



**US Army Corps
of Engineers**®

Huntsville, US Army Engineering
and Support Center

**Defense Environmental Restoration Program
For
Formerly Used Defense Sites**

**PRELIMINARY
ASSESSMENT**

FORT PICKENS

**Pensacola, Escambia County, Florida
Project Number – I04FL006301**

**FINAL – 26 September 2007
Volume 1 of 4**

Prepared by
US Army Corps of Engineers
ST. LOUIS DISTRICT



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REPLY TO
ATTENTION OF

CEHNC-OE-CX (200-1c)

26 September 2007

MEMORANDUM FOR US Army Engineer District, St. Louis
(CEMVS-PM-M/Mike Dace), 1222 Spruce Street, St. Louis, MO 63103-2833

SUBJECT: Result of the Technical Advisory Group (TAG) Review of Archives Search Reports (ASR) and Fact Sheets for Defense Environmental Restoration Program Formerly Used Defense Sites (DERP-FUDS)

1. The following enclosed ASRs and Fact Sheets are finalized.

<u>Project Number</u>	<u>Site Name</u>
J09AZ072901	Williams Field Bomb Target Range #9
I04FL006300	Fort Pickens Military Reservation
I04FL008400	Page Field Military Reservation
I04FL016501	Buckingham Army Airfield
I04FL038600	Naval Air Station Melbourne
I04FL101001	Naval Ground-to-Air Gunnery Range-Sunny Isles
I04FL111701	Cross City Target Gunnery Range
I04FL118101	Merritt Island Strafing Range
F10ID014101	Bruneau Precision Bombing Range No. 2
G05IN001900	Kingsbury Ordnance Plant
B07KS022702	Independence Army Air Field
G04TN017301	Dyersburg Army Airfield
K06TX122301	Bombing Target B-4
K06TX122400	Bombing Target B-5
K06TX122501	Bombing Target B-6
K06TX122601	Bombing Target B-7
K06TX122700	Bombing Target B-8
K06TX122801	Bombing Target B-9
K06TX122901	Bombing Target B-10
K06TX123001	Bombing Target B-11
K06TX123201	Bombing Target B-13
K06TX123301	Bombing Target B-14

2. Recommended strategy for future actions to be taken by the Project Manager is included in the enclosed fact sheets. Supporting data for TAG decisions are also included with the fact sheets.

3. Fact sheets, supporting data and corrected pages, due to prior reviews, are to be distributed with the subject ASRs.

CEHNC-OE-CX (200-1c)

SUBJECT: Result of the Technical Advisory Group (TAG) Review of Archives Search Reports (ASR) and Fact Sheets for Defense Environmental Restoration Program Formerly Used Defense Sites (DERP-FUDS)

4. Subject ASRs are recommended to be final when enclosed fact sheets, supporting data and corrected pages are included as a part of the project package.

5. The POC is Mr. Danny Mardis, commercial 256-895-1797, DSN 760-1767, and fax 256-895-1798.

FOR THE DIRECTOR:



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CERCLA PRELIMINARY ASSESSMENT (PA)

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EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers administers the Defense Environmental Restoration Program (DERP) Formerly Used Defense Site (FUDS) program. The St. Louis District Corps of Engineers prepared this Preliminary Assessment (PA) for the **Fort Pickens Military Reservation FUDS Property No. I04FL0063** in support of DERP-FUDS. St. Louis District completed this effort in coordination with the Jacksonville District and the U.S. Army Engineering and Support Center, Huntsville (USAESCH), the Center of Expertise (CX) and Design Center for Military Munitions (MM).

This PA compiles information obtained through historical research at various archives and records holding facilities. The investigation was primarily a textual, cartographic and photographic research and analysis effort. It also makes use of property visits and interviews to gather information concerning the FUDS property. The research directed efforts towards determining presence of hazardous substance as a result of previous use, storage, and/or disposal. The research places emphasis on establishing the types, quantities and areas of hazardous, toxic and radioactive waste (HTRW), munitions and explosives of concern (MEC), and chemical warfare materiel (CWM) activities. This process obtains information for use in developing recommendations for further action at the former Fort Pickens Military Reservation.

The subject of this PA is the Fort Pickens Military Reservation that, at one time, encompassed all of Santa Rosa Island. Due to time and budget constraints, this report does not address in detail those land tracts on Santa Rosa Island not utilized for the Fort Pickens Military Reservation. This report identifies the Fort Pickens Military Reservation FUDS property as the 1,638 acres of land on the west end of Santa Rosa Island, which contains Fort Pickens and the rifle range that was transferred from the Department of the Army to the Department of the Navy in 1948. This report differentiates between Fort Pickens, the original pentagonal brick fort constructed in the 1800's, and the Fort Pickens Military Reservation, which contains Fort Pickens as well as other structures and facilities (gun emplacements, control stations, searchlights, etc.) constructed by the military over the active life of the Reservation. On 4 October 1834, Fort Pickens was ready to be garrisoned. The FUDS property was declared surplus on 22 June 1948.

The Fort Pickens Military Reservation served as a coastal defense site from the construction of the initial Fort, through construction of the various concrete gun emplacements, until its declaration of surplus. During the Civil War, a number of outlying batteries were hastily erected in April 1861 and subsequent months to assist in the defense of Fort Pickens. There were nine concrete batteries on Santa Rosa Island: Batteries Cullum and Sevier, Battery Pensacola, Battery Worth, Battery Van Swearingen, Battery Payne, Battery Trueman, Battery Cooper, Battery Langdon, and Battery No. 234. Other batteries included anti-aircraft batteries, an Anti-Motor Torpedo Boat (AMTB) Battery, and Battery GPF. In addition to the Fort and gun emplacements, several fire control and searchlight towers were constructed over the active life of the Reservation. These towers were either constructed of wood or steel on concrete foundations. A Rifle Range was requisitioned in 1918.

Direct contact and/or ingestion of surface MC by humans and animals is possible due to the presence of deteriorating gun emplacements, spent .30 caliber cartridge cases on the rifle range,

remains of the rifle range target frames, spent projectiles in rifle range sand dunes, and the grounds around the existing and razed magazines. With the exception of Battery Cullum/Sevier, access to potential constituent sources by park visitors is not prohibited.

A possible cannon ball cache was reported to be in the marsh area west of the assistant engineer's quarters, ES71. The precise location was not reported. The existence of the cache has not been verified. The potential exists for discarded military munitions to be present in this location. If so, their deterioration would release MC into the environment.

Coastal artillery projectiles may still be present in the surrounding surface waters and continuing to degrade. Detectable levels of are not expected in the surface water, however, due to the dynamic nature of the surface water (tides, wind-driven currents, etc.). The degree to which any MC released from the projectiles are retained in sediment and/or bioconcentrating in the aquatic environment, if at all, is unknown. The fact that both commercial and recreational fishing occur within Fort Pickens State Park Aquatic Preserve and Gulf Islands National Seashore and that both have been designated an Outstanding Florida Water is cause for concern.

While coal storage areas and vehicle, gun emplacement, locomotive, and ordnance maintenance activities conducted on the former Fort Pickens Military Reservation may have released COPCs to soil and/or the Sand and Gravel Aquifer, such releases have not been confirmed and the magnitude of any potential releases is unknown. Although the release of HTRW COPCs to soil and/or shallow groundwater by former Fort Pickens Military Reservation operations is possible, the high permeability and apparently low organic content of the property soils and the dynamic nature of the barrier island minimizes the potential for detectable concentrations of these COPCs to remain in soil. The fact that the Fort Pickens Military Reservation is a national park with virtually unrestricted access, however, is a cause for concern.

The Sand and Gravel Aquifer is prone to contamination from overlying activities on the land surface. It is assumed the two wells currently on the FUDS property are tapped into the lowermost zone of the Sand and Gravel Aquifer and are protected by a low-permeability zone. It is unknown of any of the wells previously installed on the Reservation were properly abandoned. If not, they could act as a conduit between the uppermost and lowermost zones of the Sand and Gravel Aquifer, allowing migration of any constituents released into the uppermost zone to migrate into the lowermost zone and potentially into the water supply system for the park. Environmental sampling would be necessary to determine if residual COPCs are present in FUDS property soils and/or the Sand and Gravel Aquifer.

It is unknown if any USTs associated with Reservation activities remain. Environmental sampling would be necessary to determine if the USTs remain and whether residual COPCs are present in FUDS property soils and/or the Sand and Gravel Aquifer. It appears that there are no BD/DR projects on the FUDS property in accordance with ER 200-3-1.

ACKNOWLEDGEMENTS

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1.0 INTRODUCTION

1.1 Authority

Under the authority of the Defense Environmental Restoration Program (DERP) [10 United States Code (USC) §§ 2701 et seq.] and its policies and procedures relating to Formerly Used Defense Sites (DERP-FUDS), including DoD Management Guidance for the DERP dated September 28, 2001, and Engineering Regulation 200-3-1, Environmental Quality, Formerly Used Defense Sites (FUDS) Program Policy, the U.S. Army Corps of Engineers (USACE) St. Louis District conducted a Preliminary Assessment for the Fort Pickens FUDS property near Pensacola, Florida. Completion of this investigation on the former Fort Pickens supports several Federal laws and rules, Department of Defense (DoD) Directives and Standards, and Army Regulations as outlined in the subsequent sub-paragraphs.

1.1.1 Laws

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly known as Superfund, to respond to threats posed by uncontrolled releases of hazardous substances into the environment. This statute, amended in 1986 by the Superfund Amendments & Reauthorization Act (SARA), establishes the process for undertaking remedial actions to mitigate these threats at abandoned sites containing hazardous substances, as well as reporting requirements for releases of hazardous substances. SARA expanded the provisions of CERCLA and added major new authorities. These amendments included the addition of Section 120, Federal Facilities and Section 121, Cleanup Standards. Section 120 requires departments and agencies of the federal government to comply with the provisions of CERCLA as amended by SARA. Section 121 establishes the procedures for the selection of remedial actions and the determination of the degree of remediation.

In 1986, Congress established the DERP at 10 USC §§2701 et seq. This program directs the Secretary of Defense to “carry out a program of environmental restoration at facilities under the jurisdiction of the Secretary.” Executive Order 12580 (EO 12580, January 23, 1987), Superfund Implementation, delegated to DoD the response authority for releases or threatened releases from any facility or vessel under the jurisdiction, custody, or control of DoD, subject to Sections 120 and 121 of SARA. In March 1990, the U.S. Environmental Protection Agency (USEPA) issued a revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Under 40 Code of Federal Regulations (CFR) §300.120, DoD is identified as the removal response authority for incidents involving DoD military weapons and munitions or weapons and munitions under the jurisdiction, custody or control of DoD.

1.1.2 Military Munitions Response Program

The Senate Committee on Armed Services of the 106th Congress, 1st Session wrote Senate Report 106-50, which directed the DoD to determine the unexploded ordnance (UXO) liability costs at all military ranges and provide a report to Congress. As a result, the Army issued a data call to inventory all military ranges, generally referred to as the Advanced Range Survey (ARS).

The DoD submitted the initial report reflecting the results of the ARS on 21 May 2001, to Congress.

In September 2001, the DoD established the Military Munitions Response Program (MMRP) within the DERP in recognition of the requirements and the complexity posed at MMRP sites. In addition to defining the requirements for responses at its MMRP sites, the DoD established a requirement to identify, through an inventory, all locations other than operational ranges requiring a military munitions response. This investigation supports this program and the information gathered will confirm and/or append the earlier inventory.

1.1.3 2004 Draft DoD Directive Military Munitions Policy at Other than Operational Ranges (4715.MRP)

As of the writing of this report, the DoD is drafting a policy directive in lieu of the withdrawn DoD proposed range rule. The phrase “Other than Operational Ranges” replaces the previous definitions for Closed, Transferring, or Transferred ranges. The planned policy will direct the Service Components to conduct munitions responses in accordance with CERCLA and the NCP.

1.1.4 CERCLA Preliminary Assessment

Since the beginning of DERP, the U.S. Army Corps of Engineers acts as the agency responsible for environmental restoration at FUDS. Beginning in 1990, the U.S. Army Engineering and Support Center, Huntsville (USAESCH) serves as the Center of Expertise (CX) and Design Center for Munitions and Explosives of Concern (MEC). In cooperation with the USAESCH, the USACE-St. Louis District began preparing Archive Search Reports (ASRs) in 1992 in support of environmental restoration at active DoD installations, FUDS, and installation transitions under Base Realignment and Closure (BRAC) recommendations.

Engineering Regulation 200-3-1, Environmental Quality, Formerly Used Defense Sites (FUDS) Program Policy dated 10 May 2004 (ER 200-3-1), established CERCLA as DoD's preferred framework for environmental restoration. Pursuant to ER 200-3-1, the ASR format was adjusted and expanded to clearly meet the requirements of the CERCLA process as outlined in the NCP. As such, the ASR has become a CERCLA PA and includes a pathway and environmental hazard assessment.

1.2 Subject

The subject of this PA is the Fort Pickens Military Reservation that, at one time, encompassed all of Santa Rosa Island.^{1, 2, 3, 4, 5, 6, 7} Due to time and budget constraints, this report does not address

¹ CP-031407-028

² CP-031407-020

³ CP-031507-013

⁴ WNRC-031607-307

⁵ DC-032107-316

⁶ DC-032107-313

⁷ DC-032107-311

in detail those land tracts on Santa Rosa Island not utilized for the Fort Pickens Military Reservation. These land tracts were utilized by the Navy (Camp Saufley, 160 acres), Treasury Department (112 acres), Coast Guard (17 acres), and Escambia County (8,039 acres). Thus, this report identifies the Fort Pickens Military Reservation FUDS property as the 1,638 acres of land on the west end of Santa Rosa Island, which contains Fort Pickens and the rifle range (66.4 acres) that was transferred from the Department of the Army to the Department of the Navy in 1948.^{8, 9, 10, 11, 12, 13, 14} This report differentiates between Fort Pickens, the original pentagonal brick fort constructed in the 1800's, and the Fort Pickens Military Reservation, which contains Fort Pickens as well as other structures and facilities (gun emplacements, control stations, searchlights, etc.) constructed by the military over the active life of the Reservation.¹⁵ On 4 October 1834, Fort Pickens was ready to be garrisoned.¹⁶ The FUDS property was declared surplus on 22 June 1948.^{17, 18, 19, 20, 21, 22, 23}

1.3 Purpose

Compiled in this CERCLA PA is information obtained through historical research at various archives and records holding facilities, interviews with individuals associated with the FUDS property and its operations, and a visual property inspection. This PA is primarily a textual, cartographic and photographic research and analysis effort. No sampling or quantitative field assessment techniques were conducted to gather data. Research efforts were directed toward determining the presence of hazardous substance as a result of previous DoD use, storage, and/or disposal. Emphasis was placed on establishing the types, quantities and areas of hazardous, toxic and radioactive waste (HTRW), MEC, chemical warfare materiel (CWM) activities. Information obtained during the archives search process was used to evaluate the potential risk of MEC and/or CWM presence with the use of the Munitions Response Site Prioritization Protocol (MRSP). This information was also used to perform a pathway and environmental hazard assessment in order to identify potential migration pathways, potential environmental hazards, and potential hazards that may warrant further FUDS projects at the Fort Pickens Military Reservation.

⁸ CP-031607-302

⁹ CP-031507-005

¹⁰ ATL-030707-089

¹¹ ATL-030707-090

¹² ATL-030707-088

¹³ ATL-030707-089

¹⁴ ATL-030707-095

¹⁵ Bearss, Edwin C. 1983. Historic Structure Report, Fort Pickens, Historical Data Section 1821-1895, Gulf Islands National Seashore. U.S. Department of the Interior, Historic Preservation Division, Denver Service Center, National Park Service. p. 171.

¹⁶ Bearss, Edwin C. 1983. pp. 175, 177, 185.

¹⁷ CP-112003-011

¹⁸ CP-031507-005

¹⁹ ATL-030707-089

²⁰ ATL-030707-090

²¹ ATL-030707-088

²² ATL-030707-089

²³ ATL-030707-095

1.4 Scope

This PA presents and discusses the findings of historical research and other tasks directed toward identifying the potential for HTRW, MEC, and/or CWM constituents remaining on the Fort Pickens Military Reservation FUDS property. The DERP-FUDS Project Number is I04FL006300. This PA includes the following:

- A review of previous property investigations
- Description and characteristics of the immediate surrounding area, including real estate information, past and present
- A brief history of the Fort Pickens Military Reservation
- Description of the HTRW, MEC and/or CWM activities identified with the FUDS property
- A map and aerial photography analysis of the FUDS property
- Findings of the visual property inspection
- General technical data on MEC and/or CWM items associated with the Fort Pickens Military Reservation
- A pathway and environmental hazard assessment of MEC, HTRW, and RCWM constituents
- Conclusions regarding MMRP, HTRW, containerized HTRW (CON/HTRW), and building demolition/debris removal (BD/DR) projects and recommendations for further action

A description of the sources researched and a detailed listing of records reviewed are presented in Appendix A. A full bibliography of the textual references is contained in Appendix B. Hard copies of the textual references are contained in Appendix G.

This PA was prepared pursuant to ER 200-3-1 using USACE Formerly Used Defense Sites (FUDS) Program Guidance for Performing Preliminary Assessments under FUDS, September 2005 as a guide

2.0 PREVIOUS INVESTIGATIONS

2.1 Corps of Engineers Investigations

Jacksonville District, SAJRE-S, Environmental Restoration Defense Account (ERDA) Jacksonville District Site Visit Report, TO: Commander, Huntsville Division, ATTN: HNDED-PM, 5 September 1984.²⁴

The letter enclosed a property visit report for the Fort Pickens Military Reservation. The purpose of the property visit was to determine the property owners, inspect the property for old structures, and photograph any matters of interest that could qualify for inclusion in the ERDA program. The property visit was conducted during the week of 13-17 August 1984. According to the report, the Fort Pickens Military Reservation consisted of 1,655 acres. Fort Pickens was identified as a part of the Gulf Islands National Seashore, under the management of the National Park Service. The Fort Pickens Military Reservation was determined to be a well kept historical ruin that had been preserved and required no restoration. Based upon the results of the property visit, it was the opinion of the property visit team that the Fort Pickens Military Reservation did not qualify for restoration under the ERDA Program.

The negative report was specifically based upon the potential for debris and/or building removal projects as emphasized in the current "fast-track" phase of the program. The potential for hazardous or toxic waste problems or unexploded ordnance (UXO) problems was not investigated in detail. Nevertheless, no historical evidence of such problems at the Fort Pickens Military Reservation surfaced and it was determined that further investigations did not appear warranted. It was recommended that the Fort Pickens Military Reservation not be considered further for work under the ERDA unless new information became available that would warrant reevaluation.

Site Survey Report for Defense Environmental Restoration Program For Formerly Used Defense Sites, Site No. I04FL006300, Fort Pickens, Pensacola, Florida, Gulf Engineers & Consultants, Inc., Baton Rouge, Louisiana, December 28, 1990.²⁵

Representatives of Gulf Engineers & Consultants, Inc. (GEC) met with Mr. Jeffery Parsons and Mr. Dick Zani, Cultural Resource Specialists, National Park Service (NPS) on 10-11 October 1990 to inspect the Fort Pickens Military Reservation. Batteries Cullum and Sevier were securely fenced and closed to the public. A concrete sump was observed in the engine room (power plant). Water was visible approximately eight feet below the wall. Two underground storage tanks (USTs) were shown on the battery plans, but no filler/vent pipes were observed during the inspection. The old ammunition lift and magazines were present, but no visible ordnance contamination was noted. A small concrete sump (with water) was observed outside of the plotting room. No signs of contamination were noted at the top wall of the battery or in the turrets and lookout towers.

²⁴ PIRS-022807-001

²⁵ PIRS-022807-002

Battery No. 234 was the location of World War II six inch shield guns. Two fuel pits were shown on the battery plans near the six inch gun, but no evidence of either was observed. Nearby, some vegetation stress was noted on the sand dunes. The rangers dismissed this as a probable side effect of drought. Probable vent pipes were observed northeast of the main battery, near a four foot by four foot concrete sump. No liquids were noted. An inspection of the battery interior found it empty. This area was locked securely from the public. The interior of the engine room was empty except for platforms, drainage trenches, vent pipes, etc.

A gasoline UST was indicated on plans for Battery Cooper, but no filler/vent pipes were observed. The open bottom septic tank (latrine) located adjacent to the Battery was still present. One pit was dry and sand filled; the other pit was wet and contained algae and cattails. Open manholes on both pits were thought to constitute a possible hazard. The NPS rangers stated they planned to fill these pits and seal the openings to eliminate any safety hazard to the general public.

The septic tank was still present at Battery Worth and located near the existing parking lot, just north of the Battery. The tank appeared to be sealed shut and no visual evidence of contamination was noted.

At Battery Pensacola, the inspection team investigated an elevated foundation that was the remains of an old storehouse/warehouse. The remains indicated that boilers were located on one side and maintenance activities were located on the other. A narrow gauge railroad track ran down the center of the foundation. Although gasoline pumps were located near the transformer house outside Fort Pickens, no signs of vent/filler pipes were observed. A nearby small, brick lined pit with a concrete cover was present and appeared to be part of the old water system. An interview with a retired maintenance foreman determined that the old sanitary sewer system at Fort Pickens had been abandoned, plugged, and was no longer in use. Battery plans indicated USTs adjacent to the power plant building, but no surface evidence of these tanks was observed.

Plans for Battery Langdon show fuel pits on the north side of the Battery. Two vent pipes and a square concrete manhole were observed on the northeast side of Battery Langdon. A concrete box, filled with sand and without a cover, was observed on northwest side of the Battery. No visual contamination was evident at either the manhole or box. The interior of Battery Langdon was not accessible.

According to the Site Survey Report, the current owner planed to continue utilizing the Fort Pickens Military Reservation as a unit of the Gulf Islands National Seashore. The Fort and coastal defense batteries were entrusted to the NPS for protection and preservation. No debris and/or residues from DoD use were observed during the site survey. Interviews with the current owner, a review of the real estate files, and confirmation through the site survey revealed no information that indicated the presence of DoD generated hazardous and toxic substances or ordnance. In addition, no information was obtained during the site survey to indicate the presence of additional USTs installed by DoD. No hazards caused by DoD activity were identified at the Fort Pickens Military Reservation. The Site Survey Report concluded that there

were no potential DERP projects at the Fort Pickens Military Reservation. It was further determined that no further action was required.

CESAD-PD-R, Memorandum for CDR, USACE, ATTN: CEMP-ZA, WASH DC, SUBJECT: Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS), Inventory Project Reports (INPR), 15 November 1991.²⁶

The memorandum transmitted the "No Further Action" (NOFA) INPR for Fort Pickens (Site No. I04FL006300). The Fort Pickens Military Reservation had been evaluated and determined to be eligible for the DERP-FUDS program, but no unsafe debris, hazardous/toxic waste, containerized hazardous/toxic waste, or ordnance/explosive waste problems resulting from DoD use were found. No Risk Assessment Code (RAC) was included.

CEHNC-OE-DC, Memorandum for Commander, U.S. Army Engineer Division, South Atlantic, ATTN: CESAD-ET-PR, SUBJECT: DERP-FUDS Inventory Project Report (INPR) Proposing No Further Action (NOFA) for Site I04FL0063, Fort Pickens, Escambia County, FL, 10 June 1998.²⁷

It was determined that the potential of any ordnance and explosives (OE) remaining at on the Fort Pickens Military Reservation would be remote. Based upon no OE being found on the FUDS property from 1949 to June 1998, the Center of Expertise and Design Center of Ordnance and Explosives (CEHNC) recommend No Further Action with regard to OE. An updated RAC for the Fort Pickens Military Reservation was 5.

CESAD-MT-M, Memorandum for Commander, Jacksonville District (CESAJ-DP-S/Mr. J. Boone), SUBJECT: Approval of Ordnance and Explosives (OE) Project and Revised Risk Assessment Code (RAC) Based on Reevaluation of Defense Environmental Restoration Program - Formerly Used Defense Sites (DERP-FUDS) Inventory Project Report (INPR) for Project No. I04FL006301, Fort Pickens, FL, 30 July 2003.²⁸

Based on a reevaluation of the INPR, CEHNC revised the RAC score for the Fort Pickens Military Reservation. CEHNC had reevaluated the INPR for accuracy in accordance with current policy. It was determined that coastal gun ammunition was received, stored, and utilized on the Fort Pickens Military Reservation and that some could remain. Based upon this information, HNC recommend more extensive research be accomplished for the Fort Pickens Military Reservation and assigned a RAC score of 2. The South Atlantic Division concurred with the RAC score of 2 and approved an OE project.

²⁶ PIRS-022807-003

²⁷ PIRS-022807-004

²⁸ PIRS-022807-005

2.2 Other Investigations

No additional investigations have been identified to date.

3.0 PROPERTY DESCRIPTION, ACREAGE, AND LAND USE

3.1 Location

The Fort Pickens Military Reservation FUDS property encompassed 1,638 acres on the western end of Santa Rosa Island, Escambia County, Florida. This acreage includes the 66.4 acres containing the rifle range transferred to the Department of the Navy in 1948.^{29, 30, 31, 32, 33, 34} The location of the FUDS property is illustrated in **Plate No. 1** (see **Appendix R**).

3.2 FUDS Eligible Property

Described in this section are those properties that were located on Santa Rosa Island. As stated previously, the Fort Pickens Military Reservation at one time encompassed all of Santa Rosa Island. The property utilized by DoD for the Reservation, however, was only 1,638 acres on the western end of the Island. The remaining island acreage was utilized by the Navy (Camp Saufley, 160 acres), Treasury Department (112 acres), Coast Guard (17 acres), and Escambia County (8,039).

3.2.1 Fort Pickens Military Reservation

On 28 May 1828, the United States purchased approximately 1,181 acres on the western end of Santa Rosa Island from Joseph M. White, attorney of Henry Michelet and territorial delegate for the Territory of Florida, for the Fort Pickens Military Reservation. This property extended “four English miles from the point Lizuenza to a line running on a true north-south line.” This property was reserved for naval purposes by Executive Order dated 21 April 1838. All of Santa Rosa Island was turned over to the Department of the Interior on 29 March 1880 in accordance with the provisions of an Act of Congress of 3 March 1879. The western end of Santa Rosa Island was transferred to the War Department on 21 May 1888.^{35, 36, 37, 38, 39} The land area of the Fort Pickens Military Reservation was extended to include the whole of Santa Rosa Island when the rest of the island was transferred to the War Department by Executive Order dated 2 July 1888. A strip the full width of Santa Rosa Island, extending one-half mile east and one-half mile west from the hospital at the quarantine station on the island was transferred to the Treasury Department by War Department Letter of 27 January 1903. A tracing shows the same strip ceded by deed dated 4 September 1893 by the Governor of Florida.^{40, 41, 42, 43, 44, 45, 46, 47} Under a

²⁹ CP-031507-005

³⁰ ATL-030707-089

³¹ ATL-030707-090

³² ATL-030707-088

³³ ATL-030707-089

³⁴ ATL-030707-095

³⁵ CP-031307-221

³⁶ CP-031407-028

³⁷ DC-032107-318

³⁸ DC-032107-317

³⁹ Bearss, Edwin C. 1983. pp. 30, 65, 66.

⁴⁰ CP-031407-028

⁴¹ CP-031407-020

revocable license dated 3 March 1884, the Treasury Department was also authorized to use a strip of land for a life saving station.⁴⁸

A license was issued to M.C. Snyder on 22 September 1888 to reside on the Fort Pickens Military Reservation. A license was issued to W. A. Watson on 10 March 1897 to erect a set of ways on the Reservation. Aniellio di Lustro was issued a license on 14 February 1898 to erect and maintain a temporary boarding house on the Reservation. A license to build and maintain a public bath establishment and erect a pavilion on the Reservation was issued to H.H. Lewis on 12 January 1904.⁴⁹

Permission to use a tract of land on Santa Rosa Island for naval aviation purposes, and to construct certain buildings, was approved by the Secretary of War to the Secretary of the Navy in a letter dated 5 August 1918. This tract of land was known as Camp Saufley.⁵⁰

A permit was granted to J.W. Brooks on 15 October 1921 to construct a wharf and bathing resort on Santa Rosa Island opposite Camp Walton for a term of five years. The lease expired and there is no record of renewal. In September 1927, it was unknown if Mr. Brooks still occupied the land.⁵¹

Pursuant to Paragraph 2, A.R. 30-1425, jurisdiction of all land east of the old quarantine station on Little Sabine Bay, approximately 8,039 acres, was transferred from the Chief of Engineers to the Quartermaster General effective 1 February 1924. At the time, this portion of the Fort Pickens Military Reservation was still unoccupied. On 6 February 1924, land west of the quarantine station on Little Sabine Bay, approximately 713 acres, was transferred to the Coast Artillery pursuant to Paragraph 34, A.R. 100-20. This portion of the Fort Pickens Military Reservation was occupied at the time by the Coast Artillery. The Chief of Coast Artillery and the Quartermaster General were to locate and suitably mark the division line of their respective areas on the Fort Pickens Military Reservation.^{52, 53}

Under provisions of an Act of Congress approved on 12 March 1926 (Public Number 45, 69th Congress), that portion of the Fort Pickens Military Reservation that lay east of the quarantine station (8,039 acres) was authorized for disposal.^{54, 55} By July 1926, only portions of Santa Rosa Island (specifically parts of Township 2 South Ranges 24, 25, 26, and 27 West) had been

⁴² CP-031507-013

⁴³ WNRC-031607-307

⁴⁴ DC-032107-316

⁴⁵ DC-032107-313

⁴⁶ DC-032107-311

⁴⁷ CP-031607-302

⁴⁸ DC-032107-311

⁴⁹ Ibid.

⁵⁰ CP-031507-007

⁵¹ CP-031407-028

⁵² CP-031307-212

⁵³ CP-031407-028

⁵⁴ CP-031307-219

⁵⁵ CP-031307-220

surveyed. No portion of the island east of Little Sabine Bay had been surveyed.⁵⁶ This portion was later appraised at \$1.25 per acre and was still undeveloped by December 1926.^{57, 58} This portion was withheld from sale until May 1929, in order that Escambia County could exercise its option to purchase the land at the appraised value of \$10,048.75.⁵⁹ The 8,039 acres of land was quitclaimed to Escambia County by deed dated 29 April 1929 under Section 7, Act of 12 March 1926, for \$10,048.75.^{60, 61, 62}

A July 1936 map shows the Fort Pickens Military Reservation encompassing 1,655 acres of land.⁶³ In July 1947, Congress authorized the Secretary of War to donate and convey to Escambia County all right, title, and interest in and to the Fort Pickens Military Reservation, lying in Township 3 South, Ranges 29 and 30 West, Santa Rosa Island, determined by the Secretary of War to be surplus, with the exception of the portion of the Reservation known as Old Fort Pickens.⁶⁴ On 22 June 1948, 1,638 acres owned in fee were declared surplus, of which, 66.4 acres were to be transferred to the Department of the Navy.^{65, 66, 67, 68, 69, 70} The tract comprising 66.4 acres and containing the Fort Pickens Military Reservation rifle range was officially transferred from the Department of the Army to the Department of the Navy on 5 October 1948. The property was needed by the Navy because of the rifle range.⁷¹ The Navy requested that appropriate provision be made in the conveyance instruments to provide for utility service to the Navy.⁷² No documentation was located indicating when the Navy declared the rifle range property surplus.

In April 1949, notice was issued by the War Assets Administration for applications for purchase and removal of approximately 50 miscellaneous buildings of frame and steel construction; 10 steel towers 54 feet to 75 feet high; some electrical distribution facilities; approximately four miles of narrow gauge railroad trackage; trenched and submarine type communications; and electrical cable.⁷³ On 27 April 1949, an Agreement of Sale was entered into between the U.S. Government and the Army and Navy Surplus Stores, Inc. for removal of 27 buildings, 10 steel towers, nine igloos, one fuel tank, all electrical wiring, transmission lines, lateral water lines,

⁵⁶ CP-031307-221

⁵⁷ CP-031407-025

⁵⁸ CP-031407-026

⁵⁹ CP-031307-218

⁶⁰ CP-031307-216

⁶¹ CP-031307-217

⁶² CP-031307-213

⁶³ CP-031607-302

⁶⁴ CP-031507-004

⁶⁵ CP-031507-005

⁶⁶ ATL-030707-089

⁶⁷ ATL-030707-090

⁶⁸ ATL-030707-088

⁶⁹ ATL-030707-089

⁷⁰ ATL-030707-095

⁷¹ CP-031507-005

⁷² ATL-030907-083

⁷³ ATL-030707-099

underground cable, railroad rail, etc. Excluded from the Agreement were facilities located within the “Historical Area”, U.S. Navy area, and U.S. Coast Guard area.^{74, 75, 76, 77, 78}

On 30 April 1949, the State of Florida, acting by and through the Florida Board of Forestry and Parks, exercised its priority right under the provisions of Public Law 616 and applied for the transfer of 87 acres of land and 16 miscellaneous buildings at the Fort Pickens Military Reservation for historic monument purposes (see **Appendix I-6**).^{79, 80} The conveyance of the personal property associated with the 87 acres was inadvertently omitted from the deed. A Bill of Sale covering this property was executed on 30 November 1949.⁸¹ On 6 June 1949, the Florida Board of Forestry and Parks, acting by and through the Florida State Improvement Commission, exercised its priority right under the provisions of Public Law 616 and applied for the transfer of 1,484.6 acres of land at the Fort Pickens Military Reservation for park and recreational purposes. Escambia County applied for 134 acres of land within the 1,484.6 acres (see **Appendix I-6**).^{82, 83, 84, 85, 86, 87} The quitclaim deed was executed on 3 November 1949.⁸⁸ The application for 1,484.6 acres was approved in October 1949.⁸⁹ The quitclaim deed was executed on 3 November 1949.⁹⁰ Donation of the telephone system to the State of Florida was approved in February 1950. The system was formally transferred via quitclaim deed, dated 10 February 1950.^{91, 92, 93}

In 1966, Representative Robert Sikes spearheaded an effort to establish the Gulf Islands National Seashore, of which Fort Pickens would be a part. Fort Pickens and the surrounding park land, known as Fort Pickens State Park, were managed by the State Parks Board. The National Park Service recommended the establishment of the Gulf Islands National Seashore in October 1966.^{94, 95} By August 1968, a bill was pending in Congress to establish the National Seashore.⁹⁶

⁷⁴ ATL-030707-083

⁷⁵ ATL-030907-045

⁷⁶ ATL-030907-041

⁷⁷ ATL-030907-042

⁷⁸ ATL-030907-043

⁷⁹ ATL-030707-094

⁸⁰ ATL-030907-086

⁸¹ ATL-030907-052

⁸² ATL-030707-091

⁸³ ATL-030707-092

⁸⁴ ATL-030707-093

⁸⁵ ATL-030907-029

⁸⁶ ATL-030907-056

⁸⁷ ATL-030907-040

⁸⁸ ATL-030907-053

⁸⁹ ATL-030907-055

⁹⁰ ATL-030907-053

⁹¹ ATL-030907-050

⁹² ATL-030907-049

⁹³ ATL-030907-048

⁹⁴ PHS-051007-001

⁹⁵ PHS-051007-004

⁹⁶ PHS-051007-003

In April 1972, the Florida portion of the Gulf Islands National Seashore was formally dedicated by the Department of the Interior.⁹⁷

The INPR states that 999.13 acres on the western end of Santa Rosa Island were acquired in 1828 and the Fort Pickens Military Reservation originally consisted of approximately 9,905.54 acres (the reservation being unsurveyed).⁹⁸ The 999.13 acreage appears to have come from an undated map (assumed to be circa 1940's based on other references) showing two tracts of land. One tract, identified as Tract No. 1, consists of 999.13 acres with the vendor identified as V.M. White, Attorney-in-Fact. Tract No. 2 consists of 655.87 acres, with the vendor identified as the U.S. Government. The areas reserved for the Coast Guard and the U.S. Navy are depicted. The total acreage of Tract Nos. 1 and 2 is 1,655 acres.⁹⁹ Documents obtained during the archives search indicate that approximately 1,181 acres on the western end of Santa Rosa Island were purchased in 1828.^{100, 101} The land area of the Fort Pickens Military Reservation was extended to include the whole of Santa Rosa Island when the rest of the island was transferred to the War Department by Executive Order, dated 2 July 1888.^{102, 103, 104} As determined by the PA archives search, the total acreage of the Fort Pickens Military Reservation is estimated to be 9,806 acres [8,039 acres east of the quarantine station plus 112 acres (quarantine station) plus 1,655 acres west of the quarantine station equals 9,806 acres]. Therefore, the PA archives search cannot verify the INPR acreage of 9,905.54 acres. Accordingly, the PA archives search indicates the initial total acreage of the Fort Pickens Military Reservation is 9,806 acres. On 22 June 1948, 1,638 acres owned in fee were declared surplus, of which, 66.4 acres were to be transferred to the Department of the Navy.^{105, 106, 107, 108, 109, 110} The Fort Pickens Military Reservation is depicted in **Plate No. 2** (see **Appendix R**).

3.2.2 Other Properties

A number of parcels were carved out of the original the Fort Pickens Military Reservation land area and transferred to other entities. These parcels and their uses are discussed below. Other properties utilized by the Fort Pickens Military Reservation are also discussed below.

⁹⁷ PHS-051007-002

⁹⁸ PIRS-022807-003

⁹⁹ ATL-030907-027

¹⁰⁰ CP-031307-221

¹⁰¹ CP-031407-028

¹⁰² Ibid.

¹⁰³ CP-031407-020

¹⁰⁴ CP-031507-013

¹⁰⁵ CP-031507-005

¹⁰⁶ ATL-030707-089

¹⁰⁷ ATL-030707-090

¹⁰⁸ ATL-030707-088

¹⁰⁹ ATL-030707-089

¹¹⁰ ATL-030707-095

3.2.2.1 Camp Saufley

Permission to use a portion of Santa Rosa Island for naval aviation purposes, and to construct certain buildings, was approved by the Secretary of War to the Secretary of the Navy in a letter dated 5 August 1918. This tract of land was known as Camp Saufley and consisted of approximately 160 acres.^{111, 112} It appears that a cistern, barracks, mess hall, generator house, and other buildings were constructed on the property.^{113, 114, 115} By June 1920, it appears that two clusters of four foundations for anti-aircraft guns had been constructed on the property.¹¹⁶ The Navy conducted certain training operations for aircraft from Camp Saufley, principally machine gun, bombing, and torpedo work. The Pensacola Chamber of Commerce was granted a license, revocable at will by the Secretary of War, on 11 January 1922, in conjunction with the Navy Department, to provide bathing and other recreational facilities for the people of Pensacola. The license was revoked on 12 November 1924 because the Chamber no longer desired to use the property.¹¹⁷ Escambia County expressed their desire to purchase this property in a letter dated 2 May 1928 to the Secretary of War.¹¹⁸ The Fort Pickens Military Reservation, including the land area of Camp Saufley, was declared surplus on 22 June 1948. It appears that 134 acres of former Camp Saufley were purchased by Escambia County in October 1948 (see **Appendices I-1 and I-6**).¹¹⁹ The former Camp Saufley property does not appear to be listed in FUDSMIS.

3.2.2.2 Quarantine Station

A strip the full width of Santa Rosa Island, extending one-half mile east and one-half mile west from the hospital at the quarantine station on the island was transferred to the Treasury Department by War Department Letter of 27 January 1903. A tracing shows the same strip ceded by deed, dated 4 September 1893, by the Governor of Florida. This strip consisted of approximately 112 acres. The property was transferred to the Treasury Department for use by the Marine Hospital Service as a quarantine station. The Treasury Department was also granted permission to build cottages.^{120, 121, 122, 123, 124}

¹¹¹ CP-031407-020

¹¹² CP-031407-022

¹¹³ CP-031307-260

¹¹⁴ CP-031307-257

¹¹⁵ CP-031307-261

¹¹⁶ CP-031307-258

¹¹⁷ CP-030715-007

¹¹⁸ CP-031407-022

¹¹⁹ ATL-030907-054

¹²⁰ CP-031407-028

¹²¹ CP-031407-020

¹²² CP-031507-013

¹²³ CP-031407-020

¹²⁴ DC-032107-314

3.2.2.3 Lifesaving Station/Coast Guard Station

On 3 March 1884, authority was granted to the Treasury Department to occupy a strip of land 300 feet wide for a Life Saving Station.^{125, 126, 127, 128, 129, 130} The original request was for a strip 200 feet wide.¹³¹ This authority was amended on 8 December 1906, and 2 July 1908. These amendments were not located during the archives search. It appears that one of these amendments increased the width of the strip from 300 feet to 500 feet.¹³²

The Coast Guard was granted a revocable permit on 6 October 1926, to install and maintain a pipeline from Battery Langdon to the Santa Rosa Station in order to connect into the Reservation water system.^{133, 134} This permit appears to have remained in effect at least through August 1948.^{135, 136, 137} By May 1942, the property contained a (life saving) station, dwelling, boatroom, lookout tower, equipment building, dock platform, and pier.¹³⁸ A revocable permit was granted to the Coast Guard on 9 March 1944, to construct, operate, and maintain an electric power line on the Fort Pickens Military Reservation from Battery Langdon to the Santa Rosa Coast Guard Station for a period of five years beginning 7 January 1943.^{139, 140, 141}

On 20 February 1948, the Department of the Army transferred 17 acres of land to the control and jurisdiction of the United States Coast Guard, Treasury Department. The transfer was made subject to a right-of-way over a 500-foot segment of the narrow gauge railroad that traversed the 17 acres.^{142, 143} The 17 acres consisted of a strip of land 500 feet wide extending across Santa Rosa Island. Along with the 17 acres, the Coast Guard requested easements for a water line, power line, and telephone line.^{144, 145} This property is shown on a plan from 1958.¹⁴⁶

The electrical transmission line servicing the Coast Guard Station was conveyed to Gulf Power Company in October 1952, with the provision that uninterrupted power be supplied to the U.S.

