired to encompass noise zones and Accident Potential Zones in the event an accident were to occur on approach to or departing from the runways at NALF Waldron. Oso Bay lies 1.3 miles to the west of the installation. Laguna Madre, part of the Coastal Bend Bay System, is 0.9 miles east of NALF Waldron. A barrier island (Mustang Island) lies east of Laguna Madre and separates Corpus Christi from the Gulf of Mexico.

The installation location is provided on [Figure 2.1-1](#) and [Map 2.1-1](#) depicts the location of all MRP sites on the installation.



Figure 2.1-1: Installation location



**Preliminary Assessment  
NALF Waldron, Texas**



**MALCOLM  
PIRNIE**

**Map 2.1-1  
Area Location Map**

**Legend**

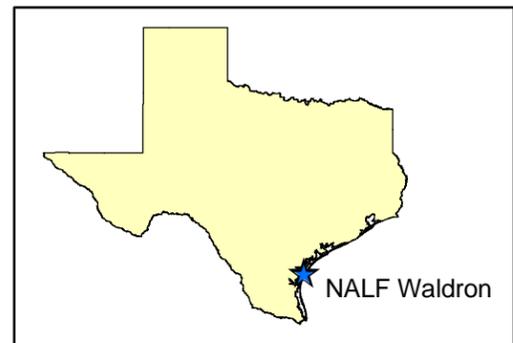
-  Installation Boundary
-  Range Boundary



Data Source: USGS, 7.5 Minute Series Topographic Survey  
Oso Creek NE  
Pita Island

Coordinate System: UTM Zone 14  
Datum: NAD 1983  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment Report  
Date: April 2005



## 2.2. Installation History

Prior to the construction of NASCC and NALF Waldron, the Encinal Peninsula was undeveloped land primarily covered in scrub oak, mesquite, and large sand dunes. Several permanent residences and vacation homes were the only buildings present. In December 1938, the Navy recommended the Flour Bluff area as a potential site for the construction of a new aviation training station due to the sparse population, the favorable location, and the potential for year-round flight operations. Additionally, the City of Corpus Christi offered to donate the land required for the installation and compensate the 100 families and residents for relocation.

The installation received Congressional approval, and an appropriations bill was signed on June 13, 1940, authorizing construction of NASCC and 25 OLFs to support the main installation. Construction began June 30, 1940, and the installation was officially commissioned on March 12, 1941. Six of the OLFs were constructed as auxiliary bases, including (dates listed indicate date of commission):

- Naval Air Auxiliary Station (NAAS) Rodd Field, June 7, 1941 (primary flight training)
- NAAS Cabaniss Field, July 9, 1941 (intermediate flight training)
- NAAS Cuddihy Field, September 3, 1941 (intermediate flight training)
- NAS Kingsville, July 4, 1942 (advanced flight training for fighters and bombers)
- NAAS Waldron Field, April 1, 1943 (torpedo bombing aircraft flight training)
- NAAS Chase Field, June 1, 1943 (instrument flight training)

NAAS Waldron Field was named on March 5, 1943, prior to the commissioning of the installation, in honor of Lieutenant Commander John C. Waldron, who was killed in action leading the attack of Torpedo Squadron 8 in the Battle of Midway on June 4, 1942. NAAS Waldron Field supported up to two squadrons at a time, which were separate from the squadrons based at the main installation. All auxiliary stations were outfitted with landing fields, runways, hangars, shops, barracks, mess halls, and recreational centers.

The Navy also acquired tracts of land to the south of Corpus Christi and on Mustang Island to perform practice bombing and other military operations. Some bombing also occurred in the

bays surrounding the region. These former bombing ranges are currently being evaluated by the United States Army Corps of Engineers (USACE) as part of the FUDS program.

Flight instruction at NASCC began on April 1, 1941. Cadets performed their initial flight training on the N3N “Yellow Peril” trainer aircraft. Flight training was then broken down into specific divisions, including primary, basic, instrument, and advanced flight classes. With the onset of the December 1941 attack on Pearl Harbor, flight training efforts were doubled from 300 cadets per month to 600 cadets per month by utilizing the auxiliary fields. Following primary and instrument training, cadets were then assigned to the type of advanced training desired, depending on their performance through the first two stages of training. This advanced aerial training was performed at the auxiliary fields. Flight training of torpedo bombing aircraft was the primary focus for NAAS Waldron Field. Between the main installation and the six auxiliary fields, NASCC became the Navy’s largest air training center during World War II (WWII).

Following the conclusion of WWII, NASCC’s mission was reduced to include only primary and instrument flight training. As a result, NAAS Waldron was temporarily decommissioned (January 24, 1947) along with NAAS Cabaniss, NAS Kingsville, and NAAS Rodd. The Navy leased the installation to Nueces County under a Revocable Permit on July 17, 1947, with an agreement between the two parties allowing for the Navy’s continual use of the runways and air operations buildings (i.e., control tower). Nueces County terminated the Revocable Permit in October 1950, returning the property to the Navy. Touch-and-go flight training continued at the inactive installation; ultimately, the installation was redesignated as NALF Waldron in June 1969. NALF Waldron currently supports the training mission of NASCC by providing runways for touch-and-go landing training and other student training operations. The history of NALF Waldron is summarized in [Table 2.2-1](#) below.

Table 2.2-1: Significant Events at NALF Waldron	
Time Period	Significant Events
1940	<ul style="list-style-type: none"> <li>• Authorization of construction of NASCC and 25 OLFs. Six of the OLFs were constructed as auxiliary bases.</li> </ul>
1940-1941	<ul style="list-style-type: none"> <li>• Construction and commissioning of NASCC.</li> <li>• NASCC becomes a supply base and major point of defensive operations in the Gulf Coast area.</li> </ul>
1943	<ul style="list-style-type: none"> <li>• NAAS Waldron Field was constructed and commissioned for torpedo bombing aircraft flight training.</li> </ul>
1947	<ul style="list-style-type: none"> <li>• NAAS Waldron Field disestablished and leased to Nueces County under Revocable Permit.</li> </ul>
1950	<ul style="list-style-type: none"> <li>• Nueces County terminates Revocable Permit, returning installation to U.S. Navy. NAAS Waldron Field moved to inactive status.</li> </ul>
1969	<ul style="list-style-type: none"> <li>• NAAS Waldron Field redesignated as NALF Waldron.</li> </ul>

### 2.3. Munitions Related Training / Storage / Usage

Station maps of NAAS Waldron from the 1940s indicate the presence of an ammunition locker located behind a hangar and a gunnery building next to the Skeet Range. The ammunition locker likely stored small arms ammunitions for the station aircraft and likely include .30 and .50 caliber munitions. The gunnery building likely stored shotgun ammunition for use at the Skeet Range. These structures are no longer present at the installation. No other ordnance or munitions were stored at NAAS Waldron. Due to the installation’s sole focus as a training airfield, NALF Waldron does not currently use, store, or train with any type of ordnance or munitions.

The NALF Waldron Skeet Range was the sole range identified by NASCC Environmental Division personnel in the MRP Navy Range Inventory. However, during the site visit and data review process, an additional range, the Fixed Gun Boresight Range, was identified at NALF Waldron. This range was once located in the southeast corner of the facility and was used to synchronize the fixed machine guns in aircraft wing mounts during WWII. The range was eventually abandoned and the site later used in the 1950s to 1970s as a landfill for the disposal of construction rubble and debris from Hurricane Celia (1970). The disposal area was investigated and sampled, and a closure letter for the disposal area, including the former range, was granted from the state regulatory agency. As the site is considered closed, this former range will not be investigated as part of the MRP.

Information regarding the NALF Waldron Skeet Range is generally limited. No property records were found at NASCC for the buildings associated with these ranges. In addition, few records are available, or known to be available, describing the construction, use, and demolition of the range. Historical data provided no indication that ordnance or explosives were used or stored at the range, and the possibility is considered unlikely as the range utilized only small arms ammunition and the installation's primary mission was flight training.

### **Skeet Range**

The former Skeet Range at NALF Waldron is an approximately 8.6-acre area located in the northeastern portion of the installation, 520 feet northeast of the intersection of Runway 31 (still active) and Runway 26 (abandoned but still visible). The range area is bounded on the south and west by Runway 31, and by grasses, shrubs, trees, and the installation fenceline to the east and north.

Station drawings indicate the Skeet Range was constructed in March 1945 and was used for cadet and security personnel weaponry training and qualification, moving target orientation training of Naval aviators, and potentially recreation. Ammunition used at the site likely included 12-, 16-, and 20-gage and .410 caliber shotgun ammunition and possibly other small arms ammunition.

Station drawings indicate the range was demolished sometime between June 1947 and July 1961. No records were found indicating the methods or the exact date of the range demolition; however, the installation POC indicated that the range was most likely brought to grade by bulldozing. The area where the Skeet Range was located is currently overgrown with vegetation, and there is no visual evidence of the former structures associated with the range (e.g., no ground scarring or concrete).

### **3. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS**

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

#### **3.1. Climate**

The climate at NALF Waldron is a moderate to semi-tropical marine climate with hot, humid, breezy summers and mild winters. The wind direction is predominantly from the southeast during the warmer months and from the northwest and north during periods of higher pressure and cold fronts during cooler months. Average low and high temperatures range from 42 degrees Fahrenheit (°F) (January) to 86°F (July). The number of clear days averages 114 days per year. Annually, there are more than 100 days of high temperatures of 90°F or higher, and fewer than seven days of low temperatures at or below 32°F.

Cold fronts, periodic thunderstorms, and hurricanes generally have the greatest impact on rainfall, which averages 34 inches annually. Extremes in precipitation can occur, ranging from drought to torrential rains associated with tropical storms and hurricanes. Nine hurricanes have made landfall in the Corpus Christi Bay area since 1900. The hurricanes of 1919 and 1945 and Hurricane Celia (1970) caused widespread property damage in the region; portions of NALF Waldron were used as disposal areas for debris from Hurricane Celia. Storm surges associated with hurricanes and tropical storms can greatly affect the Corpus Christi Bay area. On average, a tropical storm or hurricane makes landfall in the Corpus Christi Bay area once every 10 years, with a major storm once every 30 years.

#### **3.2. Topography**

The general topography of the mainland areas of Nueces County around Corpus Christi Bay can be described as a low-lying coastal area consisting of flat coastal prairies, chaparral pastures, and farmland. Elevations range between 15 and 22 feet above mean sea level (MSL). The topographic profile of NALF Waldron is generally flat with a mean elevation of 25 feet above MSL.

### 3.3. Geology

The coastal plain of the Corpus Christi area is underlain by Pleistocene river, delta, and shoreline sediments deposited during the interglacial periods. NALF Waldron is underlain by the Beaumont Formation, characterized by barrier island and beach deposits composed of fine-grained sands. Numerous pimple mounds and poorly defined relic beach ridges characterize the land surface. Locally active sand dunes are present in undisturbed areas. The barrier island and beach deposits of the Beaumont Formation are typically less than 60 feet thick. Other stratigraphic units, in order of increasing age, include the Montgomery Formation, Lissie Formation, Willis Formation, and the Goliad Sand.

### 3.4. Soil and Vegetation Types

The soils of NALF Waldron are deep, nearly level sands that are well drained. The soils are characterized by rapid permeability, low water capacity, and slow surface runoff. The water table is typically six feet below ground surface (bgs).

The Galveston-Mustang soil unit is the sole soil type mapped at NALF Waldron. Generally, these soils have a surface layer 10 inches thick or less, underlain by a three- to four-foot thick layer of fine-grained sand, followed by saturated fine white sand from four to 10 feet. The soils are typically moist in their lower layers. Common limitations of the area soils are the presence of high water table, erosion hazard, flood hazard, saturated conditions, and high permeability.

Principle vegetation types at NALF Waldron were identified in the 2001 Integrated Natural Resource Management Plan (INRMP) for NASCC and its associated auxiliary fields. The majority of NALF Waldron contains vegetation classified as Live Oak-Redbay Woodlands. This community is mostly comprised of areas of shrub thickets four to eight feet in height with various openings comprised of midgrasses and some tall trees with closed canopy. Associated species include yaupon (*Ilex vomitoria*), American beautyberry (*Callicarpa americana*), greenbriar (*Smilax bona-nox*), and wax-myrtle (*Myrica cerifera*). Drainage ditch areas on the southern end of the installation also include the Spikerush – Rush – Umbrella-Sedge, Seasonally Flooded Herbaceous Vegetation community, with a number of rare wetland species. Species found within this community include the one-head porcupine-sedge (*Fuirena scirpoidea*), spreading beakrush (*Rhynchospora divergens*), and smallseed beakrush (*Rhynchospora microcarpa*). Drainage ditches within the installation are not considered jurisdictional wetlands.

Operational requirements and mission safety for NALF Waldron have created the need to maintain portions of the installation as open grassland. Grass species may include the Kleberg bluestem (*Dicanthium annulatum*), silky bluestem (*D. sericeum*), and King Ranch bluestem (*Bothriochloa ischaemum* var. *songarica*). These areas are maintained through periodic mowing.

The INRMP indicates that the Live Oak-Redbay Woodland community is considered an ecologically sensitive area because of its global rarity and potential for providing important habitat to migratory birds, mammals, amphibians, and reptiles. However, while this community at NALF Waldron is considered an ecologically sensitive area, the deep, sandy soils of the Encinal Peninsula are unlikely to support any plant species of federal concern.

### **3.5. Hydrology**

Rainfall at NALF Waldron is collected in storm drains and open drainage canals near the runways, which ultimately slowly drain southwest toward Oso Bay (approximately 1.4 miles) or southeast toward Laguna Madre (approximately 0.9 miles). Water quality, monitored by the Texas Commission on Environmental Quality, in Oso Bay, Corpus Christi Bay, and Laguna Madre is good.

No natural lakes, rivers, or streams are present on the installation. There are no wetlands found at NALF Waldron. Permanent tidally-influenced surface water lagoons and a large tailings pond are present to the south of the installation. These surface water bodies may exist due to high tides, storm surge, or flooding from rain events.

### **3.6. Hydrogeology**

The average depth to groundwater at NALF Waldron is six feet bgs. This shallow groundwater zone is subject to salt-water intrusion due to its close proximity to Laguna Madre and Oso Bay. The water table aquifer (6 to 250 feet bgs) is predominantly sandy material overlying a clay zone with low permeability. Regional groundwater flow in the Corpus Christi area is to the northeast; local flow paths at NALF Waldron are unknown. Artesian aquifers (250 to 2,800 feet bgs) underlying NALF Waldron are moderately to highly saline and, therefore, have limited potential use. Potable water for the installation is supplied from Lake Corpus Christi, 43 miles to the northwest.

**3.7. Cultural and Natural Resources**

No data sources describing archaeological, cultural, or natural resources were found for the NALF Waldron installation.

**3.8. Endangered and Special Status Species**

The 2001 INRMP provides a survey of the presence of rare, threatened, and endangered species, their relative abundance, and the locations of identified critical habitats at NALF Waldron. During the study, plant, herpetofauna, bird, and mammalian surveys were completed. The surveys included all state or federally listed species, as well as those species that are candidates for listing.

The surveys conducted at NALF Waldron did not indicate occurrences of threatened or endangered species. However, the potential exists for migratory species to move into suitable habitats within the installation. In particular, the Live Oak-Redbay Woodlands community at NALF Waldron serves as a resource (shelter, food, and resting points) for migratory bird populations.

While not documented during the most recent survey, the INRMP indicates that the following protected species have the potential to inhabit NALF Waldron:

<b>Table 3.8-1: Summary of Known or Potential Protected Species</b>	
<b>Ecological Receptors</b>	<b>Species</b>
Federal Endangered	None
Federal Threatened	None
State Endangered	None
State Threatened	Texas Botteri’s Sparrow, Black-Spotted Newt, South Texas Siren (large form), Sheep Frog, Texas Indigo Snake, Texas Tortoise, Texas Horned Lizard, Scarlet Snake
Other Ecological Receptors	Maritime Pocket Gopher, common fauna/flora such as large mammals (e.g., deer), small mammals, reptiles/amphibians, and grassland birds.

## FINAL PRELIMINARY ASSESSMENT

The maritime pocket gopher (*Geomys personatus maritimus*), a species of concern, may be the most significant species for wildlife management and protection at NALF Waldron. The species, which is also found at NASCC, is under consideration for listing as a threatened species. Gopher populations are noted throughout the installation by the fan-shaped mounds created by tunneling. A number of mounds have been identified in the southwest and southeast corners of the installation.

## 4. SUMMARY OF DATA COLLECTION EFFORT

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

- 1) Historical archives;
- 2) Personal interviews;
- 3) Installation data repositories;
- 4) Visual survey; and
- 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 in Washington, D.C. Archival records were also reviewed at the National Archives Regional Record Centers and Navy Archives at the Washington Navy Yard in Washington, D.C., and Port Hueneme, California. The data collection team researched the following records and record groups (RG) for documents relating to munitions usage at NALF Waldron. Documents retrieved and searched are listed below by RG; an asterisk (\*) indicates the material was photocopied.