¹²⁵ CP-031407-028
¹²⁶ CP-031407-020
¹²⁷ CP-031507-013
¹²⁸ CP-031407-020
¹²⁹ DC-032107-311
¹³⁰ DC-032107-302
¹³¹ DC-032107-315
¹³² ATL-030907-076
¹³³ DC-032107-306
¹³⁴ ATL-030907-125
¹³⁵ DC-032107-301
¹³⁶ CP-112003-011
¹³⁷ ATL-030907-123
¹³⁸ ATL-030907-076
¹³⁹ DC-032107-301
¹⁴⁰ CP-112003-011
¹⁴¹ ATL-030907-123
¹⁴² WNRC-031607-308
¹⁴³ ATL-030707-095
¹⁴⁴ Ibid.
¹⁴⁵ ATL-030907-077
¹⁴⁶ ATL-030907-003

Coast Guard Lifeboat Station that was situated on 17 acres.¹⁴⁷ In 1954, a perpetual right of way and easement was granted to the State Road Department of Florida. The right of way was 100 feet wide.¹⁴⁸ In 1958, the station consisted of a wharf, paint locker, equipment building, dwelling, lookout tower, and signal tower. The dwelling was served by two septic tanks.¹⁴⁹

In 1975, the Coast Guard proposed to transfer nine acres of land. This land was described as a strip of land 500 feet wide extending partially across Santa Rosa Island, bounded on the north by Pensacola Bay and on the south by the centerline of a 100 foot right-of-way for Road No. 399-A, with east and west boundaries running true north and south a distance of 725 feet. The tract of land was 250 east of the centerline of the Coast Guard wharf and 28,000 feet west of the eastern boundary of the Fort Pickens Military Reservation, which is was a true north and south line coinciding with longitude 87° 09' 52" west. According to an Attorney's Report, this tract was part of the original acreage purchased from Henry Michelet in 1828. The nine acre tract contained a main station building, an equipment or shop building, ammunition storage building, four mobile home pads, antenna, boat dock, utilities systems, parking area, and driveway. In 1975, the station was manned by 19 enlisted men who used a 41-foot utility boat, 30-foot utility boat, and a 16-foot boat to carry out their duties. The missions of the station were: 1) search and rescue; 2) aids to navigation; and 3) recreational boating safety. The nine acre tract was transferred from the Department of the Army to the United States Coast Guard for a Lifeboat Station on 20 February 1948.^{150, 151, 152, 153, 154, 155}

In March 1976, eight fee acres of unimproved land was reported excess to the needs of the Department of Transportation, United States Coast Guard. In September 1976, this property was transferred to the Department of the Interior. The property was rectangular in shape and lay south of the Florida State Road 399-A right of way and ran to the Gulf of Mexico.^{156, 157, 158}

3.2.2.4 East End of Santa Rosa Island

That portion of the Fort Pickens Military Reservation (8,039 acres) that lay east of the quarantine station was quitclaimed to Escambia County by deed dated 29 April 1929 under Section 7, Act of 12 March 1926 for \$10,048.75.^{159, 160, 161} A corrected deed was executed by the Secretary of War on 3 February 1932 to correct the eastern boundary of the quarantine station area from being

¹⁴⁷ CP-031407-009

¹⁴⁸ ATL-030907-079

¹⁴⁹ ATL-030907-003

¹⁵⁰ WNRC-031607-309

¹⁵¹ WNRC-031607-304

¹⁵² WNRC-031607-302

¹⁵³ WNRC-031607-303

¹⁵⁴ AFRC-030507-019

¹⁵⁵ ATL-030907-075

¹⁵⁶ WNRC-031607-308

¹⁵⁷ WNRC-031607-306

¹⁵⁸ ATL-030907-078

¹⁵⁹ CP-031307-216

¹⁶⁰ CP-031307-217

¹⁶¹ CP-031307-213

coincident with true longitude 87° 08' 52" west of Greenwich instead of longitude 87° 08'.¹⁶² In 1936, Escambia County deeded the property to the Department of the Interior and Santa Rosa Island National Monument was established by an act of Congress. By act of Congress in 1946, the national monument was dissolved and the property was returned to Escambia County. In June 1947, an act of the Florida State Legislature created the Santa Rosa Island Authority and granted the Authority broad powers to develop and improve the island for beach, resort, and recreational purposes.¹⁶³ In 1949, the Authority had only developed a small portion of the island for residential and commercial purposes.^{164, 165, 166, 167}

3.2.3 Battery Observation (aka Base End Stations) and Spotting Stations

A number of battery observation and spotting stations were constructed around Pensacola harbor. Land was purchased on which these stations, basically towers, were constructed. In some instances, easements were obtained for the communication cables. A gasoline driven, 2 ½ kilovolt-amperes (KVA) generating unit was typically the source of electrical power and light for harbor defense base end stations. Several of the observation and spotting towers had supplied electrical power plus a backup generator.^{168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185} These battery observation and spotting stations do not appear to be listed in FUDSMIS.

3.2.4 Radar Site #30

Radar Site #30, Santa Rosa Island, was occupied under permit granted to the War Department on 3 July 1942. The property contained seven cantonment type temporary buildings for 40 men, three hutments for 15 men, eight tents for 40 men, 12,000 square feet of unheated, closed storage space, and 400 square feet of office building space. These buildings were permanently

¹⁶² CP-031407-019
¹⁶³ ATL-030907-044
¹⁶⁴ ATL-030707-096
¹⁶⁵ DC-032107-305
¹⁶⁶ DC-032107-304
¹⁶⁷ DC-032107-303
¹⁶⁸ CP-031307-019
¹⁶⁹ CP-031307-029
¹⁷⁰ CP-031307-021
¹⁷¹ CP-031307-002
¹⁷² CP-031207-031
¹⁷³ CP-031307-210
¹⁷⁴ CP-031207-031
¹⁷⁵ CP-031207-005
¹⁷⁶ CP-031307-203
¹⁷⁷ ATL-030707-001
¹⁷⁸ ATL-030707-002
¹⁷⁹ ATL-030707-003
¹⁸⁰ ATL-030707-037
¹⁸¹ ATL-030707-039
¹⁸² ATL-030707-087
¹⁸³ ATL-030707-086
¹⁸⁴ ATL-030707-115
¹⁸⁵ ATL-030807-010

transferred to the Army by the Eighth Naval District on 1 March 1943. By 25 March 1944, Radar Site #30 had been declared surplus to the needs of the War Department.¹⁸⁶ Radar Site # 30 does not appear to be listed in FUDSMIS.

3.2.5 Summer Rest and Recreation Camp

In an undated memo, permission to use the Summer Rest and Recreation Camp was being requested by the Bureau of Yards and Docks. Upon receipt of the approval of the Chief of Naval Operations, the Bureau of Aeronautics, and the Bureau of Naval Personnel the real estate division would make a formal request to the War Department for the transfer of the Camp.¹⁸⁷ No additional information on the Camp was obtained during the archives search.

3.2.6 USS Massachusetts Target

The Indiana-class battleship USS Massachusetts was grounded in 24 feet of water prior to a January 1921 training exercise by guns at the Fort Pickens Military Reservation. A severe storm late in December 1920, listed the ship such that it eliminated completely any possibility of attack of belt armor as part of the training exercise. The training exercise was conducted from 6 January to 18 January 1921. Ammunition fired at the ship included 700 pound (lb) mortar shells loaded with Explosive D, 1045 lb. shells loaded with Explosive D, 1046 D.P. shells filled with sand, and 1070 A.P. shells loaded with Explosive D. Although the ship sustained 21 hits, several shells showed no indication of detonation.¹⁸⁸ Since it was still partially visible from the surface, Navy pilots used the Massachusetts for target practice during World War II. It was designated as an archeological underwater preserve in 1993 and rests in the Gulf of Mexico, 1.5 nautical miles south-southwest of Pensacola Pass, off the coast of Perdido Key. It lies in 26-30 ft. of water within the Fort Pickens State Aquatic Preserve at Latitude 30°17' 45" N and Longitude 87° 18' 45" W. LORAN coordinates for the wreck are 13215.0 and 47108.9. The site is easily located because the ship's two main gun turrets are awash most of the time. The wreck also is marked by a red bell buoy, and its location is shown on nautical charts.^{189, 190, 191, 192}

3.3 Land Use and Ownership History

The land use and ownership history of the FUDS property prior to and following it being under jurisdiction of the DoD is briefly described in this section. Also described are the current land use and ownership of the FUDS property.

¹⁸⁶ CP-031507-008

¹⁸⁷ CP-031307-304

¹⁸⁸ CP-031207-035

¹⁸⁹ Internet, <http://www.dep.state.fl.us/coastal/sites/ftpickens/info.htm>.

¹⁹⁰ Internet, <http://www.history.navy.mil/branches/org12-7g.htm>.

¹⁹¹ Internet, <http://www.cr.nps.gov/nr/travel/flshipwrecks/mas.htm>.

¹⁹² Internet, <http://www.flheritage.com/archaeology/underwater/preserves/uwmass.cfm>.

3.3.1 Prior to DoD Jurisdiction

The western tip of Santa Rosa Island was named Punta de Siguenza by the Spanish and was the site of several fortifications. The first fort, Fort Montagorda, was begun by Matamoros in 1718. This unfinished fort was captured by the French and then recaptured by the Spanish in 1719. Before the end of the year, Fort Montagorda was nearly completed. It was built of hard, dark sandstone in the form of a square and mounted 15 guns. In October 1719, the French again attacked Pensacola and the fort was destroyed. With the restoration of site of Pensacola to the Spanish in 1723, a new settlement was established on Santa Rosa Island approximately two miles east of Point Siguenza. The settlement existed until 1754 when a hurricane destroyed it. The survivors then moved the settlement to the present site of Pensacola. In 1822, the ruins of Fort Montagorda were still conspicuous.^{193, 194}

Pursuant to the terms of the Peace of Paris in 1763, Pensacola fell into British hands. The British found a small, square, stockaded fort with two guns in it at the point of Santa Rosa Island. The Spanish had maintained the fort as a signal more than for actual defense. In fact, Santa Rosa Island had been used as a place of banishment for Spanish convicts. Pensacola was captured by the Spanish and was ceded back to Spain in 1783, together with the Province of West Florida. In 1814 and 1818, Pensacola was captured by General Andrew Jackson. The British destroyed the fort on Santa Rosa Island on 6 November 1814.¹⁹⁵

The whole of Santa Rosa Island appears to have been acquired by the United States from Spain by the Florida Cession Treaty of 23 February 1819.^{196, 197} A tract of 1,181 acres on the western end of Santa Rosa Island had been granted Vicente S. Pintaldo, the Spanish Surveyor General by the Spanish Intendent General in December 1817. This tract had been purchased by Henry Michelet at a public auction under execution against Pintaldo. Joseph M. White, as Michelet's attorney, was willing to sell the tract to the United States for \$4,000. This tract of land extended "four English miles from the point Lizuenza to a line running on a true north-south line." The eastern boundary, according to the plat, crossed the island a short distance east of the Three Ponds. On 28 May 1828, Mr. White conveyed 1,181 arpents at the western point of Santa Rosa Island to the United States for \$4,000.^{198, 199, 200, 201}

3.3.2 Current Land Use and Ownership

The Fort Pickens Military Reservation is a part of the Gulf Islands National Seashore. Located at the west end of Santa Rosa Island, the Reservation is protected by the Department of the Interior, National Park Service.²⁰² According to House Report 109-360 - National Defense

¹⁹³ ATL-030707-094

¹⁹⁴ Bearss, Edwin C. 1983. p. 17.

¹⁹⁵ ATL-030707-094

¹⁹⁶ CP-031407-020

¹⁹⁷ CP-031407-015

¹⁹⁸ CP-031307-221

¹⁹⁹ CP-031407-020

²⁰⁰ Bearss, Edwin C. 1983. pp. 65, 66.

²⁰¹ ATL-030707-094

²⁰² PIRS-022807-002

Authorization Act For Fiscal Year 2006, Conference Report to Accompany H.R. 1815, December 18, 2005, Subtitle E--Other Matters, Section 2872, the original boundaries of the Gulf Islands National Seashore encompassed certain federal land used by the Air Force and the Navy, and the use of such land was still required by the Armed Forces when the seashore was established. Senate Report 91-1514 of the 91st Congress addressed the relationship between these military lands and the Gulf Islands National Seashore as follows: "While the military use of these lands is presently required, they remain virtually free of adverse development and they are included in the boundaries of the seashore so that they can be wholly or partially transferred to the Department of the Interior when they become excess to the needs of the Air Force." Although section 2(a) of Public Law 91-660 [16 U.S.C. 459h-1(a)] authorized the eventual transfer of federal land within the boundaries of the Gulf Islands National Seashore from the Department of Defense to the Secretary of the Interior, an amendment mandating the transfer of excess Department of Defense land on Santa Rosa and Okaloosa Island, Florida, to the Secretary of the Interior was required to ensure that the purposes of the Gulf Islands National Seashore were fulfilled. Thus, Section 7 of Public Law 91-660 (16 U.S.C. 459h-6) was amended (1) by inserting "(a)" before "There are" and (2) by adding at the end a new subsection (b). This subsection read as follows: "If any of the Federal land on Santa Rosa or Okaloosa Island, Florida, under the jurisdiction of the Department of Defense is ever excess to the needs of the Armed Forces, the Secretary of Defense shall transfer the excess land to the administrative jurisdiction of the Secretary of the Interior, subject to the terms and conditions acceptable to the Secretary of the Interior and the Secretary of Defense. The Secretary of the Interior shall administer the transferred land as part of the seashore in accordance with the provisions of this Act."²⁰³ Use of the FUDS property by the National Park Service as a national park is not expected to change in the near future.

An average of 717,000 visitors use and enjoy the resources of the Fort Pickens Unit of the Gulf Islands National Seashore each year. The Fort Pickens Unit contains about 5.5 miles of trails and about 8 miles of scenic drives. Pedestrian access to Gulf and Sound beaches is provided at 11 locations along the Fort Pickens road system. Beach access is a major expectation of seashore visitors.

The Fort Pickens Unit of the Gulf Islands National Seashore offers access to recreational fishing, beach recreation, bicycling, hiking, surfing, and 200 developed camping locations providing 131,600 camper nights of recreation. The 200-site campground provides camping space for both tent campers and RV/trailer campers. Campsites are equipped with paved parking pads, water, and electricity. Central restrooms provide running water and showers. Fort Pickens is a destination to many visitors and guided fort tours are given daily during the summer months.

During the summer season, Langdon Beach serves as a life-guarded swimming beach. Other amenities include a picnic shelter, bathrooms, and outdoor showers. Two parking lots along Fort Pickens Road provide visitor access to the gulf side beach. Each lot provides parking for 25 cars. Picnic pavilions are also provided at Battery Worth and Little Langdon on the bay side of the island. Bay beach access is provided at Little Langdon. A snack bar and campground store

²⁰³ Internet, http://www.congress.gov/cgi-bin/cpquery/?sel=DOC&&item=&r_n=hr360.109&&sid=cp109w2SuW&&refer=&&db_id=cp109&&hd_count=&.

are available on a seasonal basis. The fishing pier and jetty are popular destinations for fishing and Scuba divers. The pier is officially licensed for fishing so individual fishing permits are not required.²⁰⁴

Gulf Islands National Seashore is still recovering from damage from Hurricane Ivan in September 2004 and Hurricane Katrina in August 2005. Clean up efforts continue. Wind and salt burn have browned most of the vegetation on the island, although many live oaks and some pines are starting to re-sprout. Sand dunes were flattened on both north and south beaches. Sections of the Fort Pickens Unit, such as the campground, are closed because of hurricane damage. The NPS proposes to restore full access to the Fort Pickens Unit of Gulf Islands National Seashore and repair associated visitor use facilities and infrastructure.^{205, 206}

As of the Property Visit in May 2007, little repair work had been done. A good portion of Fort Pickens Road was destroyed and no vehicular access is allowed to the park. The only land-based access is via foot or bicycle. Access is allowed via boat.

3.3.3 Adjacent Land Use

The Fort Pickens State Park Aquatic Preserve is located in the southwestern corner of the Florida panhandle. This 34,000 acre preserve surrounds the western end of Santa Rosa Island and the eastern end of Perdido Key and is managed by the State of Florida Office of Coastal and Aquatic Managed Areas, Northwest Florida Aquatic Preserves. The proximity of the Gulf Islands National Seashore facility provides many recreational possibilities within the preserve. Fishing, swimming, diving, boating, and sight seeing are regular recreational activities. Commercial fishing and shrimping, as well as maritime transportation, are also conducted within the Preserve boundaries. The Preserve supports some of the heaviest boating traffic in northern Florida, not only from the military but also from commercial freighters and recreational boaters.²⁰⁷ There is an underwater archaeological preserve within the Preserve, the USS Massachusetts, which provides excellent diving and fishing opportunities.^{208, 209}

As noted during the Property Visit, residential development is progressing up to the eastern park boundary. The eastern portion of Santa Rosa Island is governed by the Santa Rosa Island Authority, which has broad powers to develop and improve the island for beach, resort, and recreational purposes.²¹⁰ As noted during the Property Visit, most of the eastern portion of Santa Rosa Island has been developed for residential and commercial purposes. Although this development is expected to continue, the types of use (residential and commercial) are not expected to change in the near future.

²⁰⁴ Draft Environmental Assessment: Restore Visitor Access to Fort Pickens Area, Santa Rosa Island, Gulf Islands National Seashore, Escambia County, Florida. October 2006. U.S. Department of the Interior, National Park Service. p. 48.

²⁰⁵ Internet, <http://www.nps.gov/archive/guis/pphtml/planyourvisit.html>.

²⁰⁶ Internet, <http://www.nps.gov/guis/faqs.htm>

²⁰⁷ Ft. Pickens Aquatic Preserve Management Plan. 1992. Florida Department of Natural Resources.

²⁰⁸ Internet, <http://coastal.er.usgs.gov/hurricanes/ivan/photos/florida.html>.

²⁰⁹ Internet, <http://coastal.er.usgs.gov/hurricanes/ivan/index.html>.

²¹⁰ ATL-030907-044

3.3.4 Demographics

Estimated 2005 census data for Escambia County, Florida and the State of Florida are presented in **Table 3-1** below.²¹¹

Table 3-1. Estimated 2005 Census Data for Escambia County, Florida

People QuickFacts	Escambia County	Florida
Population, 2005 estimate	296,772	17,789,864
Population, percent change, April 1, 2000 to July 1, 2005	0.8%	11.3%
Population, 2000	294,410	15,982,378
Persons under 5 years old, percent, 2005	6.8%	6.3%
Persons under 18 years old, percent, 2005	23.6%	22.9%
Persons 65 years old and over, percent, 2005	14.6%	16.8%
Female persons, percent, 2005	50.5%	51.0%
White persons, percent, 2005 (a)	71.4%	80.4%
Black persons, percent, 2005 (a)	23.0%	15.7%
American Indian and Alaska Native persons, percent, 2005 (a)	0.9%	0.4%
Asian persons, percent, 2005 (a)	2.4%	2.1%
Native Hawaiian and Other Pacific Islander, percent, 2005 (a)	0.1%	0.1%
Persons reporting two or more races, percent, 2005	2.1%	1.2%
Persons of Hispanic or Latino origin, percent, 2005 (b)	2.9%	19.5%
White persons not Hispanic, percent, 2005	69.0%	62.1%
Living in same house in 1995 and 2000, pct 5 yrs old & over	47.7%	48.9%
Foreign born persons, percent, 2000	3.7%	16.7%
Language other than English spoken at home, pct age 5+, 2000	6.8%	23.1%
High school graduates, percent of persons age 25+, 2000	82.1%	79.9%
Bachelor's degree or higher, pct of persons age 25+, 2000	21.0%	22.3%
Persons with a disability, age 5+, 2000	57,340	3,274,566
Mean travel time to work (minutes), workers age 16+, 2000	23.0	26.2
Housing units, 2005	134,473	8,256,847
Homeownership rate, 2000	67.3%	70.1%
Housing units in multi-unit structures, percent, 2000	20.4%	29.9%
Median value of owner-occupied housing units, 2000	\$85,700	\$105,500
Households, 2000	111,049	6,337,929
Persons per household, 2000	2.45	2.46

²¹¹ Internet, <http://quickfacts.census.gov/>, accessed on 6 April 2007.

People QuickFacts	Escambia County	Florida
Median household income, 2003	\$35,281	\$38,985
Per capita money income, 1999	\$18,641	\$21,557
Persons below poverty, percent, 2003	15.7%	13.0%
Business QuickFacts	Escambia County	Florida
Private nonfarm establishments, 2004	6,914	484,938 ²
Private nonfarm employment, 2004	102,561	6,864,987 ²
Private nonfarm employment, percent change 2000-2004	-3.8%	10.4% ²
Nonemployer establishments, 2004	16,838	1,369,002 ¹
Total number of firms, 2002	20,682	1,539,207
Black-owned firms, percent, 2002	NA	6.6%
American Indian and Alaska Native owned firms, percent, 2002	1.6%	0.6%
Asian-owned firms, percent, 2002	2.6%	2.7%
Native Hawaiian and Other Pacific Islander owned firms, percent, 2002	NA	0.1%
Hispanic-owned firms, percent, 2002	1.7%	17.3%
Women-owned firms, percent, 2002	29.6%	28.4%
Manufacturers shipments, 2002 (\$1000)	1,873,203	78,474,770
Wholesale trade sales, 2002 (\$1000)	2,013,186	219,490,896
Retail sales, 2002 (\$1000)	3,340,536	191,805,685
Retail sales per capita, 2002	\$11,255	\$11,498
Accommodation and foodservices sales, 2002 (\$1000)	392,107	29,366,940
Building permits, 2005	2,602	287,250
Federal spending, 2004 (\$1000)	2,777,562	121,933,502 ²
Geography QuickFacts	Escambia County	Florida
Land area, 2000 (square miles)	662	53,926
Persons per square mile, 2000	444.7	296.4
FIPS Code	033	12
Metropolitan or Micropolitan Statistical Area	Pensacola-Ferry Pass-Brent, FL Metro Area	

1: The 2004 Nonemployer totals may be low due to late tax reporting in hurricane-impacted counties/regions in Alabama, Florida, Louisiana, Mississippi, and Texas.

2: Includes data not distributed by county.

- (a) Includes persons reporting only one race.
- (b) Hispanics may be of any race, so also are included in applicable race categories.

FN: Footnote on this item for this area in place of data
NA: Not available
D: Suppressed to avoid disclosure of confidential information
X: Not applicable
S: Suppressed; does not meet publication standards
Z: Value greater than zero but less than half unit of measure shown
F: Fewer than 100 firms

3.4 Physical Property Characteristics

Information regarding general property topography, geology, hydrogeology, terrain features, and climatic data is presented in this section. Threatened and endangered species, sensitive environments and places of historical significance (e.g., archeological sites, cemeteries, national historical landmarks, etc.) are also identified.

3.4.1 Geology and Physiology

Escambia County lies in the Coastal Plain Province, a major physiographic division of the United States that extends eastward from Texas and northward as far as New York. The Coastal Plain is underlain chiefly by beds of sand, silt, limestone, and clay that dip gently seaward. Most of these sediments were deposited during higher stands of the sea. There are two topographic subdivisions of the Coastal Plain in Escambia County: the Coastal Lowlands and the Western Highland. The Coastal Lowlands consist of a relatively undissected, nearly level plain that occupies a narrow strip 10 or 12 miles wide along the coast. Escambia County lies on the north flank of the Gulf Coast geosyncline and east flank of the Mississippi Embayment. This results in the southwestward dip that is characteristic of all the formations in the area, at least as far down as the base of the Cretaceous deposits. The subsurface geology of Escambia County has more in common with that of the central Gulf Coast of Alabama to the west than it does with the geology of peninsular Florida to the east. Only two peninsular Florida units are present within the County: the Tampa Formation and the Ocala Group.²¹²

The formations underlying Escambia County are, from oldest to youngest, the Hatchetigbee Formation, Tatchetigbee Formation, Tallahatta Formation, Lisbon Equivalent, Ocala Group, Bucatunna Clay Member (Byram Formation), Checkasawhay Limestone, Tampa Formation, Pensacola Clay, Miocene coarse clastics, and Citronelle Formation. The Lower Eocene Hatchetigbee Formation is the uppermost division of the Wilcox Group and underlies westernmost Florida at depths ranging from 1,270 feet below sea level in the northeastern corner of Santa Rosa County to 2,750 feet below sea level in southern Escambia County. The thickness of the formation in this area averages 320 feet. The Tatchetigbee Formation consists predominantly of gray to dark-gray, silty, micaceous clay. The clay is fossiliferous and

²¹² Florida Geological Survey, Bulletin No. 46, Geology of Escambia and Santa Rosa Counties, Western Florida Panhandle. 1966. Owen T. Marsh. pp. 6, 9.

calcareous and contains a little pyrite. Beds of gray to light-gray, hard glauconitic shale, siltstone, and shaley limestone are present in lesser amounts.²¹³

The Tatchetigbee is conformably overlain by the Middle Eocene Tallahatta Formation of middle Eocene age. The Tallahatta consists predominantly of hard, light-gray, calcareous shale and siltstone with numerous interbeds of gray limestone and very fine to very coarse, pebbly sand. The Tallahatta lies at depths ranging from 1,040 feet below sea level in the northeast corner of Escambia County to 2,530 feet below sea level in southern Escambia County. Its minimum thickness of 170 feet is at Pensacola.²¹⁴

The Lisbon equivalent unconformably overlies the Tallahatta Formation. The Lisbon equivalent underlies Escambia and Santa Rosa Counties at depths ranging from 510 feet below sea level in northeast Santa Rosa County to 2,090 feet in the southwestern corner of Escambia County. The formation averages 495 feet in thickness, ranging from 345 feet in northern Escambia County to 600 feet in east-central Santa Rosa County. The Lisbon equivalent consists chiefly of shaley limestone whose color ranges from dark gray to brownish gray to very light grayish cream. The formation contains a number of shale zones, two of which are especially prominent.²¹⁵

The Upper Eocene Ocala Group underlies the western Florida Panhandle at depths ranging from 290 feet below sea level in the northeastern corner of Santa Rosa County to 1,940 feet below sea level at the southern end of Escambia County. The Ocala Group is approximately 90 feet thick just east of Pensacola and thins to 50 feet or less to the west. The Ocala Group consists of a cream to white, pasty, porous, soft to firmly cemented limestone containing large foraminifers, mollusks, bryozoans, corals, and other fossils. In westernmost Florida, the Ocala Group is typically a light-gray or grayish-cream limestone near the upper contact, changing downward to chalky white limestone.²¹⁶

The Middle Eocene Bucatunna Clay Member of the Byram Formation underlies the entire western Florida Panhandle. The Bucatunna thins eastward, finally pinching out beneath Choctawhatchee Bay. In Escambia County, the Bucatunna occurs at depths below sea level ranging from about 200 feet in northeastern Santa Rosa County to about 1,760 feet in southern Escambia County. The Bucatunna averages 125 feet in thickness over the two-county area, ranging from 45 feet in northeastern Santa Rosa County to 215 feet in southwestern Santa Rosa County, just north of Escambia Bay. The Bucatunna generally thickens toward the Gulf of Mexico. Generally, the base of the Bucatunna in Escambia County consists of dark-gray, soft, calcareous, silty to sandy clay that contains occasional flecks of carbonized wood and a little pyrite.²¹⁷

The Bucatunna is conformably overlain by the Chickasawhay Limestone of late Oligocene age. In places, the Chickasawhay and Bucatunna interfinger along their contact. The Chickasawhay

²¹³ Florida Geological Survey, Bulletin No. 46, p. 18.

²¹⁴ *Ibid.*, pp. 22-24.

²¹⁵ *Ibid.*, pp. 24-29.

²¹⁶ *Ibid.*, pp. 29-44.

²¹⁷ *Ibid.*, pp. 45-49.

Limestone and Tampa Formation undifferentiated in western Florida are lithologically similar and it is difficult to locate their contact in many wells. The Chickasawhay Limestone underlies all of Escambia County, thickening gulfward from about 30 or 40 feet along the northern border of the county to as much as 130 feet along the margin of the Gulf. The formation consists of gray to light-gray, hard, highly porous or vesicular limestone and dolomitic limestone interbedded with light-brown, hard, vesicular to compact dolomitic limestone or dolomite that has a distinctive sugary texture.²¹⁸

The Tampa Formation is present only in the southern part of Escambia County, having been removed by erosion in the northern part prior to the deposition of the Pensacola Clay and Miocene coarse clastics. The Tampa Formation reaches its maximum thickness of approximately 270 feet in southern Escambia County. In Escambia County, the Tampa Formation undifferentiated limestone is hard, light gray to grayish white, and although it contains some magnesium carbonate in some places, the formation is generally not dolomitic. Locally, the limestone contains bits of carbonized wood and plant remains. The Tampa Formation also contains several beds of clay, especially in the upper part.²¹⁹

The Middle and Upper Miocene Pensacola Clay dips generally southwestward and lies at depths ranging from 135 feet below sea level near Milton in Santa Rosa County to 1,000 feet below sea level in the southwest corner of Escambia County. The total thickness of the formation ranges from 380 feet near Pensacola to more than 1,000 feet at Mobile Bay. The upper and lower members of the Pensacola Clay consist of tough, dark to light gray clay but, at a few localities, it is brownish gray. The clay is typically silty and contains variable amounts of very fine to very coarse quartz sand. Bits of carbonized wood and plant remains, such as leaves and reeds are present throughout the formation. The clay is micaceous and slightly calcareous. Some pyrite is also present. Mollusk shells and foraminifers are abundant throughout the Pensacola Clay.²²⁰

The Miocene coarse clastics are present in the western panhandle of Florida except in an area between central Escambia County and southwestern Santa Rosa County, where the Citronelle Formation lies unconformably upon the upper member of the Pensacola Clay. The thickness of the Miocene coarse clastics is variable, generally ranging from about 70 feet in north-central Escambia County to as much as 500 feet in west-central Santa Rosa County. Except for the fossils, the Miocene coarse clastics are virtually indistinguishable from the overlying Citronelle Formation. The Miocene coarse clastics consist chiefly of light-brown to light gray, poorly sorted fine to very coarse sand and granules and small pebbles of quartz. Muscovite is abundant throughout the unit. Light to dark gray, carbonaceous clay and siltstone that are somewhat calcareous occur throughout the unit as lenses up to 180 feet thick. The most distinctive feature of the Miocene coarse clastics is the numerous shell beds that occur. These beds consist mostly of minute mollusks.²²¹

²¹⁸ Ibid., pp. 49, 50.

²¹⁹ Ibid., pp. 50-54.

²²⁰ Ibid., pp. 54-58.

²²¹ Ibid., pp. 54-70.

The Miocene coarse clastics are overlain unconformably by the Pleistocene Citronelle Formation everywhere in Escambia County. It is very difficult to differentiate Pleistocene sand and gravel of the marine terrace deposits from the Citronelle sand and gravel. The terrace deposits, however, are relatively thin. Together, the Citronelle and terrace deposits range in thickness from approximately 30 feet at the southern border of Santa Rosa County to about 790 feet in northwestern Escambia County. The Citronelle consists principally of quartz sand that contains numerous lenses, beds, and stringers of clay and gravel. The lithology changes abruptly over short distances. The sand is typically light yellowish brown to reddish brown, although some is white or light gray. Muscovite is abundant throughout the Formation. In places the sand grades into gravel composed of quartz and chert pebbles up to an inch in diameter. Elsewhere the sand grades into siltstone and clay. The clay occurs in lenses. A distinctive rock type that occurs in the Citronelle Formation throughout western Florida is a limonite-cemented sandstone called “hardpan”. This rock is formed by cementation of sand with iron oxides, is dark rust brown and extremely hard. The hardpan ranges from a fraction of an inch to three or four feet in thickness. Little is known concerning the lateral extent of these hardpan layers, but it is unlikely that any given layer extends for more than a few thousand yards.²²²

During the invasions of the sea upon land in the Pleistocene Epoch, the Citronelle deposits were reworked and mixed with new deposits of similar materials. These new deposits were the terrace deposits, which are softer and less consolidated and contain fewer pebbles and clay than the Citronelle Formation.²²³

3.4.2 Soils

There are numerous distinct environments found within any particular barrier island. Although one or more of these environments may be present for any given barrier island, the overall scheme appears both consistent and predictable. Taken in sequential order, and beginning from open ocean to the outermost reaches of the back-barrier, these environments are as follows: nearshore, beach, dune, washover fan, marsh, tidal flat, and the adjacent estuary/lagoon.

The narrow zone immediately seaward of the shoreline is typically called the nearshore environment. This area generally extends from the shoreline across the zone of longshore sand bars and troughs. Usually longshore sand bars and troughs are present, but this is not always the case. The nearshore environment includes the normal surf zone where breaking waves occur. The number of longshore bars present depends upon the gradient, or slope, of the nearshore environment. Generally speaking, the more gentle the gradient, the more bars will be present. Thereby, steep nearshore gradients tend to have few or no longshore bars. Longshore bars, when present, tend to persist throughout the entire year, but can move or change shape as seasons change or conditions vary.

The beach, or visible portion of the profile, is the most familiar of the barrier island environments, and in many respects is the most important because it affords protection from wave attack to the landward upland environments. The beach extends from the shoreline.

²²² Ibid., pp. 74-78.

²²³ Ibid., p. 87.

landward, and often includes numerous changes in topography such as sand dunes, sea walls, or other man made structures. A beach is typically divided into the seaward sloping foreshore and the nearly horizontal backshore. The foreshore is considered to be that area where the last vestiges of waves rush up and back. This constitutes what is referred to as the swash zone, although such wave action can often cover an entire foreshore. This area is also the zone of the intertidal portion of the beach and may range in width depending upon slope or gradient. The backshore is generally dry except during the occurrence of severe storms and their associated storm tides. Under normal conditions, the backshore is subjected only to wind action that blows the dry sand landward, creating dunes. Opportunistic dune or beach vegetation may occupy this portion of the beach.

The landward transport of sand causes the backshore environment to accumulate sand as dunes, where the growth of opportunistic vegetation on the backshore area traps blowing sand as it moves above the beach surface. As mounds of sand accumulate, vegetation continues to grow upward, forming substantial dunes. The principal factors involved in sand dune development are the presence and width of dry beach, and the abundance of sediment being supplied to the backshore areas. Dunes can provide excellent protection for the landward portion of a barrier island, and, when possible, their continued growth should be encouraged.

An increase in water level or large waves associated with storms can sometimes cause barrier islands to occasionally be washed over, forming what are referred to as washover fans. Low-lying islands generally permit widespread washover water to channel only in the lower spaces between dunes. Strong storm induced currents over-washing a barrier island can carry abundant sand from the nearshore and beach inland. Overtopping of barrier islands during storm events causes sand to accumulate into a fan shaped feature on low barrier islands. Where the washover or overtopping process can be quite significant, these fans coalesce to form washover aprons. Individual fans may extend over hundreds to thousands of acres but are generally only 10-15 centimeters thick. It is not uncommon for washover fan deposits to accumulate in several layers, each representing a single storm. The washover deposits comprise the landward portion of a barrier island.

The landward fringe of a barrier island is typically a wetland, generally a highly vegetated environment. Wetlands develop along the intertidal portion of washover fans. They can provide excellent stabilization and protection from erosion for the landward shoreline of a barrier island.

The unvegetated intertidal zone on the protected landward side of the island represents the environment referred to as the tidal flat. These gently sloping island margins are typically covered with fine sediment and can be occupied by numerous bottom dwelling invertebrates. Such tidal flats are typically the distant portions of the washover fans. The width of the tidal flats is generally proportional to the tidal range of a given location.²²⁴

Santa Rosa Island is a “low profile” barrier island of late Holocene origin and supplied with 99% quartz sand from the Pleistocene “headland” at Grayton Beach to the east and an internal source of sediment along the west flank of the island. The remaining 1% of sediment comprising

²²⁴ Internet, www.csc.noaa.gov/beachnourishment/html/geo/barrier.htm.

the island is largely heavy minerals such as illmenite and rutile. Net longshore transport is westward and reaches a maximum of approximately 150,000 cubic meters per year ($m^3/year$) near the entrance to Pensacola Bay.²²⁵

During Hurricane Frederic in 1979, more than 90% of Santa Rosa Island was submerged as a result of the 12-14 foot (~ 4 m) storm surge.²²⁶ Santa Rosa Island underwent extensive morphological change in 1995 during Hurricane Opal.²²⁷ The coastal impacts from Opal were generally the result of wave action and flooding rather than wind. There was very little wind damage caused by Hurricane Opal; however, the damage caused by waves and storm surge was extreme.²²⁸ Approximately 70% of the sediment eroded from the foredune–beach–nearshore and was deposited as expansive overwash deposits on the interior and bayside flank of the island. This indicated a minimal loss of sediment from the nearshore (as defined during low wave energy conditions), beach and foredune system, offshore to the inner shelf. Overwash fans protruded into Pensacola Bay up to 100 meters at some locations. The island increased by an average of approximately 40 meters in width, suggesting that the system conserved mass during Opal.²²⁹ Hurricane Opal removed dunes as high as five meters, leaving Santa Rosa Island more susceptible to future storms and erosion.²³⁰

Santa Rosa Island experienced significant overwash during Hurricane Georges (1998), particularly at narrow portions. A considerable volume of sediment eroded from the berm was transported across the island to form a series of overwash terraces.²³¹ The entire Escambia County portion of Santa Rosa Island sustained major beach and dune erosion. Along the Gulf Islands National Seashore at Fort Pickens, major beach and dune erosion prevailed and the park road was covered with sand as it was during Hurricane Opal in 1995.²³²

²²⁵ Pendleton, Elizabeth A., Erika S. Hammar-Klose, E. Robert Thieler, S. Jeffress Williams. 2004. Coastal Vulnerability Assessment of Gulf Islands National Seashore (GUIS) to Sea-Level Rise. U.S. Geological Survey Open-File Report 03-108.

²²⁶ Ibid.

²²⁷ Hurricane Earl and Hurricane Georges Beach and Dune Erosion and Structural Damage Assessment and Post-Storm Recovery Plan for the Panhandle Coast of Florida. January 1999. Report No. BCS-99-01, Bureau of Beaches and Coastal Systems, Division of Water Facilities, Department of Environmental Protection, State of Florida.

²²⁸ Bush, David M. Bush, Craig A. Webb, Robert S. Young, Bryan D. Johnson, and Graham M. Bates. 1996. Quick Response Report #84, Impact of Hurricane Opal on the Florida/Alabama Coast.

²²⁹ Hurricane Earl and Hurricane Georges Beach and Dune Erosion and Structural Damage Assessment and Post-Storm Recovery Plan for the Panhandle Coast of Florida. January 1999. Report No. BCS-99-01, Bureau of Beaches and Coastal Systems, Division of Water Facilities, Department of Environmental Protection, State of Florida.

²³⁰ Internet, <http://pubs.usgs.gov/of/2003/of03-108/html/guis.html>.

²³¹ Stonea, Gregory W., Baozhu Liub, David A. Pepperc, Ping Wang. 2004. The Importance of Extratropical and Tropical Cyclones on the Short-Term Evolution of Barrier Islands along the Northern Gulf of Mexico, USA. *Marine Geology* 210, pp. 63–78.

²³² Hurricane Earl and Hurricane Georges Beach and Dune Erosion and Structural Damage Assessment and Post-Storm Recovery Plan for the Panhandle Coast of Florida. January 1999. Report No. BCS-99-01, Bureau of Beaches and Coastal Systems, Division of Water Facilities, Department of Environmental Protection, State of Florida.

Hurricane Ivan came ashore near Gulf Shores, Alabama on 16 September 2004 and formed a new breach across Santa Rosa Island. Ivan also deposited a continuous sheet of storm-generated overwash deposits in the low-lying and uninhabited portion of the barrier island. Route 399 was cut by the new breach, making the Fort Pickens section of the Gulf Islands National Seashore reachable only by boat.^{233, 234} On 10 July 2005, Hurricane Dennis made landfall on Santa Rosa Island, Florida, between the beach communities of Pensacola Beach and Navarre Beach. Throughout the Fort Pickens Unit of the Gulf Islands National Seashore, Dennis flooded the island with an approximately 10-foot storm tide. Significant beach and dune erosion losses were sustained through the overwash of sand across the island and into Santa Rosa Sound. J. Earl Bowden Way, the island road between Pensacola Beach and Navarre Beach that was substantially damaged and destroyed by Ivan, was further damaged by Dennis. About 10 miles of road had been destroyed. Much of the Fort Pickens park road was buried under sand overwash deposits. On Tuesday, 30 August 2005, Hurricane Katrina made landfall between Grand Isle and the mouth of the Mississippi River. There was no additional road damage to J. Earl Bowden Way, although the road bed was further scoured by the storm tide of Katrina. The island segment between R94 and R100 was awash four days after the storm. Tides subsided on 31 August 2005, leaving over one mile of quick conditions along the island from gulf to bay.²³⁵

The shoreline change data for Santa Rosa Island over the last 150 years suggest that the shoreline is relatively stable. Global sea level has risen approximately 18 centimeters (cm) (7.1 inches) in the past century. Climate models predict an additional rise of 48 cm (18.9 in.) by 2100. Potential coastal impacts of sea-level rise include shoreline erosion, saltwater intrusion into groundwater aquifers, inundation of wetlands and estuaries, and threats to cultural and historic resources as well as infrastructure. Predicted accelerated global sea-level rise has generated a need in coastal geology to determine the response of a coastline to sea-level rise. In order to address the multi-faceted task of predicting sea-level rise impact, the U.S. Geological Survey (USGS) has implemented a methodology to identify areas that may be most vulnerable to future sea-level rise. This relatively simple vulnerability ranking system is the coastal vulnerability index (CVI). The CVI can be used by scientists and park managers to evaluate the likelihood that physical change may occur along a shoreline as sea-level continues to rise. For the Fort Pickens Military Reservation portion of Santa Rosa Island, the CVI is low.²³⁶

3.4.3 Hydrology

3.4.3.1 Ground Water

In northwest Florida, the hydrogeologic framework is divided into four groups of sediments that constitute distinct hydrogeologic systems. In descending order from the land surface, the four

²³³ Internet, <http://coastal.er.usgs.gov/hurricanes/ivan/photos/florida.html>.

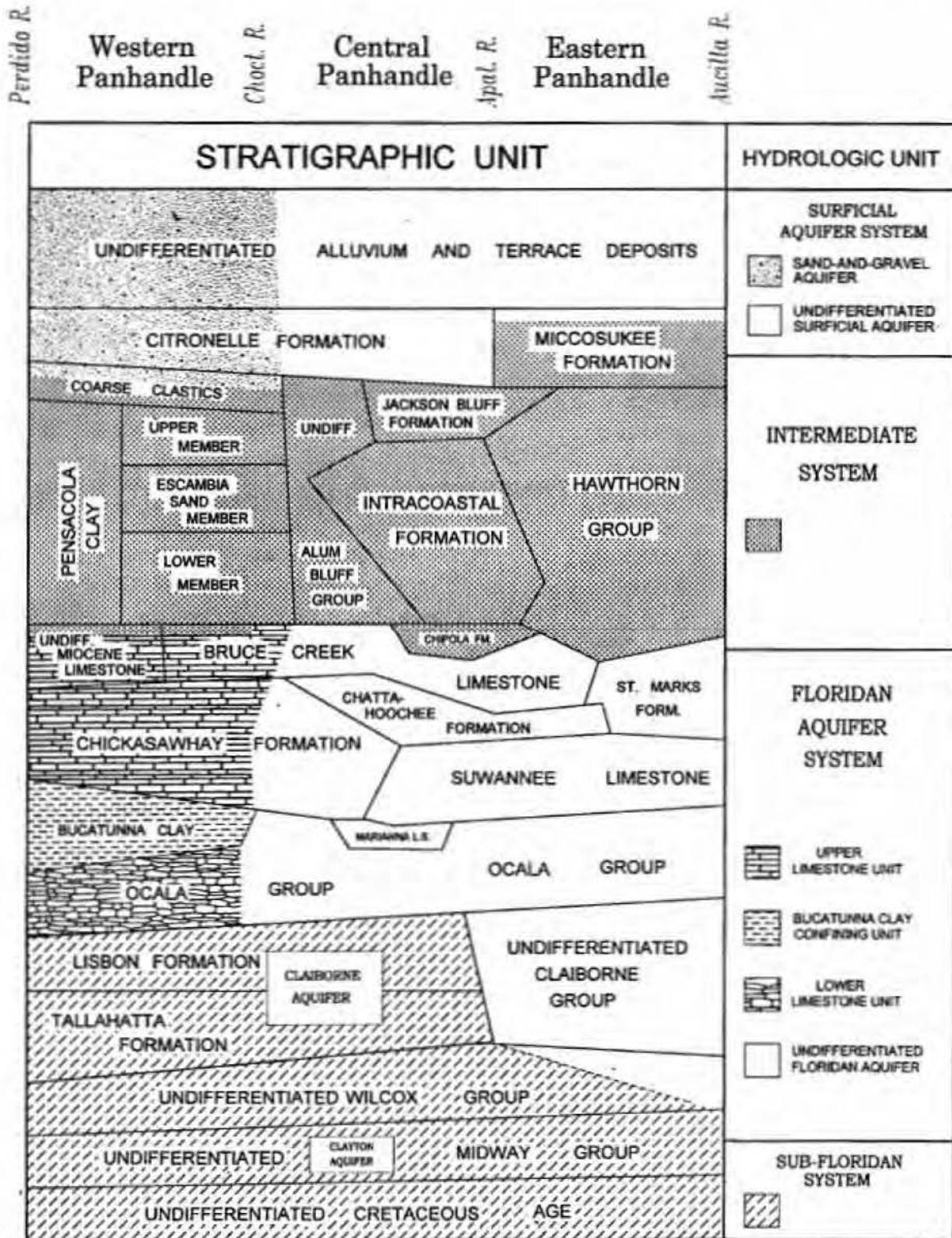
²³⁴ Internet, <http://coastal.er.usgs.gov/hurricanes/ivan/index.html>.