#### Textual Records

##### RG 71, Bureau of Yards and Docks

- Naval Property Case Files, Boxes 1188, 1189\*, 1190\*, 1191, 1192, 1193\*

##### RG 72, Bureau of Aeronautics

- Entry 67, Confidential Correspondence, 1922-1944, Boxes 1167, 1188
- Entry 67-A, Confidential General Correspondence, 1945, Boxes 287, 298
- Entry 62-B, General Correspondence, 1943-1945, Boxes 1260\*, 2157, 2158, 2159\*, 2160\*, 3395-3397, 3418
- Entry 1001-A, Unclassified General Correspondence, 1948-1949, Boxes 379, 380, 424, 425\*, 426, 427\*

## FINAL PRELIMINARY ASSESSMENT

- Entry 1001-B, Unclassified General Correspondence, 1950, Boxes 218\*,219\*,220\*
- Entry 1001-E, Unclassified General Correspondence, 1953, Boxes 32, 246, 264\*, 265
- Entry 1001-F, Unclassified General Correspondence, 1954, Boxes 183, 190, 191, 199, 200
- Entry 1001-G, Unclassified General Correspondence, 1955, Boxes 52, 196, 199, 200, 203, 204, 231
- Entry 1001-H, Unclassified General Correspondence, 1956, Boxes 187, 191, 192, 193\*, 220
- Entry 1001-I, Unclassified General Correspondence, 1957, Box 194, 196, 198, 199, 224
- Entry 1001-J, Unclassified General Correspondence, 1958, Box 149, 151, 153, 173
- Entry 1001-K, Unclassified General Correspondence, 1959, Boxes 140-142, 143\*, 144, 160
- Entry 75-A, Secret Correspondence, 1939-1947, Box 346
- Entry 1021, Inactive Air Stations, Boxes 13\*, 14\*

### **RG 74, Bureau of Ordnance**

- Entry 25-O, General Correspondence, 1943, Restricted, Boxes 472\*, 473\*, 481\*
- Entry 25-V, General Correspondence, 1944, Restricted, Box 838\*
- Entry 1003-A, General Correspondence, Unclassified and Confidential, 1948-1959, Box 152\*
- Bulky Enclosures, 1940-1943, Box 260
- Construction and Procurement Subject files, 1945 (Box 829\*), 1946 (Boxes 244, 258\*) 1947 (Box 176, 192\*, 482), 1948 (Box 126)

**Cartographic Records**

**RG 23, Coast and Geodetic Survey**

- Folders for Charts 1283-1287

**RG 71, Bureau of Yards and Docks**

- Maps for facilities 862, 863\*, codes 1, 2, 3, 15, 16, 32, 34, 42, 44-48
- Series I microfilm, Roll 649.3

**RG 385, Naval Facilities Engineering Command, 1917-1989**

- Architectural and Engineering Plans, Boxes 553-561
- Restricted UIC Architectural and Engineering Plans, Boxes S15, S16, S21, S22, S41, S54

**Still Photographs**

**RG 71, Bureau of Yards and Docks**

- Entry 71-CA, Construction Projects, 1879-1943, Boxes 414, 419, 421, 458
- Entry 71-CB, Construction Projects, 1940-1943, Box 115, 136
- Entry 71-CP, Construction Projects, 1941-1953, Box 64, 75

**RG 80, Navy Department**

- Entry 80-G, Boxes 107, 108, 109, 155\*, 173\*, 179, 187, 227, 276\*, 278, 282, 317\*, 326, 337, 565\*, 1082, 1141\*, 1259\*, 1313, 1694\*, 1975, 1976\*, 1977, 1978\*, 1979\*, 1984

The majority of the records found at the National Archives related to memorandums between the Commanding Officer, NASCC and various Naval departments such as the Chief, Bureau of Yards and Docks; Chief, Bureau of Ordnance (BUORD); and the Chief, Bureau of Aeronautics (BUAER). It is apparent from a review of the archived material that ammunition requests to the Chief, BUORD were typically made by the Commanding Officer, NASCC for the main installation and its auxiliary fields. Additionally, many installation maps and aerial photographs were found that illustrated the conditions of NASCC and its associated auxiliary fields and OLFs to include buildings, runways, and ranges.

## 4.2. Personal Interviews

Malcolm Pirnie's data collection team visited the following offices located at NASCC to interview representatives and research records related to the training that was conducted at the sites of concern:

- Environmental Division
- Public Works Department
- Public Safety Department
- Fire Department
- Security Department
- Weapons Department

A summary of the personnel interviewed and general information obtained from each office is presented below. These interviews focused on available documentation or knowledge of MEC sites at NALF Waldron.

**Environmental Division** - Mr. Michael Hilger is the primary POC for the Navy Range Inventory and the data collection portion of the PA. He is the Environmental Director for NASCC. He provided the team with historical information about the installation and provided access to various environmental reports, documents, maps, photographs, and figures of NALF Waldron. Malcolm Pirnie team members searched through these files to find maps showing historical boundaries of the installation, as well as maps delineating the areas of the subject ranges for this report. Mr. Hilger also arranged the site visit to the NALF Waldron Skeet Range and accompanied the field team during the site survey.

**Public Works Department** - Mr. Amador Garza, the Geographic Information Systems (GIS) manager with the Public Works Department, provided the team with electronic map files for NASCC, NALF Waldron, and NALF Cabaniss, to include computer-aided drawing figures and maps. Mr. Garza also indicated that he had found small arms ammunition cartridges in the baseball field at the southeastern end of the installation. Ms. Carole Roberson has been the Real Property Administrator for eight years and has worked at NASCC for a total of 21 years. She

provided property records for some of the buildings and structures associated with NASCC. Mr. Ed Villarreal, a Civil Technician with the Public Works Department, provided storm sewer drawings.

**Public Safety Department** - Mr. Hal Resides is the Safety Officer and Explosive Ordnance Disposal (EOD) Officer for the NASCC Public Safety Department. Mr. Resides has worked at NASCC for 17 years and provided information regarding the use of ordnance at NASCC and its associated OLFs. Mr. Resides had no knowledge of ordnance use at NALF Waldron.

**Fire Department** – Chief Amado Gonzalez, Deputy Fire Chief of the Fire Department at NASCC, was contacted to determine if his department had any interactions with ordnance or munitions at the NALF Waldron Skeet Range. Chief Gonzalez has worked at NASCC and its associated OLFs for 23 years. He indicated that there had been no Fire Department responses in the area of the NALF Waldron Skeet Range.

**Security Department** – Senior Chief Bradley of the Security Department indicated the department does not typically respond to ordnance or munitions related reports. The Security Department reports the discovery of such items to the Weapons Department. Senior Chief Bradley indicated that the Security Department had not responded to any reports of discovered ordnance, munitions, or MEC in the three years he has been stationed at NASCC.

**Weapons Department** – Senior Chief Tony Pineda provided the Malcolm Pirnie data collection team with an outline of the protocol the Weapons Department follows upon the discovery of MEC or other ordnance. The Weapons Officer responds to any ordnance items discovered outside of normal uses at the installation and contacts the EOD detachment to destroy expired or unstable ordnance by open detonation. Senior Chief Pineda knew of no reports of discovered MEC or munitions at any of the three installations during his assignment (six months). He indicated the longest term of any Weapons Department personnel was three years.

### **4.3. On-Site Data Repositories**

Malcolm Pirnie reviewed files and drawings provided by the Environmental Division at NASCC. Station drawing files were made available for review two weeks prior to the site visit in the form of scanned files burned to a CD. Aerial photographs and other files (e.g., property records,

environmental reports) were made available during the site visit. Malcolm Pirnie made copies of files of interest. Records reviewed as part of the data collection effort are listed on a CD and provided in Appendix B.

#### **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 any MEC ordnance related materials (e.g., expended rounds, fragmentation, range debris, old targets), any evidence of MC (such as ground scarring, stressed vegetation, or chemical residue) and/or surface features 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 area surveyed and the results of the survey are provided in [Section 5](#).

The data collection team anticipated that few landmarks or other notable structures would be visible during the visual survey. This was based on two pieces of information: the installation POC noted that the site had been leveled and a review of recent aerial photography indicated only vegetation in the area of the former range. The lack of landmarks or other structures was confirmed during the site walk. Therefore, the data collection team attempted to walk the extent of the former range based on the range area delineated in archival station maps from the 1940s.

The visual survey is typically performed by walking the perimeter of the range, followed by transects or a modified “W” pattern walked across the center of the range. As the limits of the range were unknown due to the lack of visible landmarks, the visual survey for the NALF Waldron Skeet Range resulted in approximately 10% walked coverage and approximately 70 percent visual coverage of the former range. A description of the area surveyed and the results of the survey are provided in [Section 5.1.1](#).

#### **4.5. Off-Site Data Sources**

A Malcolm Pirnie data collection team visited the Ordnance and Environmental Support Office (OESO) at Indian Head, Maryland to obtain additional historical information regarding the site.

## FINAL PRELIMINARY ASSESSMENT

The data collection team reviewed a library of historical range documents to gain further information on MEC sites at NALF Waldron. Malcolm Pirnie obtained permission from the Environmental Division at NASCC to perform the archival search at OESO.

The following documents were obtained and have been utilized to support the development of this PA:

- Initial Assessment Study of Naval Air Station Corpus Christi, February 1984
- Master Plan, Naval Complex Corpus Christi, Texas, 1985

Malcolm Pirnie visited the City of Corpus Christi Central Library to determine if any additional sources of information regarding the former range were available. Various news clippings associated with activities at NASCC and its outlying fields were reviewed. Additionally, copies of the *Slipstream*, the yearbook for NASCC, dating from 1940 to 1943 were found. The yearbooks provided an overall description of naval air training and squadrons based at NASCC, but no data specific to the use of the Skeet Range.

## 5. SITE CHARACTERISTICS

The following sections provide site-specific information about each of the sites located on NALF Waldron, including history and site description; land use; access controls and restrictions; visual survey observation and results; contaminant migration routes; and receptors.

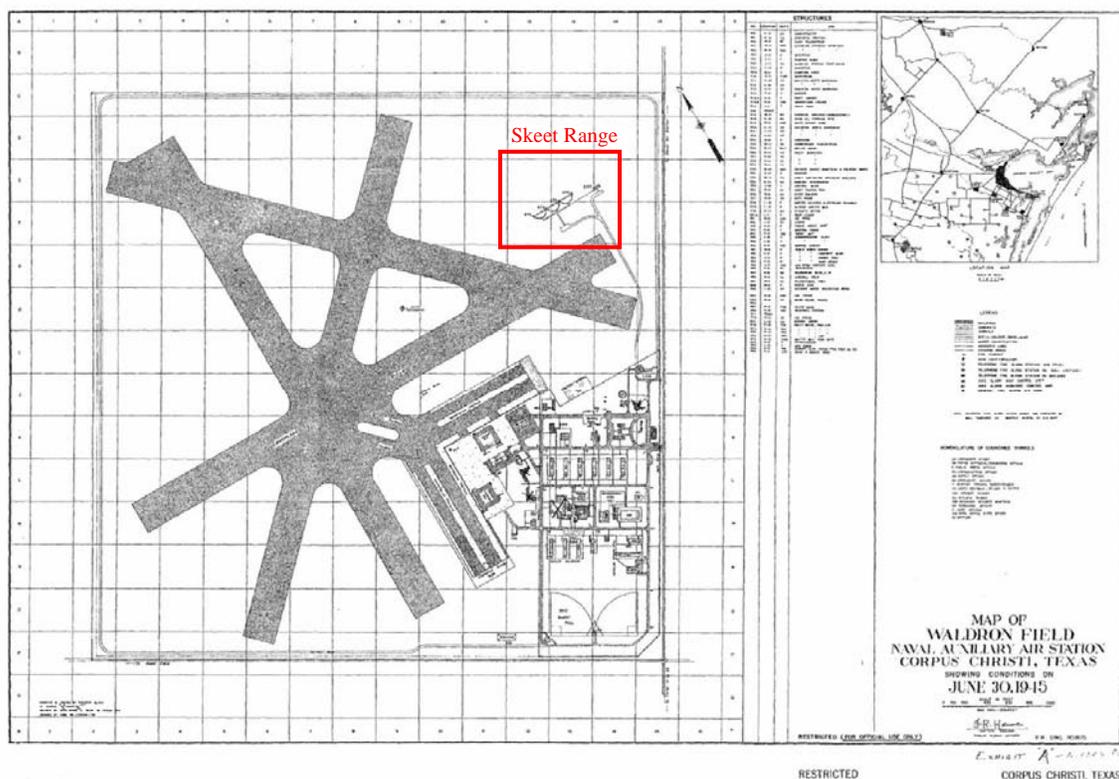
### 5.1. SKEET RANGE

#### *5.1.1. History and Site Description*

The NALF Waldron Skeet Range was located in the northeastern corner of the installation, 520 feet northeast of the intersection of Runway 31 (still active) and Runway 26 (currently abandoned but still visible) and 750 feet west of the installation boundary and Waldron Road. The area surrounding the former range is open and overgrown with vegetation. [Map 5.1-1](#) illustrates the current conditions of the Skeet Range and the surrounding area.

The Skeet Range was constructed in March 1945. [Figure 5.1-1](#) depicts an archival station map showing the Skeet Range in the northeast corner of the installation. The range was comprised of three firing arcs facing north, with wood-frame “high” and “low” skeet houses positioned at either end of each arc. The Skeet Range was used for cadet and security personnel weaponry training and qualification, moving target orientation training of Naval aviators, and potentially recreation. Ammunition used at the site likely included 12-, 16-, and 20-gage and .410 caliber shotgun munitions and possibly other small arms ammunition. A gunnery building that likely stored this ammunition was present just east of the skeet arcs. According to installation personnel and available documentation, no other munitions were used at the site.

According to Army Technical Manuals (referenced as AR 750-10 and TM 9-855) and the Navy Programming Guide (1958), each firing arc was laid out as a 63-foot radius semi-circle with concrete walkways and five firing points. The surface danger zone (SDZ) for each firing arc (which includes the down range hazard area and safety fan) consisted of a semi-circle with a 900-foot radius that utilized the same apex as the shooting field. During operation of the range, the SDZ for each firing arc would be combined, with a total acreage of approximately 37 acres.



**Figure 5.1-1: NALF Waldron Station Map, June 1945**

The site boundary for the Skeet Range, which includes approximately 8.6 acres, encompasses the firing arc, target area, and impact area where the lead shot and broken clay targets would be found (also known as the maximum shotfall zone, described in further detail in [Section 5.1.6](#)). The SDZ is the portion of the former range that represented the area where the weapons, when fired from the firing arc, could endanger personnel. The SDZ was used to define the area between the firing arc and target area, the impact area, the ricochet trajectory area, and the secondary danger area. The range boundary and the SDZ are depicted on [Map 5.1-2](#).

Operation of the Skeet Range as a training facility ceased at an unknown date. Station drawings indicate the range was demolished sometime between June 1947 and July 1961. Range demolition is confirmed by an aerial photograph of NALF Waldron taken in October 1967, which indicates the Skeet Range was no longer present. The method of demolition is unknown; however, the installation POC indicated that the range was likely brought to grade by bulldozing.

#### **5.1.1.1.Topography**

The topographic profile of NALF Waldron is generally flat with a mean elevation of 25 feet above MSL. The Skeet Range is also flat and is approximately 25 feet above MSL.

#### **5.1.1.2.Geology**

Specific geological information for the Skeet Range is not available. Regional geologic information is provided in [Section 3.3](#).

#### **5.1.1.3.Soil and Vegetation Types**

The soil at the Skeet Range has been characterized as the Galveston-Mustang soil unit. The soil is sandy, well-drained, and highly permeable, as described in [Section 3.4](#).

The Skeet Range is located in an ecologically sensitive area, the Live Oak-Redbay Woodland community. The Skeet Range is completely covered by vegetation, primarily shrub thickets and tall grasses four to eight feet tall. The area between the range and the operational runway (Runway 31) is primarily short, mown grasses. General vegetation data for the NALF Waldron is described in [Section 3.4](#).

#### **5.1.1.4.Hydrology**

As the topology of the Skeet Range is very flat, surface runoff drains slowly to the north/northeast. Most water on the surface infiltrates into the underlying permeable soil. No natural lakes, rivers, streams, or wetlands are present within or near the Skeet Range. General hydrological data for NALF Waldron is provided in [Section 3.5](#).

#### **5.1.1.5.Hydrogeology**

The depth to groundwater and local flow paths for groundwater at the Skeet Range are unknown. The average depth to groundwater at NALF Waldron is six feet bgs. Regional hydrogeologic data is provided in [Section 3.6](#).

#### **5.1.1.6. Cultural and Natural Resources**

No data sources describing archaeological or cultural resources were found for the Skeet Range. As described in [Section 3.7](#), the Live Oak-Redbay Woodland community is present on the Skeet Range and is considered ecologically sensitive.

#### **5.1.1.7. Endangered and Special Status Species**

The surveys conducted at NALF Waldron, including the former Skeet Range, did not indicate occurrences of threatened or endangered species. However, the potential exists for migratory species and state threatened species to move into suitable habitats within the installation. In particular, the Live Oak-Redbay Woodlands community located within the bounds of the former Skeet Range could serve as a resource (shelter, food, and resting points) for migratory bird populations.

Maritime pocket gopher mounds have not been identified at the Skeet Range. However, a number of mounds have been identified in the southwest and southeast corners of the installation, and the potential exists for the maritime pocket gopher to inhabit this area.

#### ***5.1.2. Visual Survey Observations and Results***

A site walk of the NALF Waldron Skeet Range was conducted by the Malcolm Pirnie data collection team (Ms. Nelline Scheuer and Mr. Mike Madl) and UXO Technicians (Mr. Dan Hains and Mr. Lee Nolan) on July 29, 2003. During the site walk, the following conditions were noted:

- The former Skeet Range was demolished and no buildings were present.
- The Skeet Range was overgrown with grasses (six inches to five feet) and shrub thickets (up to eight feet). See [Figure 5.1-2](#) and [5.1-3](#) for views of typical vegetation conditions at the Skeet Range.
- There was no evidence of flooding or erosion.
- There was no visual evidence of the former structures or foundations associated with the range (e.g., firing arcs, skeet house foundations, gunnery building).
- There was no visual evidence of scarring on trees or shrubs in the vicinity of the range.
- A single .50 caliber cartridge was observed; no lead or clay pigeon fragments were observed.
- No physical evidence of MEC was observed.



**Figure 5.1-2: Former Skeet Range Looking North**



**Figure 5.1-3: Former Skeet Range Looking Southwest**

## FINAL PRELIMINARY ASSESSMENT

The visual survey was performed by attempting to walk the perimeter of the range, followed by a transect across the center of the range. However, as the exact limits of the range were unknown at the time of the visual survey (no visual landmarks such as old skeet house foundations), the data collection team attempted to estimate the location of the former firing arcs based on a historical map and focused the perimeter walk around the estimated location. The transect was then walked across the center of the perimeter walk in order to focus the survey on the area with the highest likelihood of finding evidence of shot residue. The visual survey for the Skeet Range resulted in approximately 10 percent walked coverage and approximately 70 percent visual coverage of the former range.

No physical evidence of MEC was observed during the visual survey. Non-UXO items such as wood, metal, or concrete debris associated with the former range were not observed during the site walk. Clay target fragments associated with the former Skeet Range were not observed. The land is not currently used for operational purposes.

A single discharged .50 caliber cartridge was found at the former Skeet Range. While considered small arms ammunition, the presence of a .50 caliber cartridge is not consistent with the known uses of the Skeet Range; typically only shotguns were used for training at this range. However, the .50 caliber cartridge may have originated from past operations at the installation, as aircraft stationed at NALF Waldron during WWII utilized this type of small arms ammunition in their wing-mounted machineguns and a Fixed Gun Boresight Range was once utilized in the southeastern corner of the installation. While it is not known how this cartridge was deposited at the Skeet Range, it may have been expended or dropped at another location at the installation and was subsequently moved by various means (station personnel or mowing activities may have moved the item).

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.

### ***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. This includes both MEC and non-hazardous munitions related scrap (e.g., fragmentation, base plates, inert mortar fins).

No MEC was observed at the range during the visual survey. Based on the known uses of small arms ranges, only small arms ammunition (12-, 16-, and 20-gage and .410 caliber shotgun and potentially other small arms ammunition) would be expected to be used at the Skeet Range. No other ordnance, explosives, or weapons are expected to have been used or stored at the site.

Based on the information obtained during the data collection process (interviews, records search, etc.), no special consideration munitions are known or suspected to have been used at the site. Therefore, the Skeet Range is not suspected to contain chemical warfare material 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, Suspect MEC Areas, and Areas where No Evidence exists to indicate that MEC is known or is suspected to be at the site. The MEC presence is discussed below.

[Map 5.1-3](#) illustrates the munitions characterization of the Skeet Range and is provided at the end of Section 5.1.

#### **5.1.4.1. Known MEC Areas**

There are no known MEC areas associated with the site. As the site was only used for small arms training, no MEC would be expected at the Skeet Range.

#### **5.1.4.2.Suspected MEC Areas**

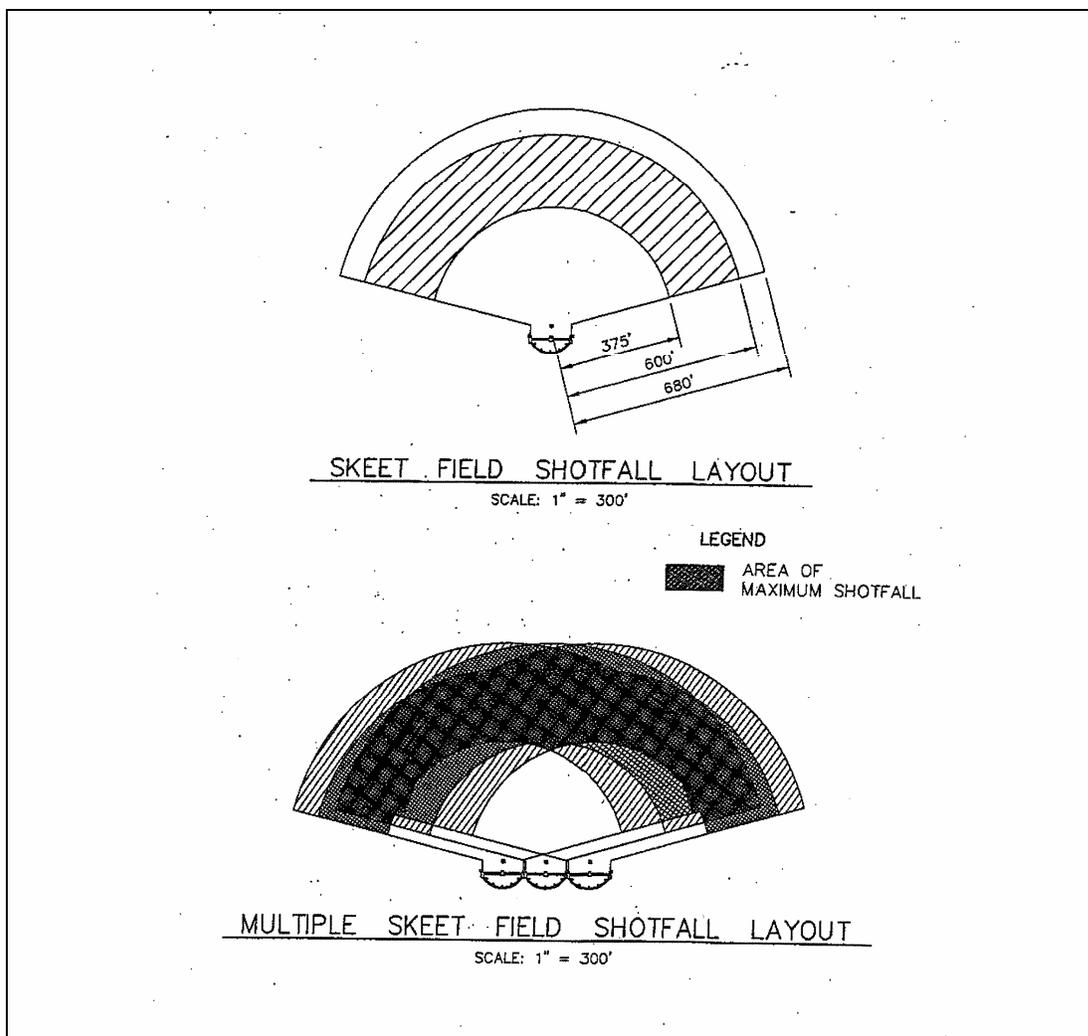
As only small arms ammunition was used at the site, there are no suspected MEC areas associated with the Skeet Range.

#### **5.1.4.3.Areas Not Suspected to Contain MEC**

Based on available documents, conversations with Environmental Division personnel at NASCC, and the site walk, the entire 8.6-acre area of the Skeet Range is not suspected to contain MEC. As described above, small arms training was the primary activity at the site, and explosive ordnance or munitions were not likely used.

#### ***5.1.5. Ordnance Penetration Estimates***

By design, skeet ammunition is dispersed as pellets over a small area in the direction of fire. According to the Navy Programming Guide (1958), the minimum SDZ for a skeet range is 900 feet. Pellets dispersed from a shotgun would be deposited on the ground surface well within this zone. The majority of the lead pellets would concentrate in the maximum shotfall zone between 375 and 600 feet from the firing point. This maximum shot fall zone is depicted on [Figure 5.1-4](#). Lead or clay target fragments would not penetrate the ground surface unless disturbed. If the area was disturbed by range demolition activities, it is possible that lead and clay target fragments could have been redeposited in surface soils to a depth of two feet bgs.



**Figure 5.1-4: Skeet Range Shot Fall Zones**

### **5.1.6. Munitions Constituents**

Based on available documents collected and conversations with Environmental Division personnel at NASCC during the PA process, the possibility exists for MC to exist at the Skeet Range based on its historical use. The primary MC of concern associated with shotgun ammunition 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, and organic matter present), oxidation products can become mobile. However, lead mobility is effectively controlled by adsorption under the majority of conditions found on skeet 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. As such, lead mobility is not likely to be an issue at

most ranges. However, while lead is not typically mobile in most environments, it is possible that limited migration of lead has occurred from the Skeet Range to other media (e.g., subsurface soil and groundwater), based on the permeable nature of the sandy soil at the site.

Other MC may include antimony, arsenic, copper, nickel, zinc, and constituents associated with black or smokeless powder (lead styphnate and lead azide). However, these constituents are less likely to be of concern since they are either present in the shotgun ammunition in only minor amounts/concentrations or are typically consumed when the shotgun round is fired. Polycyclic aromatic hydrocarbons (PAHs) associated with the usage of clay targets may also be present at the site. However, PAHs present in clay targets tend to be tightly bound in the petroleum pitch and limestone matrix of the target and are not readily available to the environment. In addition, the clay targets contain low solubility, high molecular weight PAHs that are not likely to effectively leach into the surrounding soils. However, as is the case with lead, PAHs and other MC may have migrated from the Skeet Range to other media in a limited fashion based on the permeable nature of the surface soil at the site.

As described in [Section 5.1.5](#), the majority of the lead pellets discharged at the Skeet Range would accumulate in the maximum shotfall zone between 375 and 600 feet from the firing arc. This zone is one of two areas in which MC, if present, would be concentrated. The other location is the range floor directly in front of the firing positions. MC accumulates in this area from shotgun muzzle discharge at each firing position and from clay target fragments. MC accumulation would likely be found in the upper six inches of surface soil within these two primary concentration areas. However, any near-surface disturbances such as periodic mowing or range demolition/regrading could redistribute MC to depths of two feet.

No sources of information were found which might indicate whether soil or groundwater sampling had been performed at the former Skeet Range to confirm the presence of MC in surface soil. However, based on the known historical use of the former Skeet Range for moving target orientation training and the nature of the MC commonly associated with small arms ammunition and clay targets, MC is suspected to be present in surface soil at the Skeet Range.

### ***5.1.7. Contaminant Migration Routes***

MC, if present at the Skeet Range, would be found primarily in the near-surface soils. Maintenance activities (routine mowing) and any range demolition activities (bulldozing) that might have been performed at the site may have resulted in deposition of lead shot and clay target fragments in the top one to two feet of soil. The dense grasses, shrubs, and other existing vegetation at the range likely act as a cover on top of the MC, limiting lateral migration by wind or surface runoff. The chemical and physical properties of soils affect the permeability and downward migration of chemical constituents. The soils at the Skeet Range are sandy, have low water capacity, and are highly permeable. These soil conditions may increase the rate at which chemical constituents could migrate downward to the water table. However, despite these favorable conditions for increased downward migration, the chemical and physical nature of the MC most likely to be present at the range (e.g., low solubilities and high adsorption potential of metals and PAHs) likely limits the migration.

The average depth to groundwater at NALF Waldron is approximately six feet. As the ranges were utilized approximately 60 years ago, sufficient time has passed for MC to leach into subsurface soils and groundwater. While local groundwater flow paths are unknown, it is likely that groundwater discharges west into Oso Bay and east into Laguna Madre based on topographic and regional flow patterns. Oso Bay and Laguna Madre both contain ecological and potentially human receptors. However, based on the chemical and physical nature of the MC most likely to be present at the ranges (e.g., metals, PAHs), it is unlikely that contamination would migrate to groundwater, discharge to surface water, and subsequently be available to receptors. Additionally, the shallow groundwater zone in the area is moderately to highly saline and has limited potential use (potable water is provided from Lake Corpus Christi 43 miles to the northwest).

While drainage structures are present to carry surface runoff southwest toward Oso Bay (1.4 miles) or southeast toward Laguna Madre (0.9 miles), none are located on the Skeet Range and there is little potential for MC to be carried so far from the former range and installation and deposited into these surface water bodies. The nearly level terrain at the Skeet Range also limits the potential for erosion and subsequent MC migration by surface runoff to nearby surface water bodies.

### **5.1.8. Receptors**

There are two groups of potential human receptors and two groups of potential biota receptors potentially present at the Skeet Range. The first group of current potential human receptors includes Navy personnel, such as security personnel patrolling near the area of the former range and Public Works personnel conducting environmental or ecological surveys. The second group of potential human receptors includes contractors performing grounds maintenance (mowing and vegetation removal) on the former range area that could also be exposed to MC. Visitors are not considered potential human receptors as the site is located within the flightline control area (thereby restricting access), there are no structures or equipment present, and there is no specific reason for visitors to be present at the former range. Hunters are not considered potential human receptors as hunting is not permitted on the installation. In addition, trespassers are not considered potential receptors, as the installation is fenced and periodically patrolled, the former Skeet Range is covered in vegetation, and there is nothing of particular interest at the site.

The close proximity of the former Skeet Range to both an active runway and residential neighborhoods likely precludes the construction of new facilities and places restrictions on new or existing operations. Also, land use is expected to remain as a Navy installation for the foreseeable future. Thus, development is unlikely in the future. Therefore, all current potential receptors are also considered potential future receptors.

Current and future biota receptors include the current flora (predominantly grassland species) and fauna (large mammals such as deer, small mammals such as rabbits and the burrowing maritime pocket gopher, reptiles/amphibians, and bird species) present at the site. The various media through which the potential receptors may be exposed to MC are listed in the CSM, [Section 5.1.11](#).

#### **5.1.8.1. Nearby Populations**

As described previously, the Skeet Range is located 520 feet northeast of the intersection of Runway 31 (still active) and Runway 26 (abandoned but still visible). The site is in an uninhabited area of the installation. Civilian residential neighborhoods are present approximately 450 feet north and 850 feet east of the former Skeet Range. There are no military residences at NALF Waldron.

According to the 2000 U.S. Census, the population of the City of Corpus Christi was 277,454, with a population density of 1,794 residents/square mile. The population of Nueces County was 313,645 in 2000, with a population density of 375 residents/square mile.

NASCC is home to a combined workforce of approximately 4,430 military personnel and 8,058 civilian and contractor personnel. The only personnel utilized at NALF Waldron include Air Operations personnel in the control tower, Fire Department personnel, and installation maintenance workers.

#### **5.1.8.2. Buildings Near/Within Site**

There are currently no buildings or structures at the former Skeet Range. The nearby Runway 31 is oriented in a northwest to southeast direction, and is west and south of the former Skeet Range. The air control tower is 2,000 feet to the southwest. The recreational fields located on the east and southeastern sides of the installation are approximately 2,300 feet away. Residential homes are present approximately 450 feet north and 850 feet east of the former Skeet Range.

#### **5.1.8.3. Utilities On/Near Site**

Based on a review of installation GIS files describing utilities located at NALF Waldron, there are no electric, gas, water, sewer, or other utilities near the Skeet Range.

#### **5.1.9. Land Use**

The Skeet Range is closed and has been demolished. The area where the Skeet Range was located is currently overgrown with vegetation and there is no visual evidence of the former structures associated with the range (e.g., no ground scarring or concrete). Residential areas are present north and east of the former Skeet Range. Land use in the area is designated as open space; however, the extent of the Skeet Range falls within the flightline control area. As the former range lies adjacent to an active runway and within flightline control, future use is not expected to change. Vegetation (grasses) in the areas to the west and south of the range is maintained through periodic mowing. The majority of the land use at NALF Waldron is in support of primary and intermediate flight training under CNATRA. The remaining land is utilized for recreational (fields in the southeast corner of the installation) and agricultural (64

acres within the AICUZ in the northwest corner of the installation leased to three separate parties for cattle and horse grazing) purposes.

#### ***5.1.10. Access Controls / Restrictions***

NALF Waldron is a fenced installation, with a locked gate present on the eastern side of the installation. Security personnel are not regularly posted at the entrance to the installation. There is no patrol road present around the installation perimeter. The Skeet Range is fully contained within NALF Waldron; it is not separately enclosed or bounded. The installation fenceline is 400 feet north and 750 feet east of the range, and remains in good condition.

The former Skeet Range is located within the flightline control area of NALF Waldron. The few visitors to areas within the flightline control areas require escorts and approval from Air Operations. However, the only operation typically performed in the area of the former Skeet Range is periodic mowing.

According to the 2001 INRMP, hunting is not permitted at the installation. Potential constraints of unused land at NALF Waldron and the former Skeet Range area include man-made or natural conditions such as potentially contaminated areas, flood prone areas, threatened and/or endangered species, flood zones, and noise contaminated sites.

#### ***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 (OE) sites. Guidance documents included the USEPA's Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004) and the USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental Ordnance and Explosives (OE) Sites, which was final as of February 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 that link them. The CSM is the basis for the risk evaluation, prioritization, and remediation cost estimate.

The CSM is presented in a series of information profiles that presents information about the site. The information profiles are included in [Table 5.1-1](#) below.

Table 5.1-1: Conceptual Site Model Information Profiles – Skeet Range		
Profile Type	Information Needs	Preliminary Assessment Findings
Range/Site Profile	Installation Name	NALF Waldron
	Installation Location	Corpus Christi, Nueces County, Texas
	Range/Site Name	Skeet Range
	Range/Site Location	The Skeet Range was located at the northeastern corner of the installation, 520 feet northeast of the intersection of Runway 31 and Runway 26 (now abandoned).
	Range/Site History	NALF Waldron was commissioned on April 1, 1943 for the purpose of naval flight training of torpedo bombing aircraft. The Skeet Range located at the installation consisted of three firing arcs facing north with a gunnery building constructed to the east. The range was used for cadet and security personnel weaponry training and qualification and moving target orientation training of Naval aviators. The range was also likely used for recreation. The range was constructed in March 1945 and demolished sometime between June 1947 and July 1961.
	Range/Site Area and Layout	The Skeet Range consists of approximately 8.6 acres. The range was located northeast of the intersection of Runway 31 and Runway 26 (now abandoned). The range was oriented for firing in a northerly direction.
	Range/Site Structures	No structures remain at this site. Active Runway 31 lies west and south of the former range.
	Range/Site Boundaries	The former Skeet Range is surrounded by open land and vegetation. Runway 31 bounds the former range on the west and south. The installation fence and Waldron Road are 750 feet to the east. The fence is also 450 feet north of the Skeet Range, separating the installation from a residential neighborhood.

Table 5.1-1: Conceptual Site Model Information Profiles – Skeet Range		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site Security	NALF Waldron is a fenced installation with a locked gate present on the eastern side of the installation (security personnel are not regularly posted at the entrance). There is no patrol road present around the installation perimeter. Separate fencing is not provided for the range. The area where the Skeet Range was located is within the flightline control area, and an escort is required to access the location.
Munitions/ Release Profile	Munitions Types	The predominant form of small arms ammunition used at the site was likely 12-, 16-, and 20-gage and .410 caliber shotgun ammunition. Other small arms ammunition could have been used.
	Maximum Probability Penetration Depth	Surface only. Maximum penetration depths of six inches are expected for small arms ammunition. Maintenance activities (mowing and vegetation removal) and range demolition activities (bulldozing) may have resulted in deposition of MC in the top one to two feet of soil.
	MEC Density	Unknown; no munitions observed.
	MEC Scrap/Fragments	While no MEC was observed, a single .50 caliber cartridge was present.
	Associated Munitions Constituents	Small arms firing ranges may contain MC, including lead, antimony, arsenic, copper, nickel, zinc, black powder, and PAHs from clay targets. Sampling of surface soils and groundwater at the range has not occurred.
	Migration Routes/Release Mechanisms	Limited migration of MC may occur naturally through surface soil erosion, slow surface runoff, plant/animal uptake, or by human activities, including maintenance (e.g., mowing and vegetation removal) or site work (e.g., site demolition and re-grading). MC could also potentially leach through the sandy soils to groundwater. Once present in groundwater, MC could potentially migrate with the groundwater flow, though the physical and chemical properties of the MC associated with this site would likely limit downgradient transport. Although not currently anticipated, future construction, excavation, and maintenance at the site could also be a release mechanism.