²³⁵ Hurricane Dennis & Hurricane Katrina, Final Report on 2005 Hurricane Season Impacts to Northwest Florida. April 2006. Florida Department of Environmental Protection, Division of Water Resource Management, Bureau of Beaches and Coastal Systems. pp. 1-6, 20, 23, 24.

²³⁶ Pendleton, Elizabeth A., Erika S. Hammar-Klose, E. Robert Thieler, S. Jeffress Williams. 2004. Coastal Vulnerability Assessment of Gulf Islands National Seashore (GUIS) to Sea-Level Rise. U.S. Geological Survey Open-File Report 03-108.

systems are: the Surficial Aquifer System (which includes the Sand and Gravel Aquifer); the Intermediate System; the Floridan Aquifer System (FAS); and the Sub-Floridan System. The Intermediate and Sub-Floridan systems function as groups of sediments that retard the vertical movement of groundwater. The Intermediate System limits the exchange of water between the Surficial Aquifer System and the FAS. The Sub-Floridan System forms the base of the FAS groundwater flow regime. The correlation of hydrogeologic systems to stratigraphy in the Panhandle Region of Florida is depicted in **Figure 3-1** below.²³⁷

²³⁷ Northwest Florida Water Management District, Water Resources Special Report 96-4. October 1996. Hydrogeology of the Northwest Florida Water Management District. pp. 2, 3.



NOTE: LITHOSTRATIGRAPHIC UNITS ARE NOT NECESSARILY SHOWN IN CORRECT CHRONOSTRATIGRAPHIC POSITION.

Figure 3-1. Correlation of Hydrogeologic Systems to Stratigraphy in the Panhandle Region

The Surficial Aquifer System changes from east to west across a transition zone trending from the eastern vicinity of Choctawhatchee Bay in Walton County, extending northeasterly through west-central Washington County. On the western side of the transition, the Surficial Aquifer System becomes thicker and contains a higher percentage of coarser-grained beds whose permeability is much greater than the corresponding unit to the east. In the western panhandle area, the Surficial Aquifer System is regionally distinctive and is referred to as the Sand and Gravel Aquifer. It resides in the Citronelle Formation and Miocene coarse clastics and constitutes the major source of groundwater in Escambia County. The Sand and Gravel Aquifer is composed of admixtures of sand, clay, silt, and gravel and exists under unconfined conditions. It is recharged locally by infiltrating rainfall. Due to highly permeable soils and the lack of effective confinement, the entire occurrence for the Aquifer is a recharge area. In coastal areas, the Sand and Gravel Aquifer discharges into the bays or the Gulf of Mexico. Due to its proximity to the land surface and lithologic characteristics, the Sand and Gravel Aquifer is highly vulnerable to contamination. Additionally, the lack of a regionally extensive confining unit exposes the entire aquifer to the impact of land surface activities.

In Escambia County, the Sand and Gravel Aquifer has been informally subdivided into three zones. The uppermost zone is composed of primarily fine sands and is referred to as the surficial zone. In the southern half of Escambia County, much of the surface discharge from the surficial zone occurs as discharge to the bays and bayous. Underlying the surficial zone is the low-permeability zone that locally, due to its clay and silt content, tends to provide confined to semi-confined conditions. The low-permeability zone acts to restrict the vertical flow of ground water between the overlying surficial zone and the underlying main-producing zone. The main-producing zone is the lowermost zone and is characterized by highly permeable coarse sand and gravel beds interspersed in places with fine sand and clayey sand beds. The majority of water withdrawn from the Sand and Gravel Aquifer in Escambia County is derived from the main producing zone. The ground water within this zone exists under semi-confined conditions. The thickness of the main-producing zone ranges between 90 ft and 290 ft in southern Escambia County.^{238, 239, 240}

The Intermediate System includes the Miocene age Pensacola Clay and the lower portion of the Miocene Coarse Clastics. The interbedded nature of the Pensacola Clay can result in water-bearing zones contained within the unit. These zones reflect relatively minor aquifers that exist under confined conditions. Due to their discontinuous and variable nature, the individual aquifers of the Intermediate System cannot be mapped over wide areas. In the western panhandle, however, the Intermediate System is a highly efficient confining unit limiting the exchange of waters between the Sand and Gravel Aquifer and the FAS. The Intermediate

²³⁸ Florida Geological Survey, Bulletin No. 46, p. 104.

²³⁹ Northwest Florida Water Management District, Water Resources Special Report 96-4. October 1996. Hydrogeology of the Northwest Florida Water Management District. pp. 4.

²⁴⁰ Wellhead Protection Area Delineation in Southern Escambia County, Florida. Water Resources Special Report 97-4. December 1977. Northwest Florida Water Management District. pp. 10-13.

System is composed of thick beds of clays and other low permeability sediments. Its thickness varies from 100 feet to over 1,000 feet. No significant water-bearing zones exist within the Intermediate System in the western panhandle.

The FAS is present throughout northwest Florida and its thickness increases eastward across the panhandle. The recharge area for the FAS in the western panhandle is that portion of Alabama north of the Florida state line to the updip of the FAS. In the westernmost portion of the panhandle, the FAS is split vertically by a regional confining unit, the Bucatunna Clay. The two portions of the FAS are referred to as the upper and lower limestones of the FAS. The upper limestone includes all or part of the Chickasawhay Formation, the Bruce Creek Limestone, and an undifferentiated Miocene limestone (see **Figure 3-1**). The lower limestone of the FAS includes the Ocala Limestone. In southern Escambia County, both the upper and lower FAS are highly mineralized and not readily available as a drinking water source. In Escambia County, mineralization steadily increases in a southwesterly direction in both the upper and lower FAS. In these areas, the Sand and Gravel Aquifer is the primary source for groundwater. The FAS throughout the coastal portions of the panhandle is, to a greater or lesser extent, susceptible to saltwater intrusion. This results from the fact that the FAS is, to varying degrees, hydraulically connected to the Gulf of Mexico. Furthermore, the Gulf is the ultimate discharge point for groundwaters moving through the FAS. Over time, fresh water moving through the discharge area and the saltwater have come into a state of quasi-equilibrium.

The Sub-Floridan System consists of low-permeability sediments that form the base of the FAS. The Sub-Floridan System primarily functions as a confining unit and any water-bearing zones contained within it are usually highly mineralized. There is no defined base to the Sub-Floridan System within northwest Florida.²⁴¹

The water supply for the Fort Pickens Military Reservation originally consisted of brick cisterns used to collect rainwater.^{242, 243} Subsequently, one deep and three shallow wells were constructed. These wells were identified as being artesian wells. The deep 4-inch diameter well was 331 feet below ground surface (ft bgs) and each of the 6-inch diameter shallow wells was 30 ft bgs. These wells appear to have been in place by March 1909. Water was initially stored in four 100,000 gallon cedar storage tanks and one 30,000 gallon tank. In 1920, a 10,000 gallon steel tank was constructed. By 1932, only two of the four cedar tanks remained. Water was distributed in 7,500 feet of cast iron and galvanized iron pipes ranging from one inch to eight inches in diameter.^{244, 245} The Coast Guard was granted a revocable permit on 15 October 1926 to install and maintain a pipeline from Battery Langdon to the Santa Rosa Station in order to connect into the Reservation water system.²⁴⁶ By April 1940, the 331-ft well had become contaminated and was no longer potable. The well had apparently become contaminated due to surface water or shallower groundwater leaking into the well. The shallower groundwater had a

²⁴¹ Northwest Florida Water Management District, Water Resources Special Report 96-4. October 1996. Hydrogeology of the Northwest Florida Water Management District. Pp. 4-7.

²⁴² Bearss, Edwin C. 1983. p. 767.

²⁴³ CP-031907-014

²⁴⁴ CP-031407-029

²⁴⁵ CP-032207-001

²⁴⁶ DC-032107-306

high salinity and high mineral content. The same situation had occurred prior to 1940, and a 4-inch liner was installed in the well. Installation of a new well was recommended as the existing well could not be rehabilitated.²⁴⁷ A new 10-inch diameter well was constructed during the first part of FY1940. Only one of the 100,000 gallon cedar tanks remained and was still being used. The tank was in poor condition and considered irreparable and contaminated. By June 1942, the existing water supply system was considered insufficient in quantity and pressure to supply all batteries and the Coast Guard Station and for normal use and fire protection.^{248, 249, 250}

By 1948, water was supplied to the Fort Pickens Military Reservation by a 587-foot deep, 10-inch cased well. The water was pumped by a 600-gallon per minute (gpm) Layne Turbine Pump with dual power supplied by a 50 horsepower (hp) General Electric induction motor and auxiliary Allis-Chalmers gasoline engine. The well pump discharged into two ground level steel pressure tanks of 13,030 and 15,300 gallon capacity. These tanks furnished the water supply to the Fort Pickens Military Reservation through a six inch underground system that was looped in the area where the buildings were located and extended in a single dead end line to the east end of the reservation. In August 1948, the Santa Rosa Coast Guard Station was being supplied water through the Fort Pickens Military Reservation's water system.²⁵¹ The facilities for the Fort Pickens Military Reservation were offered for sale subject to the condition that the wells and pumping equipment and the water main extending to the Coast Guard Station be left in place to provide continuous service to the Coast Guard.²⁵² The unneeded cast iron piping for the water system was to be disposed of to junk dealers. The Coast Guard wished to acquire a number of lengths of the cast iron pipe for their maintenance purposes.²⁵³

It appears that a 351-foot 12.75 outside diameter well was installed in December 1972. The well was installed by the Alton Powell Drilling Company for the Gulf Island National Seashore. No information was available on the location of the well.²⁵⁴ The Fort Pickens National Monument is currently served by one main and one auxiliary 8-inch diameter well. Each well is 300 feet deep. According to Mr. Ogden, these wells were installed in the 1960's (see Appendix L). The files for these wells, however, do not indicate the date the wells were installed or the formation they tapped.²⁵⁵

3.4.3.2 Surface Water

Water for Fort Pickens was originally secured from rain falling upon the terreplein, from which it was conducted into three or four brick cisterns, having a total capacity of 193,392 gallons.^{256, 257}

²⁴⁷ CP-031507-306

²⁴⁸ CP-031307-027

²⁴⁹ CP-031307-026

²⁵⁰ CP-031507-305

²⁵¹ CP-112003-011

²⁵² ATL-030907-089

²⁵³ ATL-030907-095

²⁵⁴ GINS-050907-001

²⁵⁵ GINS-050907-002

²⁵⁶ Bearss, Edwin C. 1983. p. 767.

²⁵⁷ CP-031907-014

Santa Rosa Island

United States Geological Survey (USGS) topographic mapping in conjunction with Environmental Systems Research Institute, Inc (ESRI) software was used for the analysis of FUDS property drainage patterns.²⁵⁸ Elevations cited herein are referenced to the National Geodetic Vertical Datum of 1929. The Fort Pickens Military Reservation is located on the western end of Santa Rosa Island, Escambia County, with the Gulf of Mexico to the south and Pensacola Bay to the north as shown in **Figure 3-2** below.



Figure 3-2. Fort Pickens Military Reservation Hydrological Setting

The center portion of Santa Rosa Island (Santa Rosa County) is separated from the mainland by Santa Rosa Sound, while the eastern end of the island (Okaloosa County) faces Choctawhatchee Bay to the north. According to topographic mapping, the ground elevation of the Fort Pickens Military Reservation ranges from about 0-20 feet with much of the surface consisting of sand dunes. A small wooded area exists on a portion of the FUDS property.

When viewed on USGS topographic maps at a scale of 1:100,000, the outline of Santa Rosa Island traces an irregular linear shape (approximately 9,905 acres). The two major water bodies to which surface water might ultimately drain are Pensacola Bay/Santa Rosa Sound/Choctawhatchee Bay to the north and the Gulf of Mexico to the south (see **Figure 3-2**

²⁵⁸ Environmental Systems Research Institute, Inc (ESRI). 2007. ArcMap 9.1. 7.5-Minute United States Geological Survey topographic mapping. ESRI GIS and Mapping Software, Redmonds, California.

above). In general, runoff from the Fort Pickens Military Reservation will ultimately flow to the surrounding waters of the Gulf of Mexico. Ponds and marshes are scattered throughout Santa Rosa Island, predominantly on the north (Bay) side of the island. It is likely that much of the island is subject to inundation from storm tides. Development on Santa Rosa Island alternates with public lands, with roads traversing the island from end to end. Some roads remain closed to traffic due to hurricane damage.²⁵⁹ The island contains the communities of Pensacola Beach, Navarre Beach, and Okaloosa Island.

Man-made drainage works associated with the roads and other development on the Reservation most likely redirect and channel runoff. The higher elevation portions of the western end of Santa Rosa Island, from Little Sabine Bay to the western edge, are located on the Gulf side of the island as depicted in **Figure 3-3** below.



Figure 3-3. Fort Pickens to Little Sabine Bay, Santa Rosa Island

Topographic mapping indicates two pond areas on the western end of this site on the bay side of the island and several marshes (see **Figure 3-3** above). Aerial photography shown in **Figure 3-4** below indicates a filled area in Little Sabine Bay, while topographic mapping does not (see **Figure 3-3** above).

²⁵⁹ Internet, <http://www.nps.gov/guis/planyourvisit/things2know.htm>, National Park Service.

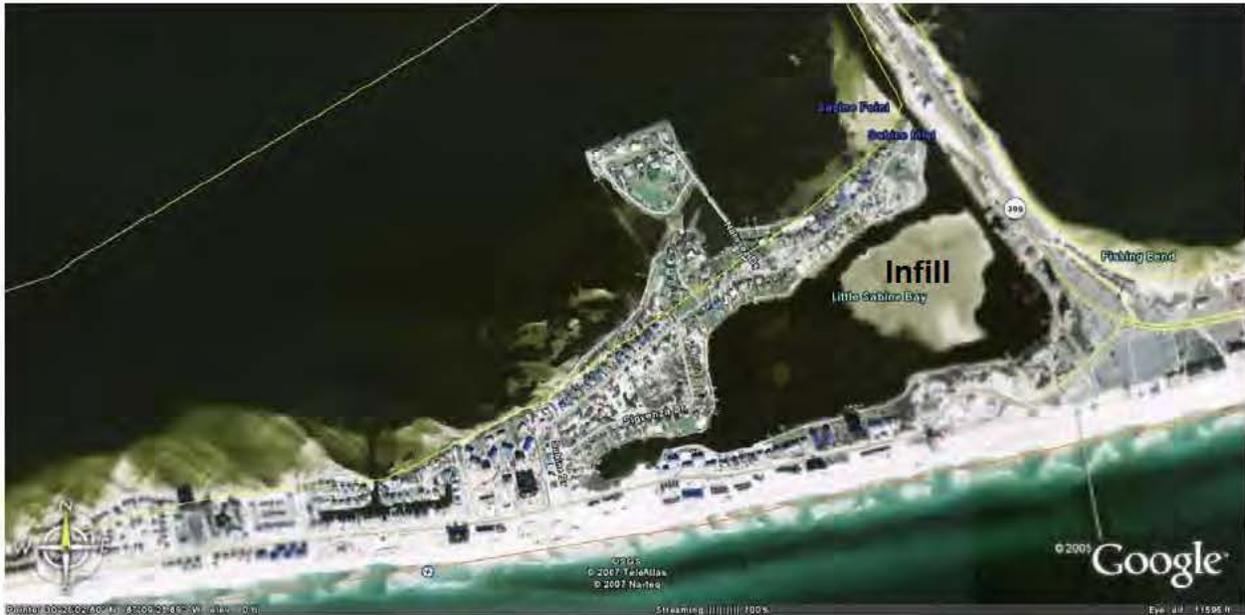


Figure 3-4. Little Sabine Bay, Santa Rosa Island, Aerial Photography

Flooding on the Fort Pickens Military Reservation could be caused by heavy rainfall, and potentially by tidal fluctuations from the coastal waters. Topographic mapping indicates that most of the land area at Fort Pickens drains to the bay side of the island as depicted in **Figure 3-5** below. No USGS stream gaging stations exist on or near the FUDS property.²⁶⁰

Because the FUDS property is very large and, thus, has a long perimeter, it is difficult to account for all possible paths taken by runoff. Thus, runoff from some peripheral portions of the Fort Pickens Military Reservation may flow into streams other than those shown in **Figure 3-5** below.

²⁶⁰ Internet, <http://waterdata.usgs.gov/fl/nwis/rt/>, United States Geological Survey.

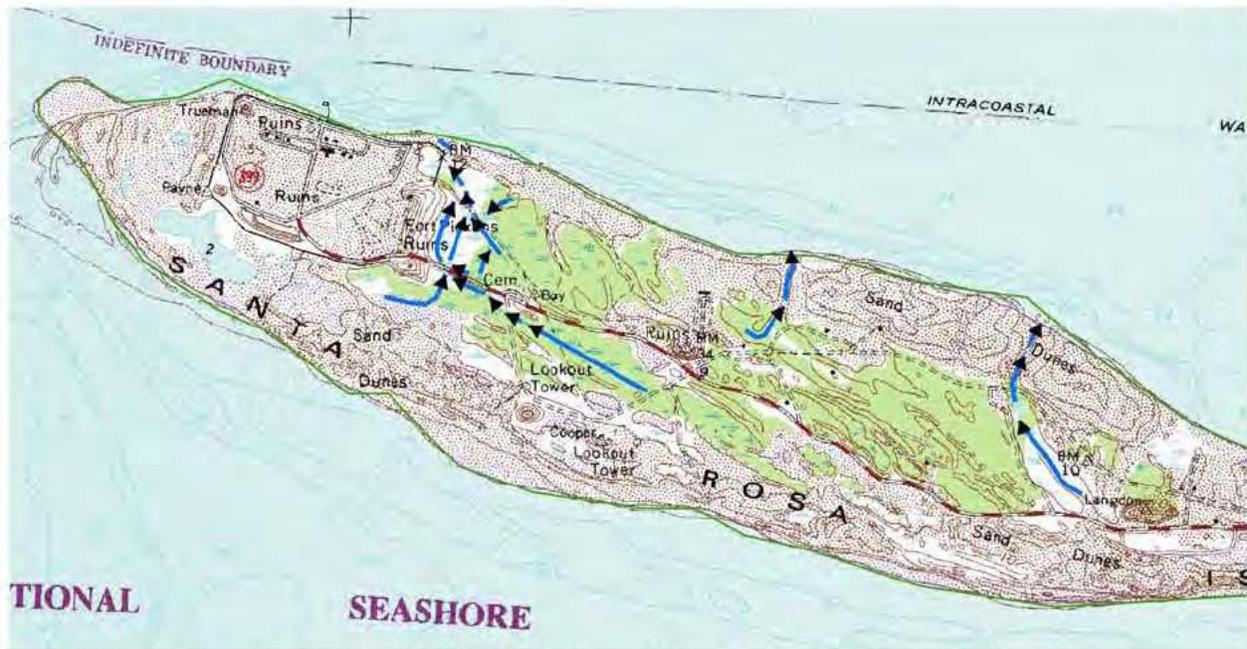


Figure 3-5. Fort Pickens Military Reservation Drainage Pathways

According to the National Ocean Service (NOS), the nearest tidal gaging station to the Fort Pickens Military Reservation is located at Pensacola Municipal Pier, on Pensacola Bay, Florida. Tidal data for this gaging station is presented in **Table 3-2** below. The data are referenced to Mean Lower Low Water (MLLW).²⁶¹

Table 3-2. Tidal Data for Pensacola Municipal Pier on Pensacola Bay, Florida (Station ID 8729840, NOS 2007)

Highest Observed Water Level (18 September 1926)	= 2.64
Mean Higher High Water (MHHW)	= 0.38
Mean High Water (MHW)	= 0.37
North American Vertical Datum, 1988 (NAVD)	= 0.10
Mean Sea Level (MSL)	= 0.19
Mean Tide Level (MTL)	= 0.19
Mean Low Water (MLW)	= 0.01
Mean Lower Low Water (MLLW)	= 0.00
Lowest Observed Water Level (06 January 1924)	= -0.74

²⁶¹ Internet, http://tidesandcurrents.noaa.gov/data_menu.shtml?unit=0&format=Apply+Change&stn=8729840+Pensacola%2C+FL&type=Datums, National Ocean Service.

Pensacola Bay System

The Pensacola Bay system includes five interconnected estuaries: Escambia Bay, Pensacola Bay, Blackwater Bay, East Bay, and Santa Rosa Sound and three major river systems: the Escambia, Blackwater, and Yellow Rivers. The system also includes numerous tributaries of these estuaries and rivers and the overall watershed. The watershed covers nearly 7,000 square miles, about one-third of which is in Florida. It includes the majority of Escambia, Santa Rosa, and Okaloosa counties, northwestern Walton County, and a substantial area of southern Alabama. The entire system discharges into the Gulf of Mexico, primarily through a narrow pass at the mouth of Pensacola Bay. The Escambia River is a major alluvial river that extends 240 miles northward from Escambia Bay to Bullock County, Alabama, as the Conecuh River. Its drainage area covers over 4,200 square miles, about 90 percent of which is within Alabama. The Yellow River extends 110 miles from the eastern shore of Blackwater Bay to a point northeast of Andalusia, Alabama. Its drainage basin covers 1,365 square miles, with 64 percent within northwest Florida. The Blackwater River drains approximately 860 square miles, of which 81 percent is in Florida's Santa Rosa and Okaloosa counties. The river originates north of Bradley, Alabama, flows about 60 miles, and discharges into Blackwater Bay. The estuarine component of the system covers approximately 144 square miles and extends approximately 20 miles inland from the Gulf of Mexico. Riverine and bay waters in Escambia County have been adversely affected by point and nonpoint source pollution, including municipal and industrial wastewater, widespread use of septic systems, and widespread nonpoint source pollution. The bayous that drain Pensacola receive significant urban stormwater runoff.

All waters of the State of Florida fall into one of five surface water classifications (62-302.400 F.A.C.) with specific criteria applicable to each class of water. In addition to its surface water classification, a water may be designated as an Outstanding Florida Water (OFW) (62-302.700 F.A.C.). An OFW is a water designated worthy of special protection because of its natural attributes. This special designation is applied to certain waters, and is intended to protect existing good water quality.²⁶² The Fort Pickens State Park Aquatic Preserve and Gulf Islands National Seashore have both been designated an OFW.²⁶³ The Fort Pickens State Park Aquatic Preserve was designated as an OFW on 1 March 1979 and has also been designated as an EPA Gulf of Mexico Ecological Management Site.^{264, 265}

Fort Pickens State Park Aquatic Preserve

The Fort Pickens State Park Aquatic Preserve was designated as an aquatic preserve on 2 November 1970 by the Florida Legislature. The Preserve is located in the southwestern corner of the Florida panhandle. This 34,000 acre preserve surrounds the western end of Santa Rosa Island and the eastern end of Perdido Key and is managed by the State of Florida Office of Coastal and Aquatic Managed Areas, Northwest Florida Aquatic Preserves. The submerged

²⁶² Internet, <http://www.dep.state.fl.us/water/wqssp/ofw.htm>.

²⁶³ District Water Management Plan. September 2005. Northwest Florida Water Management District. Program Development Series 2005-1. pp. 105, 106

²⁶⁴ Internet, <http://www.dep.state.fl.us/coastal/sites/ftpickens/info.htm>.

²⁶⁵ Ft. Pickens Aquatic Preserve Management Plan. 1992. Florida Department of Natural Resources. p. 19.

lands along the northern sides of these islands are characterized by shallow saline waters, continuous and patchy seagrass beds, and salt marshes. These communities provide habitat for wildlife and birds such as nesting sea turtles and shorebirds. Several species are listed as endangered or threatened. The land in many areas of the Coastal Lowlands is poorly drained due to a flat topography and associated high groundwater table.²⁶⁶

3.4.4 Climatological Data

Santa Rosa Island is a long barrier island located in the Gulf of Mexico, just off-shore and extending from Pensacola to Destin, Florida (approximately 50 miles). Santa Rosa Island separates Pensacola Bay from the Gulf of Mexico. Warm, wet weather predominates at the island.

According to the Air Force Combat Climatology Center, the nearest source of climatological data for the Fort Pickens Military Reservation is located at Naval Air Station (NAS) Pensacola, Florida (elevation 30 feet). Data were recorded at NAS Pensacola during 1945 through 1998. These data are summarized in **Table 3-3** below. The average annual snowfall at NAS Pensacola is zero inches.²⁶⁷

Table 3-3. Climatological Data for NAS Pensacola, Florida 1945-1998

Month	Temperature		Precipitation 1949-1991 Mean (inches)	Wind	
	Mean Minimum (°F)	Mean Maximum (°F)		Mean Speed (knots)	Prevailing Direction
January	46	61	4.4	8	N
February	48	64	5.0	9	N
March	54	69	5.5	9	N
April	59	74	4.1	9	S
May	67	82	3.8	8	S
June	73	88	4.7	7	S
July	76	90	6.9	6	SW
August	75	90	6.1	6	SS
September	72	86	6.6	7	N
October	61	79	4.0	7	N
November	54	70	3.3	7	N
December	47	63	3.9	8	N
Annual Mean	61	76	58.3	8	N

²⁶⁶ Northwest Florida Water Management District, Water Resources Special Report 96-4. October 1996. Hydrogeology of the Northwest Florida Water Management District. Pp. 1, 2.

²⁶⁷ Internet, <http://www.afccc.af.mil/>, Air Force Combat Climatology Center. Strategic Climate Information Service, Operational Climatic Data Summary.

Note: \$ = Percent calm > prevailing wind direction.

According to the National Climatic Data Center, the nearest location for which narrative climatic information has been developed is Pensacola Regional Airport (10 miles north of the Fort Pickens Military Reservation). The following Pensacola Regional Airport weather narrative should in general apply to Santa Rosa Island, keeping in mind that Santa Rosa Island is located directly on the Gulf of Mexico instead of inland on Pensacola Bay.

The City of Pensacola is situated on a somewhat hilly, sandy slope which borders Pensacola Bay, an expanse of deep water several miles in width. The Gulf of Mexico, about 6 miles distant, moderates the climate of Pensacola by tempering the cold of winter and causing cool and refreshing sea breezes during the daytime in summer. The average temperature for the summer months is around 80 degrees with an average daily range of 12.5 degrees. Temperatures of 90 degrees or higher occur on the average of 39 times yearly. A temperature of 100 degrees or higher occurs occasionally. The average winter temperature is in the low to mid 50s with an average daily range of 15.7 degrees. On the average, the temperature falls to freezing or below on only nine days of the year. The average occurrence of the last temperature as low as 32 degrees in spring is mid-February, and the average earliest occurrence in autumn is early December, making the average growing season 292 days. Severe cold waves are rather infrequent. Rainfall is usually well distributed through the year with the greatest frequency normally being in July and August. The greatest monthly rainfall occurs, on average, in July and least in October. Much of the rainfall in summer occurs during the daylight hours and comes in the form of thunderstorms, often producing excessive amounts. Winter rains are frequently lighter, but extend over longer periods. Snow has occurred in about 30 percent of the winters but measurable amounts are less frequent.

A moderate sea breeze usually blows off the Gulf of Mexico during most of the day in summer. Seriously destructive hurricanes are occasionally experienced in the vicinity of Pensacola, but loss of life is rare. Hurricanes have occurred from early July to mid-October.²⁶⁸

Santa Rosa Island has experienced a number of major hurricanes in the past 11 years. The U.S. Army Corps of Engineers completed a beach renourishment project at eastern Santa Rosa Island's Navarre Beach in 2006.²⁶⁹

²⁶⁸ Internet, <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwDI~StnSrch~StnID~10002256#ABOUT>, National Climatic Data Center.

²⁶⁹ Internet, <http://www.santarosa.fl.gov/navarre/renourishment.html>, Santa Rosa County Government.

3.4.5 Local and Regional Natural Resources

Fort Pickens Military Reservation

The Florida Fish and Wildlife Conservation Commission (FWC) has indicated that a sizeable portion of the FUDS property is a biodiversity hot spot of seven or more species. These biodiversity hot spots are depicted in **Figure 3-6** below.

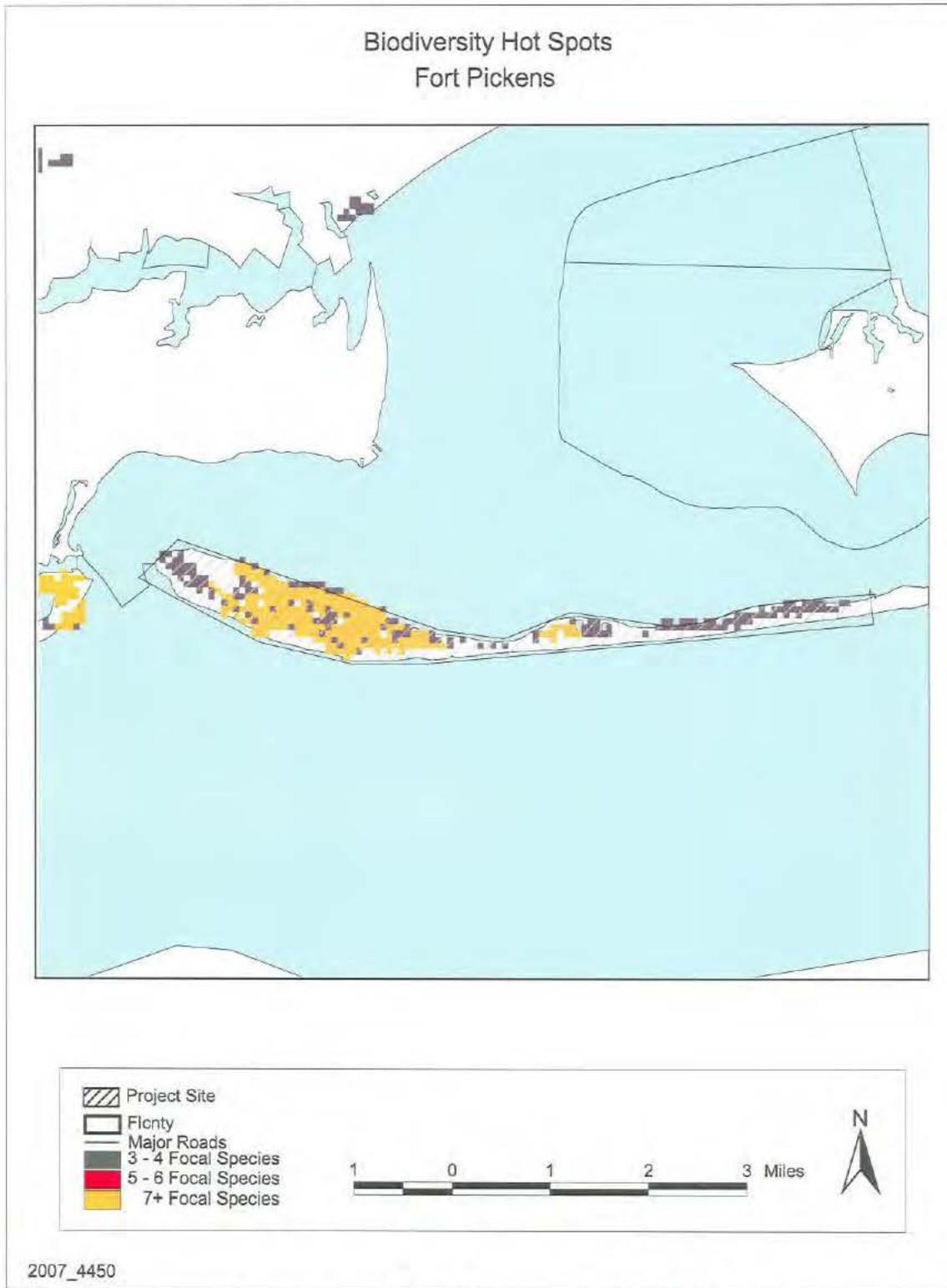


Figure 3-6. Fort Pickens Biodiversity Hot Spots

The various land cover types associated with the FUDS property are depicted in **Figure 3-7** below.²⁷⁰

²⁷⁰ Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida. Official correspondence dated 29 March 2007.



Figure 3-7. Land Cover Types at the Fort Pickens Military Reservation

Pensacola Bay

The Pensacola Bay system supports many biological communities and species characteristic of a Gulf Coastal Plain riverine and estuarine system. Estuarine habitats include benthic microalgae communities, seagrass beds, oyster beds, salt marshes, planktonic and pelagic communities, and unvegetated soft bottoms. Freshwater habitats include alluvial and blackwater rivers, bottomland hardwood forests, tupelo-cypress swamps, seepage swamps, and tidal fresh marshes. Major land uses include forestry, agriculture, military, public conservation and recreation, and urban development. Prominent activities on the rivers and estuaries include recreational and commercial fisheries, boating, commercial shipping, military training, wildlife observation, and other recreational and commercial activities.

For many years, the Pensacola Bay system showed few visible signs of being affected by these activities. However, in the 1960s and 1970s, massive, repeated fish kills occurred in Escambia and Pensacola bays and their bayous. During this period, there were dramatic decreases in seafood harvests, and most seagrass beds disappeared. Through regulatory activities and studies initiated by the USEPA during the 1970s, water quality in this area did improve. Point source pollution, stemming from direct discharges into the Bay, and nonpoint source pollution, resulting from stormwater runoff, continue to be major problems in the urban bayous. Plans to manage stormwater are being implemented to prevent further pollution. Intensive urban development has contributed to the increased stormwater runoff into Pensacola Bay. Contaminants also enter the Bay area from upstream along the Escambia, Conecuh, Yellow, Shoal and Blackwater rivers in Florida and Alabama.²⁷¹

3.4.5.1 Wildlife

Upland animal species are somewhat limited in number on Santa Rosa Island due to the lack of diversity in vegetation and difficulty of access from mainland areas. No large terrestrial animals are common on the island.

Common smaller native mammal species observed within the Gulf Islands National Seashore include marsh rabbit (*Sylvilagus palustris*), eastern cottontail rabbit (*Sylvilagus floridanus*), opossum (*Didelphis virginiana*), squirrel (*Sciurus carolinensis*), skunks (*Mephitis mephitis*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), eastern wood rats (*Neotoma floridana*), hispid cotton rats (*Sigmodon hispidus*), eastern moles (*Scalopus aquaticus*), southeastern pocket gophers (*Geomys pinetis*), short-tailed shrews (*Blarina carolinensis*), and a variety of bats, including southeastern myotis (*Myotis austroriparius*), Rafinesque's big-eared bat (*Corynorhinus rafinesquii*). River otters (*Lutra Canadensis*) can also be found in the canals near Fort Pickens.

Gulf Islands National Seashore has over 280 species of birds that use the islands for loafing, nesting, feeding, wintering, or migratory rest stops. These birds include songbirds, waterfowl, wading birds, birds of prey, marine birds, and shorebirds. Sandpipers, herons, egrets, ospreys,

²⁷¹ District Water Management Plan. September 2005. Northwest Florida Water Management District. Program Development Series 2005-1. pp. 105, 106

marsh wrens, terns, gulls, and several species of rails are just a few species that utilize the island habitats.

Shorebird nesting, foraging, and loafing areas are located along the shoreline. Great blue heron (*Ardea Herodias*) and night heron (*Nyctanassa sp.*) nesting and roosting areas are located on Santa Rosa Island. Osprey (*Pandion haliaetus*) also nest on Santa Rosa Island.

The national seashore implements seasonal closures that are reviewed on an annual basis to protect valuable shorebird habitat from impacts resulting from public use. These areas are used each year by nesting shorebirds. These closures are necessary to protect shorebirds, eggs, and chicks from human disturbance. Any less restrictive measures would permit public access into areas where shorebirds build shallow, highly disguised nests in sand and deposit small, off-white colored eggs, which are extremely difficult to see, resulting in a high probability of the loss of wildlife.

Common amphibians and reptiles found in the national seashore include the eastern glass lizard (*Ophisaurus ventralis*), anole (*Anolis sp.*), sand and ground lizard (*Sceloporus sp. Scincus lateralis*), five lined skink (*Eumeces inexpectatus*), American alligator (*Alligator mississippiensis*), and the alligator snapping turtle (*Macrochelys temminckii*). In addition, the national seashore provides habitat for four species of sea turtles, including Atlantic loggerhead (*Caretta caretta*), green (*Chelonia mydas*), Kemp's ridley (*Lepidochelys kempii*), and leatherback (*Dermochelys coriacea*).

Non-native wildlife species observed in the Gulf Islands National Seashore include Norway rat (*Rattus norvegicus*), armadillo (*Dasypus novemcinctus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and black rat (*Rattus rattus*).

3.4.5.2 Marine Mammals

Twenty-nine marine mammals are native to the Gulf of Mexico: 28 pelagic species of whales and dolphins and one sirenian, the Florida manatee. Three species commonly occur at Gulf Islands National Seashore: the bottlenose dolphin (*Tursiops truncatus*), Atlantic spotted dolphin (*Stenella frontalis*), and the Florida manatee. The bottlenose dolphin (*Tursiops truncatus*), and the Atlantic spotted dolphin (*Stenella frontalis*) are the two most common marine mammals found in the Gulf of Mexico. Both species feed primarily on fish, squid and crustaceans. While *S. frontalis* spends the majority of its life offshore, *T. truncatus* often travel into coastal bays and inlets for feeding and reproduction. Whales are rare transients in the Gulf Islands National Seashore waters.

3.4.5.3 Fish

More than 200 species of fish occur within the waters of Gulf Islands National Seashore. The most abundant fish are anchovies (*Anchoa sp.*). Silversides (*Menidia sp.*) are abundant in the shallow nearshore waters. These small species, among others, provide food for larger predators. Killifish (*Fundulus sp.*), sailfin molly (*Poecilia latipinna*), and mosquito fish (*Gambusia affinis*), live in ponds and lagoons, and along the beaches. Myriad larval and young fish occupy the

shallow waters around the islands and find food and protection in the seagrass beds. These include most of the important sport and commercial species that spawn further offshore and spend the early parts of their lives in estuarine nursery areas.

Numerous commercially and recreationally important species occur within the waters of the Gulf Islands National Seashore. Speckled sea trout (*Cynoscion nebulosus*) spawn around the islands and are often the most sought after sport fish. The red drum (*Sciaenops ocellatus*), sand sea trout (*Cynoscion arenarius*), kingfish, mackerel, jack, pompano, flounder, bluefish (*Pomatomus saltatrix*), snapper and many other species provide excellent surf and troll fishing. Cobia (*Rachycentron canadum*), locally known as lemon fish, and tarpon (*Megalops atlanticus*) are among the large game fish.

Several species of sharks occur in seashore waters, including hammerhead (*Sphyrna sp.*), bonnethead (*Sphyrna tiburo*), Atlantic sharpnose (*Rhizoprionodon terraenovae*), bull (*Carcharhinus leucas*), and blacktip (*Carcharhinus limbatus*). Several species of rays, including Southern stingrays (*Dasyatis Americana*), manta rays (*Manta birostris*), and spotted eagle rays (*Aetobatus narinari*), occur as well. Southern stingrays are the most abundant and commonly feed and rest in shallow waters.

Several species of shellfish that are of commercial, recreational, and ecological importance occur in Gulf Islands National Seashore waters, including blue crabs (*Callinectes sapidus*), stone crabs (*Menippe mercenaria*), and many species of shrimp. Water bottoms around the seashore in the Florida and Mississippi districts are important nursery areas for most species of shellfish. Blue crabs are caught recreationally. Three species of shrimp [brown shrimp (*Penaeus aztecus*), white shrimp (*Penaeus setiferus*), and pink shrimp (*Penaeus duorarum*)] occur at various seasons and life stages in seashore waters. Commercial shrimping is not allowed within the national seashore boundaries. Stone crab juveniles are common in the Pensacola Bay system waters.

The 1996 Magnuson-Stevens Act requires cooperation among the National Marine Fisheries Service (NMFS), fishers, and federal and state agencies to protect, conserve, and enhance essential fish habitats. Essential fish habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 USC 1802(10)). EFH occurs for several species of fish in the Gulf Islands National Seashore. An EFH has not yet been designated for most species occurring in the Gulf of Mexico.

NOAA's Estuarine Living Marine Resources (ELMR) Program developed a database on the distribution, relative abundance, and life history characteristics of ecologically and economically important fishes and invertebrates in the nation's estuaries. Based on ELMR data, NOAA has designated EFH for more than 30 estuaries in the northern Gulf of Mexico for a number of species of finfish and shellfish. EFH occurs for several species of fish and shellfish in and around Gulf Islands National Seashore waters. Provided in **Table 3-4** below is a summary of essential fish habitat for key species that occur in Pensacola Bay.

Table 3-4: Essential Fish Habitat for Key Species That Occur in Pensacola Bay

Species	Pensacola Bay
Brown Shrimp <i>Penaeus aztecus</i>	X
Gray Snapper <i>Lutjanus griseus</i>	X
Gulf Stone Crab <i>Menippe adina</i>	X
Pink Shrimp <i>Penaeus duorarum</i>	X
Red Drum <i>Sciaenops ocellatus</i>	X
Spanish Mackerel <i>Scomberomorus maculatus</i>	X
Spiny Lobster <i>Panulirus argus</i>	
White shrimp <i>Penaeus setiferus</i>	X

Additional invertebrates of ecological importance exist within the waters of Gulf Island National Seashore, although essential fish habitat has not been designated for these species. These species include horseshoe crab (*Limulus polyphemus*), mole crab (*Emerita talpoida*), fiddler crab (*Uca sp.*), several species of hermit crabs, coquina (*Donax sp.*), several species of conch (*Strombus sp.*), oyster drill (*Urosalpinx cinerea*), and various copepods, isopods, and amphipods.

3.4.5.4 Plants

The beach dune community on Santa Rosa Island is composed of two separate plant associations. Hardy pioneer plants, mainly sea oats (*Uniola paniculata*), are found in the harsher foredune area. The roots of sea oats serve as the anchoring system for the dunes. A more diverse plant community, including beach grass (*Uniola paniculata*), bunch grass (Family Poaceae), prickly-pear cactus (*Opuntia humifusa*), and golden aster (*Chrysopsis gossypina*), is found on the protected lee side of the dunes.

Fresh and salt marsh communities constitute the majority of wetland areas. Marsh wetlands form in low spots or inlets throughout the national seashore. Fresh water marsh areas are often isolated or associated with ponds, swales, or abandoned mosquito control ditches. True freshwater marshes are fed by rainwater, as opposed to tidal activity that supports salt marshes.

The salt marsh environment consists of salt-tolerant wetland plants growing along the sound and bay shores. It is divided into three general zones: high marsh, brackish marsh, and tidal marsh. High marsh areas are only inundated during the highest tides, but stay moist due to the salt-marsh grass ability to provide shade and reduce the rate of evaporation. The brackish marsh environment contains a combination of salt and fresh waters, and water levels fluctuate with the tides. The most productive of the marsh zones, tidal marshes are inundated twice daily.

Dominant salt marsh vegetation within the national seashore is composed of black rush, marsh spike grass, and saltwort. Salt marsh areas can be scattered and small, but some are more extensive, such as Big Sabine at Santa Rosa Island and the Fort Pickens ponds.²⁷²

Submerged aquatic vegetation is a diverse assembly of rooted macrophytes that grow in shallow water, under the surface, but not above it. Submerged aquatic vegetation beds consist of several species of seagrasses. Seagrasses are very important in stabilizing bottom sediments and improving water clarity by trapping the fine particles that would otherwise remain suspended by wave and current action. Seagrasses bind shallow water sediments with their roots and rhizomes and baffle wave and current energy with their leafy canopy.