Table 5.1-1: Conceptual Site Model Information Profiles – Skeet Range		
Profile Type	Information Needs	Preliminary Assessment Findings
Physical Profile	Climate	Moderate to semi-tropical marine climate with hot, humid, breezy summers and mild winters. Average low and high temperatures range from 42°F (January) to 86°F (July). Cold fronts, periodic thunderstorms, and hurricanes influence rainfall, which averages 34 inches annually.
	Topography	The Skeet Range is mainly flat and lies approximately 25 feet above MSL.
	Geology	NALF Waldron is underlain by the Beaumont Formation, characterized by barrier island and beach deposits composed of fine-grained sands. Numerous pimple mounds and poorly defined relic beach ridges characterize the land surface. Locally active sand dunes are present in undisturbed areas. The barrier island and beach deposits of the Beaumont Formation are typically less than 60 feet thick. Other stratigraphic units, in order of increasing age, include the Montgomery Formation, Lissie Formation, Willis Formation, and the Goliad Sand.
	Soil	Soils are deep, nearly level, well drained, and sandy. The Galveston-Mustang soil unit has been mapped at NALF Waldron. Generally, soils have a surface layer 10 inches thick or less, underlain by three- to four-foot thick layer of fine-grained sand, followed by saturated fine white sand from four to 10 feet. The soils are typically moist in their lower layers.
	Hydrogeology	Groundwater is typically present six feet bgs and subject to salt water intrusion due to the two bays (Oso Bay and Laguna Madre) in proximity to the installation. The water table aquifer (six to 250 feet bgs) is predominantly sandy material overlying a clay zone with low permeability. Regional groundwater flow is to the northeast. Artesian aquifers (250 to 2,800 feet bgs) underlying NALF Waldron are moderately to highly saline and, therefore, have limited potential use. Potable water for the installation is supplied from Lake Corpus Christi, approximately 43 miles to the northwest.

Table 5.1-1: Conceptual Site Model Information Profiles – Skeet Range		
Profile Type	Information Needs	Preliminary Assessment Findings
	Hydrology	Rainfall at NALF Waldron is collected in storm drains and open drainage canals which ultimately slowly drain southwest into Oso Bay (approximately 1.4 miles) or southeast into Laguna Madre (approximately 0.9 miles). Runoff from the Skeet Range drains slowly to the north/northeast. No natural lakes, rivers, streams, or wetlands are present on the installation, but some permanent surface water bodies are present south of the installation.
	Vegetation	Vegetation within the former Skeet Range is classified as Live Oak-Redbay Woodlands. The community is mostly comprised of areas of shrub thickets four to eight feet in height with various openings comprised of midgrasses with some tall trees with closed canopy.
Land Use and Exposure Profile	Current Land Use	The majority of land use at NALF Waldron is characterized as either open space or for operations. 64 acres within the AICUZ in the northwest corner of the installation leased to three separate parties for livestock uses. The Skeet Range was demolished between 1947 and 1961. The land the range occupied is now open space covered with vegetation, although portions of the range lie within the flightline control area. The land north and east of the former range has no current use.
	Current Human Receptors	Navy personnel including security personnel patrolling the area and Public Works personnel conducting environmental/ecological surveys; contractors performing grounds maintenance (mowing and vegetation removal).
	Current Activities (frequency, nature of activity)	No regular activity occurs at the former Skeet Range. Current activities at the range are limited to periodic non-intrusive maintenance (mowing). Other activities at the Skeet Range could include environmental and ecological surveys.
	Potential Future Land Use	Due to the close proximity to an operational runway and a residential community, no change in land use is planned.

Table 5.1-1: Conceptual Site Model Information Profiles – Skeet Range		
Profile Type	Information Needs	Preliminary Assessment Findings
	Potential Future Human Receptors	Navy personnel including security personnel patrolling the area and Public Works personnel conducting environmental/ecological surveys; contractors performing grounds maintenance (mowing and vegetation removal).
	Potential Future Land Use-Related Activities:	Due to the close proximity to an operational runway and a residential community, no change in land use is planned.
	Zoning/Land Use Restrictions	The former Skeet Range is located within the flightline control area of the active airstrip.
	Demographics/Zoning	NASCC is home to a combined workforce of approximately 4,430 military personnel and 8,058 civilian and contractor personnel. The only personnel utilized at NALF Waldron include Air Operations personnel in the control tower, Fire Department personnel, and installation maintenance workers. Demographic data include the following: <ul style="list-style-type: none"> <li>• City of Corpus Christi: <ul style="list-style-type: none"> <li>- Population (2000): 277,454</li> <li>- Population density (2000): 1,794 residents/square mile;</li> </ul> </li> <li>• Nueces County: <ul style="list-style-type: none"> <li>- Population (2000): 313,645</li> <li>- Population density (2000): 375 residents/square mile.</li> </ul> </li> </ul>
	Beneficial Resources	The Live Oak-Redbay Woodlands present across the installation and within the former Skeet Range is considered ecologically sensitive as the community can serve as suitable habitat to migratory birds, mammals, amphibians, and reptiles.
<b>Ecological Profile</b>	Habitat Type	The former Skeet Range is classified as Live Oak-Redbay Woodlands. The community is mostly comprised of areas of shrub thickets four to eight feet in height with various openings comprised of midgrasses with some tall trees with closed canopy. The maritime pocket gopher is a species of concern, which might be recommended for federal listing status. While gophers have not been identified within the former Skeet Range, they potentially could inhabit the area.

Table 5.1-1: Conceptual Site Model Information Profiles – Skeet Range		
Profile Type	Information Needs	Preliminary Assessment Findings
	Degree of Disturbance	None. Undisturbed vegetation covers the entire area.
	Ecological Receptors	
	Federal Endangered Species:	None
	Federal Threatened Species:	None
	State Endangered Species:	None
State Threatened Species:	Texas Botteri’s Sparrow, Black Spotted Newt, South Texas Siren – large form, Sheep Frog, Texas Indigo Snake, Texas Tortoise, Texas Horned Lizard, Scarlet Snake, Maritime Pocket Gopher (under consideration)	
Other Ecological Receptors:	Common fauna/ flora such as large mammals (e.g., deer), small mammals, reptiles/amphibians, and grassland birds.	
Relationship of MEC/MC Sources to Habitat and Potential Receptors	MC is likely found in surface soils to a maximum depth of two feet. Vegetation likely acts as a cover to prevent exposure to potential receptors. Burrowing animals (i.e., maritime pocket gopher) could be exposed to MC in surface soil beneath the vegetative cover.	

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., non-intrusive grounds maintenance or intrusive construction); and 4) receptors (e.g., Navy personnel, construction workers, recreational users or 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 or 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., volatilization) and a transport medium (e.g., air).

The potential interactions between the source and receptors are assessed differently between MEC and MC. 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. 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.

Only small arms ammunition is thought to have been used at the Skeet Range. Therefore, no concentration of MEC is expected to be present at the site. Subsequently, no MEC exposure pathway analysis was performed for this site.

Several exposure pathways for MC are considered for various media at the Skeet Range, as illustrated in [Figure 5.1-5](#). Each potential source media is described below.

#### Surface Soil

MC may be present in surface soil due to the direct deposition of lead shot on the range floor. MC may also have been redistributed across the range due to the demolition of the range area. The possible demolition and regrading of the range may have buried MC to depths of two feet. In addition, the entire range area is currently covered by vegetation including grasses, shrub thickets, and some trees. Therefore, any remaining MC essentially would be covered by a “cap” of surface soil and vegetation, making the constituents inaccessible to human or wildlife receptors. These constituents are typically not mobile in the environment due to their physical and chemical properties (e.g., high sorption potential and low solubility under most environmental conditions) and likely have not migrated significantly from the site. Erosion and subsequent surface runoff of MC to adjacent areas is not expected due to the vegetative cover and flat topography of the former range. Thus, dermal contact, ingestion, and inhalation exposures to MC in surface soil are not anticipated. However, while not currently anticipated, any future movement or grading of surface soils could make MC available for wind distribution and subsequent inhalation (e.g., dust) or direct contact.

Lead and PAHs are not readily absorbed and bioaccumulated by terrestrial plants and wildlife. Therefore, exposure of MC to ecological receptors via biological uptake is considered

incomplete. In addition, hunting is not permitted at NALF Waldron; therefore, food chain exposures to humans are also considered incomplete.

#### Subsurface Soil

As MC possibly migrated via infiltration from the overlying surface soils, subsurface soil may represent another exposure medium for MC. However, anticipated future land use is not expected to change due to the proximity of the range to an active runway, and sufficient evidence for a complete exposure pathway (i.e., construction workers exposed to subsurface soil by digging or earth moving operations) does not exist at this time.

#### Surface Water and Sediment

Surface runoff from previous intense rainfall events may have mobilized MC to temporary ponds on the range, which most likely migrated into the underlying soil due to its permeable nature. There is little to no potential for MC to be transported and deposited in the local bays (Oso Bay to the west and Laguna Madre to the east) due to the present vegetative cover on the surface soils, flat terrain, and the distance from the Skeet Range. Therefore, no route of exposure exists for either human or ecological receptors to affected surface water and sediment.

#### Groundwater

Leaching of MC into groundwater is possible due to the permeable sandy soil present at the Skeet Range. Though the local groundwater flow paths at the Skeet Range are unknown, groundwater will eventually discharge in either Oso Bay to the west or Laguna Madre to the east, both of which contain ecological and human receptors. However, based on the nature of the MC most likely to be present at the range (e.g., lead, PAHs) and the distance to the surface water bodies, it is unlikely that MC would migrate to groundwater, discharge to surface water, and subsequently be available to receptors at high concentrations. Additionally, there are no known users of the shallow groundwater in the area adjacent to the range. The major source of drinking water at NALF Waldron is supplied by Lake Corpus Christi, 43 miles to the northwest. Therefore, groundwater exposure pathways are considered to be incomplete.

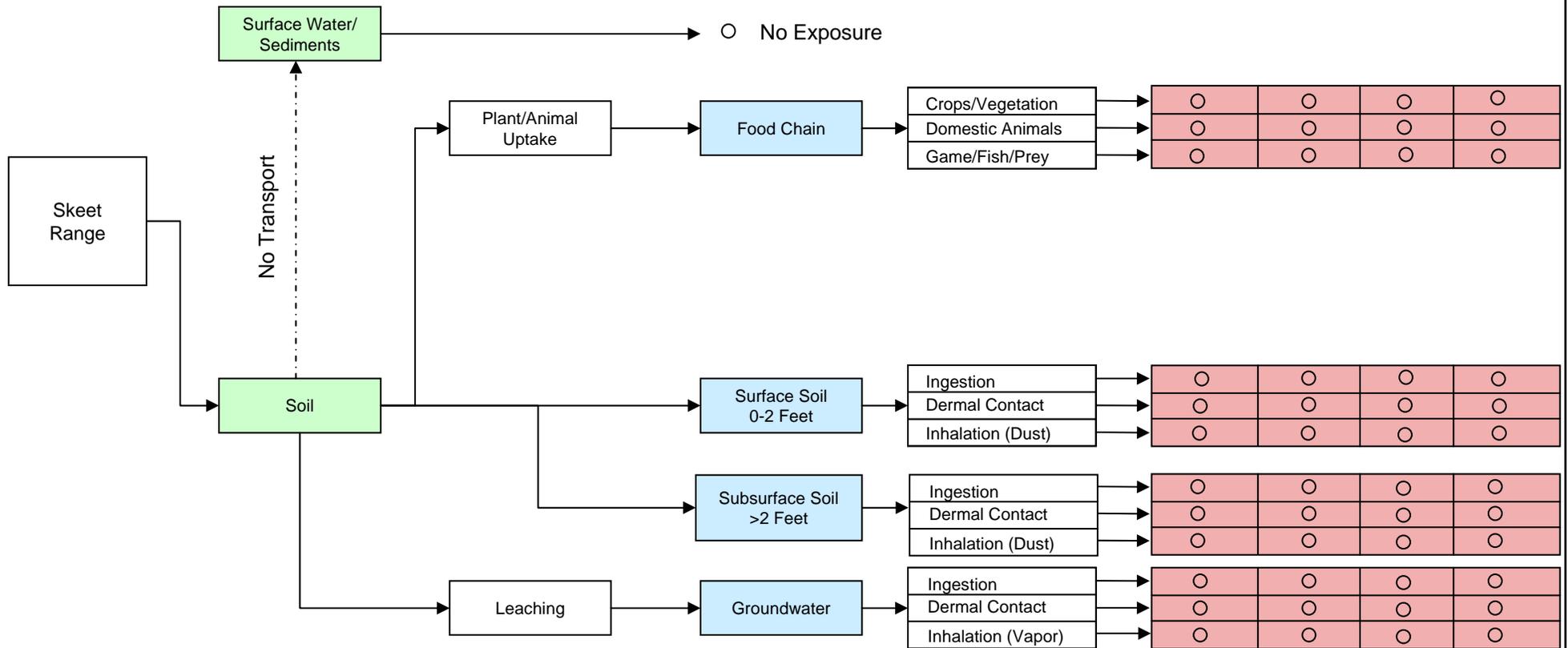
A graphical illustration of the details of the conceptual site model is included in [Figure 5.1-6](#) at the end of this section. As shown on the illustration, the former Skeet Range was oriented for firing in a northerly direction. MC associated with the range was likely deposited on surface soil within the red range boundary, although lead shot fired from a shotgun had the potential to travel

## FINAL PRELIMINARY ASSESSMENT

a full 900 feet to the edge of the SDZ. Demolition of the range may have redistributed MC within surface soil at the site. As shown on the illustration, the flat topography and vegetation present on range likely limited surface runoff to a slow northward migration and likely did not carry MC far from the site. Infiltration of MC through the permeable sands comprising the upper soil layer was likely the primary mode of contaminant transport. MC likely migrated into subsurface soil and groundwater via this process. However, as the shallow groundwater beneath the site is not used for potable supply and there is no foreseeable change in land use at the site (i.e., no activities which will disturb subsurface soil), mobilization of MC to subsurface soil and groundwater is not a concern.

Source Area	Source Media	Release Mechanisms	Exposure Media	Exposure Routes	Receptors
-------------	--------------	--------------------	----------------	-----------------	-----------

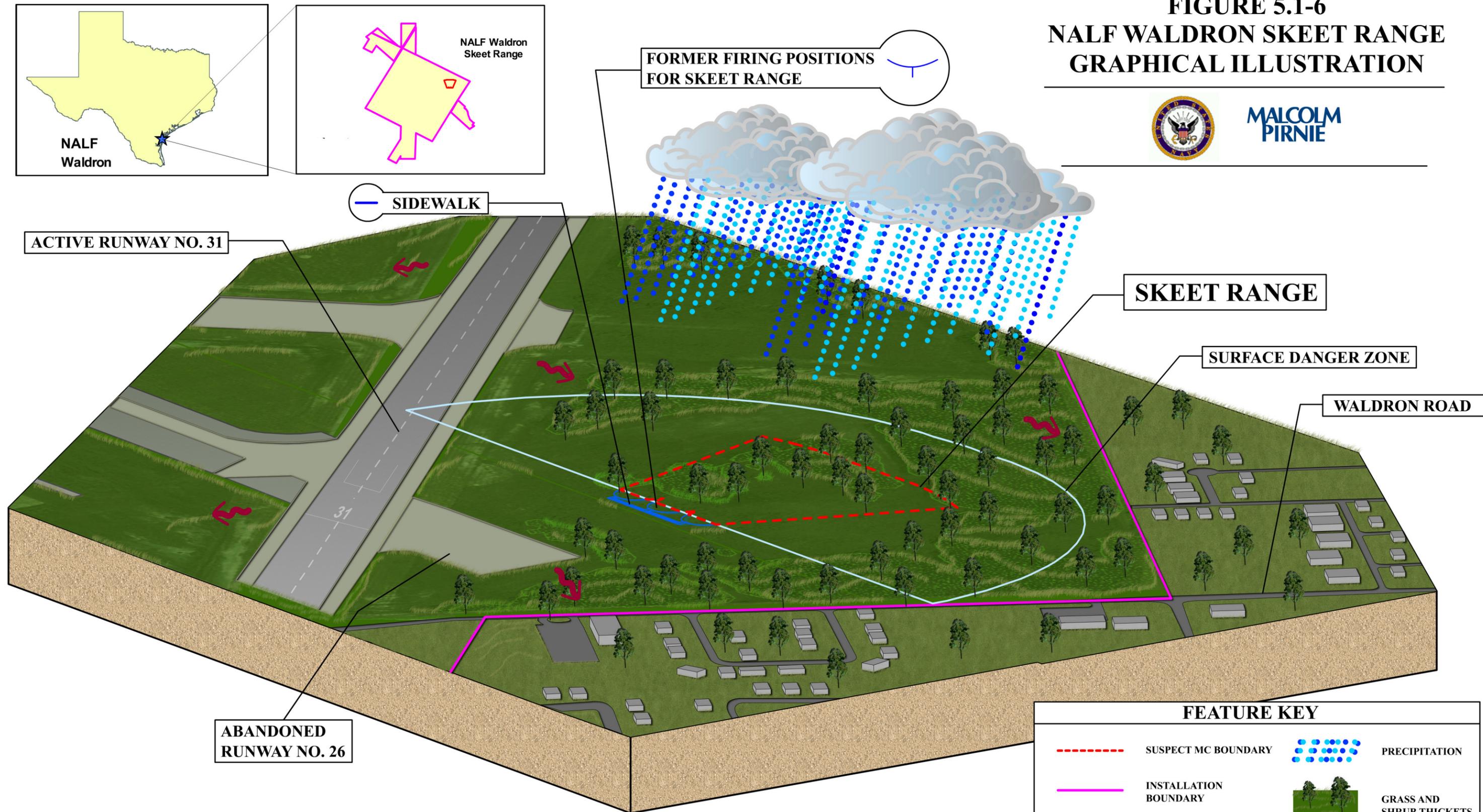
Navy Personnel	Contractor	Trespasser	Biota
----------------	------------	------------	-------



**FIGURE 5.1-6  
NALF WALDRON SKEET RANGE  
GRAPHICAL ILLUSTRATION**



**MALCOLM  
PIRNIÉ**



**FORMER FIRING POSITIONS  
FOR SKEET RANGE**

**SIDEWALK**

**ACTIVE RUNWAY NO. 31**

**SKEET RANGE**

**SURFACE DANGER ZONE**

**WALDRON ROAD**

**ABANDONED  
RUNWAY NO. 26**

**FEATURE KEY**

	SUSPECT MC BOUNDARY		PRECIPITATION
	INSTALLATION BOUNDARY		GRASS AND SHRUB THICKETS
	STREET/PAVEMENT		INFILTRATION AND RUNOFF
	RESIDENTIAL HOUSES AND BUILDINGS		

**NOTE:**

1. THE SURFACE DANGER ZONE REPRESENTS THE FULL DISTANCE THAT A SHOTGUN DISCHARGE CAN TRAVEL (FOR A SKEET RANGE).

**DISCLAIMER**

THIS ILLUSTRATION IS INTENDED FOR USE IN CONJUNCTION WITH THE REPORT IN WHICH IT WAS SUBMITTED AND IS NOT INTENDED TO BE USED AS A STAND ALONE DOCUMENT.

***5.1.12. Summary***

Based upon the information presented in this report, the Skeet Range was used for small arms qualification training of installation personnel, moving target orientation for Naval aviators, and likely for recreational purposes. Historical documentation (station documents and drawings) and NASCC personnel indicated that no other explosives or munitions were used at the site, and that the site was not used for any other purpose. There is no evidence of MEC at the Skeet Range. Based on historical operations at the site, it is possible for MC (lead, antimony, arsenic, copper, nickel, zinc, black powder, and PAHs) to exist in surface soil at the Skeet Range. The range was leveled between 1947 and 1961, and the area is currently not used for military purposes. Future use is not expected to change.

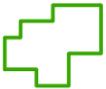
**Preliminary Assessment  
NALF Waldron, Texas**



**MALCOLM  
PIRNIE**

**Map 5.1-1  
Visual Survey  
NALF Waldron Skeet Range**

**Legend**

-  Installation Boundary
-  Skeet Range
-  Site Reconnaissance



Data Source: Orthophoto, NAS Corpus Christi, TX, 2000  
NAS Corpus Christi GIS/CAD Data

Coordinate System: UTM Zone 14  
Datum: NAD 1983  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment Report  
Date: April 2005



**Preliminary Assessment  
NALF Waldron, Texas**



**MALCOLM  
PIRNIÉ**

Map 5.1-2  
Range/Site Details  
NALF Waldron Skeet Range

**Legend**

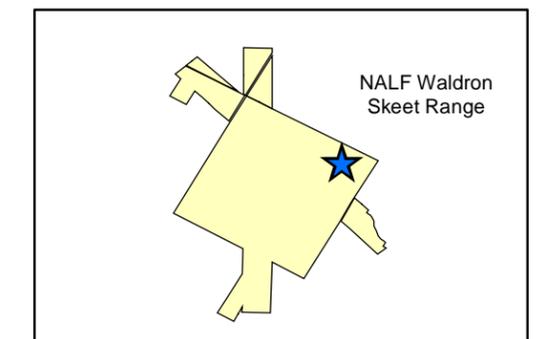
-  Installation Boundary
-  Former Firing Line
-  Skeet Range
-  Former Range Features
-  Former Access Road
-  Live Oak-Redbay Habitat
-  Airfield



Data Source: Orthophoto, NAS Corpus Christi, TX, 2000  
NAS Corpus Christi GIS/CAD Data

Coordinate System: UTM Zone 14  
Datum: NAD 1983  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment Report  
Date: April 2005



**Preliminary Assessment  
NALF Waldron, Texas**



**MALCOLM  
PIRNIE**

**Map 5.1-3  
Munitions Characterization  
NALF Waldron Skeet Range**

**Legend**

 Installation Boundary

 Skeet Range

**MEC Presence\***

 Known

 Suspect

\*There is no evidence of MEC 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 has not been confirmed by sampling or other means.



Data Source: Orthophoto, NAS Corpus Christi, TX, 2000  
NAS Corpus Christi GIS/CAD Data

Coordinate System: UTM Zone 14  
Datum: NAD 1983  
Units: Meters

Contract: N62472-02-D-1300  
Edition: Final Preliminary Assessment Report  
Date: April 2005



## Appendix A: References

REFERENCES

**Reports**

1) *An Oral History of the Naval Air Station Corpus Christi During World War II*. Prepared for: Commanding Officer, Naval Air Station Corpus Christi, Texas. Prepared by: Del Mar College, 1995.

[File:\Reference Documents\Appendix B\Waldron\\_Ref1](#)

2) *Affected Property Assessment Report, Installation Restoration Sites 1, 3, and 4 and Building 8, NAS Corpus Christi, Texas*. Prepared for: Department of the Navy, Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina. Prepared by: Ensafe, Inc., August 2001.

[File:\Reference Documents\Appendix B\Waldron\\_Ref2](#)

3) *Conceptual Site Models for Ordnance and Explosives (OE) and Hazardous, Toxic, and Radioactive Waste (HTRW) Projects*, U.S. Army Corps of Engineers, February 2002.

4) *Characterization and Remediation of Soils at Closed Small Arms Firing Ranges*. Interstate Technology and Regulatory Council, Small Arms Firing Range Team, January 2003.

[File:\Reference Documents\Appendix B\Waldron\\_Ref3](#)

5) *Defense Environmental Restoration Program Guidance*, U.S. Department of Defense, September 2001.

6) *DoD Directive on Explosives Safety, DoD Directive 6055.9 (DoD Ammunition and Explosives Safety Standards)*, DoD Explosives Safety Board (DDESB).

7) *Draft Directive on Military Munitions Response Policy on Other than Operational Ranges*, U.S. Department of Defense, January 2003.

8) *Draft Policy and Interim Final Handbook on the Management of Ordnance and Explosives at Closed, Transferred, and Transferring Ranges*, U.S. Environmental Protection Agency, July 2001 and February 2002.

## FINAL PRELIMINARY ASSESSMENT

9) *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004)*, U.S. Environmental Protection Agency.

10) *Initial Assessment Study of Naval Air Station Corpus Christi, Texas*. Prepared for: Navy Assessment and Control of Installation Pollutants Department, Naval Energy and Environmental Support Activity. Prepared by: Harmon Engineering & Testing, February 1984.

[File:\Reference Documents\Appendix B\Waldron\\_Ref4](#)

11) *Integrated Cultural Resource Management Plan, Naval Air Station Corpus Christi, Texas*. Prepared for: Department of the Navy, Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina. Prepared by: Hardy, Heck, Moore & Meyers, Inc., August 2000.

[File:\Reference Documents\Appendix B\Waldron\\_Ref5](#)

12) *Integrated Natural Resources Management Plan, Naval Air Station Corpus Christi*. Prepared for: Department of the Navy, Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina. Prepared by: Turner Collie & Braden, Inc., November 2001.

[File:\Reference Documents\Appendix B\Waldron\\_Ref6](#)

13) *Management Principles for Implementing Response Actions at CTT Ranges*, U.S. Department of Defense, March 2000.

14) *Master Plan, Naval Complex Corpus Christi, Texas*. Prepared for: Department of the Navy, Southern Division, Naval Facilities Engineering Command, 1985.

[File:\Reference Documents\Appendix B\Waldron\\_Ref7](#)

15) *Physical Separation and Acid Leaching to Process Small-Arms Range Soils*. Prepared for: Naval Engineering Facilities Service Center and U.S. Army Environmental Center. Prepared by: Batelle, September 1997.

[File:\Reference Documents\Appendix B\Waldron\\_Ref8](#)

16) U.S. Code, Title X. 2001.

## **Interviews**

All interviews conducted with installation personnel are provided in the following combined file:  
<File:\Reference Documents\Appendix B\inbrief&interviews>

## **Memos**

All memos referenced here are provided in the following combined file:  
<File:\Reference Documents\Appendix B\Waldron Memos>

15 February 1944 Reduction of Uncompleted Projects, NAS Corpus Christi, Texas

24 September 1946 to the Chief of Bureau of Ordnance from Officer-in-Charge, NAAS, Waldron Field, a report of Ammunition Stowage

December 1948, Annual Inspection of Public Works and Public Utilities of Inactivated Naval Auxiliary Air Station, Waldron Field, Corpus Christi, Texas

2 May 1949 to the Eighth Naval District, from the CO, NAS Corpus Christi, Annual Disposition of Public Works and Public Utilities

14 September 1950 letter to Rear Admiral Ernest W. Litch, Commander, Naval Air Advanced Training Command from George Prowse, County Judge, Nueces County, Texas

19 September 1950 to the Chief BUDOCKS, from the Chief of Naval Air Advanced Training, Recovable Permit Covering Occupancy of Waldron Field by County of Nueces, Texas

25 September 1950 to the Chief of Naval Operations from the Chief, Naval Air Advanced Training, Recovable Permit Covering Occupancy of Waldron Field by County of Nueces, Texas

22 April 1964 to the CO, NAS Corpus Christi from the District Public Works Officer, Eighth Naval District, a report of the Withdrawal of Building 551-A

6 September 1941, United States Engineer Office, War Department, Notice of Public Hearing

21 February 1941 to the Secretary of the Navy from the Prospective CO, NAS Corpus Christi, Lease of Coastal Area from State of Texas

27 September 1941 to the Judge Advocate General of the Navy from the CO, NAS Corpus Christi, Lease of Coastal Areas from the State of Texas

15 October 1941, Memorandum for Mr. Buettner, from the CO, NAS Corpus Christi, memorandum for actions necessary to obtain uninterrupted use of coastal and land areas for NAS Corpus Christi

14 November 1941 to the Judge Advocate General of the Navy from the Chief, BUAER, Proposed Executive Order Establishing Padre Island Defensive Sea Area

## FINAL PRELIMINARY ASSESSMENT

1 December 1941 to the Judge Advocate General of the Navy from the CO, NAS Corpus Christi, Bombing Targets for Use with Miniature and Water Filled Training Bombs

4 December 1941 to the Chief of Naval Operations from the Judge Advocate General of the Navy, Lease of Coastal Areas from the State of Texas for Aerial Machine Gunnery and Bombing Activities of the NAS Corpus Christi

10 December 1941 to the Judge Advocate General of the Navy from the Chief, BUAER, Bombing Targets for Use with Miniature and Water Filled Training Bombs

16 December 1941 to the Chief of Naval Operations from the Chief, BUAER, Bombing Targets for Use with Miniature and Water Filled Training Bombs

16 December 1941 to the Chief of Naval Operations from the Chief, BUAER, Lease of Coastal Areas from State of Texas for Aerial Machine Gunnery and Bombing Activities of the NAS Corpus Christi

9 January 1942, H.A. Stuart, Memorandum concerning establishment of a Defensive Sea Area

3 February 1942 to the CO, NAS Corpus Christi from the Judge Advocate General of the Navy, Bombing Targets for Use with Miniature and Water Filled Training Bombs

3 April 1942 to the Judge Advocate General of the Navy from the CO, NAS Corpus Christi, Bombing and Aerial Gunnery Areas on Padre Island

2 October 1942 to the District Engineer from the Commandant, Naval Air Training Center, NAS Corpus Christi, Application for Permit to Erect Oil Well Derricks in Laguna Madre, Texas

1 February 1943 to the CO, Foster Field, Victoria, Texas from the CO, NAS Corpus Christi, Violation of Danger Zones

3 March 1943 to the CO, AAFGCTC, Randolph Field, Texas from the CO, AAFAPS, Foster Field, Victoria, Texas, memorandum detailing Naval aircraft flying through Army Air Force gunnery area

4 February 1943 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Request for Aviation Ordnance Material

6 February 1943 to the Chief, BUORD from the CO, NAS Corpus Christi, Request for Ordnance Material

11 February 1943 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Request for Target Pistols

11 February 1943 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Request for Ordnance Material

19 February 1943 to the Aviation Supply Annex, NAS Norfolk, from the BUORD, Request for Aviation Ordnance Equipment

## FINAL PRELIMINARY ASSESSMENT

22 February 1943 to the Chief, BUORD from the CO, NAS Corpus Christi, Request for Caliber .30 Base Wind Vane Sight

24 February 1943 to the Commander, Inshore Patrol from the CO, NAS Corpus Christi, Request for 3 Inch .50 Caliber, Mark VII Loading Machine

27 February 1943 to the CO, NAS Corpus Christi from the Chief, BUORD, Request for Signal Projector Mark I

2 March 1943 to the CO, NAS Corpus Christi from the Chief, BUORD, Request for Aviation Ordnance Equipment

22 March 1943 to the Chief, BUORD from the Commandant, Naval Air Training Center,, NAS Corpus Christi, Request for Ammunition

2 April 1943 to the Commandant, Naval Air Training Center, NAS Corpus Christi from the Chief, BUORD, Request for Small Arms Ammunition for Familiarization Firing by Civilian and Seaman Guards

15 April 1943 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Request for Small Arms

4 May 1943 to the Chief, BUAER from the Commandant, Naval Air Training Center, NAS Corpus Christi, Request for Equipment for Aviation Free Gunnery Training

18 May 1943 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Inventory of Aviation Ordnance Equipment

28 May 1943 to the Chief, BUORD from the CO, NAS Corpus Christi, Request for Wooden Rifles

2 June 1943 to the Commandant, Naval Air Training Center, NAS Corpus Christi from the Chief, BUORD, Request for .50 Caliber Sectionalized Guns

5 June 1943 to the Chief, BUORD from CO, NAS Corpus Christi, Request for Small Arms

14 June 1943 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Request for Clay Targets

23 June 1943 to the Commandant, Naval Air Training Center, NAS Corpus Christi from the Chief, BUORD, Information Requested on Revolvers, .38 Caliber

5 July 1943 to the CO, NAS Corpus Christi from the Chief, BUORD, Aviation Ordnance Equipment for Installation in Greeker-Wheeler Training Turrets

9 July 1943 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Removal of Ordnance Equipment from U.S.S. YP-98

17 July 1943 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Request for Small Arms

## FINAL PRELIMINARY ASSESSMENT

6 August 1943 to the CO, NAS Corpus Christi from the Chief, BUORD, Request for Small Arms

26 July 1943 to the CO, NAS Corpus Christi from the Chief, BUORD, Retention of Armament and Ammunition Removed from the U.S.S. YP-98

20 August 1943 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Request for Miniature Practice Bombs

17 September 1943 to the CO, NAS Corpus Christi from the Chief, BUAER, High Speed Moving Target Range, NAS Corpus Christi

13 October 1943 to BUORD from Chief of Naval Operations, Aviation Ordnance Equipment for Martin 250 CH-3 Turrets for Training

20 October 1943 to Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Report of Aircraft Pyrotechnics

29 October 1943 to BUORD, Estimates of Ammunition Quantities at NAS Corpus Christi

4 November 1943 to the Chief, BUDOCKS from the Chief, BUAER, Moving Target Machine Gun Range, NAS Corpus Christi

8 November 1943 to the Chief, BUORD from the Supply Officer, NAS Corpus Christi, Classification of Shotguns

29 December 1943 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Request for Disposition of Excess Amount of Starter Cartridges

8 January 1944 to the CO, NAS Corpus Christi from the Chief, BUORD, Approved Storage of Ammunition

24 January 1944 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Request for Additional Target Pistols

24 January 1944 to the Chief, BUORD from the Commandant, Naval Air Training Center, NAS Corpus Christi, Numbering of Naval Magazines

7 February 1944 to the Commandant, Naval Air Training Center, NAS Corpus Christi from the Chief, BUORD, Approved Stowage of Ammunition

15 April 1944 to the Chief, BUORD from the CO, NAS Corpus Christi, Request for Line Throwing Guns

29 April 1944 to the Inspector of Ordnance in Charge, Naval Ammunition Depot from the CO, NAS Corpus Christi, Information Regarding Shipment of .50 Caliber Cartridges

21 July 1944 to Chief, BUORD from the CO, NAS Corpus Christi, Request for Ammunition

16 August 1944 to the Chief, BUORD from the CO, NAS Corpus Christi, Request for Small Arms Ammunition

## FINAL PRELIMINARY ASSESSMENT

11 October 1944 to the Chief, BUORD from the CO, NAS Corpus Christi, Request for Clay Targets

26 October 1944 to the Chief, BUORD from the CO, NAS Corpus Christi, Request for Gunnery Ammunition

6 December 1944 to the Chief, BUAER from the CO, NAS Corpus Christi, Expansion of High Speed Range Facilities

6 February 1946 to the Chief, BUORD from the CO, NAS Corpus Christi, Inventory of Class 265 Aviation Ordnance Equipment

6 March 1946 to the CO, NAS Corpus Christi, from the Chief, BUORD, memorandum recommending disposal of unserviceable ammunition by burning and burial

21 March 1946 to the Chief, BUORD from the CO, NAS Corpus Christi, Notification of Ammunition for Salvage

27 September 1946 to the Chief of Naval Air Basic Training from the Chief, BUORD, Information Concerning Caliber .30 Ammunition Allowances for Student Training

17 October 1946, Notification of Potential Mine in Corpus Christi Greene Bayou

13 November 1946 to Chief, BUORD from the CO, NAS Corpus Christi, Request for Ammunition

31 October 1946 to Supply Officer from Gunnery Officer, NAS Corpus Christi, Survey of Caliber .30 Browning Aircraft Machine Guns

12 February 1947 to the Chief, BUORD from the CO, NAS Corpus Christi, Annual Physical Inventory Program 1947

6 March 1947 to the Chief, BUORD from the CO, NAS Corpus Christi, a report on the Disposition of Excess Bombsights, Stabilizers, and SBAE Material

2 February 1948 to the Chief, BUORD from the CO, NAS Corpus Christi, Request for Ammunition and Ordnance

21 February 1948 to the CO, NAS Corpus Christi from the Chief, BUORD, Notification of Shipment of Ammunition and Ordnance