Seagrasses form the basis of the food web in clear water systems and provide important nursery habitat for many species. Larval and juvenile forms of fishes and invertebrates find protection in seagrass beds and many species of fish, mammals, turtles, and birds use these areas as feeding habitat. Further, the seagrass beds occurring within Gulf Islands National Seashore and surrounding waters are vital nursery areas for Gulf of Mexico fisheries. The predominant habitat types of the Preserve are subtidal and intertidal communities. The subtidal communities consist primarily of seagrass and aquatic algae. The intertidal communities are salt marshes. The subtidal vegetation in the Preserve is composed mostly of turtlegrass (*Thalassia testudinum*), shoal grass (*Halodule wrightii*), manatee grass (*Syringodium filiforme*) and widgeon grass, (*Ruppia maritima*). The grass beds serve as nursery areas for various shrimp and fish species that are commercially or recreationally important in the area. Salt marsh vegetation includes black needlerush (*Juncus roemerianus*), smooth cordgrass (*Spartina alterniflora*), saltmeadow cordgrass, sea oxeye daisy, saltgrass (*Distichlis spicata*), hurricanegrass, knotgrass, and coastal dropseed. Open water habitat includes estuarine and oceanic. The barrier islands provide a crucial stop over spot for migrating birds coming from South America.^{273, 274, 275}

3.4.5.5 Rare, Threatened, and Endangered Species

Rare, threatened, and endangered species assumed to be found at or in the vicinity of the Fort Pickens State Park Aquatic Preserve are presented in **Table 3-5** below.^{276, 277, 278, 279}

²⁷² Draft Environmental Assessment: Restore Visitor Access to Fort Pickens Area, Santa Rosa Island, Gulf Islands National Seashore, Escambia County, Florida. October 2006. National Park Service. pp. 34, 35.

²⁷³ Internet, <http://www.dep.state.fl.us/coastal/sites/ftpickens/info.htm>

²⁷⁴ Ft. Pickens Aquatic Preserve Management Plan. 1992. Florida Department of Natural Resources. pp. 20-26, 37-39.

²⁷⁵ Draft Environmental Assessment: Restore Visitor Access to Fort Pickens Area, Santa Rosa Island, Gulf Islands National Seashore, Escambia County, Florida. October 2006. National Park Service. pp. 34, 35.

²⁷⁶ Internet, <http://www.dep.state.fl.us/coastal/sites/ftpickens/info.htm>

²⁷⁷ Ft. Pickens Aquatic Preserve Management Plan. 1992. Florida Department of Natural Resources. pp. 20-26, 37-39.

²⁷⁸ Draft Environmental Assessment: Restore Visitor Access to Fort Pickens Area, Santa Rosa Island, Gulf Islands National Seashore, Escambia County, Florida. October 2006. National Park Service. pp. 34, 35, 39-46.

²⁷⁹ Florida Natural Areas Inventory, 2007 [ONLINE] available at <http://www.fnai.org/data>

Table 3-5. Rare, Threatened, and Endangered Species Associated with the Fort Pickens State Park Aquatic Preserve

Common Name	Scientific Name	State	Federal
REPTILES			
American alligator	<i>Alligator mississippiensis</i>	SSC	T (s/a)
Loggerhead turtle	<i>Caretta caretta caretta</i>	T	T
Green turtle	<i>Chelonia mydas mydas</i>	E	E
Leatherback turtle	<i>Dermochelys coriacea</i>	E	E
Kemp's ridley	<i>Lepidochelys kemp</i>	E	E
Alligator snapping turtle	<i>Macroclmys temminckii</i>	SSC	n/a
Gopher tortoise	<i>Gopherus polyphemus</i>	SSC	n/a
BIRDS			
Southeastern snowy plover	<i>Charadrius alexandrinus tenuirostris</i>	T	n/a
Piping plover	<i>Charadrius melodus</i>	T	T
Little blue heron	<i>Egretta caerulea</i>	SSC	n/a
Snowy egret	<i>Egretta thula</i>	SSC	n/a
Reddish egret	<i>Egretta rufescens</i>	SSC	n/a
Tricolored heron	<i>Egretta tricolor</i>	SSC	n/a
Peregrine falcon	<i>Falco peregrinus</i>	E	T
Southeastern American kestrel	<i>Falco sparverius paulus</i>	T	n/a
American oystercatcher	<i>Haematopus palliatus</i>	SSC	n/a
Wood stork	<i>Mysteria americana</i>	E	E
Brown pelican	<i>Pelicanus occidentalis</i>	SSC	n/a
Least tern	<i>Sterna antillarum</i>	T	n/a
Black skimmer	<i>Rhynchops niger</i>	SSC	n/a
Osprey	<i>Pandion haliaetus</i>	SSC	n/a
FISH			
Gulf sturgeon	<i>Acipenser oxyrinchus</i>	SSC	n/a
Saltmarsh topminnow	<i>Fundulus jenkinsi</i>	SSC	n/a
MAMMALS			
Manatee	<i>Trichechus manatus latirostrus</i>)		E
Santa Rosa beach mouse	<i>Peromyscus polionotusleucocephalus</i>	UR2	UR2
INVERTEBRATES			
Elkhorn coral	<i>Acropora palmata</i>		T
Staghorn coral	<i>Acropora cervicornis</i>		T
PLANTS			
Cruise's golden aster	<i>Chrysopsis cruiseana</i>	E	n/a

Common Name	Scientific Name	State	Federal
Godfrey's golden aster	<i>Chrysopsis godfreyi</i>	E	
Large-leaved jointweed	<i>Polygonella macrophylla</i>	T	n/a

State listings are taken from the Florida Fish and Wildlife Conservation Commission or as with plants Florida Department of Agriculture. Federal listings are taken from the United States Fish and Wildlife Service. E= Endangered. T= Threatened. T (s/a) = Threatened due to similarity in appearance. SSC= Species of Special Concern. UR= Under review. n/a= information not available or no designation listed.

NMFS species of concern are presented in Table 3-6 below.²⁸⁰

²⁸⁰ National Marine Fisheries Service, Southeast Regional Office. Official correspondence dated 23 March 2007.



Florida-Gulf

Candidate Species ²	Scientific Name
None	

Species of Concern ³	Scientific Name
Fish	
Alabama shad	<i>Alosa alabamae</i>
dusky shark	<i>Carcharhinus obscurus</i>
largetooth sawfish	<i>Pristis pristis</i>
night shark	<i>Carcharhinus signatus</i>
saltmarsh topminnow	<i>Fundulus jenkinsi</i>
sand tiger shark	<i>Carcharias taurus</i>
speckled hind	<i>Epinephelus drummondhayi</i>
Warsaw grouper	<i>Epinephelus nigritus</i>
white marlin	<i>Tetrapturus albidus</i>
Invertebrates	
ivory bush coral	<i>Oculina varicosa</i>

² The Candidate Species List has been renamed the Species of Concern List. The term "candidate species" is limited to species that are the subject of a petition to list and for which NOAA Fisheries Service has determined that listing may be warranted (69 FR 19975).

³ Species of Concern are not protected under the Endangered Species Act, but concerns about their status indicate that they may warrant listing in the future. Federal agencies and the public are encouraged to consider these species during project planning so that future listings may be avoided.

Table 3-6. National Marine Fisheries Service Species of Concern

Manatee

The Florida manatee (*Trichechus manatus latirostrus*), a subspecies of the West Indian manatee, is a large gray or brown aquatic mammal native to the United States in Florida, Georgia, and Puerto Rico. Manatees are found in shallow rivers, estuaries, and inshore coastal areas where they feed on seagrasses and other aquatic vegetation. During the winter months, manatees migrate to the warmer waters of south Florida or form large aggregations in natural springs and industrial outfalls where water temperatures are elevated.

Because of the decline in manatee populations, the U.S. Fish and Wildlife Service (USFWS) has listed the manatee as an endangered species. During the 2003 annual manatee count in Florida, 1,299 manatees were counted along Florida's Gulf Coast. Manatee sightings are rare in the Gulf of Mexico and Pensacola Bay, but have been documented. Most manatee sightings are in the waters of the Gulf of Mexico, though some individuals have been documented in Pensacola Bay and likely some in the area north of Santa Rosa Island and the Perdido Key area.^{281, 282}

Santa Rosa Beach Mouse

The Santa Rosa beach mouse (*Peromyscus polionotus leucocephalus*) is a state-listed species of concern in Florida and is found only on Santa Rosa Island. It inhabits both beach and interior dunes that are vegetated with sea oats and other typical vegetation. Storm damage, human destruction of habitat and predation by introduced species are potential threats to populations. There are a total of three known populations at the extreme ends and middle of the island.²⁸³

Prior to the 2004 and 2005 hurricane seasons, the status of the Santa Rosa beach mouse was considered stable because the majority of its occurrence is on the Gulf Islands National Seashore and Eglin Air Force Base. These protected lands are managed for natural resource conservation and are not at risk from coastal development, a major threat to beach mice. Recent storms, however, have affected habitat occupied by the Santa Rosa beach mouse, flattening dunes and reducing available food source vegetation. The current species status is unknown. An increase in impacts to the beach mouse that significantly threatens the population stability could result in the need for Federal protection.²⁸⁴

American Alligator

Formerly on the federal endangered species list, the American alligator (*Alligator mississippiensis*) is now considered fully recovered and is listed as threatened due to similarity of

²⁸¹ Draft Environmental Assessment: Restore Visitor Access to Fort Pickens Area, Santa Rosa Island, Gulf Islands National Seashore, Escambia County, Florida. October 2006. National Park Service. pp. 40-47.

²⁸² U.S. Fish and Wildlife Service, Panama City, Florida; Official correspondence (Consultation Number 4-P-07-104), 6 March 2007.

²⁸³ Draft Environmental Assessment: Restore Visitor Access to Fort Pickens Area, Santa Rosa Island, Gulf Islands National Seashore, Escambia County, Florida. October 2006. National Park Service. pp. 40-47.

²⁸⁴ U.S. Fish and Wildlife Service, Panama City, Florida; Official correspondence (Consultation Number 4-P-07-104), 6 March 2007.

appearance with other crocodilians. The state of Florida lists the alligator as a species of special concern. The American alligator is present in wetlands in the Fort Pickens Unit. The Gulf Islands National Seashore occasionally receives reports of alligators sighted on the beach. The National Seashore does not have any monitoring data documenting population (relative abundance and density) trends for this species.

Sea Turtles

Four species of sea turtles occur in the waters of Gulf Islands National Seashore: the Atlantic loggerhead, green, Kemp's Ridley, and leatherback. Each of these species is listed as federally threatened or endangered. Sea turtle populations have been adversely impacted due to loss and alteration of nesting habitat, increased mortality from boat strikes, and entanglement in commercial fishing gear. Each year, numerous adult and sub-adult sea turtles are found dead in the National Seashore and surrounding waters. Causes of death include ingestion of commercial fishing longline hooks and line, boat strikes, drowning in commercial fishing gear, and natural causes.

Sea turtles are primarily present in Gulf of Mexico waters. Jellyfish are a common sea turtle prey item and may attract sea turtles into the area north of Santa Rosa Island. Additionally, green turtles may be attracted to feed in the seagrass beds north of Santa Rosa Island.

On a seasonal basis, sea turtles are present in National Seashore waters in the spring, summer and fall, until cold weather drives them to warmer southern waters. The National Seashore does not have monitoring data on the abundance and distribution of sea turtles in national seashore waters. A loggerhead turtle satellite tagging program revealed that some individual turtles remain in area waters year round.

Sea turtles also nest on the beaches within the Gulf Islands National Seashore during the spring and summer months. Loggerhead turtles comprise the majority of sea turtle nesting, although green turtles occasionally nest as well, and five Kemp's ridley nests and one leatherback nest have been documented in recent years. Nests are marked, dated, and watched by staff biologists and volunteers.²⁸⁵

Between 2000 and 2006, 38 loggerhead sea turtle nests were documented on the Fort Pickens Unit of the Gulf Islands National Seashore. Although in fewer numbers, green, leatherback, and Kemp's Ridley sea turtles have also nested on the beaches within the Gulf Islands National Seashore. Sea turtle nesting season is from May 1 to October 31. The nesting beach at the Gulf Islands National Seashore occurs between the lower wet beach and the coastal roadway. The USFWS and NMFS share jurisdiction for sea turtles and divide Section 7 consultation responsibility depending on the habitat. The USFWS handles sea turtles on land when they

²⁸⁵ Draft Environmental Assessment: Restore Visitor Access to Fort Pickens Area, Santa Rosa Island, Gulf Islands National Seashore, Escambia County, Florida. October 2006. National Park Service. pp. 40-47.

come ashore to nest and NMFS would have responsibility for sea turtles that are in the surrounding Sound and Gulf waters.²⁸⁶

Gopher Tortoise

The gopher tortoise (*Gopherus polyphemus*), while not federally listed for Florida, is a species of special concern in the state. Gopher tortoises live in extensive burrow systems in dry upland habitats in longleaf pine sandhills, xeric oak hammocks, scrub, pine flatwoods, dry prairies, and coastal dunes. Habitat loss is the largest threat to the species. Gopher tortoises are rare in the Fort Pickens Unit.

Fish Species

The Gulf sturgeon (*Acipenser oxyrinchus*) inhabits coastal rivers, bays, and the northern Gulf of Mexico from Louisiana to Florida. In 1991, the USFWS listed the Gulf sturgeon as a threatened species. The USFWS and NMFS recently designated critical habitat essential to the conservation of the Gulf sturgeon. Nearshore waters within one nautical mile of the mainland from Pensacola Pass to Apalachicola Bay and the Perdido Key area and the area north of Santa Rosa Island were designated as critical habitat, as these areas are believed to be important migratory pathways between Pensacola Bay and the Gulf of Mexico for feeding and genetic exchange (Critical Habitat Unit 9 Pensacola Bay and Unit 11 Florida Nearshore Gulf of Mexico). The USFWS and NMFS share jurisdiction for the Gulf sturgeon and divide Section 7 consultation responsibility depending on the habitat and action agency. Units 9, 10, and 11 are depicted in **Figures 3-8, 3-9, and 3-10** below.^{287, 288}

²⁸⁶ U.S. Fish and Wildlife Service, Panama City, Florida; Official correspondence (Consultation Number 4-P-07-104), 6 March 2007.

²⁸⁷ Draft Environmental Assessment: Restore Visitor Access to Fort Pickens Area, Santa Rosa Island, Gulf Islands National Seashore, Escambia County, Florida. October 2006. National Park Service. pp. 40-47.

²⁸⁸ U.S. Fish and Wildlife Service, Panama City, Florida; Official correspondence (Consultation Number 4-P-07-104), 6 March 2007.

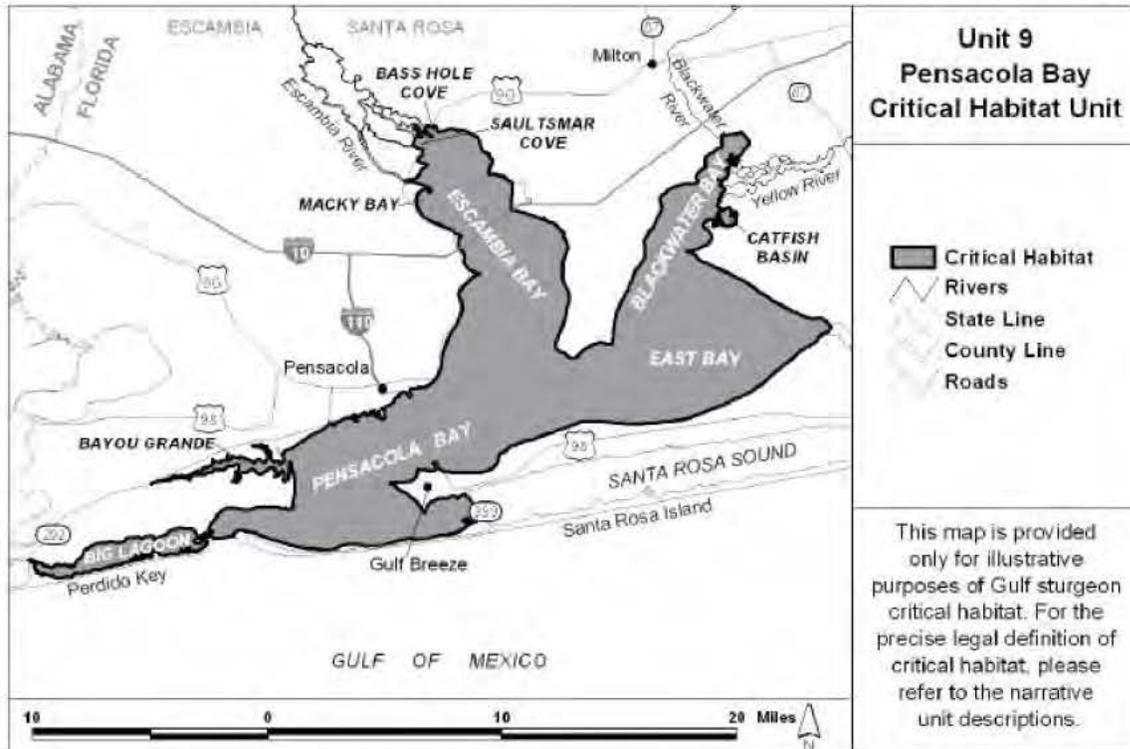


Figure 3-8. Unit 9, Pensacola Bay Gulf Sturgeon Critical Habitat Unit

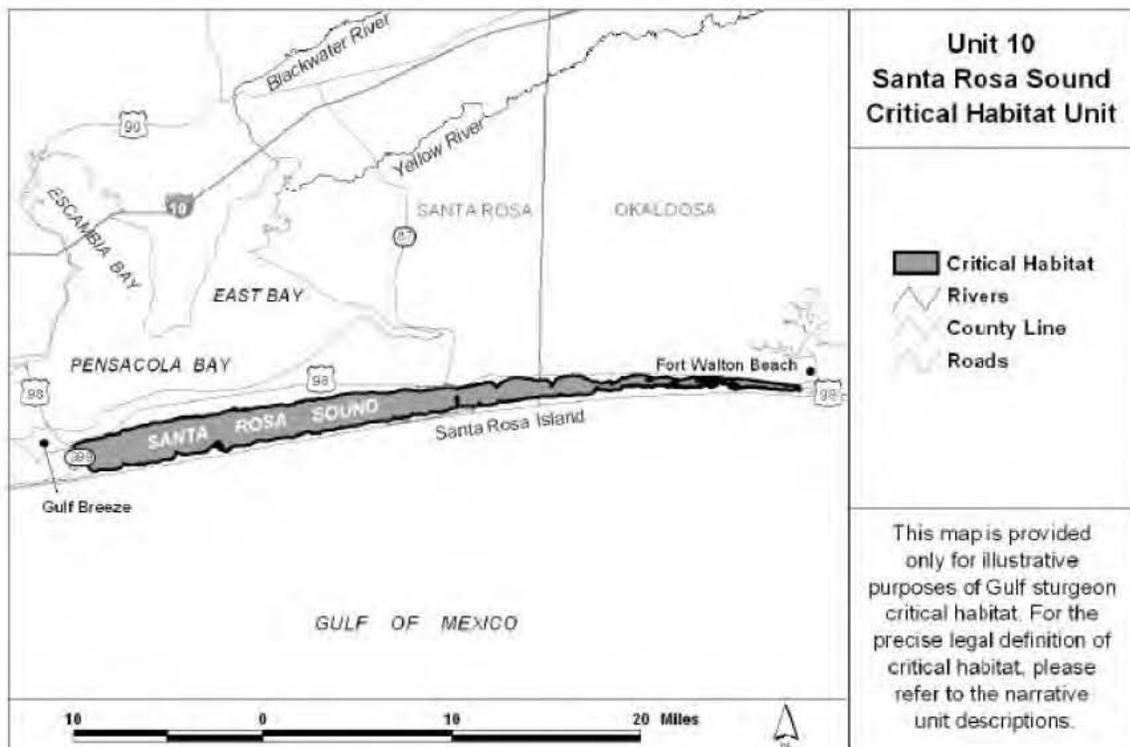


Figure 3-9. Unit 10, Pensacola Bay Gulf Sturgeon Critical Habitat Unit

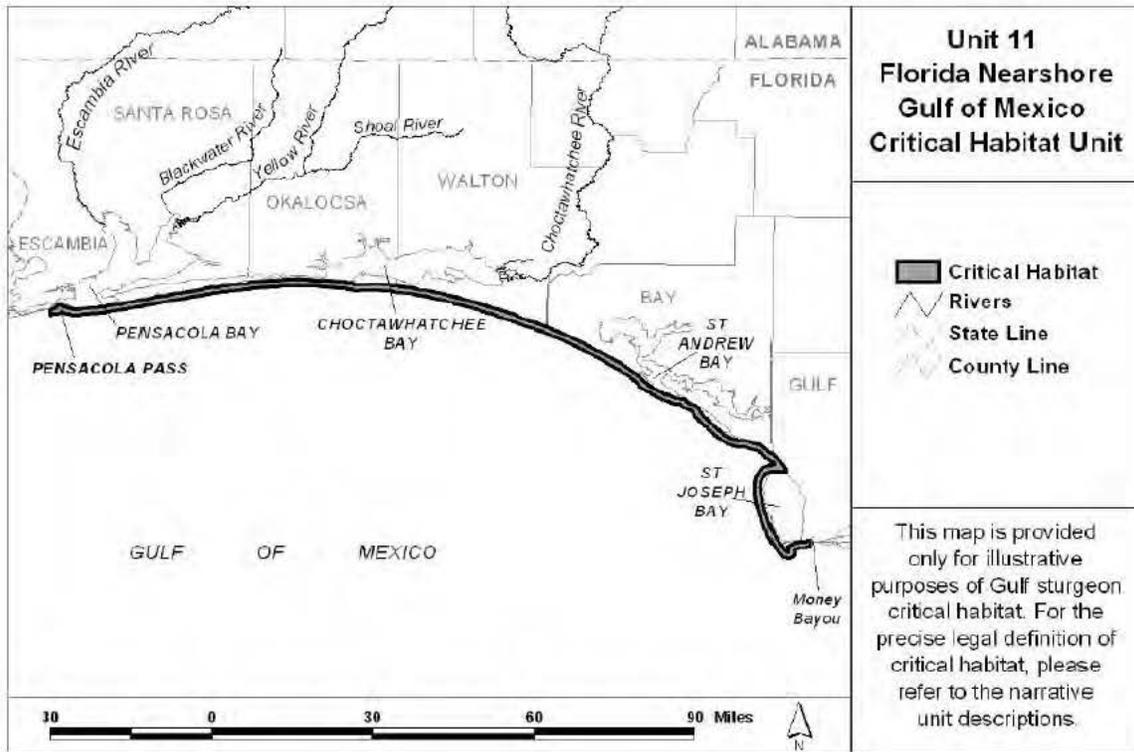


Figure 3-10. Unit 11. Pensacola Bay Gulf Sturgeon Critical Habitat Unit

The saltmarsh topminnow (*Fundulus jenkinsi*) is a small fish native to the north-central coast of the Gulf of Mexico of the southern United States from Galveston Bay, Texas eastward through Louisiana, Mississippi, Alabama, and parts of western Florida. The NMFS designated the saltmarsh topminnow as a candidate species for protection under the Endangered Species Act in 1997. The State of Florida lists the saltmarsh topminnow as a species of special concern. The saltmarsh topminnow is believed to occur in the Pensacola Bay system.

Bird species

Snowy plovers, least terns, and other migratory birds are protected under the Migratory Bird Treaty Act (MBTA). The MBTA establishes the prohibition making it illegal to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess...any migratory bird...or any part, nest, or egg of any such bird." As stated in the Memorandum of Understanding between the National Park Service (NPS) and the USFWS dated July 2002, the NPS will refer to the USFWS's Birds of Conservation Concern to determine whether migratory bird species occurring in the area are contained within the list. This list was created to identify those species the USFWS believes are

"likely to become candidates for listing under the Endangered Species Act" unless additional conservation action is take.²⁸⁹

The piping plover (*Charadrius melodus*) is a federally threatened species as well as a state-listed threatened species in Florida. Parts of the national seashore have been designated critical wintering habitat. Habitat is concentrated in open beaches and tidal flats, and piping plovers begin arriving in July and remain into the following May. Full surveys have not been conducted, but piping plovers are known to winter in tidal flat areas on the north side of Santa Rosa Island. Piping plover have also been observed utilizing tidal flat areas created when Hurricane Ivan breached Santa Rosa Island in several places.

The southeastern snowy plover (*Charadrius alexandrinus*) is a year-round resident of the Gulf Islands National Seashore and is a state-listed threatened species in Florida. Beaches, dry mud or salt flats, and the sandy shores of rivers, lakes, and ponds are the normal habitat for this plover. It nests on the ground of broad open beaches where vegetation is sparse or absent. Nests are often subject to flooding, and the plover faces threats from loss of habitat due to beach development. Feeding and loafing areas are also present on the western side of the Santa Rosa area.²⁹⁰ In addition to protection afforded to the snowy plover through the MBTA and the State of Florida, this species has been identified in various documents as a species where there is Federal concern. The USFWS and the FWC currently have a cooperative agreement to assess the status of snowy plovers. The goal is to implement conservation actions that would preclude the need to list the species. Snowy plover are year-round resident shorebirds and are known to nest, roost, and forage in the Fort Pickens Unit of the Gulf Islands National Seashore. Snowy plovers begin nesting activity in February. Optimal foraging and roosting areas will occur in areas similar to that for the piping plover, as well as on Gulf beaches. Furthermore, the snowy plover appears as a species of extremely high conservation need in the September 2002 revision of the Southeastern Coastal Plains-Caribbean Region Report for the U.S. Shorebird Conservation Plan. In order to assure the protection of this species and the minimization of impacts to the snowy plover, nesting coordination with the FWC is recommended.²⁹¹

The least tern (*Sterna antillarum*) is a state-listed threatened species in Florida. It nests near water, particularly on seacoasts, beaches, bays, estuaries, lagoons, lakes, and rivers. The least tern rests and loafs on sandy beaches, mudflats, and salt-pond dikes. The least tern is susceptible to human disturbances, predation, flooding, and loss of habitat. After Hurricane Opal, the populations at the Fort Pickens Unit increased dramatically.

The black skimmer (*Rhynchops niger*) is a state-listed species of concern in Florida. Primary habitat for the black skimmer is coastal waters, including beaches, bays, estuaries, and sandbars, as well as tidal creeks that are used for foraging. It primarily nests on sandy beaches, small coastal islands, and dredge spoil islands. Within the Gulf Islands National Seashore, black

²⁸⁹ U.S. Fish and Wildlife Service, Panama City, Florida; Official correspondence (Consultation Number 4-P-07-104), 6 March 2007.

²⁹⁰ Draft Environmental Assessment: Restore Visitor Access to Fort Pickens Area, Santa Rosa Island, Gulf Islands National Seashore, Escambia County, Florida. October 2006. National Park Service. pp. 40-47.

²⁹¹ U.S. Fish and Wildlife Service, Panama City, Florida; Official correspondence (Consultation Number 4-P-07-104), 6 March 2007.

skimmers share colony sites with least terns. In the Fort Pickens Unit, two nests were documented in 2000, 47 nests in 2001, and 38 nests in 2002.

The reddish egret (*Egretta rufescens*), a state-listed species of concern in Florida, has been identified within the National Seashore as an uncommon and occasional migratory species. The reddish egret is generally found in shallow water areas that are saline, hypersaline, or brackish within coastal habitats, including barren sand or mud tidal flats, salt ponds, lagoons, and open red mangrove and black mangrove communities. It occasionally feeds in other habitats including coastal beaches, sparsely vegetated freshwater marshes, and the shores of lakes and reservoirs. Habitat loss and human disturbance are the main factors in the decline of the species.

The little blue heron (*Egretta caerulea*) is a state-listed species of concern in Florida. It is found primarily in freshwater habitats in marshes, ponds, lakes, meadows, mudflats, lagoons, streams, mangrove lagoons, and other bodies of calm shallow water. It nests in trees and shrubs to about 4 meters above ground or water, often with other herons, egrets, and ibises. The primary threat to populations is disturbance and development of nesting areas, in addition to weather and shoreline variability. The little blue heron is likely only migratory in the area, as nesting activity has not been confirmed within the Gulf Islands National Seashore.

The snowy egret (*Egretta thula*) is a state-listed species of concern in Florida. It is found in marshes, lakes, ponds, lagoons, mangroves, and shallow coastal habitats. It often nests with other colonial water birds in trees or shrubs, and occasionally on the ground or in marsh vegetation. The main threat to the snowy egret is from loss and degradation of wetland habitats. The snowy egret is not known to nest within the Gulf Islands National Seashore, but it is found within park saltmarsh environments.

The brown pelican (*Pelecanus occidentalis*), though not federally protected in Florida, is a state species of special concern and is found throughout the area. The brown pelican feeds primarily in shallow waters within 20 miles of the shoreline, rests during the day and roosts at night on sand spits and offshore sand bars, and nests on small coastal islands that provide protection from mammal predators and have sufficient elevation to prevent flooding of nests. Brown pelican do not nest on Santa Rosa Island.

The southeastern American kestrel (*Falco sparverius*) is a state-listed threatened species in Florida. Habitat consists of open or partly open areas, though during winter in Florida males use less open habitats than do females. Kestrels nest in the cavities of tall dead trees or in telephone poles. Fluctuation in species numbers is attributed to habitat destruction and loss of nest sites, as well as predation and pesticide use.

The peregrine falcon (*Falco peregrinus*) was delisted in 1999 from a federally threatened species and is currently monitored to ensure continued recovery. Peregrines are routinely observed during the winter and fall perched on dead-fall, woody vegetation found along shoreline areas.

Plant species

Cruise's golden aster (*Chrysopsis cruiseana*) is a state-listed endangered species in Florida, but is sometimes locally abundant in dune communities with nutrient-poor, well-drained sandy soil. It faces threats due to development and consequent habitat loss. It is found throughout the Florida District of the Gulf Islands National Seashore, though not in large numbers. Habitat ranges from coastal grasslands, dunelets, dune ridges, tall dunes with rosemary, and scrub.

Large-leaved jointweed (*Polygonella macrophylla*) is a state-listed threatened species in Florida. The main threat to species survival stems from development and consequent loss of habitat. Within the National Seashore, it is found mostly on the mainland in coastal bluffs and sand pine scrub environments.

Coastal plain honeycomb head (*Balduinia angustifolia*) is associated with large, mature dune ridges occurring behind the foredunes of barrier islands and sandy coastal margins, and supports a solitary bee species (*Hesperapis oraria*) that is limited to the northern coastal margins of the Gulf of Mexico and is the only species of *Hesperapis* known to occur east of the Mississippi River. The bee is noteworthy in its association with a mesic biome and a coastal environment and its restriction to *B. angustifolia* as a single floral host. Located along the aprons of dunes and around the perimeters of dune swales, the plant represents a major component of the Gulf Islands National Seashore island community.²⁹²

3.4.6 Historical/Cultural Resources

The Fort Pickens State Park Aquatic Preserve is rich with archaeological history, varying from prehistoric (Native American) to historic (Spanish and American). There are several Indian middens on Santa Rosa Island, but most of the past activity was historic and included Spanish settlers who first came in 1528, but also included activity from the Civil and Spanish-American Wars. Fort Pickens guarded the mainland in the Civil and Spanish-American Wars.²⁹³

The Gulf Islands National Seashore contains 121 known archaeological and cultural sites, 12 of which are listed on the National Register of Historic Places, including Fort Pickens. Forty of these sites are located within the Fort Pickens State Park Aquatic Preserve. Most of the terrestrial sites on the adjacent uplands have been surveyed for their cultural resources, although much of the underwater acreage within the Preserve has not been studied.²⁹⁴ The Florida Division of Historical Resources lists two resource groups and 18 recorded archeological sites on the Fort Pickens Military Reservation FUDS property. A number of these sites include the known permanent gun emplacements as well as Fort Pickens. Due to the sensitive nature of this information, no specific information is provided in this PA. This does not mean that there are no other historic or cultural resources on the property, however. In the event that further work on

²⁹² Draft Environmental Assessment: Restore Visitor Access to Fort Pickens Area, Santa Rosa Island, Gulf Islands National Seashore, Escambia County, Florida. October 2006. National Park Service. pp. 40-47.

²⁹³ Internet, <http://www.dep.state.fl.us/coastal/sites/ftpickens/info.htm>.

²⁹⁴ Ft. Pickens Aquatic Preserve Management Plan. 1992. Florida Department of Natural Resources. p. 40.

the FUDS property is necessary, additional coordination with the Compliance Review Section of the Florida Bureau of Historic Preservation (850-245-6333) may be required.²⁹⁵

As of January 1991, only five submerged sites in the Preserve had been studied and recorded in the Florida Master Site File Inventory. These sites include three shipwrecks (the E.W. Fowler, the Sport, and the Convoy); one pre-civil war fort, Fort McRee; and a 19th century cannon found in Pensacola Pass.²⁹⁶

A sunken ship within the Fort Pickens State Park Aquatic Preserve, the USS Massachusetts, was built in 1891 and was one of the most powerful naval vessels of her time. Numerous guns and 18 inches of armor plating around her hull made the Indiana-class battleship formidable. The ship was grounded 1921 for a training exercise by guns at the Fort Pickens Military Reservation. It was designated as an archeological underwater preserve in 1993 and rests in the Gulf of Mexico, 1.5 nautical miles south-southwest of Pensacola Pass, off the coast of Perdido Key. It lies in 26-30 ft. of water within the Fort Pickens State Aquatic Preserve. It serves as a popular fishing and diving location.^{297, 298, 299, 300}

²⁹⁵ Correspondence dated 26 February 2007 from Division of Historical Resources.

²⁹⁶ Ft. Pickens Aquatic Preserve Management Plan. 1992. Florida Department of Natural Resources. P. 40.

²⁹⁷ CP-031207-035

²⁹⁸ Internet, <http://www.dep.state.fl.us/coastal/sites/ftpickens/info.htm>.

²⁹⁹ Internet, <http://www.history.navy.mil/branches/org12-7g.htm>.

³⁰⁰ Internet, <http://www.cr.nps.gov/nr/travel/flshipwrecks/mas.htm>.

4.0 HISTORICAL PROPERTY SUMMARY

4.1 Chronological Property Summary

A general history of the Fort Pickens Military Reservation is presented in this section. Available information is provided that covers the entire life of the FUDS property, regardless of ownership. Ownership and leasing before and after the time the FUDS property was under DoD jurisdiction and general use of the property during these periods is discussed, as applicable.

4.1.1 General History of Fort Pickens Military Reservation

In January 1822, Pensacola Bay was examined as a possible site for a naval depot and defenses. It was decided that a fort on Santa Rosa Island was of primary importance and should be the first to be constructed. On 7 February 1827, the plans for a proposed fort “of considerable magnitude” were forwarded by the Chief of Engineers to the Secretary of War. As passed by the Senate and signed into law by President John Quincy Adams on 24 May 1828, the Fortifications Bill included an item of \$50,000 for commencement of the works to be erected at Pensacola. Of this sum, \$20,000 was made available for the first quarter of 1829.^{301, 302}

According to a 1 August 1828 order, Capt. William H. Chase, senior engineer on the Gulf Frontier, had been assigned to Pensacola, and charged with “construction of the fortifications for the defence” of Pensacola Bay. On 5 September 1828, and Captain Chase sat down in Newport with General Bernard and Colonel Totten and reviewed the project for fortifying the western extremity of Santa Rosa Island. They reviewed the drawings (18 sheets) painstakingly prepared by Col. Joseph Totten of the “Fort for Sta. Rosa Isd. Pensacola Harbour.” They saw that the fort was to be a five-bastioned work, consisting of one tier of casemates and a barbette tier. Two of the five fronts bore upon the channel. Located in the East Front or gorge were the casemates designed for Officers’ Quarters, magazines, and storehouses. Soldiers’ barracks were in the casemates of the North Front, and the Tower and Northwest and Southwest Bastions. To guard against an investing force, landing east of the fort, an elaborate glacis and counterscarp was projected. The counterscarp had bonnets at its northeast and southeast angles and midway between these two. The northeast and southeast bonnets had reverse-fire casemates for sweeping the ditch encircling the five-bastioned fort.³⁰³

Ground was broken in the third week of May 1829. It had been determined to construct the Fort of brick, because of the impossibility of obtaining stone of suitable quality either on Pensacola Bay or from any of the waters tributary to the Gulf. Most of the 21 .5 million bricks used during construction were purchased locally and brought to the island by barge. Huge quantities of lead was needed to waterproof the casemate arches and for gutters and drains. The final tally showed that more than 260,000 pounds of sheet lead, most of it for covering the casemate arches, had gone into building Fort Pickens. Cut granite stone was used for the cordon, tablet, coping, sills, steps, and traverses. Sixty-six sets of granite traverse stones were received and positioned on the

³⁰¹ ATL-030707-094

³⁰² Bearss, Edwin C. 1983. pp. 50 - 55.

³⁰³ Ibid., pp. 50, 55-57.

barbette tier in the summer of 1834. On 14 August 1932, Capt. Chase placed an order for 2,000 square feet of copper, 400 pounds of copper nails, and 200 pounds of solder. The copper was used principally in the magazines and construction of the wharves.^{304, 305}

On 18 April 1833, General Order 32 was issued naming the fort Fort Pickens. It is not known who suggested that the Santa Rosa Island fort be named for the South Carolina Revolutionary War hero, Maj. Gen. Andrew Pickens. When completed, Fort Pickens was pentagonal in shape, with a bastion at each of the five corners. The brick walls were 40 feet high and 12 feet thick. The walls were embrasured (portholed) for one tier of guns in bombproof casements, while one tier of guns was *en barbette* (mounted on top of the walls). The peacetime garrison of the Fort Pickens Military Reservation was set at 100 men, to be increased in time of war to 1,260 men. The armament of the Fort was to consist of 252 guns of various types and calibers.³⁰⁶

On 4 October 1834, Captain Chase notified Major Zantzinger that Fort Pickens was ready to be garrisoned. Nightfall of 21 October 1834 found Company H, 2d U.S. Artillery, settled in their new quarters in the Fort Pickens casemates. The stay of Company H, 2d U.S. Artillery, at Fort Pickens was brief. In mid-December, three months after the unit's arrival on Santa Rosa Island, Major Zantzinger's men evacuated the post. Some time before 31 December 1835, sixteen 24-pounders were emplaced in the Fort Pickens casemates bearing on the channel. These were the first guns mounted in the fort.³⁰⁷

Fort Pickens guarded Santa Rosa Island and the entrance to the harbor. Its size allowed for the protection of large numbers of infantry, whose job was to prevent an invading land force from occupying the island. Fort Pickens was also sited to prevent enemy ships from anchoring in range of the Navy Yard. In concert with Fort McRee, the two forts' cannon created a crossfire in the narrow channel between Perdido Key and Santa Rosa Island to prevent a hostile fleet from entering the harbor.^{308, 309}

Fort Pickens again became home to a company of artillery in 1835. On 13 May, Company C, 2d U.S. Artillery disembarked at the Fort Pickens wharf. At the time the artillerists moved into the casemates, artisans and laborers were rebuilding the Northeast Bastion faces. Company C evacuated Fort Pickens on 24 November 1834 and boarded a steamship to Tampa Bay. Fort Pickens was left in the charge of a guard.³¹⁰

³⁰⁴ PIRS-022807-002

³⁰⁵ Bearss, Edwin C. 1983. pp. 71, 73, 77, 88, 92, 98, 99.

³⁰⁶ Roberts, Robert B. Encyclopedia of Historic Forts, The Military, Pioneer, and Trading Posts of the United States. 1988. Macmillan Publishing Company, pp. 95-98, 169-171.

³⁰⁷ Bearss, Edwin C. 1983. pp. 175, 177, 185.

³⁰⁸ PIRS-022807-002

³⁰⁹ Roberts, Robert B. pp. 195-198.

³¹⁰ Bearss, Edwin C. 1983. pp. 190, 191.

In 1836, Fort Pickens was still under construction.^{311, 312, 313} By 31 March 1836, four 24-pounders and 30 32-pounder barbette carriages were to be shipped to Fort Pickens. If all went according to schedule, the guns would become available by 31 October. With the 16 24-pounders already emplaced, Fort Pickens would then be armed with 50 guns. Six shot furnaces were constructed in the scarp of the Southeast Bastion. Each of the six shot furnaces was divided into three divisions, each division being 8'3" in length. Each furnace would hold 45 32-pounder shot, or a total of 270 for the six.³¹⁴

The only work performed at Fort Pickens during 1837 was maintenance-oriented. Contingency funds had been used to paint and finish the casemate Officers' Quarters and barracks and make some minor repairs. The Pensacola area of the Gulf Coast was hammered by a hurricane on Monday, 7 August 1837. Although surf pounded across Santa Rosa Point, no damage was reported to Fort Pickens. On 7 July 1838, Captain Chase was promoted to Major.³¹⁵

In 1839, the Armament Board arrived at new figures for armament of the coastal defenses. Fort Pickens was now assigned an armament of 253 cannon and mortars--88 42-pounders, 62 32-pounders, 44 24-pounders, 20 8-inch siege howitzers, 28 carronades, four 10-inch mortars, four 8-inch mortars, two stone mortars, and five coehorn mortars.³¹⁶

Fort Pickens was identified as a newly completed fortification in a 10 May 1840 report on the defenses of the Atlantic frontier.^{317, 318, 319} Several projects were undertaken in 1841, including: 1) correcting the positions of certain guns on the four water fronts; 2) adjusting the earthen parapets and lowering the breast-height walls; 3) relocating the centers and circles of the guns on the land front; 4) regulating the land front terrepleins forming the ramps and barquettes; and (5) modifying the terreplein of the covered way and correcting the glacis. By mid-September 1841, the entire tier of casemates was ready for its long guns.³²⁰

In anticipation of receiving troops, several casemates were fixed up as barracks. On 10 February 1842, Company I, 3rd U.S. Artillery, disembarked at the wharf and occupied Fort Pickens. Once again, after six years, Fort Pickens was garrisoned. Two weeks later, on 6 March 1842, Lt. Col. William Gates and the regimental headquarters detachment landed at the fort, to be followed on the 16th by Companies E and K, 3rd U.S. Artillery. The battalion's stay on Santa Rosa Island was brief. Orders reached Pensacola in mid-May alerting Colonel Gates to the impending

³¹¹ PIRS-022807-002

³¹² Roberts, Robert B. pp. 195-198.

³¹³ Permanent Fortification and Sea-Coast Defences, Report of the Committee of Military Affairs, United States House of Representatives, 37th Congress, 2nd Session, Report No. 86, April 25, 1862, Reprint Edition 1998, Thomson-Shore, Inc., pp. 85, 112, 142, 263, 212, 332.

³¹⁴ Bearss, Edwin C. 1983. pp. 197, 399.

³¹⁵ Ibid., pp. 203, 204, 207.

³¹⁶ Ibid., pp. 215, 220-222.

³¹⁷ PIRS-022807-002

³¹⁸ Roberts, Robert B. pp. 195-198.

³¹⁹ Permanent Fortification and Sea-Coast Defences, Report of the Committee of Military Affairs, United States House of Representatives, 37th Congress, 2nd Session, Report No. 86, April 25, 1862, Reprint Edition 1998, Thomson-Shore, Inc., pp. 85, 112, 142, 263, 212, 332.