10 August 1948 to the Commandant, Naval Air Training Center, Eighth Naval District, from the CO, NAS Corpus Christi, Request for Ammunition

3 November 1948 to the Chief, BUDOCKS from the CO, NAS Corpus Christi, Survey of Gun Emplacements with NAS Corpus Christi

1948-1949 Building Disposition of NAS Corpus Christi

March 1953, Report of Annual Inspection of Public Works and Public Utilities, Government-Owned Satellite Fields, Radio Range Stations and Bombing Targets, NAS Corpus Christi

NALF Waldron, Texas

Final PA Report  
April 2005

## Websites

<http://www.navyrangeinventory.net> (March 2003)  
<https://nascc.cnatra.navy.mil/aahome.htm> (June 2003)  
<http://www.globalsecurity.org/military/facility/waldron.htm> (June 2003)  
<http://www.corpuschristichamber.org/> (August 2003)  
<http://www.cctexas.com/> (August 2003)  
<http://www.ccredc.com/publications.asp> (August 2003)

## Maps

Ammunition Lockers, Main Station, Base Field P-4, Waldron Field, 18 June 1942  
<File:\Reference Documents\Appendix B\PW Waldron Amm 1942>

Roads, Walks, and Building Layout, Waldron Field, 31 October 1942  
<File:\Reference Documents\Appendix B\PW Waldron RWB 1942>

Roads, Walks, and Building Layout, Waldron Field, 3 May 1943  
<File:\Reference Documents\Appendix B\Archive large Waldron 1943>

Fixed Gun Boresight Range, Waldron Field, Naval Air Training Center, Corpus Christi, Texas, 31 July 1943  
<File:\Reference Documents\Appendix B\PW Waldron Boresight>

Map of Waldron Field, NAS Corpus Christi, Texas, 30 June 1945  
<File:\Reference Documents\Appendix B\Archive large Waldron 1945>

Map of Waldron Field, NAS Corpus Christi, Texas, 30 June 1946  
<File:\Reference Documents\Appendix B\Archive large Waldron 1946>

Map of Waldron Field, NAS Corpus Christi, Texas, 30 June 1947  
<File:\Reference Documents\Appendix B\Archive Map Waldron 1947>

Master Shore Development Plan, Waldron Field, Conditions as of 31 December 1957  
<File:\Reference Documents\Appendix B\Archive large Waldron 1957>

General Development Map, Existing and Planned Pre-M-Day, OLF Waldron Field, Corpus Christi, Texas, 3 July 1961  
<File:\Reference Documents\Appendix B\PW Waldron GDP 1961>

Real Estate Summary Map, OLF Waldron Field, Corpus Christi, Texas, 20 March 1974  
<File:\Reference Documents\Appendix B\PW RealEstate Waldron 1974>

**Aerial Photographs**

AAS Waldron Field, Texas, Oblique Looking Approximately West, NAS Corpus Christi, 15 January 1944

[File:\Reference Documents\Appendix B\Archive aerial Waldron 1944](#)

Mosaic of NAAS Waldron Field, Texas, Looking Approximately South, NAS Corpus Christi, 10 January 1945

[File:\Reference Documents\Appendix B\Archive aerial Waldron 1945](#)

USNAAS Waldron Field, Texas, PhotoLab NAS Corpus Christi, 12 March 1945

[File:\Reference Documents\Appendix B\Archive aerial Waldron Mar1945](#)

NAAS Waldron Field, Texas, Oblique Looking Approximately East, NAS Corpus Christi, 12 May 1945

[File:\Reference Documents\Appendix B\Archive aerial Waldron May1945](#)

Waldron Field, Texas, NAS Corpus Christi Public Works Department, 19 October 1967

[File:\Reference Documents\Appendix B\Aerial PW Waldron 1967](#)

## **Appendix B: Project Source Data – General**

## FINAL PRELIMINARY ASSESSMENT

Electronic copies of reference materials for Appendix B are provided on the CD-ROM in folder:  
[\Reference Documents\Appendix B](#)

Links to all reference documents are provided in [Appendix A](#).

## **Appendix C: Project Source Data – Site Specific**

## Appendix C-1: SKEET RANGE

**Installation:**

NALF Waldron

**Location:**

Former Skeet Range

**Date:**

July 29, 2003

**Photo No.****1****Description:**Field team walking north  
through former Skeet Range.**Installation:**

NALF Waldron

**Location:**

Former Skeet Range

**Date:**

July 29, 2003

**Photo No.****2****Description:**Vegetation re-established at  
former Skeet Range.

**Installation:**

NALF Waldron

**Location:**

Former Skeet Range

**Date:**

July 29, 2003

**Photo No.**

**3**

**Description:**

Maintained grasses near runway in area of former Skeet Range.



**Installation:**

NALF Waldron

**Location:**

Former Skeet Range

**Date:**

July 29, 2003

**Photo No.**

**4**

**Description:**

View of NALF Waldron looking south from former Skeet Range.



<b>Installation:</b> NALF Waldron	<b>Location:</b> Former Skeet Range	<b>Date:</b> July 29, 2003
--------------------------------------	----------------------------------------	-------------------------------

**Photo No.**  
**5**

**Description:**  
Vegetation re-established at former Skeet Range.



<b>Installation:</b> NALF Waldron	<b>Location:</b> Former Skeet Range	<b>Date:</b> July 29, 2003
--------------------------------------	----------------------------------------	-------------------------------

**Photo No.**  
**6**

**Description:**  
Vegetation re-established at former Skeet Range.



**Installation:**

NALF Waldron

**Location:**

Former Skeet Range

**Date:**

July 29, 2003

**Photo No.**

7

**Description:**

.50 caliber cartridge found  
within boundary of former  
Skeet Range.



**Installation:**

**Location:**

**Date:**

**Photo No.**

**Description:**



**Banks  
Information  
Solutions, Inc.**

# **Water Well Report <sup>TM</sup>**

**Thursday, November 18, 2004**

## **CLIENT**

MALCOLM-PIRNIE, INC.-HOUSTON  
1700 West Loop South, Ste. 1450  
Houston, TX 77027-3006

## **SITE**

NALF Waldron  
Off of Waldron Drive  
Corpus Christi, Texas  
111804-2  
PO #: 0474114

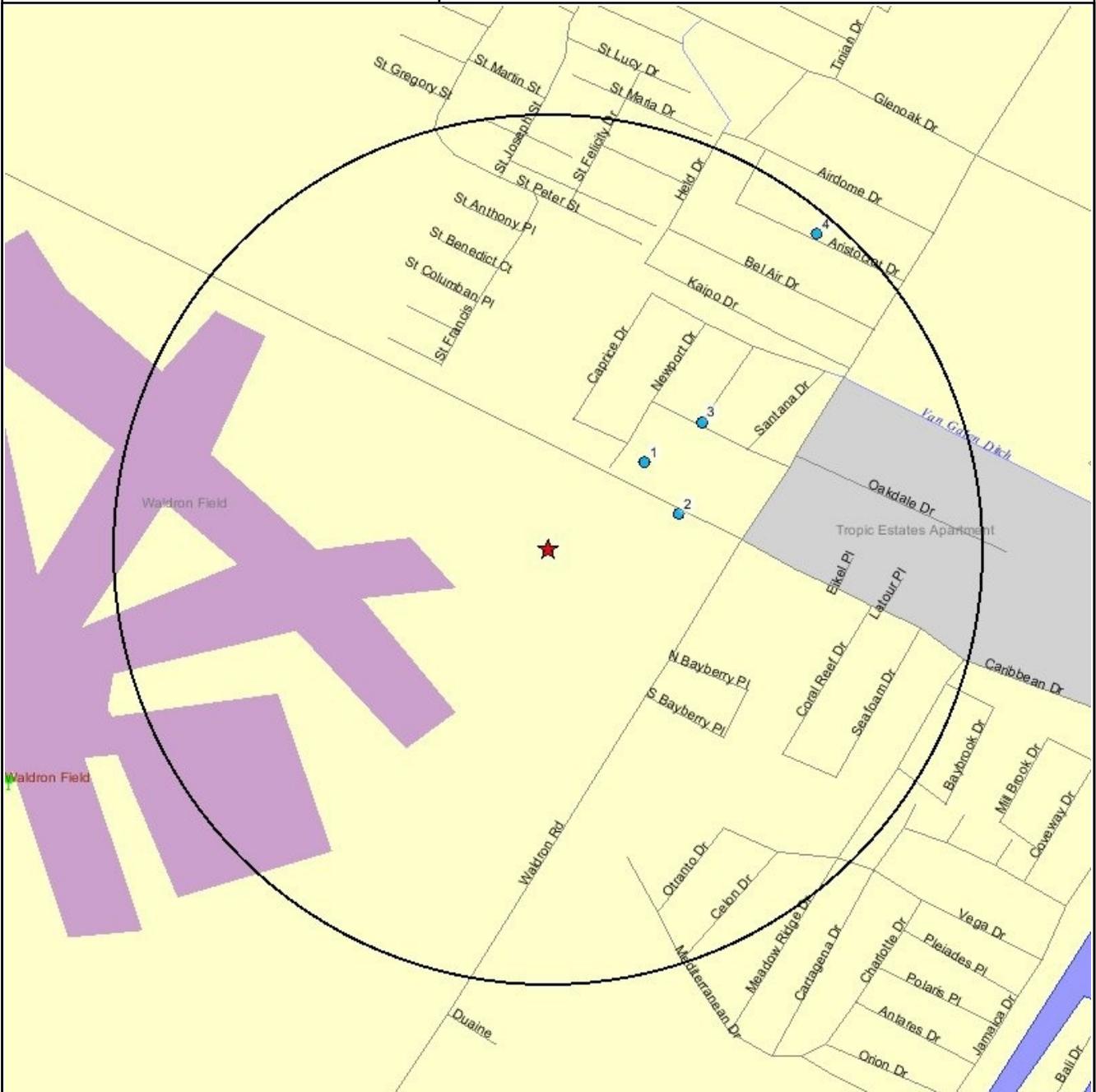
**700 N Lamar Suite 200 Austin, Texas 78703  
PH 512.478.0059 FAX 512.478.1433 E-mail [banks@banksinfo.com](mailto:banks@banksinfo.com)**



**Banks  
Information  
Solutions, Inc.**

# Water Well Report <sup>TM</sup>

## Map of Wells within 0.5 Mile(s)



- |                       |            |                         |
|-----------------------|------------|-------------------------|
| ★ Site                | 🌳 Park     | □ County                |
| ● Site                | 🎓 School   | ▭ State                 |
| ⊙ Cluster             | ⚰ Cemetary | ▭ Urban Area            |
| 🛣️ Limited Access Hwy | 🏠 Building | ▭ Open Space            |
| 🛣️ Primary Highway    | 🚂 Railroad | ▭ Educational/Religious |
| 🛣️ Secondary Highway  | ⛪ Church   | ▭ Water Bodies          |
| 🛣️ Roads              | ⚰ Dead Guy | ▭ Multihousehold        |
| 🏥 Hospital            | 🌉 Bridge   | ▭ Military              |
| ✈️ Airport            | 🗼 Tower    | ▭ Custodial Facility    |

One inch = 0.19 miles

### NALF Waldron

**Banks Information Solutions, Inc.**  
700 N Lamar Suite 200 Austin, Texas 78703  
PH 512-478-0059 FAX 512-478-1433  
E-Mail: banks@banksinfo.com





**Banks  
Information  
Solutions, Inc.**

# Water Well Report <sup>TM</sup>

## DETAILS

Map #	State ID	Banks ID	Owner of Well	Type of Well	Depth Drilled	Completion Date	Longitude	Latitude	Driller's Log
1	83-22-8p	4835500636	Lt. Col. F. B. Parish	Domestic	122	7/26/1984	-97.30359	27.6381	<a href="#">View</a>
2	83-22-8m	4835500635	Martin Kirbow	Domestic	115	7/24/1984	-97.30302	27.63724	<a href="#">View</a>
3	83-22-8r	4835500640	Wayne R Dahl	Domestic	85	3/1/1985	-97.30263	27.63876	<a href="#">View</a>
4	83-22-8	4835500644	Ray Kubik	Domestic	163	7/21/1989	-97.30072	27.6419	<a href="#">View</a>

700 N Lamar, Suite 200 Austin, Texas 78703  
PH 512.478.0059 FAX 512.478.1433 E-mail [banks@banksinfo.com](mailto:banks@banksinfo.com)

Send original copy by certified mail to the Texas Department of Water Resources P. O. Box 13087 Austin, Texas 78711

State of Texas  
WATER WELL REPORT

Texas Water Well Drillers Board  
P. O. Box 13187  
Austin, Texas 78711

ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side

1) OWNER Lt. Col. F. B. Parish Address 3701 Waldron Road, Corpus Christi, Tx 78418  
 (Name) (Street or RFD) (City) (State) (Zip)  
 2) LOCATION OF WELL: City Flour Bluff  
 County Nueces miles in \_\_\_\_\_ direction from \_\_\_\_\_  
 (N.E., S.W., etc.) (Town)

Driller must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.  
 Legal description: Section No. \_\_\_\_\_ Block No. \_\_\_\_\_ Township \_\_\_\_\_  
 Abstract No. \_\_\_\_\_ Survey Name \_\_\_\_\_  
 Distance and direction from two intersecting section or survey lines \_\_\_\_\_  
 See attached map.

3) TYPE OF WORK (Check):  New Well  Deepening  Reconditioning  Plugging  
 4) PROPOSED USE (Check):  Domestic  Industrial  Public Supply  Irrigation  Test Well  Other  
 5) DRILLING METHOD (Check):  Mud Rotary  Air Hammer  Driven  Lored  Air Rotary  Cable Tool  Jetted  Other

6) WELL LOG:  
 Date drilled 7-26-84  
 DIAMETER OF HOLE  
 Dia. (in.) From (ft.) To (ft.)  

6 3/4	Surface	122
-------	---------	-----

7) BOREHOLE COMPLETION:  
 Open Hole  Straight Wall  Unreamed  
 Gravel Packed  Other \_\_\_\_\_  
 If Gravel Packed give interval ... from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

From (ft.)	To (ft.)	Description and color of formation material
0-10	10-65	Sand Shale
65-75	75-100	Sand Shale
100-122		Sand

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)		Casing Screen
			From	To	
4	N	PVC Casing	0	102	
4	N	PVC Screen	102	122	

CEMENTING DATA  
 Cemented from 15 ft. to surface ft.  
 Method used \_\_\_\_\_  
 Committed by Martin Water Wells  
 (Company or Individual)

9) WATER LEVEL:  
 Static level 20 ft. below land surface Date 7-26-84  
 Artesian flow \_\_\_\_\_ gpm. Date \_\_\_\_\_

RECEIVED  
AUG 23 1984

10) PACKERS: Type Rubber Depth 90'

DEPT. OF WATER RESOURCES  
 (Use reverse side if necessary)

11) TYPE PUMP:  
 Turbine  Jet  Submersible  Cylinder  
 Other \_\_\_\_\_  
 Depth to pump bowls, cylinder, jet, etc., 60' ft.

13) WATER QUALITY:  
 Did you knowingly penetrate any strata which contained undesirable water?  Yes  No  
 If yes, submit "REPORT OF UNDESIRABLE WATER"  
 Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
 Was a chemical analysis made?  Yes  No

12) WELL TESTS:  
 Type Test  Pump  Bailor  Jetted  Estimated  
 Yield: \_\_\_\_\_ gpm with \_\_\_\_\_ ft. drawdown at r \_\_\_\_\_ hrs.

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

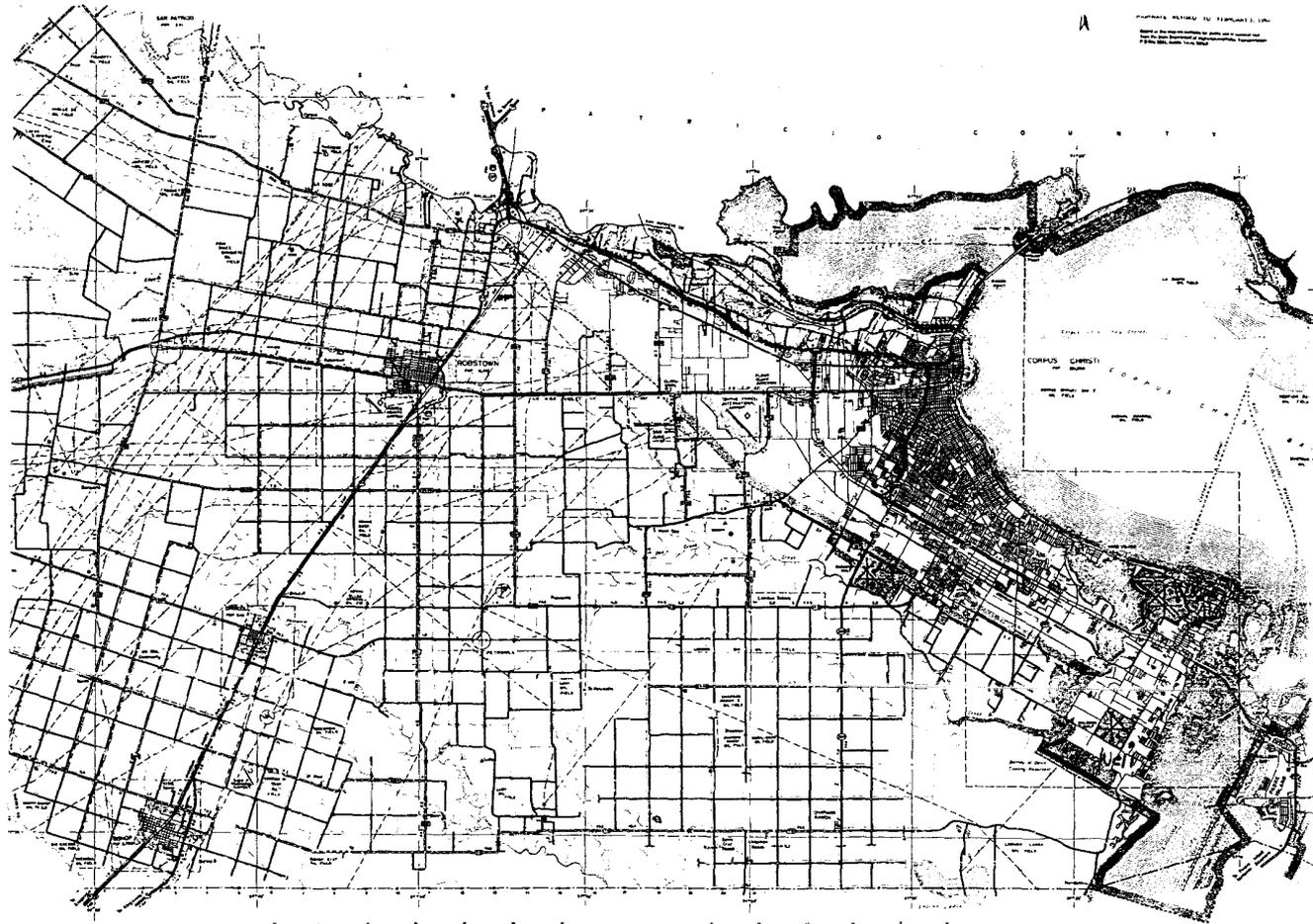
COMPANY NAME Martin Water Wells Water Well Driller's License No. 1669  
 (Type or Print)  
 ADDRESS Hwy 77 North Robstown Texas 78380  
 (Street or RFD) (City) (State) (Zip)  
 (Signed) [Signature] (Signed) \_\_\_\_\_  
 (Licensed Water Well Driller) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TDWR use  
 Well No. 22-8P  
 Located on map Yes DLE

4835500630

PROPERTY HISTORY TO FEBRUARY 1, 1940  
Based on the best available records and information  
as of the date of the original survey and as of  
February 1, 1940.