³²⁰ Bearss, Edwin C. 1983. pp. 230, 236.

transfer of his battalion and other units of the 3rd Artillery to posts on the Atlantic coast. On 2 May 1842, Company I was sent to Foster's Bank to temporarily occupy Fort McRee. On 7 June Company E left for St. Augustine and on 11 July Company K boarded a ship chartered to Savannah. The battalion's replacements began arriving on 17 June, when Maj. J.L. Nelson and Company K, 7th U.S. Infantry, came ashore. Three days later, Major Nelson assumed command at Fort Pickens. Company E of Nelson's battalion reached the fort on 2 July 1842, and two days later was ordered to Fort McRee. Five weeks later, Company E rejoined Company K on Santa Rosa Island. Companies E and K, 7th U.S. Infantry, were posted at Fort Pickens from the summer of 1842 until May 27, 1843.³²¹

In the 15 months beginning October 1844, the following projects were undertaken and completed at Fort Pickens: 1) new gunners platforms constructed; 2) terrepleins of northwest and south curtains paved, and joints filled with mastic; 3) new coping to the Channel Fronts added; 4) old pavement in the casemates renewed, and traverse circles adjusted; 5) slopes of the ramparts, parapets, and glacis filled and graded; 6) banquettes widened; 7) terreplein of the counterscarp raised; 8) bottom of the ditch adjusted and drained and drain and culvert built and positioned; 9) piazza for South Front Officers' Quarters completed; 10) iron traverses for the carronades in the flank embrasures laid; 11) double doors to the posterns in the flanks of east front positioned; and 12) doors to the galleries under the counterscarp constructed and hung. In addition, the wharf road had been repaired.³²²

On 19 April 1845, Company K was sent across the bay to Fort Pickens and Company E to Fort McRee. Next day, Company K was joined by Company D, 7th Infantry. Fort Pickens, after 23 months, was again garrisoned. On 24 August 1845, Company K departed for Texas. Company D left for Texas in mid-September. Four days before Company D, 7th Infantry, moved out of Fort Pickens, Company F, 1st Artillery, landed on Santa Rosa Island. The date was 13 September 1845. They were joined at Fort Pickens on 4 October by Company H and Company I, 1st Artillery. Companies F and H departed on 17 November 1845 and Company C moved from Fort McRee into the Fort Pickens casemates. Company I had sailed for Fort Brooke, Florida 2 weeks before. Company C, 1st Artillery, spent the winter of 1845-46 at Fort Pickens. Companies C and K left Pensacola in May 1846 for Brazos de Santiago. Company G, 1st U.S. Artillery was recalled from Fort Brooke to garrison Fort Pickens.³²³

Due to the departure of the companies that protected the three Pensacola forts, then Governor Moseley enrolled a company of volunteers under Captain Kelly and sent them to Fort Pickens. The company gathered at Fort Pickens and 78 men were mustered into federal service on 26 March 1847. Kelly's Company served five months in Fort Pickens before being called to Mexico. Eventually, new recruits came to Fort Pickens and, the company then grew to 82 officers and men. Kelly's Company departed in the late evening of 18 September or early morning of 19 September 1847 for Vera Cruz. In fiscal year 1847, repairs undertaken at Fort Pickens included: 1) application of mastic to the pavement of the terreplein to seal surfaces damaged during the recent dismounting and remounting of the guns of the barbette tier; 2)

³²¹ Ibid., pp. 246-249, 252, 253, 320.

³²² Ibid., p. 310.

³²³ Ibid., pp. 324, 327.

repointing masonry of the arches and scarp; and 3) resurfacing sections of the glacis eroded by the heavy rains that drenched the area in the winter of 1846-47.³²⁴

Regimental headquarters and Companies G, H, and I of the 4th U.S. Artillery occupied Fort Pickens in November 1848. Company I left Fort Pickens on 25 April 1849. Company H departed from the Fort for Key West on 19 May, and Company G for Baton Rouge the next day. Regimental headquarters were transferred to Pensacola on the 23rd. Company G was converted into a light artillery company. Companies A and M moved from Fort McRee into the Fort Pickens casemates vacated by Companies G, H, and I in the fourth week of May 1849. On 3 November 1850, Fort Pickens was again occupied by troops. Company D, 1st U.S. Artillery, was the new garrison. From May 1852 until January 1861, no troops were garrisoned Fort Pickens.³²⁵

A board representing the Engineer and Ordnance Departments had been organized by the Secretary of War Davis to make a study of the armament of the nation's forts as established by the 1839 Board. Technological advances afloat and ashore called for change. Heavier guns, 8- and 10-inch columbiads, were being cast and proved themselves in tests. Some of these guns had been sent to and mounted in the coastal fortifications, replacing lighter weight guns prescribed by the 1839 Board. Explosive shells were becoming more popular and were being substituted, more and more, for solid shot. The Davis Board submitted its report early in 1855, which made substantial changes in the armament of the country's seacoast defenses.³²⁶

A hurricane struck the area on 28 August 1856 and damaged the Fort Pickens wharf. The fort itself had received no damage. In September, workmen repaired the storm-damaged Fort Pickens wharf.³²⁷ Because the gun carriages and chassis had been permitted to deteriorate, repairs began in early 1857.³²⁸

On 10 January 1861, Florida left the Union to join what would soon become the Confederate States of America. A force of 50 U.S. Army regulars, in addition to 30 sailors and two Navy ships, left the mainland and occupied Fort Pickens. This was the first time Fort Pickens had been garrisoned since 1851. Early in the morning of 6 October 1861, approximately 1,000 Confederate troops attacked the 6th New York Volunteer Infantry camped approximately one mile east of Fort Pickens at Camp Brown. Reinforcements were sent out by the garrison at Fort Pickens and the Confederates were forced to withdraw under heavy fire. This attack became known as the Battle of Santa Rosa Island. The only time Fort Pickens came under fire occurred on 22-23 November 1861 and 1 January 1862 when Confederates at Fort Barrancas and several other positions along the mainland exchanged artillery fire with Union artillerists at Fort Pickens. On the morning of 22 November 1861, the guns of Fort Pickens and its outlying batteries opened fire on Forts McRee and Barrancas and the 14 Confederate batteries on the mainland. The damage inflicted on Fort Pickens by the Confederate bombardment was not extensive. The casemate arches escaped injury, although at several points embrasure crowns were damaged, as

³²⁴ The Coast Defense Journal. August 2002. Coastal Defense in Florida During the Mexican War. pp. 83-87.

³²⁵ Bearss, Edwin C. 1983. pp. 349, 355, 356, 387.

³²⁶ Ibid., pp. 388, 389, 395, 396.

³²⁷ Ibid., pp. 419, 437, 438.

³²⁸ Ibid., pp. 465, 466, 470.

the scarp had been “well peppered.” The open stairways from parade to parapet were badly broken and their iron railings twisted and torn. On 25 November, two days after the guns fell silent, there was a terrible accident on Santa Rosa Island. A working party of regulars was gathering and disarming unexploded shells. One of the men, in removing the powder, carelessly knocked two shells together. The ensuing explosion wiped out the party, killing five and wounding seven.^{329, 330, 331}

The next clash in Pensacola Bay was precipitated by the Confederates. On 1 January 1862, a small steamer was brought into the wharf at the navy yard within range of the Federal guns. Fort Pickens opened fire on the steamer. After three shots landed nearby, the vessel pulled hurriedly away from the dock. One of the Southern siege guns briefly returned the Yankees’ fire--then all was quiet. Three-quarters of an hour after the initial firing had ceased, the Confederate big guns roared into action. The Yankees vigorously replied, using only their heaviest guns. By 9 p.m. a large fire was burning in the Navy Yard. On 8 and 9 May, the Confederates abandoned the Pensacola area. Fort Pickens served out the remainder of the Civil War as a prison for Rebel military and political prisoners, as well as a disciplinary barracks. From 20 February 1863 until 19 June, seven companies of the 7th Vermont were camped on Santa Rosa Island near Fort Pickens.^{332, 333, 334}

On 23 April 1862, the House of Representatives authorized the appointment of a Board of Fortification to examine and consider the existing system of seacoast and lake fortifications, with special reference to the changes necessary to address the introduction of new elements of attack and defense. The western extremity of Santa Rosa Island was determined to be positioned in such a way that some type of fortification was thought appropriate.³³⁵

A small force of artisans and laborers were hired and put to work rehabilitating Fort Pickens in the spring of 1864. Brickmasons repaired the damage to the scarp suffered in the Rebel bombardments. During fiscal year 1865, despite an uncertain financial situation, the construction hands made satisfactory progress in their repairs of Fort Pickens and the wharf.³³⁶

In May 1864, four companies (B, C, E, and H) of the 25th U.S. Colored Troops reported for duty at Fort Pickens, along with Company K, 7th Vermont. They joined Company K, 2nd U.S. Artillery, and Companies D and F, 7th Vermont. The garrison for the next several weeks numbered eight companies. Company K, 2nd U.S. Artillery, on 18 May finally said goodbye to Santa Rosa Island. On 10 August 1864, Companies D, F, and K, 7th Vermont departed Fort Pickens. The 25th U.S. Colored Troops (Companies B, C, E, and H) garrisoned the Fort until 10

³²⁹ Roberts, Robert B. pp. 195-198.

³³⁰ Bearss, Edwin C. 1983. pp. 511, 595, 607, 608, 612, 615, 634.

³³¹ ATL-030707-094

³³² Roberts, Robert B. pp. 195-198.

³³³ Bearss, Edwin C. 1983. pp. 511, 595, 607, 608, 612, 615, 634.

³³⁴ ATL-030707-094

³³⁵ Permanent Fortification and Sea-Coast Defences, Report of the Committee of Military Affairs, United States House of Representatives, 37th Congress, 2nd Session, Report No. 86, April 25, 1862, Reprint Edition 1998, Thomson-Shore, Inc., pp. 47.

³³⁶ Bearss, Edwin C. 1983. pp. 645, 646, 654.

March 1865, when Companies C and H were transferred to Fort Barrancas. During this period, Company H was on detached duty on the mainland from December to February. On 26 June 1865, Companies B and E, 25th U.S. Colored Troops, rejoined Companies C and H at Barrancas. At the same time, Companies I and M, 1st Indiana Heavy Artillery, were landing on Santa Rosa Island to garrison Fort Pickens. These two companies were joined by Company L of the regiment on 21 September and Company F on 7 October. The Indiana heavy artillery battalion remained at the Fort until late December 1865.

Upon departure of the Indianans, two companies (B and C) of the 82nd U.S. Colored Troops occupied Fort Pickens. In January 1866, Company B was sent to Tallahassee and was replaced by Companies D and H, which arrived on the 9th. In April, Company O was transferred to St. Marks, leaving Fort Pickens garrisoned by two companies--C and D. Four months later, in August, Companies A, E, F, and K, 82nd U.S. Colored Infantry, reached the Fort. On 4 September 1866, the regiment was mustered out of service and the enlisted men honorably discharged. To guard the public property, a small detachment from Company E, 5th U.S. Artillery, crossed the bay from Fort Barrancas and moved into the Fort Pickens casemates. A detachment continued to occupy Fort Pickens until March 1868, when it was withdrawn. Care and protection of the government property would henceforth be the responsibility of the Engineer and Ordnance Departments.³³⁷

From 1865 until 1875, little was done to Fort Pickens beyond general maintenance and repair. In March 1868, work was begun to rebuild the wharf. New copper-sheeted pilings were driven. Gun carriages, shot, shell, and blocks of granite dropped from the wharf and vessels in discharging cargo and a sunken scow were encountered. All told, several tons of old iron, mostly ordnance materials, were recovered. Two cannon were found in the muck.^{338, 339}

On a May 1877 visit to Fort Pickens, the Inspector-General, Department of the South, saw that the wooden shot beds had rotted and the projectiles needed lacquering. It was proposed to construct new beds of iron and brick to avoid the rapid decay of wood that occurred on the Gulf Coast. Nothing came of these proposals, however, and the shot platforms and skids continued to deteriorate and spill more and more projectiles onto the ground. The situation was again called to the War Department's attention in the spring of 1884.³⁴⁰

No appropriation having been made for construction, operations at Fort Pickens were limited in the 12 months ending 30 June 1883 to building repairs, weeding slopes, cutting grass, cleaning drains, and the care and preservation of public property. The condition of the Fort was the same as at the close of fiscal year 1882. During FY1884, maintenance at Fort Pickens had been limited to minor repairs to the engineer buildings, weeding and mowing the earthen parapets, and care of the public property. On 30 August 1884, the Pensacola forts, along with the rest of West

³³⁷ Ibid., pp. 659, 660, 662.

³³⁸ ATL-030707-094

³³⁹ Bearss, Edwin C. 1983. p. 686.

³⁴⁰ Ibid., pp. 740-743.

Florida, were detached from the Mobile Engineer District and assigned, along with Alabama and Georgia, to the newly constituted Montgomery Engineer District.³⁴¹

By the late nineteenth century, American seacoast forts of brick or stone masonry and earth had become obsolete. A new system of reinforced concrete structures began that continued well into the 20th century.³⁴² President Grover Cleveland constituted a board in 1885 headed by Secretary of War William C. Endicott to review the coastal defenses of the United States and submit recommendations for a program to update them to take advantage of the technological revolution in weaponry. The Endicott Board made its report in 1886. The Board called for fortifications at 26 coastal points, plus three on the Great Lakes, as well as floating batteries, torpedo boats, and submarine minefields. During the period 1887-1896, detailed plans for defense of 23 key ports, including Pensacola, were prepared by the Board of Engineers and approved by the Secretary of War. It was 1893 before the final report for the Pensacola Harbor defenses was reviewed and approved. These plans provided the basis for additional changes and adaptations made over the next 40 years.^{343, 344}

Between October 1886 and May 1888, Fort Pickens served as a prison home for approximately 50 Chiricahua Apache men, women, and children. Included among the prisoners were Geronimo and Naiche, the son of Cochise. For 18 months, the Apaches performed maintenance jobs around the Fort and entertained curious visitors. The Apaches left the Fort for Mount Vernon, Alabama on 12 May 1888.^{345, 346}

It was the autumn of 1888 before Congress again made an appropriation for the “Protection, Preservation, and Repair” of coastal fortifications. Repair of the Southeast Bastion Magazine was initiated in the summer of 1889. In January 1894, construction of a mining casemate and cable gallery in the Northeast Bastion began. Workmen restored the earthen till and breast-height wall over Casemates Nos. 86 and 87. As built, the mining casemate was 11 feet by 21 feet, with an arched roof 10 feet high at the center; the walls and roof were of concrete four feet thick, and the floor one foot. The entrance was through Casemate No. 86. The cable gallery arched with walls and floors of concrete one foot thick.³⁴⁷

Until February 1901, the same regiments performed both field and coast artillery service. As weapons became more advanced, however, the physical differences between field and seacoast armament were multiplied. As a result, a reorganization of the Army in February 1901 created 30 batteries of field artillery and 126 companies of coast artillery. The Coast Artillery Corps became the primary user of Coast Artillery Defense Sites.^{348, 349, 350}

³⁴¹ *Ibid.*, pp. 747-752, 754.

³⁴² Roberts, Robert B. pp. 195-198.

³⁴³ Roberts, Robert B. pp. 195-198.

³⁴⁴ Bearss, Edwin C. 1983. pp. 758, 759, 766.

³⁴⁵ Roberts, Robert B. pp. 195-198.

³⁴⁶ Bearss, Edwin C. 1983. pp. 769-713, 727, 728.

³⁴⁷ *Ibid.*, pp. 790-794, 799-806.

³⁴⁸ Hines, Frank T and Ward, Franklin W., *The Service of the Coast Artillery*, 1910, p. 66

³⁴⁹ Lewis, Emanuel Raymond, *Seacoast Fortifications of the United States, An Introductory History*, Naval Institute Press, Annapolis, Maryland, 1979, p.95.

Before work could begin on the Santa Rosa Island Endicott batteries, it was necessary to construct a new wharf. The Fort Pickens wharf, which had been periodically rebuilt in the years since 1829, had deteriorated to the point where it would be more economical to erect a new structure. As protection, the piles were encased in terra cotta pipes, driven at least four feet into the sand and a foot above the high tide mark. The space between the pipe and the pile was filled with mortar consisting of four parts sand to one part cement. The wharf was completed in July 1896.³⁵¹

Beginning in 1895, one concrete battery was constructed on Fort Pickens and the rest were constructed along the length of the Reservation. Each concrete battery was constructed of steel reinforced concrete. The batteries were manned during the Spanish-American War, World War I, and World War II by the men of the Artillery and Coast Artillery Corps.^{352, 353} To expedite construction of the batteries, 7,500 feet of narrow gauge railroad tracks were laid in 1896.³⁵⁴ There were nine concrete batteries on Santa Rosa Island. In chronological order of completion they were: Batteries Cullum and Sevier, Battery Pensacola, Battery Worth, Battery Van Swearingen, Battery Payne, Battery Trueman, Battery Cooper, Battery Langdon, and Battery No. 234.^{355, 356} These batteries are discussed in detail in Section 4.2 below.

Shortly after midnight on 20 June 1899, a fire was discovered in the second or third casemate west of the Fort Pickens sally port. These casemates housed blocking for moving guns and ordnance stores. At 0520 the flames reached the powder and the magazine exploded. The northwest bastion was destroyed, along with several of the outlying submarine defense buildings. Rubble from the shattered bastion and adjoining north curtain casemates was used to stabilize the shoreline fronting Battery Trueman in 1904-1905.³⁵⁷

On 3 January 1902, the Board of Ordnance and Fortification met to consider installation of an experimental horizontal base system of position finding for fire control and direction in Pensacola Harbor. The system's wiring was to be placed in permanent conduits. Because this was an experiment, temporary structures were erected on concrete piers. By August 1903, the eight Fort Pickens towers had been completed. By late winter 1903, all elements of the experimental system had been installed.³⁵⁸

During the hurricane of September 1906, the surf surged across Santa Rosa Island to a depth of 10 feet, flooding most of the magazines. The favored solution to preventing a recurrence was the construction of seawalls. The Fortifications Act signed into law on 2 March 1908 appropriated

³⁵⁰ Bearss, Edwin C. 1982. *Historic Structure Report and Resource Study, Pensacola Harbor Defense Project, 1890-1947, Florida Unit, Gulf Islands National Seashore*. Escambia & Santa Rosa Counties, Florida. p. 10.

³⁵¹ *Ibid.*, pp. 21-24.

³⁵² Roberts, Robert B. pp. 195-198.

³⁵³ Bearss, Edwin C. 1982. pp. 301-321.

³⁵⁴ *Ibid.*, pp. 25, 26.

³⁵⁵ Roberts, Robert B. pp. 195-198.

³⁵⁶ Bearss, Edwin C. 1982. pp. 301-321.

³⁵⁷ *Ibid.*, pp. 193-197.

³⁵⁸ *Ibid.*, pp. 207-216.

funds for the construction of seawalls for the protection of the Fort Pickens Military Reservation and work began. The seawall was five feet wide on top, 13 feet wide at the base, and 11 feet high. To prevent the seawall from being undercut by the surf, two rows of interlocking sheet piling 12 feet long were installed, reinforced by riprap positioned on the slopes in front and in rear of the wall. The seawall enclosed the Quartermaster structures and the batteries except Batteries Worth and Cooper. The glacis of the Third System was utilized as part of the protection. One end of the projected seawall abutted on the 1830's counterscarp while the other end of the seawall extended into the glacis slope. Retaining walls were constructed at Batteries Trueman and Payne. By late May 1911, construction of the seawall was complete and workmen had finished placing the riprap.³⁵⁹

On 4 September 1915, the Commanding General, Eastern Department, was directed to select a site for emplacement of two 12-inch rifles, mounted for long-range fire, at Pensacola. In July 1916, two 12-inch Barbette carriages and two 3-inch antiaircraft guns and mounts were slated for delivery to Fort Pickens.³⁶⁰

The Fort Pickens Military Reservation was hit by a powerful storm packing 104-mile per hour winds on 5 July 1916. Buildings were blown off their foundations (the oil storeroom being one of them), roofs were badly damaged or blown off, and emplacement embankments eroded. The Quartermaster Wharf was badly damaged and the superstructure of the Engineer's Wharf was swept away. The boardwalk to Battery Worth was floated off its foundation.^{361, 362, 363} Before most of the hurricane damage could be repaired, a cyclone struck the area on 18 October 1916, bringing with it 114-mile per hour winds. The area was hit with another hurricane on 28 September 1917.³⁶⁴

The site selected for a new battery on Santa Rosa Island (Battery Langdon) was approximately two miles east of Fort Pickens and 600 feet from the north shore of the Island. A wharf was constructed at the site because the round trip distance from Battery Langdon to the Engineer's Wharf was four miles, making handling costs excessive. Work on the wharf commenced in March 1917. A narrow gauge railroad was constructed from the wharf to the battery site. It was February 1923 before Battery Langdon was completed and turned over to Coast Artillery by the Corps of Engineers.³⁶⁵

By February 1924, the land west of the quarantine station, approximately 713 acres, was occupied by the Coast Defense and troops.³⁶⁶ The hurricane of 20 September 1926 caused severe damage to the Reservation. The old Engineer's Wharf was swept away, leaving only the pilings. The Fort Pickens Military Reservation was, at times, completely submerged.³⁶⁷

³⁵⁹ *Ibid.*, pp. 231, 234-239.

³⁶⁰ *Ibid.*, pp. 273, 274.

³⁶¹ ATL-030807-019

³⁶² ATL-030807-020

³⁶³ Bearss, Edwin C. 1982. pp. 246, 247.

³⁶⁴ *Ibid.*, pp. 248-251.

³⁶⁵ *Ibid.*, pp. 274-282.

³⁶⁶ CP-031307-212

³⁶⁷ Bearss, Edwin C. 1982. p. 251

By 1938, the Fort Pickens Military Reservation was being called the largest Army post in Florida and one of the largest Coast Artillery training centers in the United States.^{368, 369} Effective 27 May 1946, 81 buildings at the Fort Pickens Military Reservation were declared surplus.³⁷⁰ While the Fort Pickens Military Reservation was in operation, the Army operated a ferry service from Fort Barrancas. This service was discontinued 24 October 1947.³⁷¹

The FUDS property was declared surplus on 22 June 1948.^{372, 373, 374, 375, 376, 377, 378} By August 1948, the Fort Pickens Military Reservation was in the custody of the U.S. Engineer's Office, Mobile, Alabama. All personal property had been declared and removed except a few items of property in use by the Custodian. This property consisted principally of a fire truck (Class 325 Brush Truck), jeep, Case tractor, sicklebar mower, four wheel trailer (with 200-gallon mounted gas tank), and necessary household furnishings.³⁷⁹ By March 1949, only a resident custodian and fire-fighter guard remained on the Fort Pickens Military Reservation. In March 1949, approximately 50 miscellaneous structures, four disappearing type steel searchlight towers, six miscellaneous steel towers, railroad trackage, trenched and submarine type communications and electrical cable were offered for disposal as one lot for salvage or removal from the Fort Pickens Military Reservation. This offer was to Federal government agencies, state and local governments, and eligible non-profit institutions. Applications from these priority claimants were to be received on or before 25 March 1949.³⁸⁰ In April 1949, approximately 50 miscellaneous structures, 10 steel towers, approximately four miles narrow gauge railroad trackage, trenched and submarine type communications and electrical cable, and some electrical distribution facilities were offered for disposal as one lot for salvage or off-site use to non-priority applicants. Sealed bids were due on or before 21 April 1949.³⁸¹ On 27 April 1949, an Agreement of Sale was entered into between the U.S. Government and the Army and Navy Surplus Stores, Inc. for removal of 27 buildings, 10 steel towers, nine igloos, one fuel tank, all electrical wiring, transmission lines, lateral water lines, underground cable, railroad rail, etc. Excluded from the Agreement were facilities located within the "Historical Area", U.S. Navy area, and U.S. Coast Guard area.^{382, 383}

³⁶⁸ Roberts, Robert B. pp. 195-198.

³⁶⁹ Bearss, Edwin C. 1982. pp. 301-321.

³⁷⁰ CP-032207-008

³⁷¹ CP-112003-011

³⁷² Ibid.

³⁷³ CP-031507-005

³⁷⁴ ATL-030707-089

³⁷⁵ ATL-030707-090

³⁷⁶ ATL-030707-088

³⁷⁷ ATL-030707-089

³⁷⁸ ATL-030707-095

³⁷⁹ CP-112003-011

³⁸⁰ ATL-030907-094

³⁸¹ ATL-030907-087

³⁸² ATL-030707-085

³⁸³ ATL-030707-083

After many years of neglect, the Fort was closed briefly after becoming part of Gulf Islands National Seashore for much needed repairs. Fort Pickens reopened in 1976 after waterproofing, removal of sand and rubble, and some replacement of brick.^{384, 385}

4.1.2 Building History

Initially, the support operations of the Reservation were housed within Fort Pickens as this was basically the only structure on the Reservation for many years. Casemates were designed for Officers' Quarters, magazines, and storehouses.³⁸⁶ In anticipation of receiving troops, several casemates were fixed up as barracks in 1842.³⁸⁷

By 1849, Fort Pickens was still without exterior barracks. The only buildings for which the quartermaster was responsible were a storehouse, a shed for a bakery, a nondescript building used as a carpenter's shop, and a "topping" stable. There was also a log hospital on the Barrancas side of the Fort.³⁸⁸

During the first 28 months of the Civil War, the Federals erected several buildings outside Fort Pickens. By mid-July 1863, there were ten public buildings on the Reservation, in addition to the fort and wharf. These structures were:

- 1) The quartermaster storehouse, a new frame building with attached shed, on the bay side near the wharf. This structure was about 200 feet long, with a pavilion and shingle roof. Inside there were two small offices, one issuing room, a bedroom for the storekeepers, and a "wareroom."
- 2) The post hospital was in an old frame house, on the south shore of the island. It was about 80 feet long and had four rooms. One of the rooms served as a dispensary.
- 3) A small frame building near the hospital was used as a kitchen for the sick.
- 4) The commissary storehouse, a frame building with an ell, was within several hundred yards of the hospital. It had a canvas roof. The north ell had been converted into an icehouse in May.
- 5) A 200-foot stable was merely a scantling covered with paulins to shelter the public animals, hay, and harness.
- 6) The carpenter's shop was a low, wooden, canvas covered shed.
- 7) The blacksmith shop was a small shed, "covered with boards, leaky, and defective."
- 8) Three sheds, in the fort's ditch, were erected in April and May to shelter commissary stores and prevent pilfering.
- 9) The wharf, on Pensacola Bay north of the fort, extended about 30 feet out into the water. It was constructed of light materials, and the autumn storms were a source of damage.³⁸⁹

³⁸⁴ PIRS-022807-002

³⁸⁵ Bearss, Edwin C. 1983. pp. 71, 73, 77, 88, 92, 98, 99.

³⁸⁶ *Ibid.*, pp. 50, 55-57.

³⁸⁷ *Ibid.*, pp. 246-249, 252, 253, 320.

³⁸⁸ *Ibid.*, pp. 353, 354.

³⁸⁹ *Ibid.*, pp. 634, 635.

A small force of artisans and laborers were hired and put to work rehabilitating Fort Pickens in the spring of 1864. A temporary barracks, kitchen, storehouse, blacksmith shop, and stables to support a 100-man construction force had been erected by 30 June.^{390, 391}

In 1898, a site for the torpedo storehouse was designated on the axis of a line between the engineer's wharf and the Fort Pickens sally port. The north elevation was several hundred feet south of the wharf and its west wall was adjacent to the narrow gauge railroad. The foundations and floor were concrete, the walls red brick, and the roof slate with steel trusses, shutters and doors. There was a traveling crane to handle mine cases. The concrete cable tank was constructed south of and adjacent to the torpedo storehouse. It was sheltered by a wooden shed, open to the west. The shed supported a traveling crane for moving cable drums. A windmill and pump were erected for filling the tank with brackish water. A frame boarding house originally erected by Aniello de Lustro earlier that year was situated such that the railroad track from the cable tank and torpedo storehouse passed in front of the building. During the winter of 1898-1899, the boarding house was purchased and outfitted as a loading room for the submarine mine defense. The cable tank, however, was not large enough to store all the cable on hand. Furthermore, another 6 ½ miles of cable were en route to Fort Pickens. The cistern in the northwest bastion was used to store the overflow cable.³⁹²

The explosion of 20 June 1899 did extensive damage to the mine defense facilities. The torpedo storehouse was demolished; only the foundation remained. The loading room was flattened and the cable tank shed, windmill, and traveling crane were wrecked. The concrete tank and cable tank were unaffected, but both doors to the mining casemate were wrenched off their hinges. A new torpedo storehouse and cable tank were completed well before 30 June 1900. The torpedo storehouse was reconstructed of brick on the old foundation and capped with a corrugated iron roof. A new windmill was erected and the tank shed was rebuilt.³⁹³

Construction of a new mining casemate began in the spring of 1905 to replace the one within Fort Pickens. The site of the new casemate was in the moat of Fort Pickens in lee of the northwest bastion. Work also began on constructing a new torpedo loading room, which was to include a 33 foot by 7 foot tank. The cable tank was enlarged and a new cable tank house was constructed to accommodate the enlarged tank. Work was completed in June 1907. Also begun in 1905 was construction of a double primary station for mine command on Fort Pickens' northeast bastion and a double secondary station for mine command 800 feet east of Battery Cooper. These facilities were completed in May 1909.³⁹⁴

In 1919, the construction of a separate engineer's area was proposed. The area was proposed to contain quarters, mess hall, storerooms, mine loading room, mine store room, mine cable tank, mine pump house, and mine casemates.³⁹⁵

³⁹⁰ Ibid., pp. 645.

³⁹¹ CP-031907-024

³⁹² Bearss, Edwin C. 1982. pp. 181-184.

³⁹³ Ibid., pp. 185-192.

³⁹⁴ Ibid., pp. 185-192.

³⁹⁵ ATL-030907-039

In 1926, as an aftermath of the hurricane, the submarine mine defense system was eliminated. The badly damaged double primary and double secondary stations were salvaged in the early 1930's. The frame cable tank house was salvaged on 11 August 1941. The corrugated roof of the torpedo storehouse, ripped off by the hurricane, was replaced by a cypress shingle roof. In the 1930's, responsibility for maintenance and repair of the torpedo storehouse and loading room was transferred from the Corps of Engineers to the Quartermaster Department. The building number for the torpedo storehouse was changed to No. 24 and the torpedo loading room was changed to No. 25. Both buildings were given new missions: No. 24 as an automotive maintenance area and No. 25 as a carpenter's shop. The mining casemate was retained by the Harbor Defense Project, becoming the Fire Control Switchboard Room.³⁹⁶

Building Nos. 1095, 1096, 1097, 1098, 1099, 1100, 1101A, 1101B, 1102, 1103, 1104, 1105 and the YMCA building were sold to Mrs. Buelah L. Sage for \$778 under Articles of Agreement dated 21 September 1923.³⁹⁷

On 27 April 1949, an Agreement of Sale was entered into between the U.S. Government and the Army and Navy Surplus Stores, Inc. for removal of 27 buildings, 10 steel towers, nine igloos, one fuel tank, all electrical wiring, transmission lines, lateral water lines, underground cable, railroad rail, etc. Excluded from the Agreement were facilities located within the "Historical Area", U.S. Navy area, and U.S. Coast Guard area.^{398, 399} On 19 May 1949, the Army and Navy Surplus Stores was issued an Interim Occupancy Permit to use and occupy of Officers Quarters Numbers 2, 3 and 21 effective 15 May 1949 to 15 August 1949.^{400, 401} The permit was extended to 31 August 1949 in a Supplemental Agreement dated 12 August 1949.⁴⁰² In November 1949, The Florida Board of Parks and Historic Memorials proposed the exchange of Building Nos. 9 (Latrine) and 105 (Carpenter Shop) for one steel tower.⁴⁰³ The request was approved in May 1950. The buildings were to be dismantled and removed.⁴⁰⁴

The Fort Pickens Military Reservation building schedule is presented in **Table 4-1** below.^{405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419} Buildings of interest for MEC and/or HTRW are in bold. The layout of the buildings is depicted in **Appendices I-3** and **I-4**.

³⁹⁶ Bearss, Edwin C. 1982. pp. 193.

³⁹⁷ CP-031407-013

³⁹⁸ ATL-030707-085

³⁹⁹ ATL-030707-083

⁴⁰⁰ ATL-030907-122

⁴⁰¹ ATL-030907-114

⁴⁰² ATL-030907-110

⁴⁰³ ATL-030907-108

⁴⁰⁴ ATL-030907-105

⁴⁰⁵ CP-112003-011

⁴⁰⁶ ATL-030907-032

⁴⁰⁷ CP-031407-027

⁴⁰⁸ CP-030707-303

⁴⁰⁹ ATL-030907-039

⁴¹⁰ CP-030707-301

⁴¹¹ CP-030707-302

⁴¹² CP-031407-013

⁴¹³ CP-031407-014

Table 4-1: Fort Pickens Building Schedule

Bldg. No.	Past Use(s)	Type	Post-DoD Use	Current Status
1	Administration (Mess Hall)	P	Park Service Administration	Razed
2	Officers Quarters	P	Park Staff Quarters	Razed
3	Officers Quarters	P	Park Staff Quarters	Razed
4	NCO Quarters (2)	P	Park Staff Quarters	Razed
5	Carpenter Shop (Ordnance Storehouse) (Storeroom) (Storehouse Shop)	P	Park Garage and Maintenance Shop	Razed
6	Storehouse (Firehouse)	P	Unknown	Razed
7	Ordnance Tractor Shed (Artillery Barracks)	P	Salvaged 7/12/1940	N/A
8	NCO Quarters (Guard House)	P	Unknown	Razed
9	Latrine	P	Public Comfort Station	Razed
10	Coal Shed	P	Destroyed by fire 5/14/41	N/A
12	Ordnance Repair Shop	P	Salvaged 7/3/1942	N/A
13	Boat House	P	Unknown	Razed
15	Q.M. Wharf	P	Unknown	Remnants remain
17	RR Round House	P	Unknown	Razed (foundation present)
18	NCO Quarters	P	Park Staff Quarters	Razed
19	NCO Quarters (Civilian Employees Quarters)	P	Park Staff Quarters	Razed
20	Flagstaff	P	Unknown	Razed
21	Officers Quarters	P	Park Staff Quarters	Razed
22	Pumping Plant	P	Retained by Park Service	Field House
23	Old Pump House	P	Salvaged	Location of Paint

⁴¹⁴ CP-031307-001

⁴¹⁵ CP-031307-017

⁴¹⁶ CP-031407-029

⁴¹⁷ ATL-030907-030

⁴¹⁸ ATL-030907-092

⁴¹⁹ ATL-030907-045

Bldg. No.	Past Use(s)	Type	Post-DoD Use	Current Status
			8/28/1923	Shed
24	Mine Store Room (Mine Load Room)	P	Park Storehouse	Razed
25	Locomotive Repair Shop (Mine Store Room) (Mine Loading Room)	P	Park Storehouse	Park Storehouse
26	Post Engineer Office & Warehouse (Mine Cable Tank)	P	Salvaged 8/11/1941	Razed
27	Area Engineer Warehouse (Engineers Office)	P	Salvaged 4 April 1939	N/A
28	Oil House (Engineers Mess Hall & Kitchen)	P	Salvaged 4 April 1939	N/A
29, 30	Dormitory	P	Salvaged 4 April 1939	N/A
31	Railroad Tool House (Engineering Storeroom) (Warehouse)	P	Salvaged 8/11/1941	N/A
32	Transformer Building (Engineering Storeroom)	P	Salvaged 8/11/1941	N/A
33	Battery Langdon Wharf	P	None	Razed
35	"H" Station	P	None	Razed
36	Army & Navy Bldg. (Coast Guard Station)	P	Unknown	Razed
37	Latrine	P	Unknown	Unknown
38	Signal Station	P	Unknown	Razed
39	Oil House	T	Unknown	Razed
40	Cooper Latrine	P	Unknown	Razed
41	1000' Range House	P		Razed
42	Cooper Store House	P	Unknown	Razed
43	Cooper Plotting Room	P	Unknown	Razed
44	Battery C Storehouse	P	Unknown	Unknown
45	Search Lights 4 and 5 Power Plant	P	Unknown	Razed
46	Magazine	P	Unknown	Razed
50	Day Room (Oil House)	P	Unknown	Unknown
51	Mechanics Shop (Langdon Guardhouse) (Oil House)	P	Unknown	Razed
52	Battery G Storehouse		Unknown	Unknown
53	Magazine	P	Unknown	Razed
E-100	Ordnance Repair Shop	E	Unknown	Foundation and partial walls present
E-101	Ordnance Warehouse	E	Unknown	Razed
E-102	Ordnance Warehouse	E	Unknown	Razed
E-103	Ordnance Boiler House	E	Unknown	Abandoned
E-120	Fire Station	E	Unknown	Present

Bldg. No.	Past Use(s)	Type	Post-DoD Use	Current Status
T-105	PE Paint Shop (Carpenter Shop)	T	Unknown	Razed
T-126	Fire Station	T/O	Park Service Fire Station	Razed
T-500	Regimental HQ	T/O	Unknown	Unknown
T-501	Regimental Aid (Hospital)	T/O	Unknown	Unknown
T-505	New Pump House	T/O	Unknown	Unknown
T-509	Barber Shop	T/O	Unknown	Unknown
T-510	Post Exchange (Building)	T/O	Unknown	Unknown
T-511	Theater	T/O	Unknown	Unknown
T-526	Admin and Supply	T/O	Unknown	Unknown
T-527, T-528, T-531, T-532, T-533	Barracks, Enlisted Men	T/O	Unknown	Unknown
T-529	Lavatory	L-4 (Mod)	Unknown	Unknown
T-530	Kitchen and Mess	T/O	Unknown	Unknown
T-537	Store Room	T/O	Unknown	Razed
T-540, T-541, T-542	Hutment	T/O	Unknown	Unknown
T-575, T-576, T-579	Barracks, Enlisted Men	T/O	Unknown	Unknown
T-577	Lavatory	L-3 (Mod)	Unknown	Unknown
T-578	Kitchen and Mess	T/O	Unknown	Unknown
T-580	Admin and Supply	T/O	Unknown	Unknown
T-585	Officers Quarters (MOQ)	T/O	Unknown	Unknown
T-588, T-589, T-620, T-625-628	Hutment	T/O	Unknown	Unknown
T-640	Plotting Room	T/O	Unknown	Razed
T-650, T-660	Barracks, Enlisted Med	T/O	Unknown	Unknown
T-651	Latrine	P-4	Unknown	Unknown
T-664	Latrine	T/O	Unknown	Unknown
T-668	Day Room (HQ and Storehouse)	T/O	Unknown	Unknown
T-669	Regimental HQ (Battalion Aid)	T/O	Unknown	Unknown
T-670, T-672, T-673	Hutment	T/O	Unknown	Unknown
T-671	Admin and Supply	T/O	Unknown	Unknown
T-674	Kitchen and Mess	T/O	Unknown	Unknown
T-675 – T-678	Barracks, Enlisted Men	T/O	Unknown	Unknown
T-679	Kitchen and Mess	T/O	Unknown	Unknown

Bldg. No.	Past Use(s)	Type	Post-DoD Use	Current Status
T-680, T-681	Hutment	T/O	Unknown	Unknown
T-682	Admin and Supply	T/O	Unknown	Unknown
T-684, T-690	Lavatory	L-3 (Mod)	Unknown	Unknown
T-683, T-685-T-689	Barracks, Enlisted Men	T/O	Unknown	Unknown
T-691	S. L. Store Room (Range House)	T	Unknown	Unknown
T-694	Range House	T	Unknown	Unknown
T-700, T-701	Hutment	T/O	Unknown	Unknown
T-702	Admin and Supply	T/O	Unknown	Unknown
T-703	Kitchen and Mess	T/O	Unknown	Unknown
T-704, T-706, T-707, T-709, T-710, T-711	Barracks, Enlisted Med	T/O	Unknown	Unknown
T-708	Lavatory	L-3 (Mod)	Unknown	Unknown
T-725	Collecting Station	T/O	Unknown	Unknown
T-726	Battery Aid	T/O	Unknown	Unknown
T-727	Hutment	T/O	Unknown	Unknown
T-750, T-755, T-756, T-758, T-759	Barracks, Enlisted Med	T/O	Unknown	Unknown
T-751	Admin and Supply	T/O	Unknown	Unknown
T-752, T-753	Hutment	T/O	Unknown	Unknown
T-754	Kitchen and Mess	T/O	Unknown	Unknown
T-757	Lavatory	L-3 (Mod)	Unknown	Unknown
T-765, T-766	Hutment	T/O	Unknown	Unknown
T-770	Barracks, Enlisted Med	T/O	Unknown	Unknown
T-771	Latrine	Pit	Unknown	Unknown
T-1000	Mess Hall	Unknown	Unknown	Unknown
T-1001	Mess Hall	Unknown	Unknown	Unknown
T-1002	Mess Hall	Unknown	Unknown	Unknown
T-1003	Mess Hall	Unknown	Unknown	Unknown
T-1004	Mess Hall	Unknown	Unknown	Unknown
T-1005	Mess Hall	Unknown	Unknown	Unknown
T-1006	Mess Hall	Unknown	Unknown	Unknown
T-1007	Unknown	Unknown	Unknown	Unknown
T-1008	Unknown	Unknown	Unknown	Unknown
T-1026	Unknown	Unknown	Unknown	Unknown

Bldg. No.	Past Use(s)	Type	Post-DoD Use	Current Status
T-1027	Unknown	Unknown	Unknown	Unknown
T-1028	Unknown	Unknown	Unknown	Unknown
T-1095, T-1096, T-1098, T-1099	Q.M. Barracks	NR	Salvaged 1923	N/A
T-1097, T-1100	Q.M. Mess Hall	NR	Salvaged 1923	N/A
T-1101-A, T-1101-B	Q.M. Latrine	NR	Salvaged 1923	N/A
T-1102, T-1103, T-1104	Q.M. Officers Quarters	NR	Salvaged 1923	N/A
T-1105	Guard House	NR	Salvaged 1923	N/A
1106 - 1109	Water Tank (100,000 gal)	Cedar	Unknown	Unknown
T-1110	Concrete Sub-station	Concrete	Unknown	Unknown
T-1111	Pumping House	NR	Unknown	Unknown
T-1112, T-1114	Barracks	NR	Unknown	Unknown
T-1113	Mess Hall	NR	Unknown	Unknown
T-1115	Latrine	NR	Unknown	Unknown
Unknown	YMCA	NR	Salvaged 1923	N/A

N/A = Not applicable
 NR = No Record
 E = Emergency temporary building
 T/O = Theatre of Operations buildings
 T = Temporary building
 P = Permanent building

4.2 Military Operations

Presented in this section is a description of DoD operations that were conducted on the Fort Pickens Military Reservation. In addition to property specific information gathered from archives and other repositories, applicable technical manuals, Range and Common Operation Reports are utilized and referenced, as appropriate.