KEY TO SHADING  
Dotted



SEE PLAT 104

Send original copy by certified mail to the Texas Department of Water Resources P. O. Box 13087 Austin, Texas 78711

State of Texas WATER WELL REPORT

Texas Water Well Drillers Board P. O. Box 13017 Austin, Texas 78711

ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side

1) OWNER Martin Kirbow Address 3601 Waldron Road, Corpus Christi, Tx78418
2) LOCATION OF WELL: Nueces county, city Flour Bluff

Legal description: Section No., Block No., Township, Abstract No., Survey Name, Distance and direction from two intersecting section or survey lines. See attached map.

3) TYPE OF WORK (Check): New Well, Deepening, Reconditioning, Plugging. 4) PROPOSED USE (Check): Domestic, Industrial, Public Supply, Irrigation, Test Well, Other. 5) DRILLING METHOD (Check): Mud Rotary, Air Hammer, Drawn, L rod, Air Rotary, Cable Tool, Jetted, Other.

6) WELL LOG: DIAMETER OF HOLE (Dia. (in.), From (ft.), To (ft.)), Surface, 6 3/4, 115. Date drilled 7-24-84. 7) BOREHOLE COMPLETION: Open Hole, Straight Wall, Underreamed, Gravel Packed, Other. If Gravel Packed give interval ... from ... ft. to ... ft.

Table with 4 columns: From (ft.), To (ft.), Description and color of formation material, Dia. (in.), New or Used, Steel, Plastic, etc., Perf., Slotted, etc., Screen Mfg., if commercial, Setting (ft.), Casing Screens. Rows include Sand, Shale, PVC Casing, PVC Screen.

CEMENTING DATA: Cemented from 15 ft. to surface ft. Method used, Cemented by Martin Water Wells (Company or Individual)

9) WATER LEVEL: Static level 21 ft. below land surface Date 7-24-84. Artesian flow gpm. Date

10) PACKERS: Type Rubber, Depth 80'

11) TYPE PUMP: Turbine, Jet, Submersible, Cylinder, Other. Depth to pump bowls, cylinder, jet, etc., 60' ft.

13) WATER QUALITY: Did you knowingly penetrate any strata which contained undesirable water? Yes No. If yes, submit "REPORT OF UNDESIRABLE WATER". Type of water? Depth of strata? Was a chemical analysis made? Yes No

12) WELL TESTS: Type Test, Pump, Bailor, Jetted, Estimated. Yield: gpm with ft. drawdown after hrs.

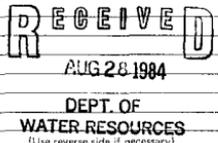
I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

COMPANY NAME Martin Water Wells Water Well Driller's License No. 1669

ADDRESS Hwy 77 North Robstown Texas 71380

(Signed) [Signature] (Licensed Water Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information if available. For TDWR use only Well No. 82-10-27M Located on map 101 DIF



4635506035



State of Texas  
WATER WELL REPORT

Texas Water Well Drillers Board  
P. O. Box 13087  
Austin, Texas 71711

ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side

Water Resources  
0711

OWNER ZUMWINE R DANL Address 2905 ISLANDER CORPUS CHRISTI TX 78418  
(Name) (Street or RFD) (City) (State) (Zip)  
2) LOCATION OF WELL  
County WHEELER miles in SE direction from CORPUS CHRISTI  
(Town) (In E., S.W., etc.)

Driller must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Section Texas County General Highway Map and attach the map to this form.

Legal description:  
Section No. \_\_\_\_\_ Block No. \_\_\_\_\_ Township FLOWER BLUFF

Abstract No. \_\_\_\_\_ Survey Name \_\_\_\_\_  
Distance and direction from two intersecting section or survey lines \_\_\_\_\_

See attached map.

3) TYPE OF WORK (Check):  
 New Well  Deepening  Reconditioning  Plugging  
4) PROPOSED USE (Check):  
 Domestic  Industrial  Public Supply  Irrigation  Test Well  Other  
5) DRILLING METHOD (Check):  
 Mud Rotary  Air Hammer  Driven  Bored  
 Air Rotary  Cable Tool  Jetted  Other

6) WELL LOG:  
Date drilled 3-1-85  
DIAMETER OF HOLE  
Dia. (in.) From (ft.) To (ft.)  
Surface 0 85

7) BOREHOLE COMPLETION:  
 Open Hole  Straight Wall  Unreamed  
 Gravel Packed  Other  
If Gravel Packed give interval ... from 70 ft. to 80 ft.

From (ft.) To (ft.) Description and color of formation material  
0-14' FINE SAND Almond  
14-19 CLAY SAND "  
19-25 SAND "  
25-30 SAND/SHALE "  
30-40 SHALE/CLAY "  
40-52 SAND/CLAY "  
52-55 HAMILTON LIGHT TAN sandstone!  
55-62 GRAVEL SAND "  
62-68 SAND "  
68-75 CLAY (BLUE)  
75-85 GRAVEL SAND Almond

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:  
Dia. (in.) New or Used Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial Setting (ft.) Gauge Casing Screen  
From To  
4" new PASTIC SLotted 75-85 0.25

9) CEMENTING DATA [Rule 319.44(b)]  
Cemented from 0 ft. to 70 ft.  
Method used \_\_\_\_\_  
Cemented by \_\_\_\_\_

10) SURFACE COMPLETION  
 Specified Surface Slab Installed [Rule 319.44(c)]  
 Pitsess Adapter Used [Rule 319.44(d)]  
 Approved Alternative Procedure Used [Rule 319.71]

11) WATER LEVEL:  
Static level 12 ft. below land surface Date: 3-1-85  
Artesian flow \_\_\_\_\_ gm. Date: \_\_\_\_\_

RECEIVED  
MAR 19 1985

12) PACKERS: NONE Type \_\_\_\_\_ Depth \_\_\_\_\_

13) WATER QUALITY:  
Did you knowingly penetrate any strata which contained undesirable water?  Yes  No  
If yes, submit "REPORT OF UNDESIRABLE WATER"  
Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
Was a chemical analysis made?  Yes  No

13) TYPE PUMP:  
 Turbine  Jet  Submersible  Cylinder  
 Other \_\_\_\_\_  
Depth to pump bowis, cylinder, jet, etc., 65 ft.

14) WELL TESTS:  
Type Test:  Pump  Bailor  Jetted  Estimated  
Yield: 20 gm with 55 ft. drawdown at 97 hrs.

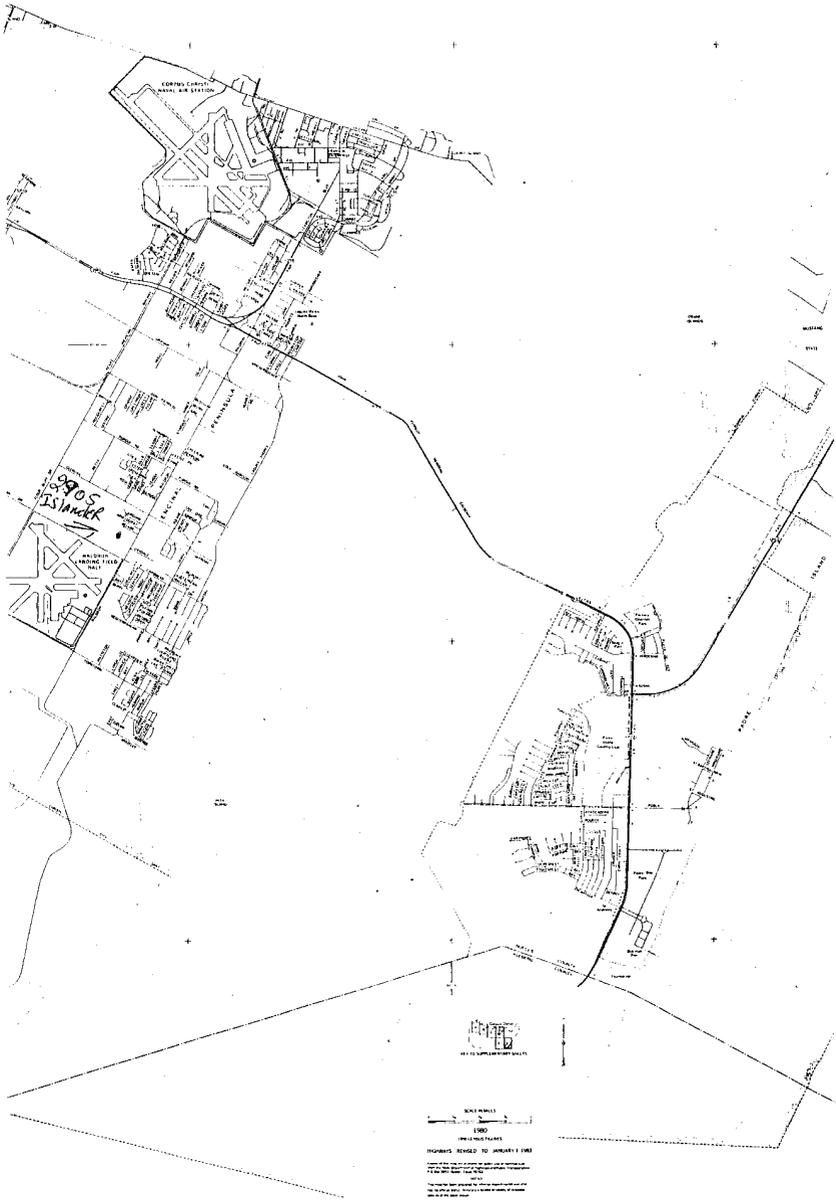
I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 12 will result in the logs being returned for completion and resubmittal.

COMPANY NAME EDWARDS DRILLING Water Well Driller's License No. 2474  
(Type or Print)  
ADDRESS 3017 NEWPORT CORPUS CHRISTI TEXAS 78418  
(Street or RFD) (City) (State) (Zip)  
(Signed) Edward R. Danl (Registered Driller Trainee)  
(Licensed Water Well Driller)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TDWR use only  
Well No. 8222-8A  
Located on map 78661.5

4335500640



ATTENTION OWNER: Confidentiality  
Privilege Notice on Reverse Side

State of Texas  
WELL REPORT

Texas Water Well Drillers Board  
P.O. Box 13087  
Austin, Texas 78711

1) OWNER Roy Kubik (Name) ADDRESS 626 Trustockt <sup>Capus</sup> ~~Cherish~~ Dr (Street or RFD) (City) (State) (Zip)  
2) LOCATION OF WELL: County Wheeler miles in w town direction from FLOOR BLUFF (NE, SW, etc.) (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

LEGAL DESCRIPTION:

Section No. \_\_\_\_\_ Block No. \_\_\_\_\_ Township \_\_\_\_\_ Abstract No. \_\_\_\_\_ Survey Name \_\_\_\_\_

Distance and direction from two intersecting section or survey lines \_\_\_\_\_

SEE ATTACHED MAP # 7-17 on 83-03-8

3) TYPE OF WORK (Check):

New Well  Deepening  
 Reconditioning  Plugging

4) PROPOSED USE (Check):

Domestic  Industrial  Monitor  Public Supply  
 Irrigation  Test Well  Injection  De-Watering

5) DRILLING METHOD (Check):

Mud Rotary  Air Hammer  Jetted  Bored  
 Air Rotary  Cable Tool  Other \_\_\_\_\_

6) WELL LOG:

DIAMETER OF HOLE

Date Drilling:	Dia. (in.)	From (ft.)	To (ft.)
Started <u>7/20</u> 19 <u>89</u>	<u>6 3/4</u>	Surface	<u>163</u>
Completed <u>7/21</u> 19 <u>89</u>			

7) BOREHOLE COMPLETION:

Open Hole  Straight Wall  Underreamed  
 Gravel Packed  Other \_\_\_\_\_  
If Gravel Packed give interval . . . from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

From (ft.) To (ft.) Description and color of formation material

<u>0</u>	<u>8</u>	<u>sand</u>
<u>8</u>	<u>56</u>	<u>shale</u>
<u>56</u>	<u>83</u>	<u>shale</u>
<u>83</u>	<u>138</u>	<u>shale</u>
<u>138</u>	<u>143</u>	<u>sand</u>
<u>143</u>	<u>159</u>	<u>shale</u>
<u>158</u>	<u>163</u>	<u>shale</u>

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)		Gage Casing Screen
			From	To	
<u>4</u>	<u>N</u>	<u>Plastic sch 40</u>	<u>0</u>	<u>158</u>	
<u>4</u>	<u>N</u>	<u>Plastic slotted</u>	<u>158</u>	<u>163</u>	<u>0/10</u>

9) CEMENTING DATA [Rule 287.44(1)]

Cemented from 0 ft. to 162 ft. No. of Sacks Used 3  
\_\_\_\_\_ ft. to \_\_\_\_\_ ft. No. of Sacks Used \_\_\_\_\_

Method used \_\_\_\_\_  
Cemented by \_\_\_\_\_

13) TYPE PUMP:

Turbine  Jet  Submersible  Cylinder  
 Other \_\_\_\_\_

Depth to pump bowls, cylinder, jet, etc., \_\_\_\_\_ ft.

14) WELL TESTS:

Type Test:  Pump  Bailor  Jetted  Estimated  
Yield: 45 gpm with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

15) WATER QUALITY:

Did the drilling penetrate any strata which contained undesirable constituents?  
 Yes  No If yes, submit "REPORT OF UNDESIRABLE WATER"  
Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
Was a chemical analysis made?  Yes  No

10) SURFACE COMPLETION

Specified Surface Slat Installed [Rule 287.44(2)(A)]  
 Pitless Adapter Used [Rule 287.44(3)(B)]  
 Approved Alternative Procedure Used [Rule 287.71]

11) WATER LEVEL:

Static level 17 ft. below land surface Date 7/21/89  
Artesian flow \_\_\_\_\_ gpm. Date \_\_\_\_\_

12) PACKERS:

Type \_\_\_\_\_ Depth 158  
shirt tail

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME Welty Water Wells (Type or printing)

WELL DRILLER'S LICENSE NO. 543

ADDRESS 318 Missing (Street or RFD)

Robstown (City)

TX (State)

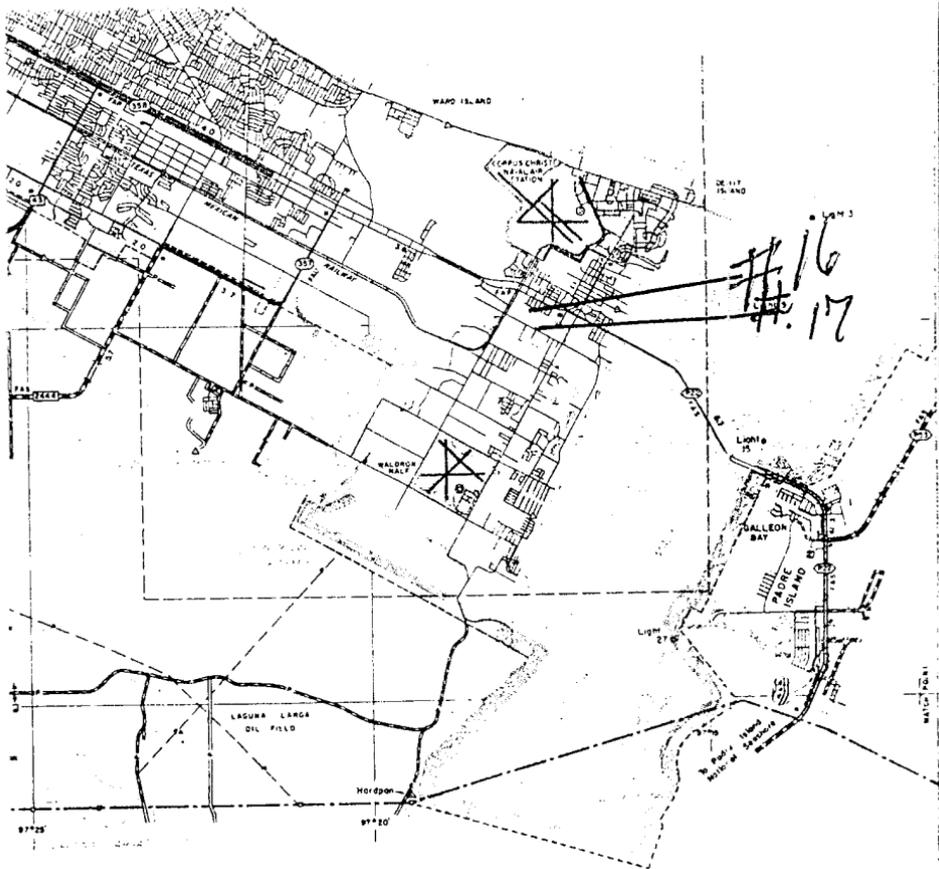
78380 (Zip)

(Signed) Bruce H. Welty (Licensed Well Driller)

(Signed) \_\_\_\_\_ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. 83-22-8 Located on map \_\_\_\_\_



T Y



KEY TO SUPPLEMENTARY SHEETS



KEY TO BASE SHEETS

Sheet 2 of 2 Base Sheets and 4 Supplementary Sheets



# Water Well Report <sup>TM</sup>

## DISCLAIMER

### Water Well Report Research Mapping <sup>TM</sup>

The Banks Information Solutions, Inc. Water Well Report is prepared from existing state water well databases <sup>TM</sup> and additional file data/records research conducted at Texas' regulatory authorities. Submission of driller's log records upon completion of a drilled water well became mandatory in 1985. The state of Texas has processed these records into several different filing systems within two state regulatory authorities. The water well files, records and map locations are maintained by the Texas Commission on Environmental Quality (TCEQ) and the Texas Water Development Board (TWDB). Actual water well site locations of this report are geocoded and geoplotted directly from the drilling records, drilling schedules, and driller's logs and maps submitted by the water well driller and maintained at these two primary water well regulatory authorities. Below is a description of the four filing systems utilized for well drilling records.

#### Texas Water Development Board (TWDB)

Texas Water Development Board maintains a file system of located water well locations. These well files are water well site locations that have been verified with a field inventory inspection by TWDB personnel. The wells are assigned a State Identification Number unique to that well and plotted on county base maps, U.S.G.S. 7.5 minute topographical quadrangle maps, and in-house geographic information system. Records will also include analytical data attached with each drilling record. This is the current protocol for maintaining water well records within the TWDB.

#### Texas Commission on Environmental Quality

The Texas Commission on Environmental Quality maintains a file system of plotted, partially numbered, and un-numbered water well locations. Plotted water well files are water well site locations that have been determined from map information submitted on water well logs and subsequently plotted on TWDB county highway base maps. This type of mapping and filing procedure ceased in June 1986. Partially numbered water well files are water well site locations processed from 1986 through 1990. These wells are provided a State Identification Number which establishes the well location somewhere within a 2.5 minute quadrant of a 7.5 minute quadrangle map, but the site location has never been precisely mapped or verified by a State of Texas staff member. Un-numbered water well files are water well site locations that have been processed since June 1990. These well records are filed solely on their county location and are not provided a State Identification Number nor are they mapped. This is the current protocol for maintaining water well records within the TCEQ.

#### Disclaimer

Banks Information Solutions, Inc. has performed a thorough and diligent search of all wells recorded with the Texas Water Development Board and the Texas Commission on Environmental Quality. All mapped locations are based on information obtained from the TWDB and the TCEQ. Although Banks performs quality assurance and quality control on all research projects, we recognize that any inaccuracies of the records and mapped well locations could possibly be traced to the appropriate regulatory authority or the water well driller. Many water well schedules may have never been submitted to the regulatory authority by the water well driller and, thus, may explain the possible unaccountability of private drilled wells. It is uncertain if the above listing provides 100% of the existing well locations within the area of review. Therefore, Banks Information Solutions, Inc. cannot guarantee the accuracy of the data or well location(s) of those maps and records maintained by Texas' regulatory authorities.

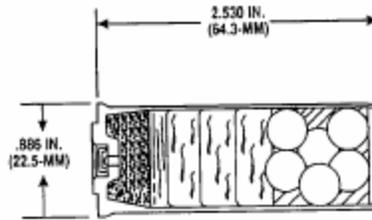
700 N Lamar, Suite 200 Austin, Texas 78703  
PH 512.478.0059 FAX 512.478.1433 E-mail [banks@banksinfo.com](mailto:banks@banksinfo.com)

## Appendix D: Ordnance Technical Data Sheets

# Ordnance Technical Data Sheet

## **12 Gage Shotgun, NO 00**

CARTRIDGE, 12 GAGE, SHOTGUN, NO. 00, M162



<b>Nomenclature:</b>	12 Gage Shotgun, NO 00
<b>Ordnance Family:</b>	Small Arms
<b>DODIC:</b>	A011
<b>Filler:</b>	Smokeless Powder
<b>Filler weight:</b>	+ Various
<b>Item weight:</b>	0.736 gr
<b>Diameter:</b>	.886 in
<b>Length:</b>	2.53 in. (64.3 mm)

**Usage:** Military issue shotgun, 2-3/4 inch chamber. The cartridge is intended for guard and combat use.

**Description:** The cartridge case is all plastic, and is loaded with smokeless powder and No. 00 commercial shot.

**Reference:** TM 43-0001-27

# SMALL-ARMS AMMUNITION

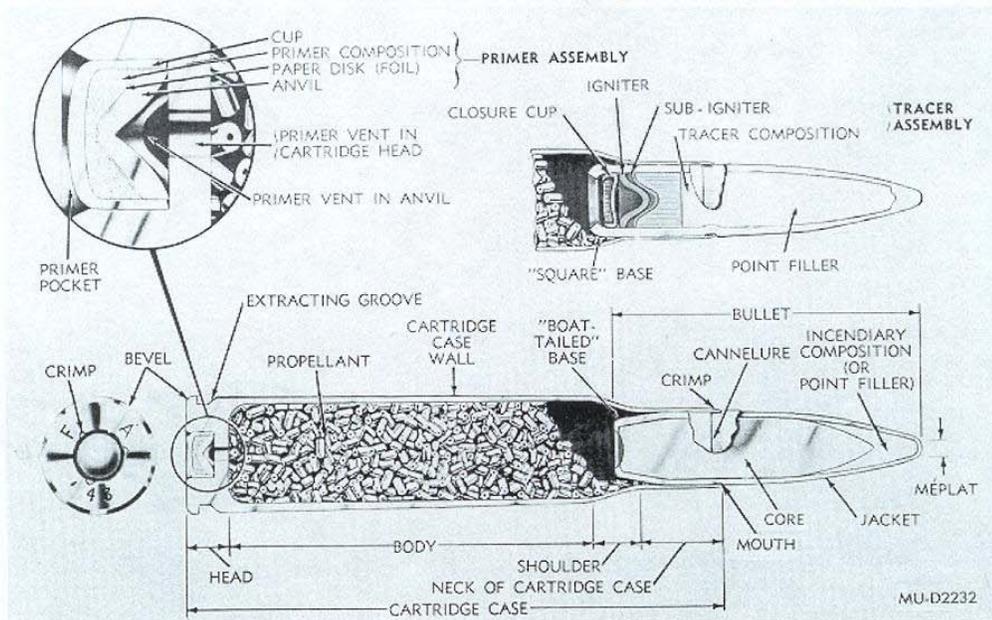


Figure 1. Typical cartridge (sectional)

**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.

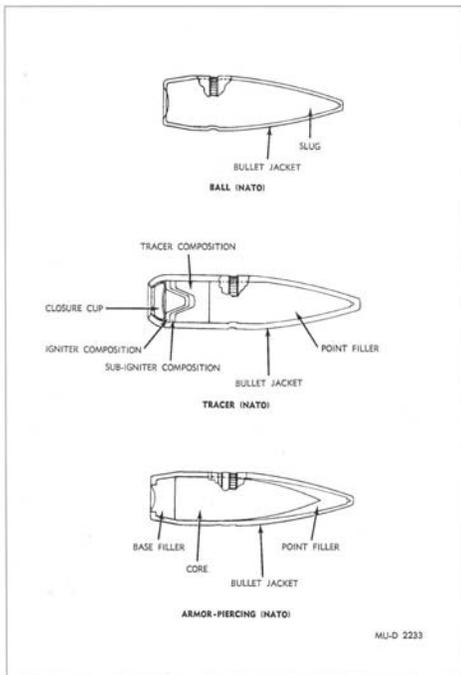


Figure 2. 7.62 mm bullets (sectional)

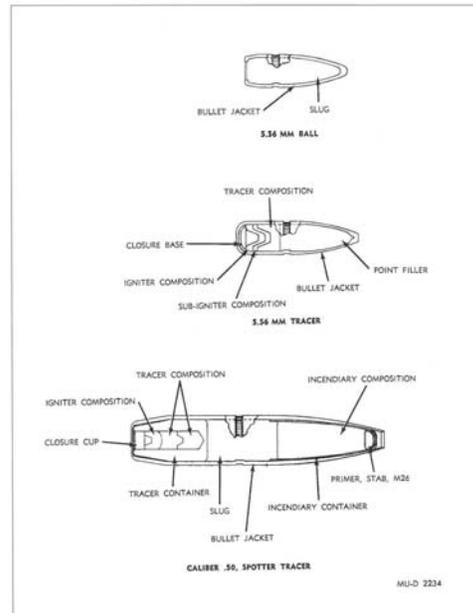


Figure 3. 5.56mm and caliber .50 spotter tracer bullets (sectioned)

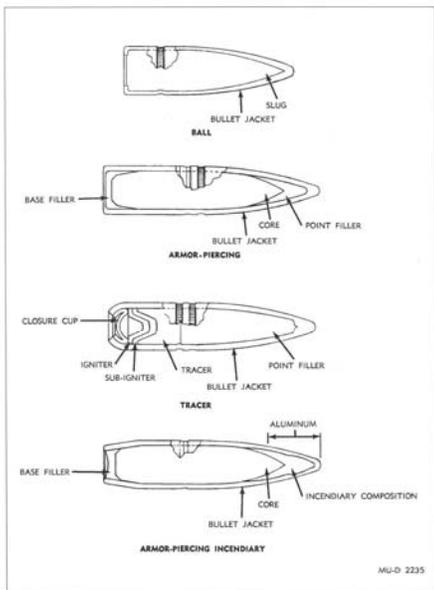


Figure 4. Caliber .30 bullets (sectional)

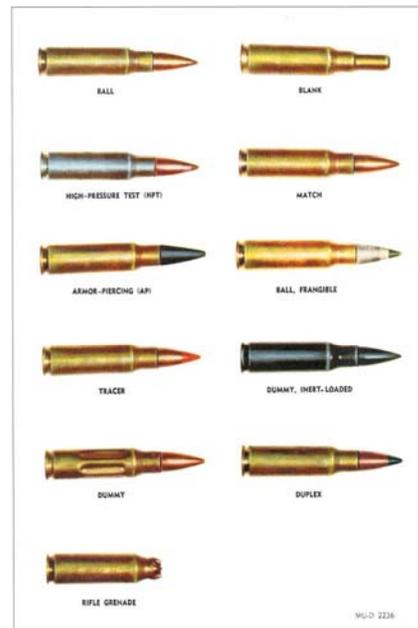


Figure 5. 7.62mm cartridges

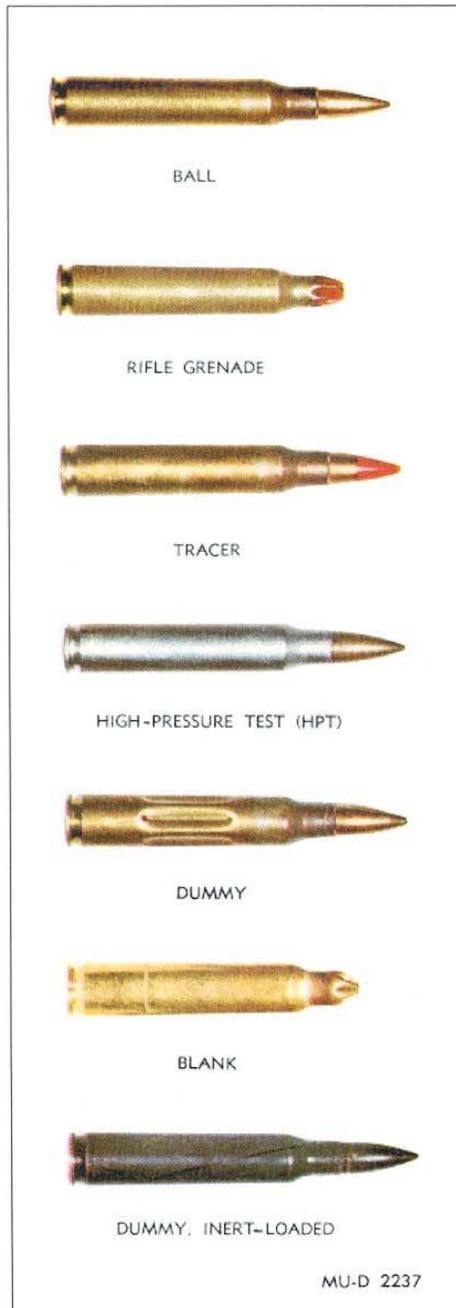


Figure 6. 5.56mm cartridges

*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.

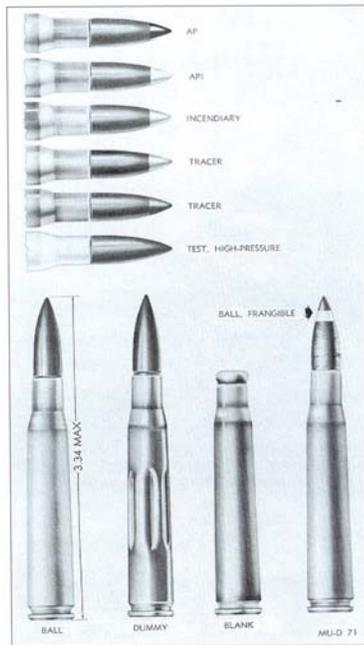


Figure 7. Caliber .30 cartridges

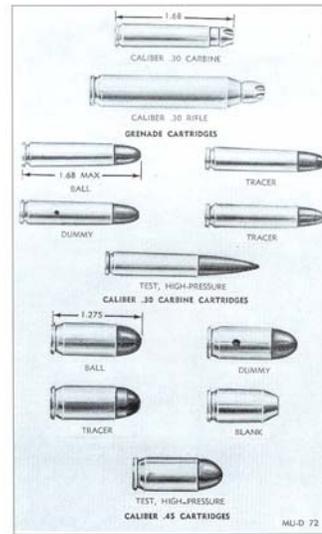


Figure 8. Caliber .30 carbine and caliber .45 cartridges

**Bullet.** With few exceptions, bullets through caliber .50 are assemblies of a jacket and a lead or steel core. They may contain other components or chemicals which provide the terminal ballistic characteristics of the bullet type. The bullet jacket may be either gliding metal, gliding-metal clad steel, or copper plated steel. Caliber .30 and 7.62mm frangible bullets are molded of powdered lead and a friable plastic which pulverizes into dust upon impact with the target. The pellets used in the shotgun shells are spheres of lead alloys varying from 0.08 inch to 0.33 inch in diameter.



Figure 9. Caliber .50 cartridges

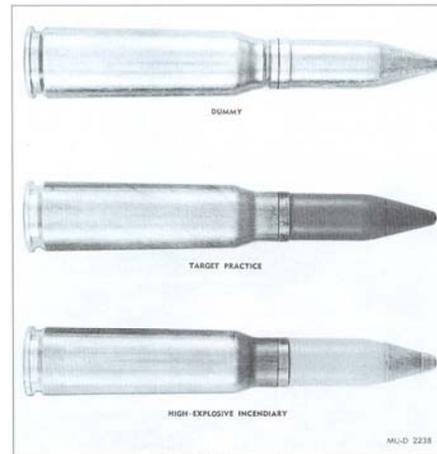


Figure 10. 20mm cartridges

**Ball Cartridge.** The ball cartridge is intended for use in rifles, carbines, pistols, revolvers and/or machineguns against personnel and unarmored targets. The bullet, as designed for general purpose combat and training requirements, normally consists of a metal jacket and a lead slug. Caliber .50 ball bullet and 7.62-mm, Ball M59 bullet contain soft steel cores.

**Tracer Cartridge.** By means of a trail of flame and smoke, the tracer cartridge is intended to permit visible observation of the bullet's in-flight path or trajectory and the point of impact. It is used primarily to observe the line of fire. It may also be used to pinpoint enemy targets to ignite flammable materials and for signaling purposes. The tracer element consists of a compressed, flammable, pyrotechnic composition in the base of the bullet. This composition is ignited by the propellant when the cartridge is fired. In flight, the bullet emits a bright flame which is visible to the gunner. Trace burnout occurs at a range between 400 and 1,600 yards, depending upon the caliber of ammunition.

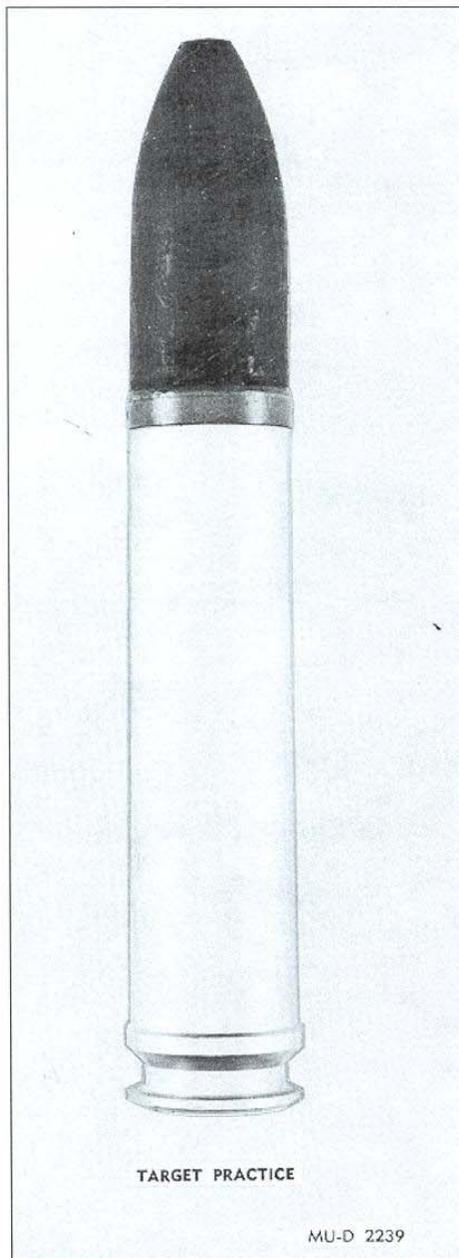


Figure 11. Typical 30mm projectile

*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.