The Fort Pickens Military Reservation served as a coastal defense site from the construction of the initial Fort, through construction of the various concrete gun emplacements, until its declaration of surplus. In addition to the Fort and gun emplacements, several fire control and searchlight towers were constructed over the active life of the Reservation. These towers were either constructed of wood or steel on concrete foundations.^{420, 421, 422, 423, 424, 425, 426, 427, 428}

⁴²⁰ CP-031307-022

⁴²¹ CP-031307-023

⁴²² CP-031307-018

Searchlight No. 5 was completed by October 1920.⁴²⁹ Foundations for searchlight Nos. 7-10 were constructed in February 1921.⁴³⁰ Searchlight Nos. 7 and 8 (renumbered 4 and 5), both 60-inch, were positioned on 60-foot steel bascule towers, the legs of which rested on concrete foundations. The towers were, respectively, positioned 600 and 760 feet east of Battery Worth. Energy for the lights was provided by two 25 kW generators housed in a reinforced concrete structure. These searchlights were salvaged in 1946.⁴³¹ The towers for searchlight Nos. 9 and 10 were received in April 1921. Searchlight Nos. 9 and 10 (renumbered 6 and 7) were positioned on 60-foot bascule towers 2,900 and 3,149 feet east of Battery Langdon. The tower legs were anchored to concrete support piers. The 60-inch lights were powered by two 25 kW generators housed in a reinforced concrete power station. Searchlight Nos. 6 and 7 were damaged in the 1926 hurricane and rebuilt in 1930. These searchlights, their towers, and electrical equipment were salvaged in 1946.⁴³² Installation of all the searchlights on Santa Rosa Island was nearly complete by 10 October 1921.^{433, 434}

On 3 January 1902, the Board of Ordnance and Fortification met to consider installation of an experimental horizontal base system of position finding for fire control and direction in Pensacola Harbor. Because this was an experiment, temporary structures were erected on concrete piers. By August 1903, the eight Fort Pickens towers had been completed. By late winter 1903, all elements of the experimental system had been installed. The Fire Commander's Station (FC) for the primary stations was located approximately 200 yards east of the superior slope of Fort Pickens' southeast bastion. It was flanked on the east by Battery Worth's BC station and on the west by the BC station for Battery Pensacola. Battery Cullum's BC station was to the west of the station for Battery Pensacola. The secondary stations for the Santa Rosa Island fire command were near the Pensacola Bay shore, 1,000 yards east of Battery Worth. They were positioned in the same relation as the primary stations. These stations were destroyed in the 20 September 1926 hurricane. At the time, they were serving Batteries Cullum and Worth.⁴³⁵

Four of the wooden fire control towers on concrete foundations were constructed on the north shore of the island. Three of the four towers were destroyed in the storm of 20 September 1926, but their foundations were still present in June 1930. In May 1930, it was proposed to replace the three destroyed towers with three new steel towers. These new towers would be approximately 60 feet shoreward from the position of the destroyed towers. These new positions

⁴²³ CP-031207-031

⁴²⁴ ATL-030707-008

⁴²⁵ ATL-030707-024

⁴²⁶ ATL-030707-016

⁴²⁷ ATL-030707-114

⁴²⁸ ATL-030707-118

⁴²⁹ ATL-030707-114

⁴³⁰ ATL-030707-116

⁴³¹ Bearss, Edwin C. 1982. pp. 199-201.

⁴³² *Ibid.*, pp. 199-202, 284.

⁴³³ ATL-030707-119

⁴³⁴ ATL-030707-120

⁴³⁵ Bearss, Edwin C. 1982. pp. 207-217, 222.

were selected because the shoreline was eroding.^{436, 437} Construction of the three replacement towers, including concrete foundations, was completed during the early portion of FY1931.^{438, 439} The fire control stations constructed on the towers contained an observation platform. From west to east, these stations, designated the Butler Group, served as secondary stations for Batteries Sevier, Cullum, and Langdon. In 1933, after Batteries Sevier and Cullum were withdrawn from the Defense Project, the westernmost station was assigned to Battery GPF and the middle one to Fire Group II.⁴⁴⁰

By the 1930's, another trio of towers, known as the Davis Group, was erected approximately 300 yards west of Battery Langdon. The middle tower served as Battery Worth's secondary station. The station to the west was assigned to the Harbor Defenses and the easternmost station was for auxiliary purposes.⁴⁴¹

With WWII came radar and an increase in base lines. Battery Langdon was provided with one primary and four secondary stations. Battery Langdon and Battery 234 were each provided with a SCR-296 radar.⁴⁴² Constituting the antiaircraft defense in the late 1930's/early 1940's were five 60-inch mobile searchlights and three SCR-268 radars.⁴⁴³

On 27 April 1949, an Agreement of Sale was entered into between the U.S. Government and the Army and Navy Surplus Stores, Inc. for removal of a number of items from the Fort Pickens Military Reservation, including 10 steel towers. Excluded from the Agreement were facilities located within the area of the original fort (87 acres).⁴⁴⁴

4.2.1 Operations Involving Military Munitions

4.2.1.1 Fort Pickens

Fort Pickens was a pentagonal fort. The two Channel Fronts were connected to two lateral fronts--designated North Front and South Front. A fifth front (East Front) completed the perimeter. The face of each Channel Front was 160 yards. The North and South Fronts had similar arrangements of casemates and other parts of their construction, except that, in the former, one of the casemates was used for the sally port. The right half of the East Front was similar to the left half front. The half North Front had: 1) a casemate along the face bearing on the channel, with three embrasures on this face, one on the other face, and a fifth flanking the collateral Channel Front; 2) a powder magazine along the face of the bay side (on the South Front this casemate was pierced with three embrasures); 3) a casemate "facilitating the communication of the two preceding casemates with the flank of same bastion and the curtain of

⁴³⁶ CP-031307-030

⁴³⁷ ATL-030807-021

⁴³⁸ ATL-030807-054

⁴³⁹ ATL-030807-055

⁴⁴⁰ Bearss, Edwin C. 1982. p. 223.

⁴⁴¹ Ibid., p. 223.

⁴⁴² Ibid., pp. 223, 224.

⁴⁴³ Ibid., p. 290.

⁴⁴⁴ ATL-030707-083

the collateral” Channel Front, with one embrasure on the flank of the latter front; and 4) three casemates on the flank, each having one embrasure. The curtain of half North Front and half East Front had seven casemates, the middle one being the sally port and the others used for guns and quarters. In addition to these seven casemates, there was another that could be used either as a magazine or as a communications to the left flank and curtain. The three casemates of the right flank were similar to those of the left flank. A gallery afforded communication from the right flank and curtain of the North Front to the casemated flank of the East Front. The gallery also gave access to the mines under the bastion’s earthen mass. A powder magazine was at the intersection of the curtains of the North and East Fronts.⁴⁴⁵

The faces of the bastions of the East Front were not casemated, but each flank had four casemates. Three of these were armed, while the fourth, at the re-entering angle, had a “sally door”, which, during a siege, could be retained as a means of communication with the covered way or walled up and used for an embrasure. Mines were constructed under the bastions of the East Front. Each mine consisted of three chambers, designed to be detonated in succession after the opening of the breach and when the besieger either made his establishment on the breach or stormed the bastion. The calculated charge for each chamber of the mine was 1,027 pounds of gun powder. Ingress and egress to Fort Pickens was provided by: 1) a “sally door and bridge on the North Front, and a postern at each re-entering angle of the East Front”; 2) by two wide stairs on each extreme point of the curtains of the Channel Fronts; 3) a stairway at each end of the curtain of the East Front; 4) two slope ascents at the middle of the subject curtain; and 5) two stairs at the gorge of the re-entering place de arms in the covered way. At each end of the counterscarp was a loopholed casemate to shelter infantry charged with the mission of relieving the covered way and protecting the ditch of the Channel Fronts and those of the lateral fronts. A branch gallery, 73 feet in length, lead to a mine chamber 12 feet beneath the crest of the glacis.⁴⁴⁶ The basic layout of Fort Pickens is illustrated in **Figure 4-1** below.⁴⁴⁷

⁴⁴⁵ Bearss, Edwin C. 1983. pp. 107, 117-123.

⁴⁴⁶ Ibid., pp 117-123.

⁴⁴⁷ PIRS-022807-002

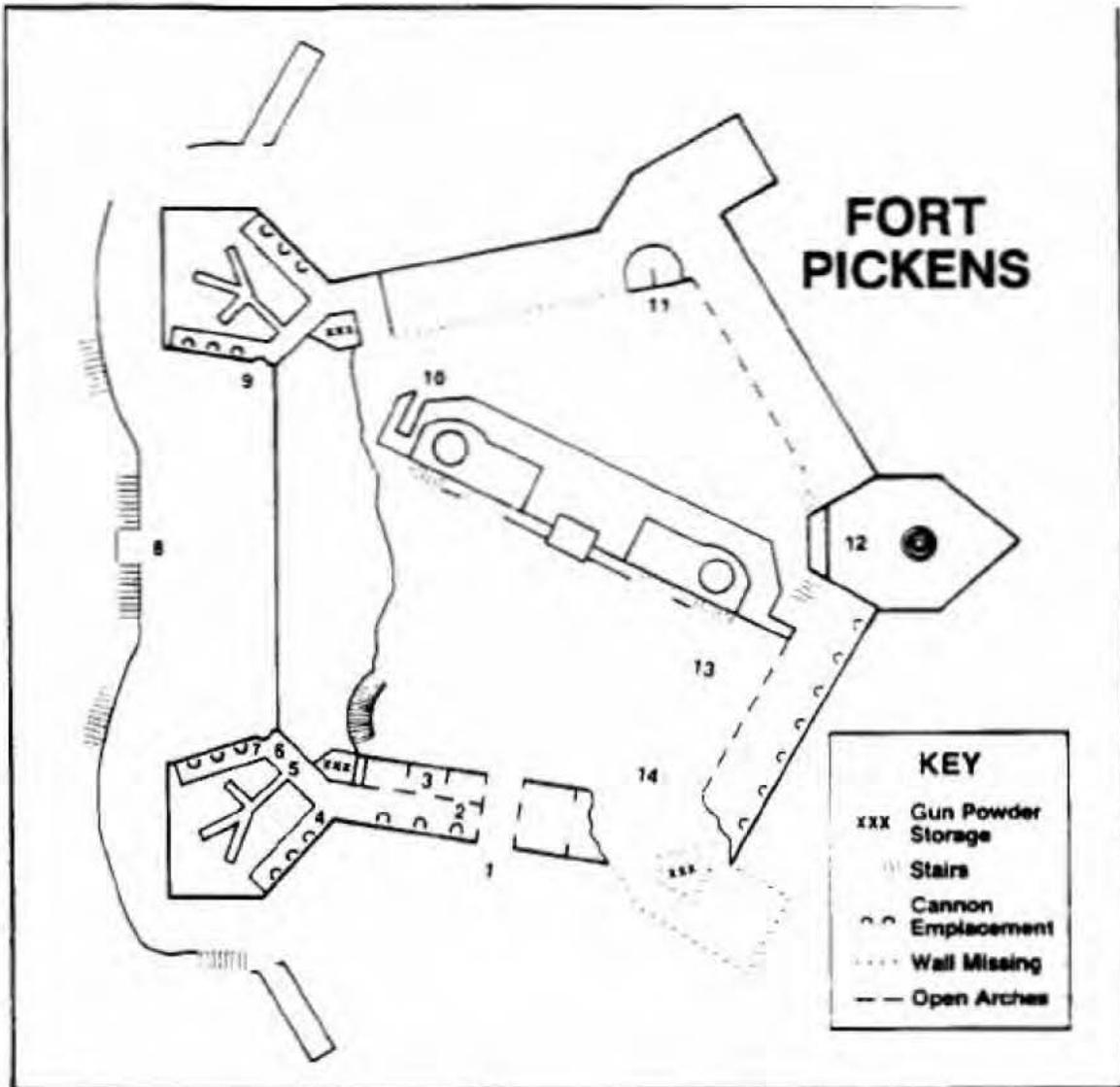


Figure 4-1. Basic Layout for Fort Pickens, Florida

Each of the numbered features in **Figure 4-1** above is described in the following text. In the Casemate Embrasure (1), heavy oak doors once secured the main entrance into the Fort. The Casemate (2) held a variety of interior cannon emplacements. Chimneys over the embrasure (gun port) vented smoke from the room during firing. The plaster lined Quarters (3) were intended to house officers. The fireplaces held marble mantels and the floors, doors and window sashes were wood. Enlisted men camped outside in the fort's center or in the casemate alongside the cannon. The Apache prisoner Geronimo and his renegade followers were housed in these rooms from 1886-1888. In 1894, two casemates were converted into concrete Battery Storage Rooms (4) (vaults) for electric batteries. The batteries controlled torpedo mines, via a network of cables, placed in the harbor for defense. Dampness forced the relocation of the operation to buildings outside the fort. Three Mine Chambers (6) were designed to hold about 3,000 pounds of black powder. Opposite the chambers, two vent windows led to the gunpowder magazine.

The entrance to the magazine faced the fort's center. Along the wall, beyond the mine chambers, concrete Ammunition Storage (6) stalls were added. In 1903, these casemates were converted into a Generator Room (7) (power station). A Counterscarp Wall and Moat (8) protected the land approach to the fort from direct artillery fire and infantry assault. A ten foot deep moat surrounded the fort. Drifting sand and the Army have since filled in the moat. Projecting from the fort wall, bastions extended the fort's field of fire for cannon. Like Bastion E (the northeast corner), Bastion A (9) contains casemates, mine chambers, and a powder magazine. Battery Pensacola (10) (gun emplacement) was built in the middle of Fort Pickens. A tunnel was placed through the Battery for access to the quarters and casemates on the south side of Fort Pickens. Rainwater, a convenient source of fresh water on Santa Rosa Island, was collected along the fort walls and stored in a Cistern (11) and at Bastion D (14). This water was used for cooking, drinking, and washing. Called the tower bastion, Bastion C (12) provided a view of the end of the island. The longest walls and channel fronts ran northeast and southeast from Bastion C (12). Cannon were mounted here and aimed over the wall. Below Bastion C (12) was a refrigeration room, which was installed about 1900. Encompassing seven acres of land, the Parade Ground (13) at the center of Fort Pickens provided space to quarter and drill soldiers. The construction of Battery Pensacola (10) filled a portion of the Parade Ground (13). Bastion D (14) was destroyed when a fire ignited a magazine containing black powder on June 20, 1899. Bricks from the explosion landed 1 ½ miles across the bay in the towns surrounding the Navy Yard.⁴⁴⁸

Total armament was originally planned to be 171 cannon, 26 carronades, and eight mortars. When constructed, the two Channel Fronts were retained, while the other three fronts were modified. The guns on Channel Fronts consisted of 104 cannon and eight carronades. On the North Front, there were 20 cannon and six carronades. Guns on the East Front consisted of 20 cannon, eight carronades, and four mortars. On the South Front there were 20 cannon, six carronades, and nine mortars. Steep slopes were covered with from 1 foot to 212 feet of clay and sodded to a depth of 4 inches. Terrepleins were covered with shells to a depth of ½-inches, and the parade to a depth of 4 inches.⁴⁴⁹

At Fort Pickens, the 1839 Board had called for 63 42-pounders, 17 32-pounders, 49 24-pounders, 5 18-pounders, 13 12-pounders, six field guns, 26 24-pounder flanking howitzers, 13 8-inch seacoast howitzers, one 13-inch mortar, four 10-inch seacoast mortars, nine 10-inch siege mortars, four 8-inch mortars, two 16-inch stone mortars, and five coehorns. The following armament was at Fort Pickens in January 1856: mounted in the casemates 45 32-pounders, 10 8-inch columbiads, six 24-pounders, and 26 24-pounder flanking howitzers; mounted *en barbette* 10 32-pounders, 46 24-pounders, six 18-pounders, 14 12-pounders, 12 8-inch seacoast howitzers, and four 10-inch mortars; and dismounted seven 32-pounders, two 24-pounders, and one 8-inch seacoast howitzer. In November 1856, orders were received to mount four 10-inch columbiads at Fort Pickens.⁴⁵⁰

⁴⁴⁸ PIRS-022807-002

⁴⁴⁹ Bearss, Edwin C. 1983. pp. 123, 175.

⁴⁵⁰ Ibid., pp. 388, 414.

4.2.1.2 Civil War Batteries

During the Civil War, a number of outlying batteries were hastily erected in April 1861 and subsequent months to assist in the defense of Fort Pickens. Battery Scott was constructed at the southwestern point of Santa Rosa Island opposite Fort McRee and mounted two 10-inch columbiads and one 42-pounder rifle *en barbette* and two 10-inch seacoast mortars. Battery Cameron was located approximately 580 yards west of Fort Pickens on the bay side of the island and had two 10-inch columbiads *en barbette*. Battery Lincoln was constructed about 803 yards west of the fort on Pensacola Bay and mounted four 8-inch seacoast howitzers, one 42-pounder rifle mounted *en barbette*, and two 10-inch seacoast mortars. Battery Totten was located approximately 400 yard west of Fort Pickens on the Gulf side and contained one 13-inch and one 12-inch seacoast mortar. One 10-pounder Parrott was mounted on the “Spanish fort” located about 2,612 yards west of Fort Pickens on the Bay side. It is possible that this “Spanish fort” was the site of the fort built by the Santa Rosa Island settlers in the eighteenth century. After nightfall on the 22nd, the 10-pounder Parrott was moved from the old Spanish Fort to Battery Cameron.^{451, 452}

4.2.1.3 Permanent Concrete Gun Batteries

Modern fixed harbor defense battery structures were built to perform three basic functions: anchor (emplace) the guns to a stable platform for accurate firing; protect the gun and its crew from enemy fire; and provide protected space for the storage of ammunition. By 1900, the term battery was used to describe a set of guns under a single commander, together with the entire structure erected for the emplacement, protection, and service of those guns. A typical harbor defense gun battery was composed of a maze of concrete rooms and walls, each with a specialized name and function. The emplacement was the entire structure that surrounded and protected a single gun. It was composed of the gun platform, where the gun was anchored to the ground, the loading platform, where the gun crew worked when loading the gun, and the parapet, the thick wall in front of the emplacement. The protective walls on either side of the emplacement were called traverses. In batteries built for disappearing guns, a counterweight well was located directly below the gun. In mortar batteries, the term pit was used instead of emplacement. If the battery was in danger of being fired on from behind, the rear was often protected by a custom-built ridge called a *parados*.

The interior of the battery was composed of a number of connected rooms and passageways. Corridors were the uncovered passageways at the rear of the traverse between adjacent emplacements; galleries were passageways that were enclosed on the sides and above; rooms were enclosed areas. All batteries had magazines, rooms or galleries for the storage of the powder charges, and shell or shot rooms (or galleries) for the storage of projectiles. Batteries also had several specialized storage rooms for equipment and supplies, an officer’s room, and one or more latrines. Some batteries were equipped with their own power generating equipment that required a power room. The power facilities for the later batteries sometimes had additional

⁴⁵¹ ATL-030707-094

⁴⁵² Bearss, Edwin C. 1983. p. 601, 605.

rooms such as a motor-generator room, a radiator room, a transformer room, and a muffler gallery.⁴⁵³

As stated above, there were nine concrete batteries on Santa Rosa Island. In chronological order of completion they were: Batteries Cullum and Sevier, Battery Pensacola, Battery Worth, Battery Van Swearingen, Battery Payne, Battery Trueman, Battery Cooper, Battery Langdon, and Battery No. 234.^{454, 455} The locations of these batteries in relation to Fort Pickens are illustrated in **Figure 4-2** below and described in the following paragraphs.⁴⁵⁶

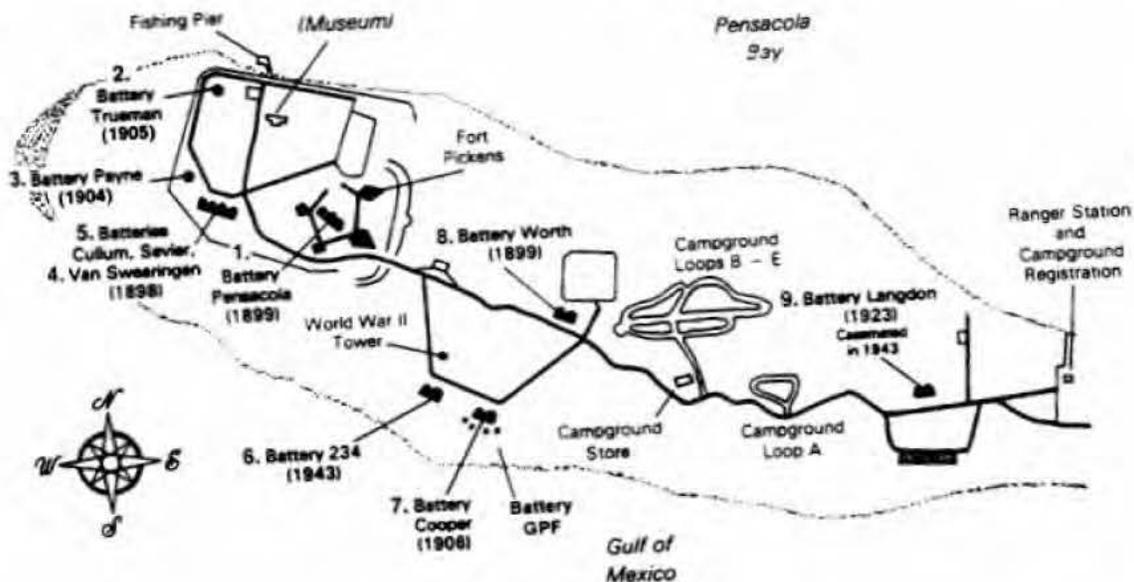


Figure 4-2. Layout of Batteries Surrounding Fort Pickens

Batteries Cullum and Sevier

Although Batteries Cullum and Sevier appear to be one large complex, they are two separate structures. The complex housed four 10-inch rifled guns with disappearing carriages and was originally designated Battery Cullum in honor of Brig. General George W. Cullum. He is best known for his monumental compilation, *Biographical Register of the Officers and Graduates of the United States Military Academy*, published in three volumes in 1890. Because of the size and complexity of the structure, it was divided into two separate batteries, each having its own fire control equipment. On 25 April 1916, General Order No. 5 was issued designating Emplacement Nos. 1 and 2 as Battery Sevier, honoring John Sevier, a pioneer, soldier, and first

⁴⁵³ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp. 20, 21.

⁴⁵⁴ Roberts, Robert B. pp. 195-198.

⁴⁵⁵ Bearss, Edwin C. 1982. pp. 301-321.

⁴⁵⁶ PIRS-022807-002

governor of Tennessee. Emplacement Nos. 3 and 4 continued to be known as Battery Cullum.^{457, 458, 459}

Construction of Battery Cullum was begun in 1895 and completed on 29 June 1898. The battery mounted two 10-inch guns (Model 1888 M2, Serial Nos. 30 and 44) on disappearing carriages (Model 1894 M1 and 1896). Three guns were mounted in February 1898 and the fourth was mounted in April 1898. Power was supplied by two 25 kW General Electric gasoline generators as well as commercial alternating current (A.C.) from Pensacola.^{460, 461, 462, 463, 464} A splinter-proof BC station was constructed at Battery Cullum in 1914-15.⁴⁶⁵ By March 1918, the guns at Battery Cullum were listed for service abroad.^{466, 467, 468} In May 1918, the two guns were dismounted and shipped on 15 June Watervliet Army Gun Factory. On 18 March 1919, the Battery was listed by the War Department to be retained. In December 1919, two Model 1895 guns (Nos. 48 and 49) were shipped to Fort Pickens as replacements for Nos. 30 and 44 and mounted in May 1921. Gun No. 48 fired 172 rounds and Gun No. 49 fired 210 rounds.⁴⁶⁹ On 16 June 1933, the guns of Battery Cullum were listed as no longer required. In the 4th Indorsement to a 4 May 1936 reply, the Adjutant General directed that the breech mechanisms be removed, the gun tubes sold as surplus, and the carriage Model 1896 sold as scrap and sufficient parts retained for maintenance of other like carriages. The Model 1894 carriage was directed to be sold as scrap with no parts retained.^{470, 471} In October 1941, Battery Cullum was identified as being no longer necessary as part of the modernization program for the Harbor Defenses of Pensacola.⁴⁷² The guns and carriages were removed and salvaged in November 1942.⁴⁷³

Relocation of the two 3-inch rapid fire guns from Battery Trueman to Battery Cullum was begun in March 1942 and completed in December 1942. The guns were mounted on emplacements built in the gun wells of the old battery. The existing magazines were rehabilitated.⁴⁷⁴ In 1943, a combined splinter-proof Battle Commander's-CRF (BC-CRF) station was built for Battery Payne between Batteries Cullum and Sevier. This station replaced the CRF station constructed in the early 1920's at Battery Van Swearingen.⁴⁷⁵ Battery Cullum also served as a signal and meteorological station. In June 1946, the guns were dismounted and turned over to the Post

⁴⁵⁷ Roberts, Robert B. pp. 195-198.

⁴⁵⁸ ATL-030707-026

⁴⁵⁹ Bearss, Edwin C. 1982. p. 56.

⁴⁶⁰ CP-031307-001

⁴⁶¹ CP-031207-024

⁴⁶² Bearss, Edwin C. 1982. p. 42.

⁴⁶³ CP-032107-007

⁴⁶⁴ ATL-030907-040

⁴⁶⁵ Bearss, Edwin C. 1982. pp. 222.

⁴⁶⁶ ATL-030807-011

⁴⁶⁷ ATL-030807-012

⁴⁶⁸ ATL-030807-052

⁴⁶⁹ CP-031307-001

⁴⁷⁰ CP-031307-204

⁴⁷¹ Bearss, Edwin C. 1982. pp. 57, 58.

⁴⁷² CP-031307-008

⁴⁷³ Bearss, Edwin C. 1982. pp. 57, 58.

⁴⁷⁴ CP-031207-012

⁴⁷⁵ Bearss, Edwin C. 1982. p. 178.

Salvage Officer for disposal.^{476, 477} In July 1986, the NPS completed the initial phase of cultural resource preservation at Battery Cullum. The Battery remained closed to the public due to unsafe conditions such as broken metal parts, loose and broken railings, and cracked concrete.⁴⁷⁸

Construction of Battery Sevier was begun in 1895 and completed on 29 June 1898. On 15 February 1898, the guns were mounted. Battery Sevier mounted two 10-inch rifled guns (Model 1888, Serial Numbers 25 and 42) on disappearing carriages (Model 1894). Power was supplied by two 25 kW General Electric gasoline generators as well as commercial A.C. from Pensacola. Gun #25 had fired 210 rounds and Gun #42 had fired 235 rounds.^{479, 480, 481} By March 1918, the guns at Battery Sevier were listed for service abroad, but were still mounted in October 1918.^{482, 483} On 16 June 1933, the guns of Battery Sevier were listed as no longer required. In the 4th Indorsement to a 4 May 1936 reply, the Adjutant General directed that the breech mechanisms be removed and the gun tubes sold as surplus. The carriages were directed to be sold as scrap with no parts retained.^{484, 485} As of 28 July 1941, the guns and mounts were still present. In October 1941, Battery Seveir was identified as being no longer necessary as part of the modernization program for the Harbor Defenses of Pensacola.^{486, 487} The guns and carriages were removed and salvaged in November 1942.^{488, 489} In May 1944, a Harbor Defense Signal Station was constructed on the old battery.⁴⁹⁰ In July 1986, the NPS completed the initial phase of cultural resource preservation at Battery Sevier. The Battery remained closed to the public due to unsafe conditions such as broken metal parts, loose and broken railings, and cracked concrete.⁴⁹¹ The layout of Battery Sevier is depicted in **Figure 4-3** below (best available drawing).⁴⁹²

⁴⁷⁶ Roberts, Robert B. pp. 195-198.

⁴⁷⁷ Bearss, Edwin C. 1982. pp. 178.

⁴⁷⁸ PHS-031407-007

⁴⁷⁹ CP-031207-025

⁴⁸⁰ Bearss, Edwin C. 1982. p. 42.

⁴⁸¹ ATL-030907-040

⁴⁸² ATL-030807-011

⁴⁸³ ATL-030807-012

⁴⁸⁴ CP-031307-204

⁴⁸⁵ Bearss, Edwin C. 1982. pp. 57, 58.

⁴⁸⁶ CP-031307-008

⁴⁸⁷ CP-031307-021

⁴⁸⁸ Roberts, Robert B. pp. 195-198.

⁴⁸⁹ Bearss, Edwin C. 1982. pp. 57, 58.

⁴⁹⁰ CP-031207-027

⁴⁹¹ PHS-031407-007

⁴⁹² ATL-030607-006

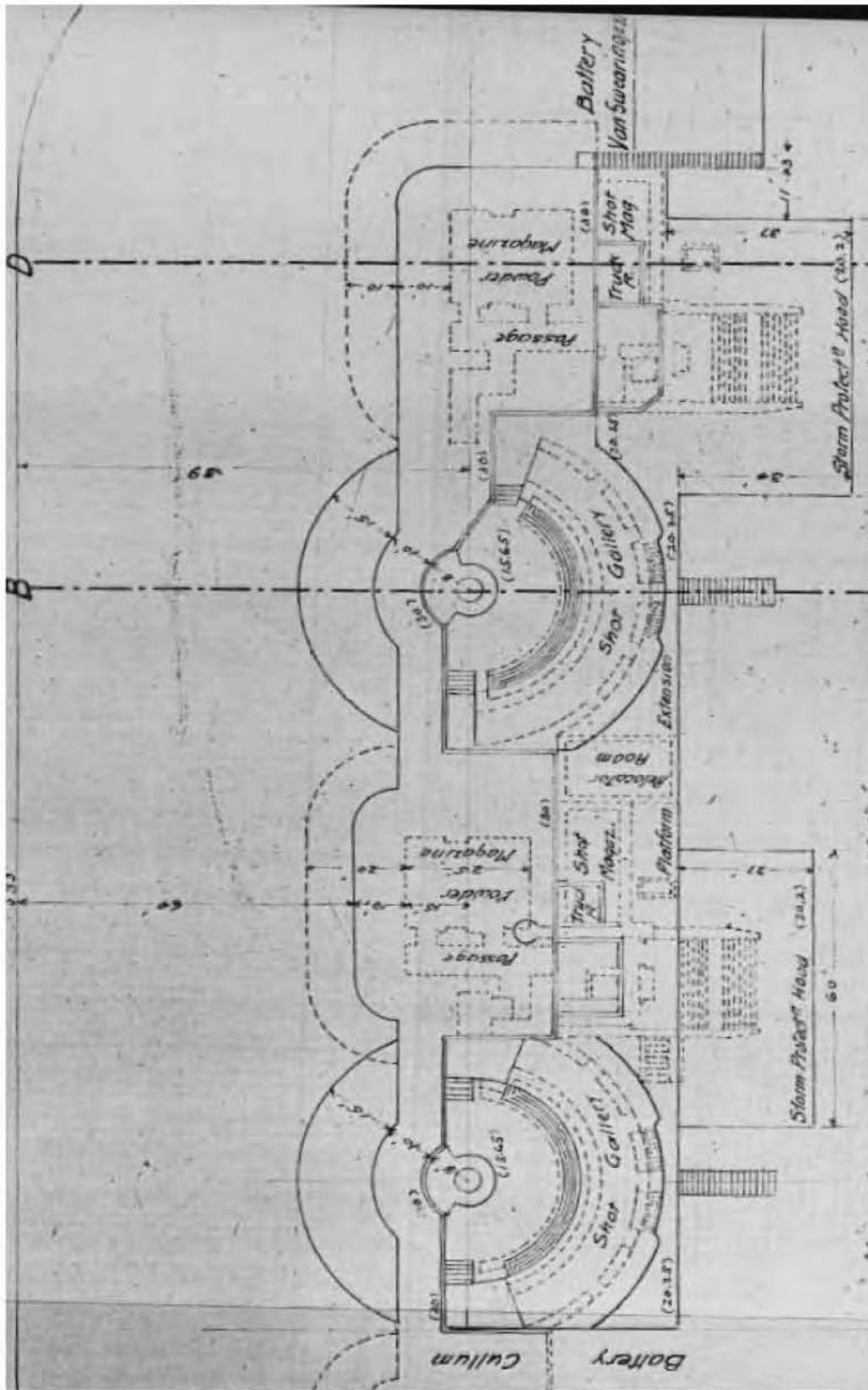


Figure 4-3. Layout of Battery Sevier

Battery Pensacola

Battery Pensacola was on the drawing board as early as 22 June 1893 and approved by the Chief of Engineers on 6 January 1894.⁴⁹³ Construction of the Battery began in 1897 and was completed on 20 December 1898. Mounting of the two 12-inch rifled guns (Model 1895) on disappearing carriages (Model 1897) was completed on 27 November 1899. An observation tower was located between the two gun pits and earth and vegetation covered the Battery for protection from enemy artillery fire. The 12-inch guns were capable of firing 1,070-pound (lb.) shells approximately eight miles. The Battery was originally powered by an internal 15 kW power plant.^{494, 495} On 22 July 1899, the War Department issued General Order No. 134 designating the emplacement Fort Pensacola. This violated the Army's nomenclature and, on 29 May 1900, the War Department issued another general order redesignating the emplacement Battery Pensacola. Later, the Battery was powered by an external power plant along with A.C. commercial power from Pensacola.^{496, 497, 498, 499} A splinter-proof BC station was constructed at the Battery in 1908. The frame 1902 station was listed as obsolete. It was destroyed by fire on 24 February 1911.⁵⁰⁰ The layout of Battery Pensacola is shown in **Figure 4-4** below (best available drawing).

⁴⁹³ CP-031907-012

⁴⁹⁴ Bearss, Edwin C. 1982. pp. 93-105.

⁴⁹⁵ CP-032107-021

⁴⁹⁶ CP-031307-001

⁴⁹⁷ Roberts, Robert B. pp. 195-198.

⁴⁹⁸ CP-031207-017

⁴⁹⁹ ATL-030807-052

⁵⁰⁰ Bearss, Edwin C. 1982. pp. 222.

On 16 June 1933, Battery Pensacola was listed as surplus. The power was disconnected, the breech-blocks removed, and the guns and carriages coated with cosmoline. On 24 October 1934, the guns, having been dismantled, were shipped to Watervliet. In the 4th Indorsement to a 4 May 1936 reply, the Adjutant General directed that the two disappearing carriages be sold as scrap with no parts retained.⁵⁰¹ The carriages were salvaged and sold as scrap in October 1942. During the years of the pre-Pearl Harbor military build-up, the battery served as a storage facility.^{502, 503, 504, 505}

Battery Worth

Construction of Battery Worth began in 1897 and was completed in 1898. The battery was named in honor of Bvt. Maj. Gen. William J. Worth, who was the first to plant the U.S. flag on the Rio Grande in 1847. The battery housed eight 12-inch mortars (Model 1890 M1) in two gun pits of four mortars each. Four of the mortars were mounted on mortar mounts (Model 1896) and four were unmounted.^{506, 507, 508} While the carriages were mounted by 31 December 1898, the mortars had not yet been received.⁵⁰⁹ The mortars appear to have been emplaced by 31 March 1899.⁵¹⁰ The Battery contained two powder magazines, shell magazine, four guard rooms, firing room, plotting room, and battery storage room. The internal power plant was removed and replaced by a free-standing plant in 1903.^{511, 512} Later, power was supplied by two 25 kW General Electric gasoline generators as well as commercial A.C. from Pensacola.^{513, 514, 515} A BC station for the Battery was constructed on top of the parapet between pits A and B. Drainage from the mortar pits were conveyed via six-inch vitrified clay pipe to a “cess pool” located at the power house.^{516, 517} The layout for Battery Worth is depicted in **Figure 4-5** below (best available drawing).⁵¹⁸

⁵⁰¹ CP-031307-204

⁵⁰² CP-031307-001

⁵⁰³ Roberts, Robert B. pp. 195-198.

⁵⁰⁴ CP-031207-017

⁵⁰⁵ Bearss, Edwin C. 1982. pp. 121.

⁵⁰⁶ CP-031307-001

⁵⁰⁷ Roberts, Robert B. pp. 195-198.

⁵⁰⁸ ATL-030707-006

⁵⁰⁹ CP-032107-017

⁵¹⁰ CP-032107-009

⁵¹¹ Bearss, Edwin C. 1982. p. 83.

⁵¹² CP-032107-020

⁵¹³ CP-031207-023

⁵¹⁴ ATL-030807-029

⁵¹⁵ ATL-030807-052

⁵¹⁶ Bearss, Edwin C. 1982. p. 222.

⁵¹⁷ CP-031907-019

⁵¹⁸ CP-031207-023

Although Battery Worth lost half of its armament in May 1918 in accordance with the War Department policy to reduce weaponry mounted in the nation's older emplacements, the other four mortars remained active until approved for decommissioning on 21 May 1942. In mid-November 1942, it was reported by the Southern Defense Command that the mortars and their carriages had been salvaged.^{519, 520, 521, 522} Two barracks, a mess hall, and a latrine in the vicinity of Battery Worth were condemned in 1925.⁵²³ Even before the mortars were salvaged, the Fire Control Switchboard Room had been established at the Battery. In the weeks after November 1942, the magazines and bombproofs were converted into a combination Harbor Defense Command Post - Harbor Entrance Control Post (HDCP-HECP).^{524, 525, 526, 527, 528, 529, 530}

Battery Van Swearingen

The threat of war with Spain and the passage of the National Defense Act of 9 March 1898 prompted the immediate construction of Battery Van Swearingen in 1898. Two 4.7-inch British Armstrong guns were mounted on pedestal carriages (Model 1897) and turned over to the artillery on 29 June 1898. Power was originally supplied by the Central Plant. On 25 May 1903, the battery was named for Captain Joseph Van Swearingen, who was killed in action against the Seminole Indians at the battle of Okeechobee on Christmas 1837. By 1917, the guns were obsolete. Declared surplus to the needs of the Pensacola Harbor Defense Project, the guns were dismantled in the winter of 1917-1918 and shipped to Watervliet in February 1918. In mid-March 1919, the War Department determined to retain Battery Van Swearingen as an element of the Harbor Defense Project. The guns and their carriages were returned to the Fort Pickens Military Reservation and placed in storage. Then, in May 1921, the War Department reversed itself and ordered the guns and carriages disposed of. Gun No. 9718 and carriage No. 10841 were donated to Danielsville, Georgia. Gun No. 9719 and carriage No. 10836 were donated to Orlando, Florida. In 1922, the battery was given a new mission and Emplacement No. 1 was converted into a Coincidence Range Finder Station for Battery Payne.^{531, 532, 533, 534, 535, 536, 537} The layout for Battery Van Swearingen is depicted in **Figure 4-6** below (best available drawing).⁵³⁸

⁵¹⁹ CP-031207-023

⁵²⁰ CP-031307-007

⁵²¹ CP-031307-014

⁵²² Bearss, Edwin C. 1982. p. 85.

⁵²³ ATL-030707-113

⁵²⁴ Roberts, Robert B. pp. 195-198.

⁵²⁵ PIRS-022807-002

⁵²⁶ American Seacoast Defenses, A Reference Guide. January 1999. Edited by Mark A. Berhow. Coast Defense Study Group Press. Pp. 308, 309, 320.

⁵²⁷ CP-031307-007

⁵²⁸ CP-031207-008

⁵²⁹ CP-031207-027

⁵³⁰ Bearss, Edwin C. 1982. p. 86.

⁵³¹ CP-031307-001

⁵³² CP-031207-019

⁵³³ Roberts, Robert B. pp. 195-198.

⁵³⁴ Bearss, Edwin C. 1982. pp. 87-91, 176, 301-321.

⁵³⁵ ATL-030807-052

⁵³⁶ ATL-030807-011

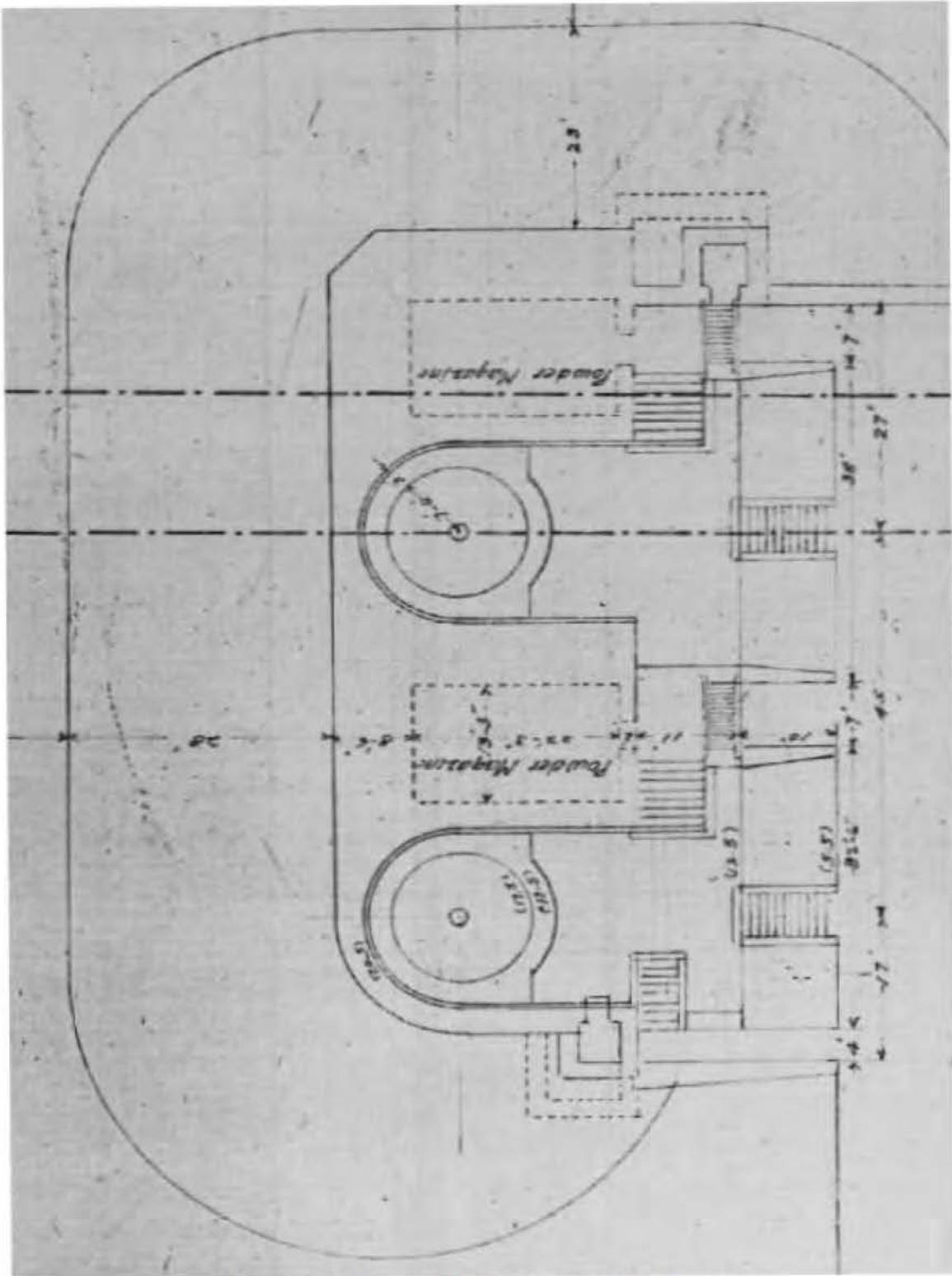


Figure 4-6. Layout of Battery Van Swearingen

⁵³⁷ CP-032207-002
⁵³⁸ ATL-030607-008

Battery Payne

Battery Payne was constructed in 1904 and ready for its armament on 11 May 1904. Soon thereafter, the two three-inch guns (Nos. 16 and 17, Model 1902 R.F.) on pedestal carriages (Model 1902 R.F.) were mounted. The current for lighting the Battery was obtained from the Central Power Plant through a lead cable from Battery Van Swearingen. The design and mission of this battery were identical to Battery Trueman. The battery was named for U.S. Army 1st Lieutenant Matthew M. Payne of Virginia who served in both the War of 1812 and the Mexican American War. In the spring of 1913, Gun No. 16 and its carriage was dismantled from Battery Payne and shipped to the Sandy Hook Proving ground for experimental purposes. In August 1913, Gun No. 29 and its carriage were moved from Battery Trueman to Battery Payne. In the summer of 1916, Gun No. 16 was returned and mounted in Battery Trueman. Ten months after V-J Day, the two 3- inch guns and carriages were marked for disposal. In October 1941, Battery Payne was identified as being retained as part of the modernization program for the Harbor Defenses of Pensacola.^{539, 540, 541, 542} In 1945, two caliber .50 machine guns were installed at Battery Payne.⁵⁴³ On 27 June 1946, the three inch guns and carriages were dismantled and turned over to the post salvage officer for disposal.⁵⁴⁴ The layout of Battery Payne is shown in **Figure 4-7** below (best available drawing).⁵⁴⁵

⁵³⁹ CP-031307-001

⁵⁴⁰ Roberts, Robert B. pp. 195-198.

⁵⁴¹ CP-031307-021

⁵⁴² Bearss, Edwin C. 1982. pp. 172-176.

⁵⁴³ Ibid., p. 291.

⁵⁴⁴ Ibid., p. 178.

⁵⁴⁵ ATL-030607-004

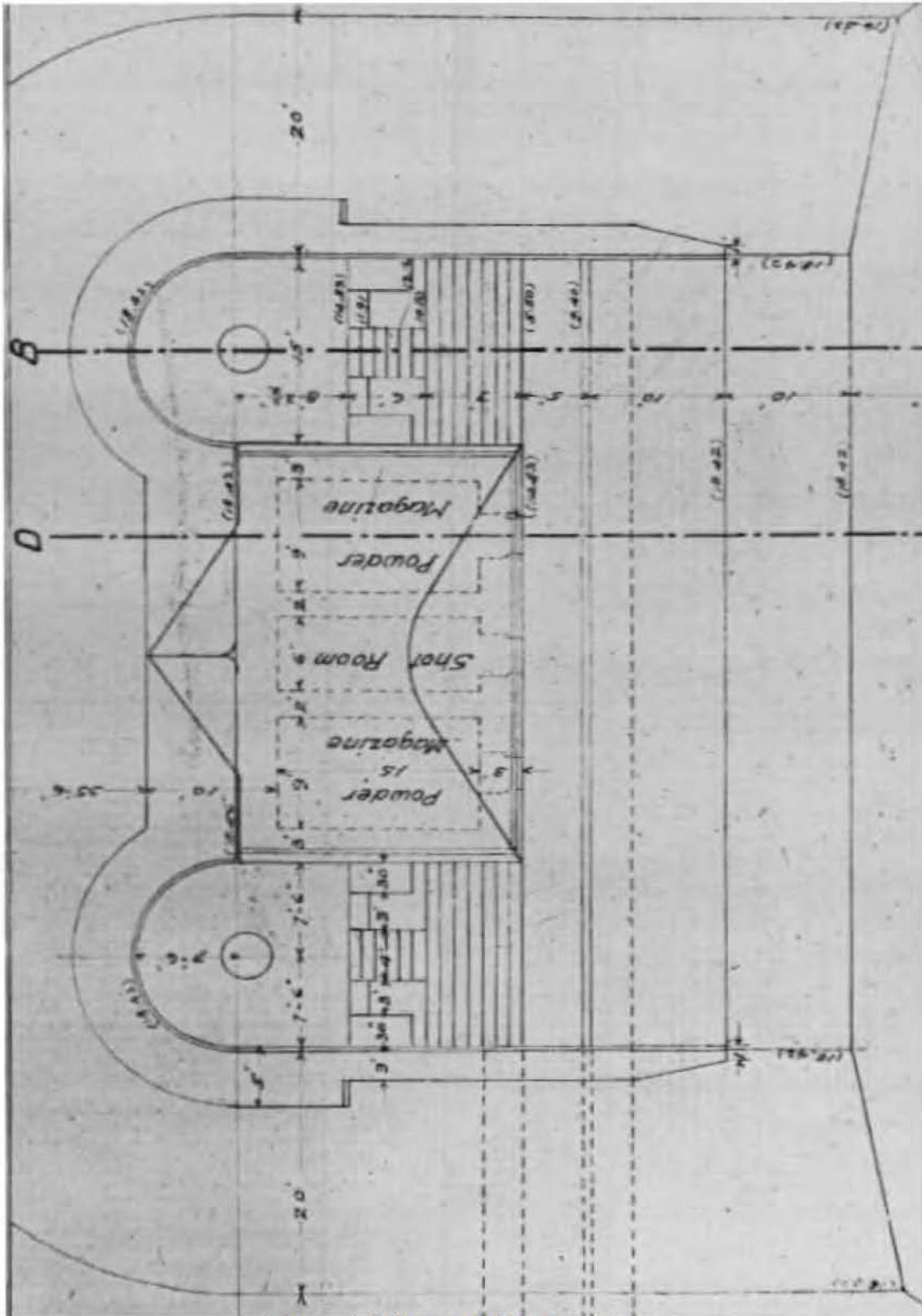


Figure 4-7. Layout of Battery Payne

Battery Trueman

Battery Trueman was named for Alexander Trueman of Maryland, who died of wounds received in action with Indians near Fort Recovery on 2 June 1792. Positioned on the western end of Santa Rosa island north of the harbor entrance, the battery was completed in the winter of 1904 and mounted two 3-inch rapid-fire guns (Serial Nos. 25 and 24, Model 1902) on pedestal mounts (Model 1902). One gun was mounted in July 1904 and the other gun was mounted by 5 February 1907 when the guns were transferred to the Coast Artillery. The Battery was designed to defend the bay entrance against fast torpedo boats and minesweepers, as well as to provide maximum protection to the inner submarine minefield. Current for lighting the Battery was drawn from the Central Power Plant.^{546, 547, 548} In the 1920's, a reinforced concrete range-finder station was sited about 100 feet northeast of the Battery. The concrete shelter was supported by foundation walls and a platform that raised its floor six feet above ground surface. Earth and sand were embanked against three of its elevations to within six inches of the observation slit. In October 1941, Battery Trueman was identified as being retained as part of the modernization program for the Harbor Defenses of Pensacola.^{549, 550} To provide better coverage of the beach and water areas within its range, the two 3-inch guns were relocated to Battery Cullum in 1943.^{551, 552, 553} The layout of Battery Trueman is shown in **Figure 4-8** below (best available drawing).⁵⁵⁴

⁵⁴⁶ Roberts, Robert B. pp. 195-198.

⁵⁴⁷ ATL-030707-014

⁵⁴⁸ Bearss, Edwin C. 1982. pp. 170-176.

⁵⁴⁹ CP-031307-021

⁵⁵⁰ Bearss, Edwin C. 1982. pp. 176-178.

⁵⁵¹ Roberts, Robert B. pp. 195-198.

⁵⁵² PIRS-022807-002

⁵⁵³ CP-031407-003

⁵⁵⁴ ATL-030607-007

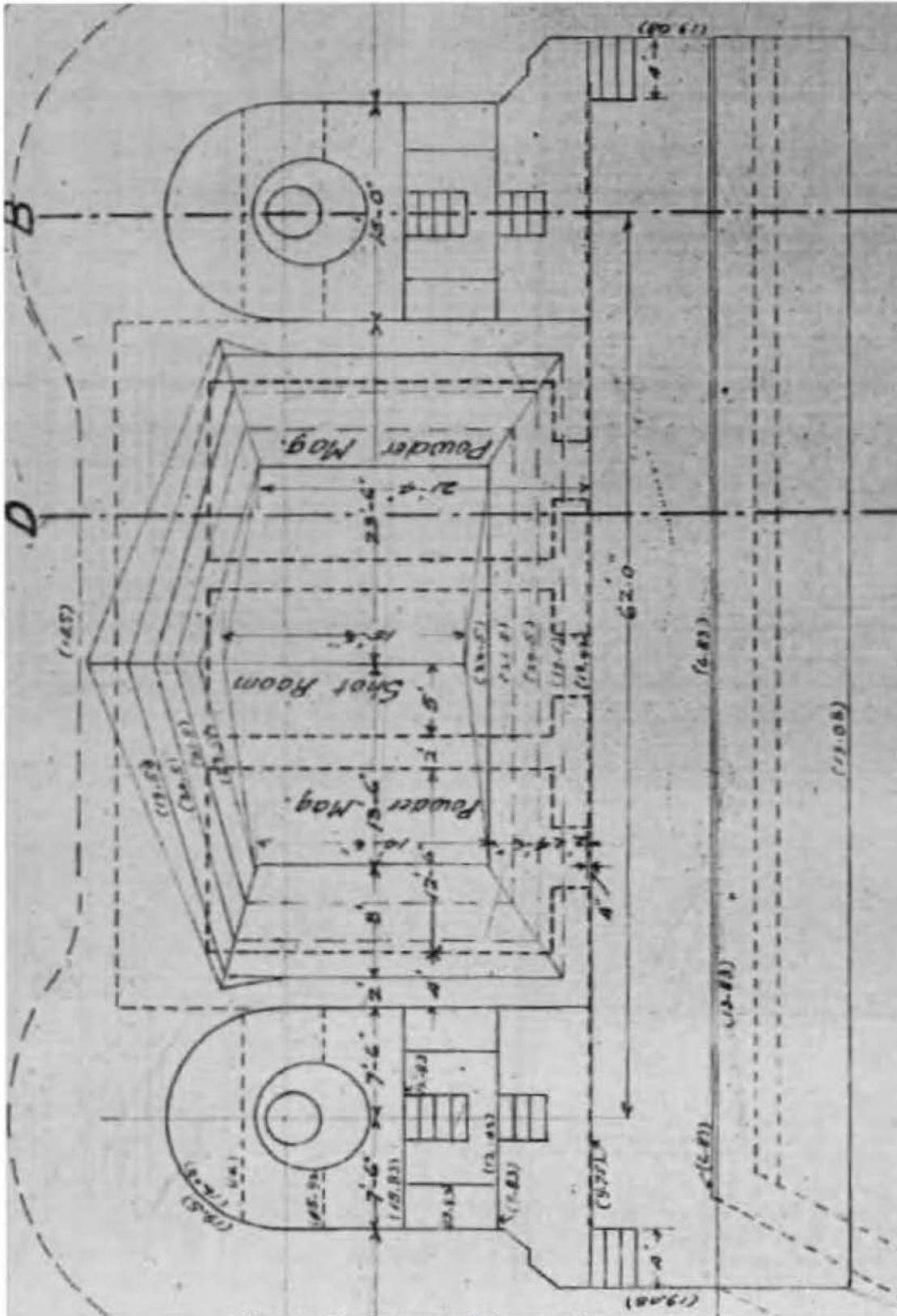


Figure 4-8. Layout of Battery Trueman

It was proposed in November 1942 to install two 37-mm guns on top of Battery Trueman. A combined Battery Commander's Station-Self-contained Horizontal Base (BC-CRF) was constructed on the left flank of Battery Trueman in May 1944.⁵⁵⁵ In 1945, two caliber .50 machine guns were installed at the Battery.⁵⁵⁶

Battery Cooper

Constructed in 1905, Battery Cooper mounted two 6-inch rapid fire guns (Model 1903) on disappearing carriages (Model 1903). The guns and carriages, however, were not mounted until June 1906. Power was obtained from Battery Worth over a pole line. The battery was named Battery George Cooper to commemorate 2nd Lt. George A. Cooper, killed in action at Mivital, Philippine Islands, on 17 September 1900. In August 1917, the War Department listed the 6-inch guns at Fort Pickens as available for use on railway mounts in Europe. In November 1917, the guns were dismantled. The carriages remained until 7 June 1920, when they were declared obsolete and salvaged.^{557, 558, 559, 560, 561} The mounts and carriages were partially broken up with sledge hammers and dynamite.⁵⁶² A Board of Officers convened at Fort Barrancas on 5 February 1934 to establish a battery of four 155-mm Grande Puissance Filloux (GPF) guns at Battery Cooper. This was Battery was named Battery GPF.^{563, 564, 565} In October 1941, authority was granted for the disposal of the remaining parts of the carriages and shields.^{566, 567} The layout of Battery Cooper is depicted in **Figure 4-9** below (best available drawing).⁵⁶⁸

⁵⁵⁵ CP-031207-029

⁵⁵⁶ Bearss, Edwin C. 1982. p. 291.

⁵⁵⁷ CP-031307-001

⁵⁵⁸ ATL-030807-011

⁵⁵⁹ Roberts, Robert B. pp. 195-198.

⁵⁶⁰ American Seacoast Defenses, A Reference Guide. January 1999. Edited by Mark A. Berhow. Coast Defense Study Group Press. Pp. 308, 309, 320.

⁵⁶¹ Bearss, Edwin C. 1982. pp. 158-162.

⁵⁶² CP-031307-008

⁵⁶³ CP-031207-015

⁵⁶⁴ ATL-030807-052

⁵⁶⁵ Bearss, Edwin C. 1982. pp. 162, 163.

⁵⁶⁶ CP-031307-008

⁵⁶⁷ Bearss, Edwin C. 1982. pp. 162, 163.

⁵⁶⁸ CP-031207-015

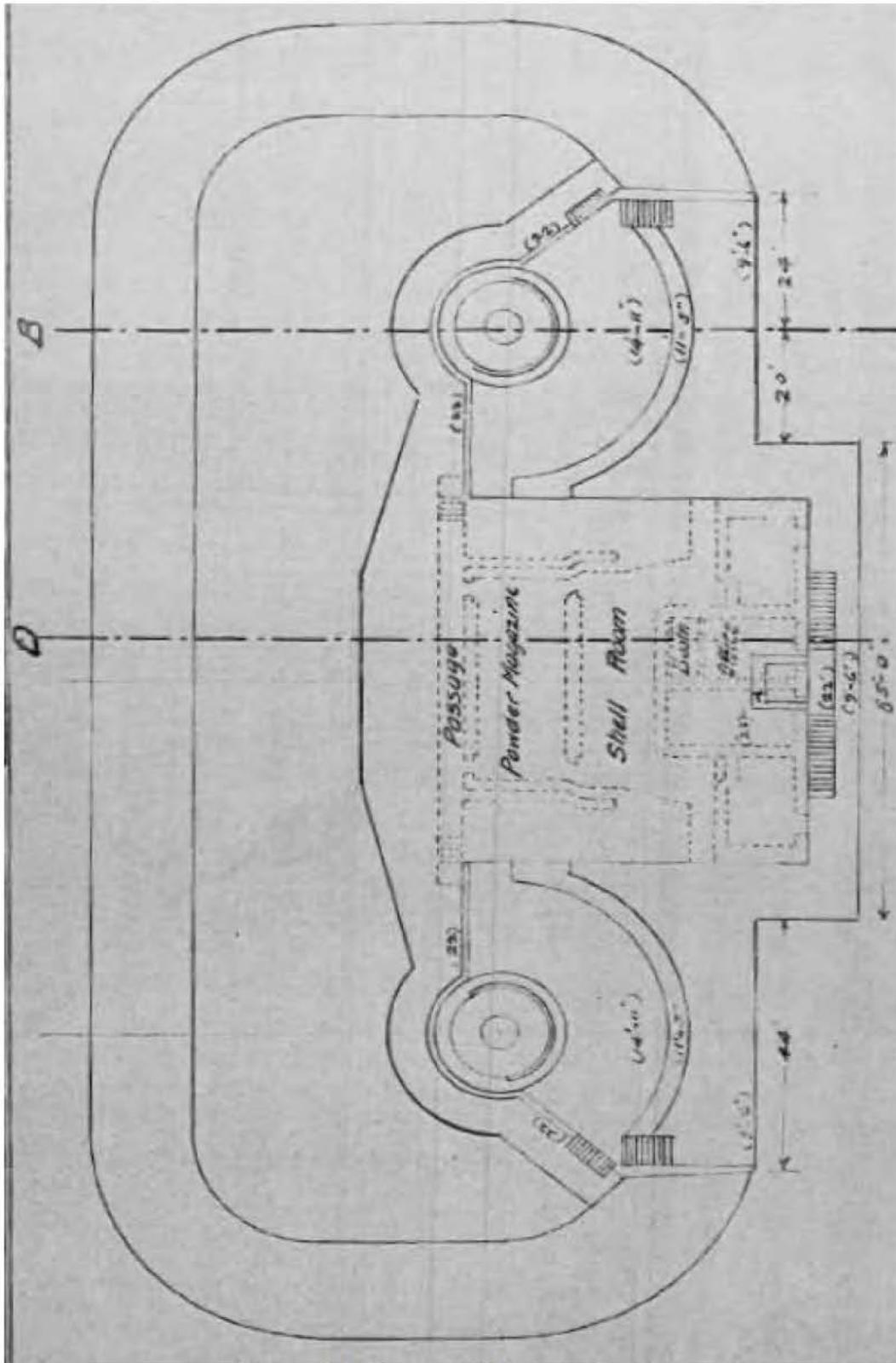


Figure 4-9. Layout of Battery Cooper

Battery Langdon

Although Battery Langdon was constructed from April 1917 to May 1921, the two 12-inch guns (Nos. 14 and 62, Model 1895 M1) weren't mounted [*en barbette* (Model 1917)] until March 1923.^{569, 570} The battery was named in honor of Loomis L. Langdon, a man whom was stationed at Fort Pickens on three occasions.^{571, 572, 573} Power was supplied by two 25 kW General Electric gasoline generators and two exterior fuel pits.^{574, 575} Construction of an electric line from Battery Worth to Battery Langdon was approved in October 1931. The line was proposed to contain one 5 KVA transformer and two 1.5 KVA transformers.⁵⁷⁶ In 1931, a Battery Commander's station was constructed on the traverse. An inexpensive frame structure covered in tarpaper, it was abandoned and razed in 1941.⁵⁷⁷ The layout of Battery Langdon is presented in **Figure 4-10** below (best available drawing).⁵⁷⁸

⁵⁶⁹ CP-031207-021

⁵⁷⁰ ATL-030707-011

⁵⁷¹ Roberts, Robert B. pp. 195-198.

⁵⁷² PIRS-022807-002

⁵⁷³ Bearss, Edwin C. 1982. p. 283.

⁵⁷⁴ CP-031207-021

⁵⁷⁵ ATL-030707-008

⁵⁷⁶ CP-031307-028

⁵⁷⁷ Bearss, Edwin C. 1982. p. 285.

⁵⁷⁸ CP-031207-021

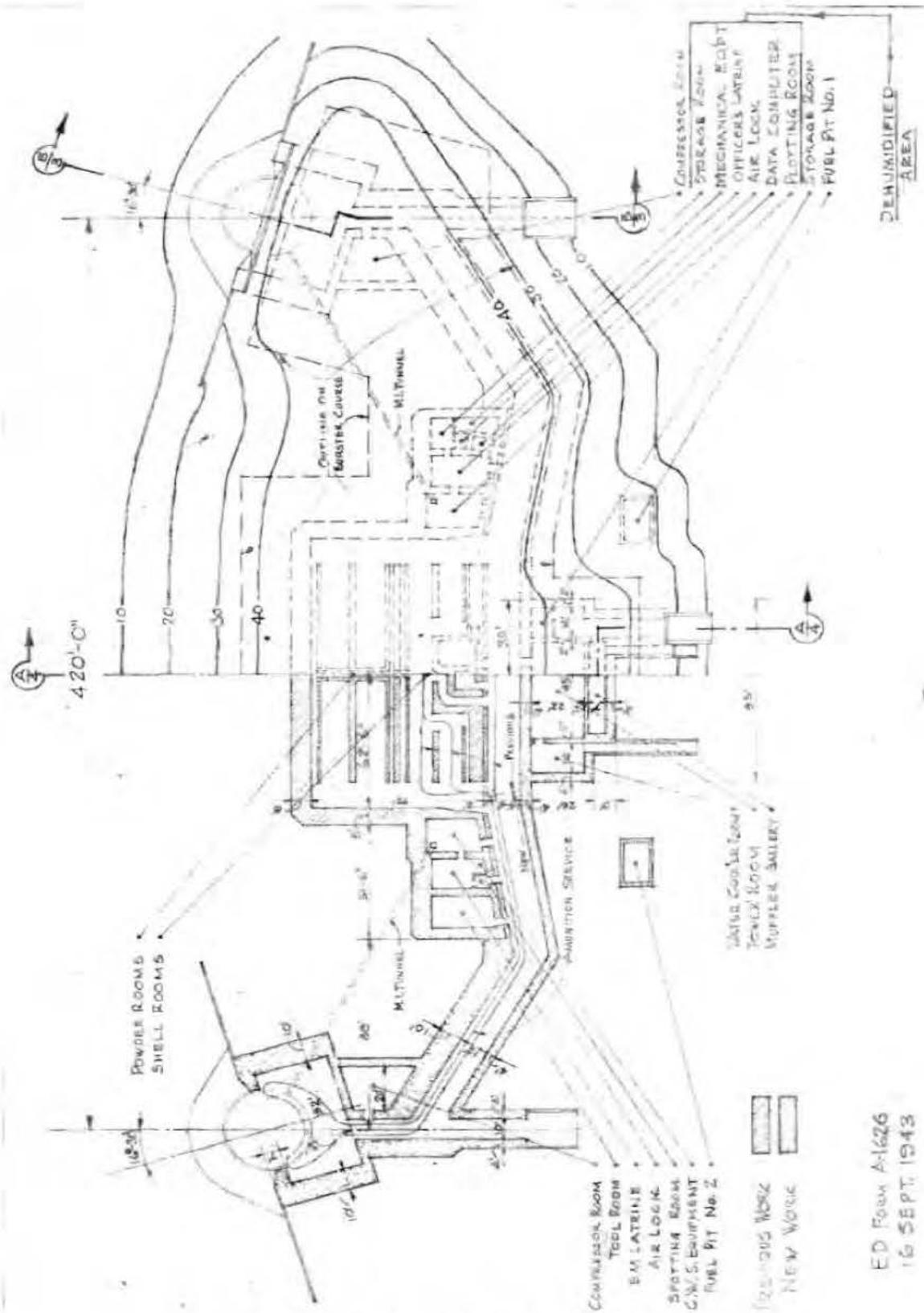


Figure 4-10. Layout of Battery Langdon

Major structural changes were made to Battery Langdon during 1942-43. Massive concrete casemates, with walls 10 feet thick and 17 feet of overhead masonry, were added to protect the guns and crews. Construction of the casemates reduced each gun's field of fire from 360 to 145 degrees. Each emplacement was connected with the magazines in the traverse by reinforced concrete corridors with more than eight feet of masonry, 20 feet of sand fill, and a two-foot burster course of concrete overhead. A new power room in the rear of the traverse was built. The power room was protected by five-foot concrete walls with five feet of concrete and more than six feet of sand fill overhead. This structure was divided by concrete interior walls into a power room, storeroom, water cooler room, muffler gallery, corridor, and two exhaust tunnels. On either side was a fuel storage tank positioned in a pit.⁵⁷⁹ In 1945, four 40-mm and four caliber .50 machine guns were installed at Battery Langdon.⁵⁸⁰ In May 1947, the War Department declared the Pensacola Harbor Defenses surplus to the nation's needs and ordered them deactivated.^{581, 582} During June and July 1947, the two 12-inch guns and Barbette carriages at Battery Langdon were completely demilitarized, removed, mutilated, and sold for scrap.^{583, 584}

Battery No. 234

Responding to the sweeping victories won by the German military in the spring of 1940, a special War Department board convened to prepare a new master plan for coastal defenses that resulted in plans for two new 6-inch gun batteries for the Pensacola Harbor Defense Project. These batteries were Battery No. 234 on Santa Rosa Island and an identical emplacement, known as Battery No. 233, on Perdido Key. The 6-inch guns had curved shields of cast steel four to six inches thick. These shields provided protection against machine gun and light artillery fire. Battery 234's magazines, power station, air conditioning equipment, communication, storage, and service rooms were in an earth-covered concrete traverse positioned between the two guns. By the time Battery No. 234 was completed in the autumn of 1943, the war favored the Allies and arming the batteries was not a high priority.^{585, 586, 587} The Battery was powered by three 125 KVA diesel generators apparently supplied by two fuel pits.⁵⁸⁸ Approval and allotment of funds for construction of housing facilities in the vicinity of Battery 234 were requested in a letter dated 29 May 1943.⁵⁸⁹ A BC-CRF Station (essentially a tower) was constructed to the rear of Battery 234 in 1944.⁵⁹⁰ Although the Battery did receive the barbette carriages by June 1944, the shields were projected to be delivered in July 1944.⁵⁹¹ In 1945, two 37-mm guns and four caliber

⁵⁷⁹ Bearss, Edwin C. 1982. p. 287.

⁵⁸⁰ Ibid., p. 291.

⁵⁸¹ Roberts, Robert B. pp. 195-198

⁵⁸² PIRS-022807-002

⁵⁸³ CP-112003-011

⁵⁸⁴ Bearss, Edwin C. 1982. p. 288.

⁵⁸⁵ Roberts, Robert B. pp. 195-198.

⁵⁸⁶ CP-031207-004

⁵⁸⁷ Bearss, Edwin C. 1982. pp. 293, 294.

⁵⁸⁸ CP-031207-011

⁵⁸⁹ CP-031207-006

⁵⁹⁰ CP-031207-028

⁵⁹¹ CP-031207-003

.50 machine guns were installed at Battery 234.⁵⁹² In 1946, the shields and Barbette carriages were finally received. The 6-inch guns were never received. In the summer of 1947, the carriages and shields were demilitarized, mutilated, and sold for scrap.^{593, 594} The guns, shields, and carriages present today at Battery No. 234 were obtained from Battery 227, Fisherman Island, Ft. John Custis, Virginia in 1976 and are identical to the type of guns that would have been emplaced by the Army. The tower adjacent to the Battery was used to direct gunfire from the Battery's shield guns.^{595, 596, 597} The layout of Battery 234 is depicted in **Figure 4-11** below (best available drawing).⁵⁹⁸

⁵⁹² Bearss, Edwin C. 1982. p. 291.

⁵⁹³ CP-112003-011

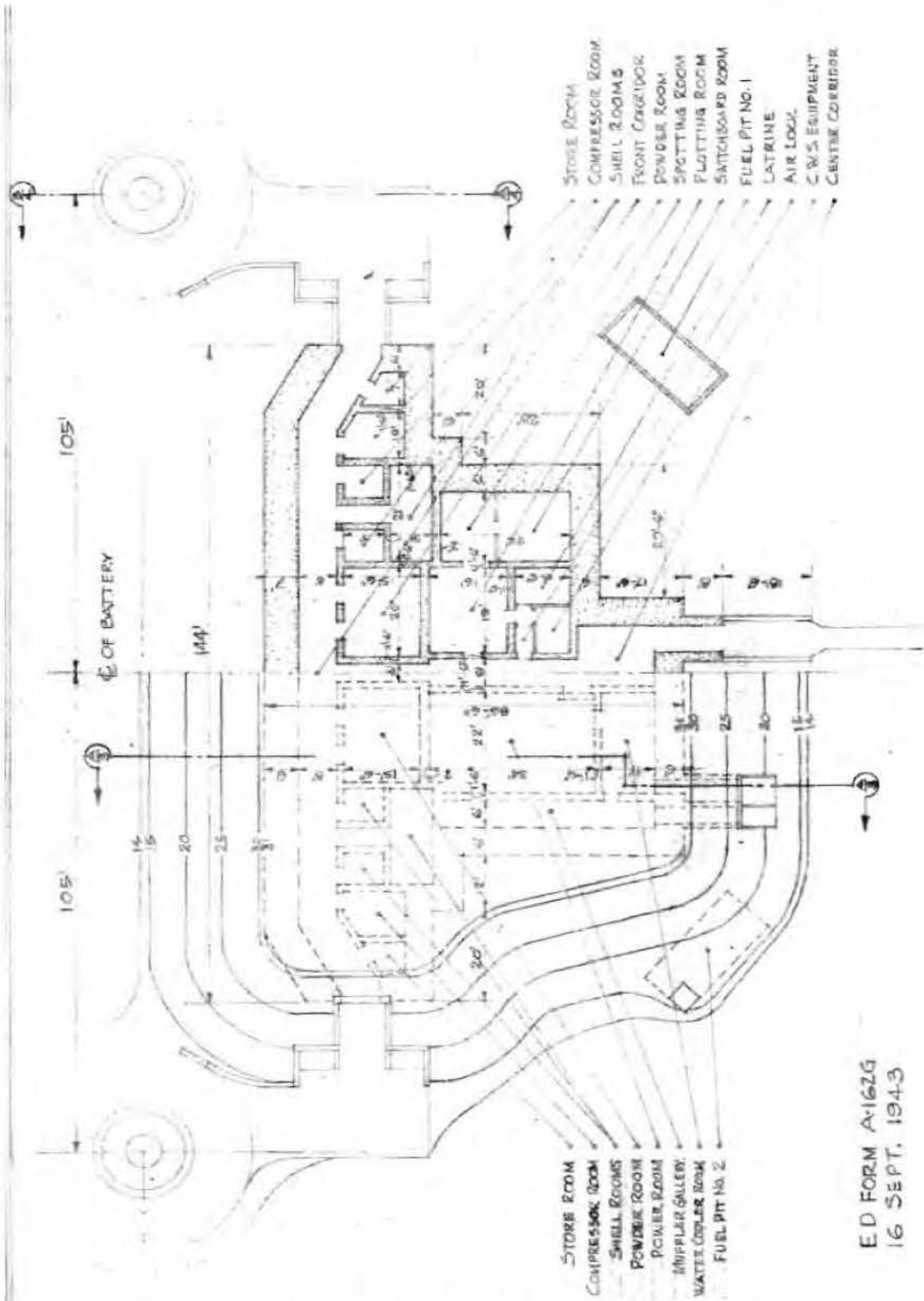
⁵⁹⁴ Bearss, Edwin C. 1982. p. 295.

⁵⁹⁵ Roberts, Robert B. pp. 195-198.

⁵⁹⁶ PIRS-022807-002

⁵⁹⁷ Coast Defense Study Group News, Volume Three, Number Three. May 1989. p. 3.

⁵⁹⁸ CP-031207-011



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Figure 4-11. Layout of Battery 234

4.2.1.4 Mobile 155-mm Guns

Two mobile 155-mm guns were present on the Fort Pickens Military Reservation at least by November 1925. A shed (Bldg. 7) was constructed for these guns and their two tractors just south of the barracks. The shed had a concrete foundation, wooden framing, weatherboarding, and galvanized tin roof. The concrete in the compartments for the guns and tractors was 12 inches thick with an apron approach of concrete also 12 inches thick. The building proper was 36 feet by 50 feet with side walls 10 feet high. The shed was transferred to the Coast Artillery Corps on 20 January 1926.^{599, 600, 601, 602}

4.2.1.5 Battery Air

Battery Air was a mobile anti-aircraft battery completed on 10 January 1929. Battery Air had four 3-inch guns (Model 1917), each mounted on a mobile trailer. The three-inch guns were to be mounted on four gun blocks. Target practice positions were selected in order to reduce interference from shipping or other battery firings and to improve flank spotting conditions when the Battery Langdon station was used.⁶⁰³ Commercial A.C. power was supplied from Battery Pensacola.⁶⁰⁴ By March 1937, the original guns had been shipped to the National Guard and replaced with three 3-inch guns, Model M-3, on spider mounts. In 1937, the battery was used by the Regular Army, Reserve Officers Training Corps (R.O.T.C.), Organized Reserve, and National Guard units.⁶⁰⁵

4.2.1.6 AA Battery Fixed

Battery Fixed was constructed between November 1917 and March 1918, and consisted of two 3-inch guns (Serial Numbers 32 and 46, Model 1917) mounted on anti-aircraft pedestal mounts (Serial Numbers 24 and 25, 1917).^{606, 607, 608, 609} These guns were located 700 to 1,000 yards from Battery Worth and 2,000 yards from Battery Langdon.^{610, 611} The concrete bases for these guns were approximately 12 feet in diameter and 4 ½ feet thick.⁶¹² The platforms were apparently constructed of wood.⁶¹³ The guns had yet to be emplaced by May 1920, but were emplaced by June 1921.^{614, 615} A reinforced concrete magazine and store room were constructed in late 1928 to

⁵⁹⁹ CP-031207-011

⁶⁰⁰ ATL-030707-012

⁶⁰¹ ATL-030707-013

⁶⁰² ATL-030707-075

⁶⁰³ ATL-0030807-027

⁶⁰⁴ CP-031207-018

⁶⁰⁵ CP-031307-031

⁶⁰⁶ ATL-030707-007

⁶⁰⁷ ATL-030707-060

⁶⁰⁸ ATL-030707-063

⁶⁰⁹ Bearss, Edwin C. 1982. p. 289.

⁶¹⁰ ATL-030707-067

⁶¹¹ Bearss, Edwin C. 1982. p. 289.

⁶¹² ATL-030707-068

⁶¹³ ATL-030707-060

⁶¹⁴ ATL-030707-074

early 1929, to service this battery. The structure contained two rooms and was located 100 yards southwest of the Battery.^{616, 617}

In the mid-1930's, the War Department revised its Antiaircraft Defense Project for Pensacola. Battery Fixed was relocated to a site east of Battery Langdon (see **Appendix I-5**). Construction of the new platforms for Battery Fixed several hundred yards east of Battery Langdon was initiated in August 1939, and completed in March 1940. An igloo type reinforced concrete magazine was constructed for the storage of the battery's ammunition. When Battery Fixed was relocated, the battery was armed with different 3-inch guns (Nos. 162 and 165, Model 1917 MII) mounted on pedestal mounts (Model 1917 M1). Power was supplied by two A.C. gasoline electric generating units. A dugout shelter and ammunition magazine were also associated with the Battery.^{618, 619, 620} Battery Fixed was located to provide maximum protection of Battery Langdon. In October 1941, Battery Fixed was identified as being retained as part of the modernization program for the Harbor Defenses of Pensacola.⁶²¹ In 1945, four caliber .50 machine guns were installed at the battery.⁶²² On 1 April 1945, the guns were declared obsolete. WWII ended before it was determined what armament would replace them.⁶²³

4.2.1.7 Anti-Motor Torpedo Boat (AMTB) Battery

The motor torpedo boat developed by the 1940s was highly maneuverable and the types of guns, carriages, and fire control available at the time were not suitable for defense against attacks by these boats. To meet this new threat to shipping, special batteries with fire control equipment designed for the purpose were provided to various batteries.⁶²⁴ The layout and cost estimate for construction of the 90-mm Anti-Motor Torpedo Boat (AMTB) Battery was approved on 2 April 1943.⁶²⁵ The Battery was completed on 16 June 1943, and was composed of two 90-mm M1 guns on fixed T-3 fixed carriages and saw service through 1946.^{626, 627, 628} The battery was located approximately 25 yards in front of the Fort Pickens seawall and 150 yards southeast of Battery Cullum. A reinforced concrete igloo-type magazine was constructed to store ammunition for the battery.⁶²⁹ Standard equipment for an AMTB battery included two base end stations, one combined battery command post and battery observation station, one plotting room, one standard 60-inch portable searchlight, and the emplacement itself. In a typical emplacement

⁶¹⁵ ATL-030707-007

⁶¹⁶ ATL-030707-080

⁶¹⁷ CP-031207-016

⁶¹⁸ Ibid.

⁶¹⁹ CP-031507-307

⁶²⁰ Bearss, Edwin C. 1982. p. 290.

⁶²¹ CP-031307-021

⁶²² Bearss, Edwin C. 1982. p. 291.

⁶²³ Ibid., p. 290.

⁶²⁴ CP-032207-004

⁶²⁵ CP-031407-001

⁶²⁶ American Seacoast Defenses, A Reference Guide. January 1999. Edited by Mark A. Berhow. Coast Defense Study Group Press. Pp. 308, 309, 320.

⁶²⁷ CP-031407-002

⁶²⁸ CP-031207-013

⁶²⁹ Bearss, Edwin C. 1982. pp. 291.

were two 90-mm guns on fixed mounts, two 90-mm guns on mobile mounts, a 35-KVA generator with alternate power or a spare 35-KVA generator. The extreme range of the guns was 12,000 yards with a maximum effective range of 8,000 yards. The rate of fire was 25 rounds per gun per minute.^{630, 631, 632, 633} In 1945, two 37-mm guns and four caliber .50 machine guns were installed at the AMTB battery.⁶³⁴

4.2.1.8 Battery GPF

A Board of Officers convened at Fort Barrancas on 5 February 1934, to establish a battery of four 155-mm GPF guns at Battery Cooper. This would require the modification of the firing platforms on the battery and the construction of two new platforms. The modification of Battery Cooper would also require the construction of a latrine and septic tank connected by a 2-inch water main from Battery Worth. In the spring of 1937, two emplacements for 155-mm GPFs were constructed in front of Battery Cooper, not on the platforms as proposed. These guns, Model 1918, were numbered 806 and 932. A third emplacement (gun No. 831) was constructed to the right of Battery Cooper and the fourth to the left (gun No. 789). These guns were used for training R.O.T.C., C.M.T.C., and O.R.^{635, 636}

The alteration of Battery Cooper to provide for emplacements of the four 155-mm guns on Panama mounts was approved by the Secretary of War on 11 June 1936. Funds were allotted for this alteration in 1942.⁶³⁷ This battery was designated Battery GPF. Construction of the Panama mounts commenced on 27 July 1942 and was completed on 18 September 1942. Each of the four 155-mm guns (Model 1918, Nos. 615, 763, 762, and 791) was mounted on a Panama mount (Model 1918) with it G.P.F. split trail carriage. In August 1942, a 25-kW gasoline generator was removed from Battery Pensacola and reinstalled at Battery GPF.⁶³⁸ Assigned to Fire Group 1, Battery GPF remained part of the Harbor Defense Project until 5 April 1945, when it was disarmed.^{639, 640, 641}

4.2.1.9 Submarine Mine Projects

A vital component of the Endicott Defense System was the submarine mine project. The mines and their miles of control cable were stored ashore so they could be planted rapidly in the event of war. Elements of this system included, besides the cables and mines, a fire control station or mining casemate as it was called, mine and cable storage facilities, loading rooms, wharves,

⁶³⁰ CP-032207-004

⁶³¹ CP-031407-005

⁶³² CP-032207-003

⁶³³ CP-032207-005

⁶³⁴ Bearss, Edwin C. 1982. p. 291.

⁶³⁵ CP-031207-015

⁶³⁶ ATL-030807-052

⁶³⁷ CP-031307-006

⁶³⁸ CP-031207-015

⁶³⁹ Roberts, Robert B. pp. 195-198.

⁶⁴⁰ American Seacoast Defenses, A Reference Guide. January 1999. Edited by Mark A. Berhow. Coast Defense Study Group Press. Pp. 308, 309, 320.

⁶⁴¹ Bearss, Edwin C. 1982. pp. 162, 163.

primary and secondary stations, and mine-laying vessels. In the years between 1893 and 1895, casemate Nos. 86 and 87 in the northeast bastion of Fort Pickens had been converted into a mining casemate. A cable gallery was also constructed connecting the casemate with Pensacola Bay. Work began in April 1898 to position mines of a grand group across the channel in two lines, employing both buoyant and ground torpedoes. There were three groups of mines in the outer row and four in the inner row. Extending out from the six-foot curve fronting Santa Rosa Island and Foster's Bank were two heavy booms. The booms were positioned to stop a torpedo boat moving at flank speed. Planted behind the booms were 36 mines "extemporized" from gasoline tanks. Two tons of dynamite had been shipped to Fort Pickens for arming the mines. The mining casemate was activated and a searchlight was positioned to sweep the channel minefield. Two Fort Pickens casemates were utilized as a storeroom and engine room for the searchlight and oil engine. After the restoration of peace with Spain, the mines and cables were taken up and stored. By early December 1898, 35 of the 45 mines had been recovered and destroyed. Four of the missing ten mines were surmised to have gone adrift. The other six missing mines were gasoline tanks used as ground mines. These, too, were surmised to have gone adrift.^{642, 643, 644, 645, 646, 647}

The submarine mine defense system was lacking in several key structures. Among these were the torpedo storehouse, cable tank, and loading room. Until those could be built, emergency locations for these activities were found near the mining casemate. Plans for construction of the needed structures were formulated in June 1898.⁶⁴⁸ A typical underwater harbor defense installation is depicted in **Figure 4-12** below.⁶⁴⁹

⁶⁴² Ibid., pp. 177, 179-181.

⁶⁴³ Installation Report No. 12, Coast Artillery Defense Site. October 2006. Prepared by US Army Corps of Engineers, St. Louis District. FOUO. pp. 26-37.

⁶⁴⁴ Bearss, Edwin C. 1982. p. 181.

⁶⁴⁵ CP-031307-208

⁶⁴⁶ CP-031307-209

⁶⁴⁷ CP-031907-026

⁶⁴⁸ Bearss, Edwin C. 1982. p. 181.

⁶⁴⁹ CP-032207-010

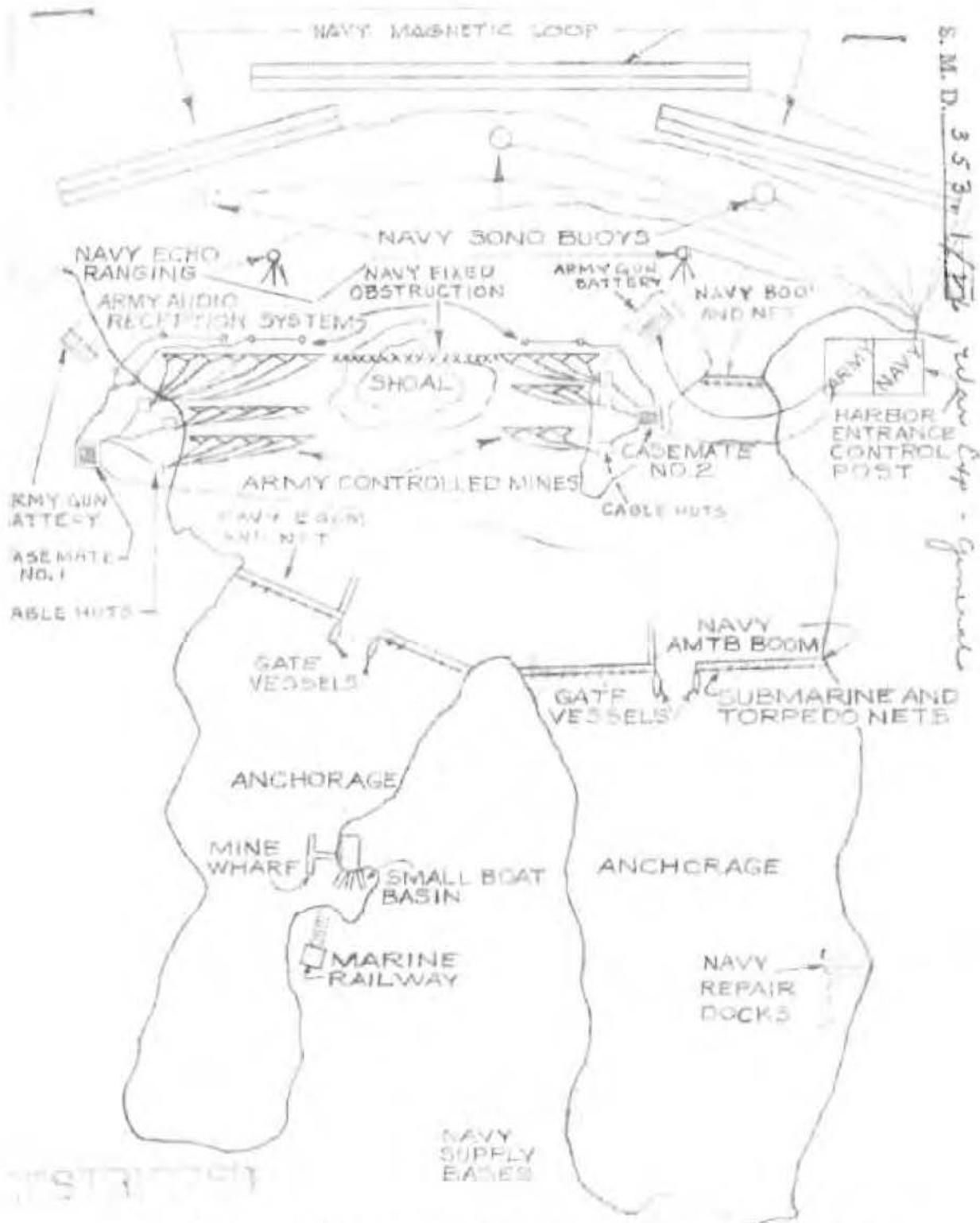


Figure 4-12. Typical Underwater Harbor Defense Installation, Circa 1946

In 1926, as an aftermath of the year's killer hurricane, the submarine mine defense system was eliminated from the Army's Harbor Defense Project for Pensacola Bay. Responsibility for underwater defense of the area was assumed by the Navy. An inspection of the entire mine system was conducted in June 1928 that would result in a recommendation as to the disposal of the mine system and material.^{650, 651, 652, 653} A test of the submarine mine cable stored at the Fort Pickens Military Reservation was tested on 12 December 1928. At that time, the Fort Pickens Military Reservation had on hand 11.5283 miles of Class A 1-conductor cable, 5.5570 miles of Class B 1-conductor cable, and 2.4931 miles of 19-conductor cable.⁶⁵⁴ It appears submarine mine service practice may have been conducted at the Fort Pickens Military Reservation.⁶⁵⁵

An underwater defense project was approved by the Secretary of War and Secretary of Navy on 7 January 1930. This project prescribed a defensive coastal area, provided a seaward limit, and established an antisubmarine net, fixed listening posts, and a contact mine project to be planted only in the event the harbor was closed to all traffic.^{656, 657} It does not appear that Pensacola Harbor was part of the project. The Fort Pickens Military Reservation was identified as having 11 miles of cable to be transferred.⁶⁵⁸

In October 1941, installation of a mine field in the vicinity of the Three Lakes area on the Fort Pickens Military Reservation was contemplated. This mine field would cover a probable approach to the Harbor Defenses of Pensacola from the east.⁶⁵⁹ In 1942, it was recommended that M-4 type mines not be installed in Pensacola Harbor.⁶⁶⁰

⁶⁵⁰ CP-032207-035

⁶⁵¹ CP-031307-208

⁶⁵² CP-031307-209

⁶⁵³ Bearss, Edwin C. 1982. pp. 177, 193.

⁶⁵⁴ CP-031507-002

⁶⁵⁵ CP-031307-308

⁶⁵⁶ CP-031307-208

⁶⁵⁷ CP-031307-209

⁶⁵⁸ CP-032207-011

⁶⁵⁹ CP-031307-021

⁶⁶⁰ CP-031307-302

4.2.1.10 Rifle Range

The Rifle Range was originally requisitioned on 10 July 1918. The requisition called for a 600-yard length, elevated firing points, and target pits. No backstop was required because the existing sand dunes offered protection and shooting was directed into the Gulf of Mexico.^{661, 662} The U.S. Marine Corps was granted a license on 14 March 1936 to use and occupy a portion of the Fort Pickens Military Reservation to construct and maintain a 600-yard target range.⁶⁶³ A U.S. Marine Corps report on the condition of the range in 1939 stated that the range belonged to the Army and was in use during certain periods. The range consisted of eight targets at 200, 300, 500, and 600-yards. The range was adequate for the Command, but would need to be repaired. Space was adequate to construct 30 to 40 more targets by extending the butts and the firing lines to the southwest. The report also stated that, although there were no facilities for throwing fragmentation hand grenades, such facilities could easily be constructed on, or near, the rifle range. Additionally, no facilities were available for firing the live rifle grenade (VB). The necessary facilities, however, could be constructed on, or near, the rifle range, if permission was granted by the Army.⁶⁶⁴ A document dated 12 February 1948 describes the range as consisting of 20 target butts, 200 and 300 yard firing lines, and a partial 500 yard firing line.⁶⁶⁵ According to an August 1948 Preliminary and Fire Inspection Report, indirect information indicated that the Rifle Range was used by the Army and Navy for grenade practice. It was also indicated that the Army Range Officer had cleared the location of all duds prior to deactivation. Form 1005 indicated the property would be checked again and a Certificate of Clearance furnished.⁶⁶⁶ No other information was obtained during the archives search regarding the use of the Rifle Range for hand and/or rifle grenades. The range was officially transferred from the Department of the Army to the Department of the Navy on 5 October 1948.⁶⁶⁷

Reference is made in a 13 January 1949 memorandum of a range located on Santa Rosa Island used by the Marine Corps. The current condition of the range facilities and the lack of supervisory and technical range personnel precluded conducting marksmanship firing at the time. Repairs were necessary in order to place the range in operable condition. Indications were, however, that activities might be required to conduct organizational firing in calendar year 1950. In this regard, it was directed that the necessary information be submitted to the Commandant of the Marine Corps, including the practicability of firing on the range in 1950.⁶⁶⁸ No information was uncovered during the archives search that indicated whether or not the range was used by the Marine Corps beyond 1949. It is assumed that the range mentioned in the referenced documents was the Rifle Range on the Fort Pickens Military Reservation.

⁶⁶¹ CP-031407-010

⁶⁶² CP-031407-011

⁶⁶³ DC-032107-307

⁶⁶⁴ CP-031307-226

⁶⁶⁵ CP-031507-005

⁶⁶⁶ CP-112003-011

⁶⁶⁷ CP-031507-005

⁶⁶⁸ CP-102003-003

4.2.1.11 Ordnance Storage

In December 1883, three of the casemates at Fort Pickens were used as an ordnance storehouse.⁶⁶⁹ The interior of each battery was composed of a number of connected rooms and passageways. Each battery had magazines, rooms, or galleries for the storage of the powder charges, and shell or shot rooms (or galleries) for the storage of projectiles.^{670, 671, 672, 673}

4.2.2 Operations Involving HTRW

Operations and activities conducted during DoD jurisdiction of former Fort Pickens Military Reservation that may have caused the release of hazardous substances, pollutants, or contaminants to the environment are discussed in this section. Information contained in Technical Manuals (TMs), Technical Orders (TOs), and Field Manuals (FMs) were used to augment the information contained in the historical record regarding the materials used in cleaning, maintenance, and other operations conducted at the Fort Pickens Military Reservation that may have released HTRW.

In support of the FUDS program, USACE is conducting a study of operations performed at FUDS to support decisions regarding the potential releases to the environment as a result of DoD range and common operations at FUDS. Individual Common Installation, Common Support Service Operation, and Common Range Reports were written to document the results of the study and provide programmatic subject matter expert reports for the FUDS program by identifying and describing specific range and common operations. By associating specific common operations and common range activities with installations, the potential for releases to the environment at the installations can be identified, thereby providing documentation to support project specific response decisions. Information regarding cleaning, maintenance, and other operations known to have been conducted or potentially conducted at the Fort Pickens Military Reservation were obtained from Range Operations Report No. 23 (RO-23) Coast Artillery Range and Range Operations Report No. 1 (RO-1) Small Arms Range. The Common Installation, Range and Operations Reports are posted to the U.S. Army Corps of Engineers' Project Information Retrieval System (PIRS) (<https://mvrpirs.mvr.usace.army.mil/GuidanceDocs.cfm>).

4.2.2.1 POL Tank

In 1917, efforts were underway to providing commercial power and installing individual 25-kW gasoline generating sets in each of the batteries rather than rely on the Central Power Plant. This necessitated the installation of underground storage tanks (USTs) to store the gasoline.⁶⁷⁴ During 1942-43, a new power room in the rear of the Battery Langdon traverse was built. The power

⁶⁶⁹ Bearss, Edwin C. 1983. pp. 744, 745.

⁶⁷⁰ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp. 20, 21.

⁶⁷¹ CP-031907-021

⁶⁷² CP-032107-014

⁶⁷³ ATL-030907-040

⁶⁷⁴ ATL-030807-053

room was protected by five-foot concrete walls with five feet of concrete and more than six feet of sand fill overhead. This structure was divided by concrete interior walls into a power room, storeroom, water cooler room, muffler gallery, corridor, and two exhaust tunnels. On either side was a fuel storage tank positioned in a pit.⁶⁷⁵ Power to Battery Langdon was supplied by two 25 kW General Electric gasoline generators.^{676, 677} Battery 234 was powered by three 125 KVA diesel generators apparently supplied by two fuel pits.⁶⁷⁸

In 1922-23, a new power station was constructed to serve Batteries Cullum and Sevier. The reinforced concrete structure was built adjacent to the exterior slope of Battery Cullum, near the division between the two batteries. A wooden partition divided the structure into two rooms – a radiator and an engine room. Two 25-kW gasoline powered generators were installed. The generators were supplied with fuel from two USTs.^{679, 680}

In the 1920's, a new exterior power station was built to service Battery Pensacola. The reinforced concrete structure's south elevation abutted on the concrete retaining wall at the Battery's left flank. The power station was divided into a power room and a radiator room by a frame partition. Housed in the station were two 25 kW gasoline powered generators and one SRW transformer. Two gasoline USTs were located near the station's west elevation.^{681, 682, 683} Later, the Battery was powered with A.C. commercial power from Pensacola along with the two 25 kilowatt (kW) gasoline electric generators.^{684, 685, 686, 687}

Initially, a single steam power plant served both Battery Worth and Battery Cooper. This power plant originally consisted of two 15 kW generators. In 1916, one of the 15 kW generator sets was transferred to the Central Power Plant and one 8 kW generator was transferred from the Central Power Plant to the Battery Worth power plant. At one time, the power plant also supplied power to a 36-inch searchlight. The power plant was housed in a wooden building to the rear of the gun emplacements. Water for the boiler was supplied from a tank located in the rear of the plant.^{688, 689, 690, 691, 692, 693, 694} In the early 1920's, a new reinforced concrete power

⁶⁷⁵ Bearss, Edwin C. 1982. p. 287.

⁶⁷⁶ CP-031207-021

⁶⁷⁷ ATL-030707-011

⁶⁷⁸ CP-031207-011

⁶⁷⁹ Bearss, Edwin C. 1982. p. 57.

⁶⁸⁰ CP-031907-022

⁶⁸¹ CP-031907-017

⁶⁸² Bearss, Edwin C. 1982. p. 120.

⁶⁸³ CP-031907-017

⁶⁸⁴ CP-031307-001

⁶⁸⁵ Roberts, Robert B. pp. 195-198.

⁶⁸⁶ CP-031207-017

⁶⁸⁷ ATL-030807-052

⁶⁸⁸ Ibid.

⁶⁸⁹ Bearss, Edwin C. 1982. pp. 63, 66, 78, 203.

⁶⁹⁰ CP-031907-019

⁶⁹¹ CP-031207-031

⁶⁹² CP-031207-021

⁶⁹³ ATL-030707-008

⁶⁹⁴ ATL-030807-029

station was constructed, incorporating part of the old steam power house located in the rear of Battery Worth. Power was supplied by one 25 kW generator.^{695, 696} In 1942, Generator No. 1 (25 kW) from Battery Pensacola was transferred to the electric plant for Battery Cooper. The plant then contained one 25 kW engine and one 25 kW generator, both supplied by a gasoline UST. Later, power was supplemented with commercial A.C. from Pensacola.^{697, 698, 699, 700}

Bldg. E-100 (Ordnance Shop) was constructed in 1942.⁷⁰¹ A fuel tank was located near the building.⁷⁰²

On 23 October 1942, the Fort Pickens Military Reservation had one Ford Brush fire truck and one Chevrolet Brush fire truck on hand.⁷⁰³ Two Fire Stations appear to have been present on the FUDS Property: Bldg. E-120 (Fire Station) and Bldg. T-126 (Fire Station). These fire stations may have had their own USTs for fuel storage.

The potential constituents of concern (COPCs) for gasoline and diesel fuel are presented in **Table 4-2** below.⁷⁰⁴

Table 4-2: Gasoline and Diesel COPCs

Maintenance Material	Composition	COPCs
Gasoline	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics (BTEX), Tetraethyl lead, Ethylene dibromide, Ethylene dichloride, MMT, Tetramethyl lead, Tetramethylethyl lead, Dimethyldiethyl lead, Methyltriethyl lead, Methyltertbutyl ether
Diesel fuel	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics (BTEX)

⁶⁹⁵ Bearss, Edwin C. 1982. p. 85.

⁶⁹⁶ CP-031907-018

⁶⁹⁷ CP-031207-015

⁶⁹⁸ CP-031207-023

⁶⁹⁹ ATL-030807-029

⁷⁰⁰ ATL-030807-052

⁷⁰¹ CP-031407-029

⁷⁰² ATL-030907-045

⁷⁰³ CP-031307-211

⁷⁰⁴ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. Prepared by: US Army Corps of Engineers, St. Louis District. FOUO. p. 120.

4.2.2.2 POL Non-Tank

Construction Plant

In order to construct Batteries Cullum and Sevier, a “plant” was constructed on the Fort Pickens Military Reservation. The “plant” included a Ledgerwood engine and boiler, a sandpump boiler and engine, a sawmill engine and boiler, three derricks, two concrete mixers and their engine, a locomotive, and measuring cars. During the four months of November 1896 to March 1897, the four boilers and five plant engines used 160 gallons of cylinder oil, 246 gallons of black oil, and 860 pounds of waste. In operating the lighting plant, 11 gallons of lard oil, 324 gallons of kerosene, and 842 gallons of gasoline were burned. Fuel consumed included 340 cords of wood and 57 barrels of coal.⁷⁰⁵ The location of this plant was not identified in the historical documents collected during the archives search.

POL Commodities

One barrel of N.F.O. lubricating oil was to be delivered to the Fort Pickens Military Reservation in March 1915. Materials potentially used on the Fort Pickens Military Reservation include coal oil, marine engine oil, and engine oil.^{706, 707, 708} One barrel of 150° F.P. kerosene and six barrels of gas tar were delivered to the Fort Pickens Military Reservation in December 1912.⁷⁰⁹

Bldgs. 28, 39, 50, and 51 are identified as Oil Houses (see **Table 4-1** above). An oil storage house constructed of corrugated metal on a concrete slab is shown in a 1941 drawing. The oil drums are shown stored on their sides in wooden racks. A sump pit that discharges to a storm drain is present in the center of the building floor.⁷¹⁰

Emplacement Interior Power Plants

Power to Battery Cullum-Sevier was initially provided by an “electric light plant.” In June 1900, construction of two new chambers began: one for the generator and one for the storage battery. The room formerly used for the power plant was converted into a boiler room.⁷¹¹

Battery Pensacola was originally powered by an internal 15 kW power plant. The 10 kW generator used for the submarine mine project was installed in the Battery in 1902 as a backup.⁷¹² In the 1920’s, a new exterior power station was built to service the Battery.⁷¹³

⁷⁰⁵ Bearss, Edwin C. 1982. pp. 24-28, 37.

⁷⁰⁶ ATL-030807-003

⁷⁰⁷ ATL-030807-004

⁷⁰⁸ ATL-030807-005

⁷⁰⁹ ATL-030707-106

⁷¹⁰ Construction Division, Office of the Quartermaster General, Mobilization Buildings, Oil Storage House, Plans, Elevations and Details, Plan Number 700-384, 10 February 1941 (superseded by Drawing No. 652-1038).

⁷¹¹ Bearss, Edwin C. 1982. p. 46.

⁷¹² Ibid., pp. 93-105, 111.

⁷¹³ Ibid., p. 120.

Power to Battery Langdon was supplied by two 25 kW General Electric gasoline generators. In 1945, Battery 234 was powered by three 125 KVA diesel generators.⁷¹⁴ The power plant for Langdon consisted of two 25-kW gasoline generating sets. In 1945, Battery Langdon was upgraded to three 187 KVA diesel #2 generators with an auxiliary 62.5 KVA diesel #2 generator.⁷¹⁵

Portable and Fixed Searchlights

Both portable and fixed searchlights were emplaced at the Fort Pickens Military Reservation during the early years. In June 1899, there was one 36-inch searchlight assigned to Fort Pickens. The projector, along with the dynamo and other parts, were stored in a Fort Pickens casemate east of the sally port. They were damaged or destroyed in the 20 June 1899 explosion.⁷¹⁶

In 1912, there were three 36-inch portable searchlights.⁷¹⁷ A searchlight located 5,500 feet east and 20 south of Battery Worth was powered by a 25kW GE generating set located 325 feet to the rear of the searchlight.⁷¹⁸

In 1915, the Board of Review had developed a searchlight system for Pensacola Harbor. Subsequently, in 1917, the Davis Board redefined the project. Its primary mission was to provide illumination for the fire of the coast defense guns. In the early 1920's, funds were allotted by the War Department to modernize the searchlight system. Seven 60-inch searchlights were emplaced on Santa Rosa Island by September 1921. Six of these searchlights (Searchlight Nos. 5-9) were fixed and Searchlight No. 10 was portable.

Searchlight Nos. 7 and 8 (renumbered 4 and 5), both 60-inch, were, respectively, positioned 600 and 760 feet east of Battery Worth. Energy for the lights was provided by two 25 kW generators housed in a reinforced concrete structure. Bldg. 45 is identified as the Power Plant for Search Lights 4 and 5. These searchlights were salvaged in 1946.

Searchlight Nos. 9 and 10 (renumbered 6 and 7) were located 2,900 and 3,149 feet east of Battery Langdon. The 60-inch lights were powered by two 25 kW generators housed in a reinforced concrete power station. These searchlights, their towers, and electrical equipment were salvaged in 1946.^{719, 720, 721, 722, 723, 724, 725} In **Figure 4-13** below, Searchlight No. 7 is shown in its operating position.⁷²⁶

⁷¹⁴ CP-031207-011

⁷¹⁵ CP-031207-032

⁷¹⁶ Bearss, Edwin C. 1982. pp. 196, 199.

⁷¹⁷ ATL-030807-006

⁷¹⁸ ATL-030707-005

⁷¹⁹ Bearss, Edwin C. 1982. pp. 199-202.

⁷²⁰ CP-031307-022

⁷²¹ CP-031307-023

⁷²² CP-031307-018

⁷²³ CP-031207-031

⁷²⁴ ATL-030807-008

⁷²⁵ ATL-030807-016

⁷²⁶ CP-031207-031



Figure 4-13. Searchlight No. 7 in Operating Position

Searchlight 3A was added during World War II. The 60-inch light was positioned on a ramp at Fort Pickens and was assigned to the AMTB battery.⁷²⁷

⁷²⁷ Bearss, Edwin C. 1982. p. 202.

Backup Generator

In 1943, purchase of a backup diesel generator for the Fort Pickens Military Reservation was requested. The electrical service to the Fort Pickens Military Reservation was supplied by one 3-wire #4 copper submarine cable extending 1 1/8 miles from Fort Barrancas. By 1943, the cable had been in service for more than 26 years.⁷²⁸ The location of the generator is unknown.

The COPCs associated with the non-tank POL materials are provided in **Table 4-3** below.⁷²⁹

Table 4-3: Non-Tank POL Materials COPCs

POL Material	Composition	COPCs
Gasoline	See Table 4-2 above	
Diesel	See Table 4-2 above	
Cylinder oil	Unknown	
Black oil (aka bunker oil, dirty oil and heavy oil) ⁷³⁰	Petroleum oils ⁷³¹	Paraffins, Isoparaffins, Napthenes, Olefins
Lard oil		
Kerosene	Petroleum oils ^{732, 733}	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Coal oil (possibly kerosene or petroleum)	Petroleum oils ⁷³⁴	Paraffins, Cycloparaffins, Cyclic aromatic hydrocarbons, Benzene, Sulfur
Marine engine oil	Petroleum oils ⁷³⁵ Other compounds unknown	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Engine oil	Petroleum oils ^{736, 737}	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Gas tar	Petroleum oils ^{738, 739}	Paraffins, Olefins, Aromatic hydrocarbons, Sulfur

⁷²⁸ CP-032207-301

⁷²⁹ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp. 108, 109, 113, 117, 118, 133, 134.

⁷³⁰ Internet, http://www.k-sea.com/black_oil.htm.

⁷³¹ Petroleum Handbook, Fifth Edition, Shell International Petroleum Company Limited (Fourth Edition 1959), pp. 60, 61.

⁷³² Ibid.

⁷³³ Internet, Diesel Fuel Refining and Chemistry, www.chevron.com/prodserv/fuels/bulletin/diesel.

⁷³⁴ Sax's Dangerous Properties of Industrial Materials, 11th Edition, Vol. 3, 2004, John Wiley & Sons, Inc., pp.2190, 2870.

⁷³⁵ Petroleum Handbook, Fifth Edition, Shell International Petroleum Company Limited (Fourth Edition 1959), pp. 112, 114, 485.

⁷³⁶ Ibid.

⁷³⁷ Internet, Diesel Fuel Refining and Chemistry, www.chevron.com/prodserv/fuels/bulletin/diesel.

⁷³⁸ Butterfield, William John Atkinson. 1896. The Chemistry of Gas Manufacture: A Practical Handbook on the Production, Purification and Testing of Illuminating Gas, and the Assay of the Bye-Products of Gas Manufacture. pp. 37, 40, 59, 97, 115, 123, 142, 208, 221.

⁷³⁹ Petroleum Handbook, Fifth Edition, Shell International Petroleum Company Limited (Fourth Edition 1959), pp. 185, 186, 187, 239, 388-393.

4.2.2.3 Weapons and Ammunition Maintenance

Ordnance Repair Shops

Bldg. 12 is identified as an Ordnance Repair Shop (see **Table 4-1** above). Bldg. 12 was salvaged on 3 July 1942. No information was contained in the available historical documentation regarding the repair operations conducted. Bldg. E-100 (Ordnance Shop) was constructed in 1942. It had a reinforced concrete floor and foundation, structural steel walls, and R.P.M. siding.⁷⁴⁰ The shop also contained a 10 ton overhead traveling crane. A fuel tank was located near the building.⁷⁴¹ It appears that Bldg. E-100 was capable of handling maintenance on the big guns.

Ammunition maintenance included reconditioning and renovation. Reconditioning included removing rust, repainting, remarking, repairing, and repacking. Renovation involved partial or complete disassembly of ammunition items, cleaning parts or subassemblies, repair or replacement of mechanical parts, replacement of explosive components, repainting and remarking, repacking and remarking for shipment and delivery to an ammunition issuing point. Salvage operations included the disassembly or breakdown of ammunition and ammunition components in order to recover materials or components that were or could be made serviceable, or that had monetary value as scrap.⁷⁴²

Gun Emplacements

Echelons of maintenance procedures did not truly apply to coast artillery weapons. This was because the coast artillery weapon was normally in a fixed position and the maintenance activities came to the weapon rather than taking the weapon to a maintenance shop. This also applied to mobile railway weapons where maintenance was brought to the storage facility rather than the temporary gun emplacement. Bldg. 7 was identified as the Ordnance Tractor Shed for the two mobile 155-mm guns. Bldg. 7 was salvaged on 12 July 1940.

In addition to the normal first and second echelon (operator and organizational) maintenance, third and even fourth echelon maintenance would have been performed at the gun emplacement. When the gun bore lost both range and accuracy, however, the gun tube was dismounted from its emplacement and shipped back to a specially equipped arsenal. There, the old gun liner was removed and replaced. In June 1933, the four 10-inch guns on Battery Cullum-Sevier had their breech mechanisms removed and were given a heavy coat of cosmoline.⁷⁴³

Materials authorized for coastal artillery maintenance operations included soda ash, sodium hydroxide, castile soap, glycerin, medium rust preventive compound, heavy rust preventive

⁷⁴⁰ CP-031407-029

⁷⁴¹ ATL-030907-045

⁷⁴² Final Support Service Operation Report Ammunition and Explosives Storage and Maintenance (CO-18). April 2005. Prepared by: Dynamac Corporation. FOUO. pp. 16, 17, 45-50.

⁷⁴³ Bearss, Edwin C. 1982. p. 58.

compound, recoil oil, car journal oil, lubricating oil, light class D lubricating oil; gear, chain, and wire rope lubricating oil; preservative lubricating oil, dry-cleaning solvent (petroleum distillate), red lead, olive drab paint, black bituminous paint, petrolatum, and graphite lubricating grease. The COPCs associated with these authorized maintenance materials are provided in **Table 4-4** below.^{744, 745}

Table 4-4: Authorized Ordnance and Ammunition Maintenance Materials COPCs

Maintenance Material	Composition	COPCs
Soda ash	Sodium carbonate	Sodium (Na) Carbonate (CO ₃)
Sodium hydroxide	Sodium hydroxide	Sodium (Na) Hydroxide (OH)
Castile soap	Vegetable oils	Unknown
Glycerine	Trihydroxyalcohol (HOCH ₂ CHOHCH ₂ OH)	Hydrogen Oxygen Carbon
Rust preventive compounds (aka cosmoline, cosmoline, or slushing oils)	Petroleum oils Other compounds unknown	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Recoil oil	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Car journal oil	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Lubricating oil	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Preservative lubricating oil	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
	Rust inhibitor	Unknown
Dry-cleaning solvent	Petroleum distillates	Paraffins (30-50%) Cycloparaffins, naphthenes (30-40%), Aromatics (10-20%) Lead (less than 1 ppm) Sulfur (3.5 ppm).
Red lead	Lead oxide (Pb ₃ O ₄)	Lead Oxygen
Type A raw linseed oil	Vegetable oil	Palmitic acid (5-7%), Stearic acid (3-6%), Oleic acid (20-30%), Linoleic acid (15-20%), Linolenic acid (45-55%)
Turpentine	Gum spirits	Unsaturated bicyclic monoterpene hydrocarbons, monocyclic monoterpenes ,

⁷⁴⁴ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. Prepared by: US Army Corps of Engineers, St. Louis District. FOUO. pp. 108, 109, 113, 117, 118, 133, 134.

⁷⁴⁵ Final Support Service Operation Report Ammunition and Explosives Storage and Maintenance (CO-18). April 2005. Prepared by: Dynamac Corporation. FOUO. pp. 59-61.

Maintenance Material	Composition	COPCs
		Alcohols, Sesquiterpines, Diterpines
Black bituminous paint	Lead Other compounds unknown	Lead Other constituents unknown
Petrolatum	Petroleum derivative	Unsaturated hydrocarbons, Naphthenes, Alkanes
Graphite lubricating grease	Graphite (carbon)	Carbon
	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Gasoline	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics (BTEX), Tetraethyl lead, Ethylene dibromide, Ethylene dichloride, MMT, Tetramethyl lead, Tetramethylethyl lead, Dimethyldiethyl lead, Methyltriethyl lead, Methyltertbutyl ether
Diesel fuel	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics (BTEX)
Nitric acid	Nitric acid ⁷⁴⁶	Nitrate
Acetone	Acetone	Acetone
Benzene	Benzene	Benzene
Carbon tetrachloride	Carbon tetrachloride	Carbon tetrachloride
Toluene	Toluene	Toluene
Xylene	Xylene	Xylene

4.2.2.4 Miscellaneous Shops

In the rear and to the right of Battery Pensacola was a blacksmith shop and carpenter shop. A proposal to move these shops to an area set aside for Engineer purposes was tendered in October 1914.^{747, 748, 749, 750} Other shops included Bldg. 5 (Carpenter Shop), Bldg. T-105 [PE Paint Shop (Carpenter Shop)], and Bldg. 51 (Mechanics Shop) (see **Table 4-1** above).

The Carpenter Shop may have contained a drill press, saws, sanders, grinder, and storage lockers.⁷⁵¹ Glues and other chemicals may have been utilized in the carpenter shops. If painting was done, paint pigments may have included lead chromates, oxides, sulfates, and chromates as

⁷⁴⁶ Sax's Dangerous Properties of Industrial Materials, 11th Edition, Vol. 3, 2004, John Wiley & Sons, Inc., p. 2643.

⁷⁴⁷ ATL-030807-016

⁷⁴⁸ ATL-030807-017

⁷⁴⁹ ATL-030807-018

⁷⁵⁰ ATL-030807-017

⁷⁵¹ Final Support Service Operation Report (CO-7), Civil Engineering, May 2006. Prepared by: HydroGeoLogic, Inc. FOUO. p. 43.

well as zinc chromate. Some commonly used solvents and thinners during WWII included benzene, toluene, xylene, carbon tetrachloride, methanol, acetone, ethyl alcohol, and turpentine.⁷⁵² The disposition of the wastes generated at the Carpenter Shop is unknown. Coal may have been used to heat the forge and scrap metal may have been generated by blacksmith shop operations. Paint COPCs are discussed in Section 4.2.2.7 below.

4.2.2.5 Coal Storage

Three frame sheds were constructed in 1902-1903 to store coal for the power stations at Batteries Pensacola, Cullum, and Worth. This may have been Bldg. 10 (Coal Shed), located in the same area as the Ordnance Boiler House (see **Plate No. 3, Appendix R**). Up until that time, the coal had been dumped on the ground. The coal shed was destroyed by fire on 14 May 1941. In the summer of 1903, the casemate on the left of the sally port, next to the tracks, was converted into a coal shed for the Central Power Plant.⁷⁵³ In constructing Batteries Cullum and Sevier, 340 cords of wood and 57 barrels of coal were burned from November 1896 to March 1897.⁷⁵⁴ The buildings were individually heated with coal-burning stoves. The Ordnance Boiler House (Bldg. E-103) was constructed in February 1942. Trucks hauled coal from boats to the boiler house. A number of the quarters had coal burning cooking stoves.⁷⁵⁵

The Central Power Plant was initially housed in casemate Nos. 75 and 76 of old Fort Pickens. The boiler room was in a frame shanty outside of the fort. A tall iron chimney protruded through the roof. The Central Plant originally contained one eight kW generator, one 10 kW generator, one 50 kW generator, three engines, and three storage batteries. In 1916, one of the 15 kW generators was transferred from the power plant at Battery Worth to the Central Plant and the eight kW generator was transferred to Battery Worth. As early as 1913, it was thought better to eliminate the central plant altogether and depend on isolated gas motor plants at the batteries. Construction of a new building in a protected location was recommended in 1915.^{756, 757, 758} By 1916, the Central Plant was leaking badly and the boiler room structure was in a dilapidated state. In 1917, efforts were underway to providing commercial power and installing individual 25-kW gasoline generating sets in each of the batteries rather than rely on the Central Power Plant. The Central Plant became superfluous in the early 1920's following completion of the powerhouses for Batteries Pensacola and Cullum. In 1925, the Plant equipment was surveyed and sold and the boiler house demolished.^{759, 760} The Central Power Plant may have been powered by coal.

Polynuclear aromatic hydrocarbons (PAHs) and acid mine drainage are associated with coal piles and result from the oxidation of pyrite (FeS₂) and various other metal sulfides. As metal sulfides

⁷⁵² TM 5-618, Painting, Repairs and Utilities, 24 October 1946.

⁷⁵³ Bearss, Edwin C. 1982. pp. 203, 204.

⁷⁵⁴ Ibid., p. 37.

⁷⁵⁵ CP-031407-029

⁷⁵⁶ ATL-030707-109

⁷⁵⁷ ATL-030807-029

⁷⁵⁸ ATL-030807-052

⁷⁵⁹ ATL-030807-053

⁷⁶⁰ Bearss, Edwin C. 1982. pp. 205-206.

become oxidized, the aqueous environment becomes acidified and rich in a variety of metals, including iron, manganese, lead, mercury, and others.^{761, 762}

4.2.2.6 Lead Acid Batteries

The Central Plant at the Fort Pickens Military Reservation contained storage batteries as did Batteries Cullum-Sevier, Worth, and Pensacola.^{763, 764} Lead and lead alloys are commonly found in storage batteries. Lead's properties, such as corrosion resistance, density, and low melting point, make it a familiar metal in storage batteries. Lead compounds commonly used in storage batteries include lead oxide and lead sulfate. Determining the amount of lead available from batteries for a given year requires historical data on battery production and average lead content.⁷⁶⁵

4.2.2.7 Paint

Searchlight ironwork was painted. B'' station ironwork as well as interior and exterior of instrument houses were painted. The interior, exterior, and ironwork at the batteries were also painted.⁷⁶⁶ Steel structures were painted with two coats of red lead paint. The wooden tower for Searchlight No. 3 (offsite) was painted with two coats of dark gray, or about lead colored, paint.⁷⁶⁷ The paint on six steel searchlight towers and six steel fire control towers deteriorated rapidly after the September 1926 storm. The work of scraping and repainting these towers began in March 1929, with 90% of the work completed by 30 June 1929.⁷⁶⁸

Lead compounds were used as a pigment in paints. Some old paint contains as much as 50% lead. Lead compounds in paints included lead chromate, lead oxide, and lead sulfide.⁷⁶⁹ Paints and paint pigments potentially utilized at Fort Pickens Military Reservation may have included lead chromates, oxides, sulfates, and chromates as well as zinc chromate. Other painting materials utilized on army installations included water-resisting spar varnish; varnish-type floor sealer; shellac; asphalt varnish; shellac varnish; interior varnish; rubbing varnish; and wood filler.⁷⁷⁰

⁷⁶¹ Matlock, Matthew M. et al, *Covalent Coating of Coal Refuse to Inhibit Leaching*, [Advances in Environmental Research](#), 2002. (FS-Matlock 21 Feb 02).

⁷⁶² Toxicological Profile for Polycyclic Aromatic Hydrocarbons, U.S. Department Of Health And Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, August 1995.

⁷⁶³ ATL-030707-040

⁷⁶⁴ Bearss, Edwin C. 1982. pp. 46, 78, 109, 110, 111, 203.

⁷⁶⁵ Draft Toxicological Profile For Lead, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, September 2005. pp. 2, 253, 268, 272, 274.

⁷⁶⁶ ATL-030707-004

⁷⁶⁷ ATL-030707-010

⁷⁶⁸ ATL-030807-054

⁷⁶⁹ Draft Toxicological Profile For Lead, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, September 2005. pp. 2, 10, 307.

⁷⁷⁰ TM 5-618, Painting, Repairs and Utilities, 24 October 1946.

4.2.2.8 Wharves

The Fort Pickens Military Reservation was hit by a powerful storm packing 104-mile per hour winds on 5 July 1916. The Quartermaster Wharf (Bldg. 15) was badly damaged.^{771, 772, 773}

The Engineer Wharf was constructed of wood on creosoted piles and was used by the engineers and Coast Artillery. The wharf was destroyed by a hurricane in 1906. The superstructure of the Engineer's Wharf was swept away in the storm of July 1916. The wharf was listed in fair condition as of October 1919. The wharf was again destroyed in the hurricane of 20 September 1926, leaving only part of the pile foundation. The deck and approach to the wharf were also carried away. The piling and framing of the wharf were concrete, so no damage was done to them^{774, 775} The Engineer Wharf was repaired in FY1929. Instructions to initiate a report for the disposal of the wharf was contained in a letter dated 13 November 1934.^{776, 777, 778, 779, 780}

The Langdon Wharf (Bldg. 33) was constructed of creosoted piling and creosoted pine decking.⁷⁸¹ The wharf was equipped with railroad tracks and provided the only means of loading and unloading heavy material, including ammunition, at the Fort Pickens Military Reservation.⁷⁸²

Coal tar creosote is a wood preservative and water-proofing agent for marine pilings, and fence posts. In addition, coal tar creosote prevents animal and vegetable growth on concrete marine pilings. Coal tar creosote contains a complex mixture of PAHs, phenol, and cresols.⁷⁸³

4.2.2.9 Railroad

The railroad on the Fort Pickens Military Reservation was constructed by the Quartermaster Corps using creosoted ties. To expedite construction of the Endicott batteries, 7,500 feet of narrow gauge railroad tracks were laid in 1896. During the summer of 1897, a track spur was constructed from the Engineer's Wharf to Battery Worth.⁷⁸⁴ As of October 1919, the railroad consisted of 1 ½-miles of track that connected the engineer wharf with Batteries Sevier, Cullum, Pensacola, and Worth as well as the central power plant, coal shed, ordnance store house, torpedo store house, cable tank house, ordnance machine shop, and torpedo loading room. The

⁷⁷¹ ATL-030807-019

⁷⁷² ATL-030807-020

⁷⁷³ Bearss, Edwin C. 1982. pp. 246, 247.

⁷⁷⁴ CP-031907-023

⁷⁷⁵ ATL-030807-026

⁷⁷⁶ CP-031207-033

⁷⁷⁷ ATL-030707-005

⁷⁷⁸ ATL-030807-019

⁷⁷⁹ ATL-030807-020

⁷⁸⁰ Bearss, Edwin C. 1982. pp. 246, 247.

⁷⁸¹ CP-031407-029

⁷⁸² CP-031207-002

⁷⁸³ Toxicological Profile for Wood Creosote, Coal Tar Creosote, Coal Tar, Coal Tar Pitch, and Coal Tar Pitch Volatiles, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, September 2002. pp. 3, 19, 24, 63, 154, 233, 265, 269.

⁷⁸⁴ Bearss, Edwin C. 1982. pp. 25, 26, 67.

railroad was used for the transportation of troops, ammunition, and supplies to the various gun positions. The equipment used on the railroad consisted of one locomotive and 16 small flat cars.^{785, 786, 787, 788} Correspondence from a 1917 inspection report indicates the narrow gauge railroad had been damaged by a recent storm. It was recommended that the narrow gauge railroad not be rebuilt but that a standard gauge railroad be constructed instead. It appears, however, that the narrow gauge railroad was expanded and not replaced with a standard gauge.⁷⁸⁹ The railroad tracks were again damaged in the storm of 20 September 1926, and were repaired.⁷⁹⁰ The storm also swept the locomotive and the 16 flat rail cars from their tracks and buried them under tons of sand and debris. The cars were uncovered and rebuilt. It was 1943, however, before the locomotive was excavated and sold as scrap.⁷⁹¹

It was proposed in 1927 to extend the railroad from Battery Worth to Battery Langdon. The tropical storms that occurred at Santa Rosa Island often inflicted severe damage on the railroad. At times, these storms caused waves and currents to sweep over the island, causing damage to the railroad embankments and track.⁷⁹² By February 1929, funds had yet to be appropriated for the extension.⁷⁹³ Work on extending the railroad track from Battery Worth to the Battery Langdon, located approximately 600 yards away, began in April 1930, and was completed in June 1930. Upon its completion, this project facilitated movement of stores and material from the Quartermaster Wharf to Battery Langdon. Light loads and passengers were transported by a gasoline-powered locomotive. To handle heavier loads, the Battery Langdon wharf was rebuilt.^{794, 795} In 1930-1931, the railroad was extended through the Coast Guard Station to the east end of the Fort Pickens. The railroad covered a distance of 21,200 feet with spurs to the principal structures.^{796, 797} The locomotive was ordered destroyed on 30 December 1930.⁷⁹⁸ In June 1941, there were 5 ½ miles of track and 14 turnouts.⁷⁹⁹ As of August 1948, all rolling stock had been removed.⁸⁰⁰ Transfer of a portion of the track to NAS Pensacola was requested in February 1949.⁸⁰¹

⁷⁸⁵ CP-031207-033

⁷⁸⁶ CP-031207-007

⁷⁸⁷ ATL-030707-005

⁷⁸⁸ ATL-030807-025

⁷⁸⁹ ATL-030707-111

⁷⁹⁰ ATL-030807-054

⁷⁹¹ Bearss, Edwin C. 1982. p. 284.

⁷⁹² ATL-030807-022

⁷⁹³ ATL-030807-023

⁷⁹⁴ ATL-030807-054

⁷⁹⁵ Bearss, Edwin C. 1982. p. 284.

⁷⁹⁶ CP-112003-011

⁷⁹⁷ CP-031307-016

⁷⁹⁸ CP-031207-022

⁷⁹⁹ CP-031407-029

⁸⁰⁰ CP-112003-011

⁸⁰¹ ATL-030907-098

Coal tar creosote is widely used for the preservation and water-proofing of wood which is used for railroad ties. Coal tar creosote is a wood preservative and water-proofing agent and contains a complex mixture of PAHs, phenol, and cresols.⁸⁰²

Bldg. 25 is identified as the Locomotive Repair Shop and Bldg. 17 is identified as the Railroad Round House (see **Table 4-1** above). First echelon maintenance consisted primarily of preventive maintenance and included inspection of moving parts, lubrication, and minor adjustments. Second echelon maintenance consisted of preventive maintenance measures such as inspections, adjustments, replenishment of lubricants, fuel water, and other necessary supplies. It also included minor repairs such as replacing headlight bulbs, applying new brake shoes and air brake hoses, application tests of air brake equipment, and inspection of the engine for fuel and lubricant leaks. Third echelon maintenance required taking the locomotive or locomotive crane out of service for a specified period of time. It included repairs to or the removal of parts that interfered with efficient and successful operation. Fourth echelon maintenance consisted of heavy repairs requiring the use of heavy machinery or tools, including the complete rebuilding of a locomotive or locomotive crane.⁸⁰³

The roundhouse was the building where locomotives were housed between runs and facilities were provided for maintaining the locomotives and making light repairs (2nd and 3rd echelons). A backshop was a locomotive shop where heavy repairs were made (4th and 5th echelons), such as rebuilding and redesigning locomotives.⁸⁰⁴ It is assumed that the Locomotive Repair Shop (Bldg. 25) operated much as a backshop because the removal of the Reservation locomotive to an offsite location would likely have posed logistical and monetary difficulties. The representative materials used in locomotive maintenance and associated echelons are presented in **Table 4-5** below.⁸⁰⁵

Table 4-5: Representative Materials Used in Locomotive Maintenance and Associated Echelons

Operations	Materials	Echelon
Cleaning	Engine Washing Compound	2, 3
Repair of Insulation	Cement	2
Repair Cables	Varnish	2
Battery Maintenance	Electrolyte	2
Changing Oil	Valve Oil, VV-O-601	2
Painting	Locomotive black paint	3, 4

⁸⁰² Toxicological Profile for Wood Creosote, Coal Tar Creosote, Coal Tar, Coal Tar Pitch, and Coal Tar Pitch Volatiles, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, September 2002. pp. 3, 6, 8, 24, 60, 63, 154, 233, 265, 269.

⁸⁰³ Final Support Service Operation Report (CO-20) Locomotive Maintenance. July 2005. Prepared by: Dynamac Corporation. FOUO. p. 12.

⁸⁰⁴ Ibid., pp. 28, 29.

⁸⁰⁵ Ibid., pp. 34-39.

4.2.2.10 Incinerators

Incinerators were used at the Fort Pickens Military Reservation. An extension of the incinerator system was preferred over extension of the sewer system for an increased number of troops.⁸⁰⁶ The locations of the incinerators were not identified in the historical documents obtained during the archives search. Metals and PAHs may have been associated with the ash generated by the incinerator.⁸⁰⁷ The disposition of the incinerator ash is unknown.

4.2.2.11 Commercial Electric Power

Provision of commercial electric power to the Fort Pickens Military Reservation was contemplated in 1916 due to the poor condition of the central power station.^{808, 809, 810} By 1943, electrical service to the Fort Pickens Military Reservation had been supplied by one 3-wire #4 copper submarine cable extending 11/8 miles from Fort Barrancas for more than 26 years.⁸¹¹ By August 1948, commercial electric power was furnished from the Pensacola Naval Air Training Station by a subterranean cable carrying 2,300 volts with primary metering service at the last pole on the mainland. A secondary meter was installed at the Coast Guard Station. The current consumed by the Station was deducted from the primary reading and the Coast Guard billed accordingly.⁸¹² The commercial power was distributed on 40 creosoted pine poles. As of 30 June 1932, the Fort Pickens Military Reservation had five 5 KVA transformers, two 10 KVA transformers, and one 15 KVA transformer. By 10 May 1938, there were 10 transformers. Four 25 KVA transformers were installed in February 1942.⁸¹³ In 1922-23, a new power station was constructed to serve Batteries Cullum and Sevier. One transformer (SEW) was listed as a standard accessory.⁸¹⁴ Bldg. 32 is identified as a Transformer Building (see **Table 4-1** above).

Coal tar creosote is a wood preservative and water-proofing agent for telephone poles and contains a complex mixture of PAHs, phenol, and cresols.⁸¹⁵ Due to their period of use, the transformers utilized on the Fort Pickens Military Reservation are expected to have contained polychlorinated biphenyls (PCBs). PCBs were produced commercially in the United States from 1929 until 1977 and marketed worldwide under trade names such as Aroclor, Askarel, and Therminol. Some commercial PCB mixtures are known in the United States by their industrial trade name, Aroclor. For example, the name Aroclor 1254 means that the mixture contains approximately 54% chlorine by weight, as indicated by the second two digits in the name.

⁸⁰⁶ ATL-030707-111

⁸⁰⁷ Toxicological Profile for Polycyclic Aromatic Hydrocarbons, U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, August 1995, pp. 1, 2.

⁸⁰⁸ ATL-030707-108

⁸⁰⁹ ATL-030707-109

⁸¹⁰ ATL-030707-111

⁸¹¹ CP-032207-301

⁸¹² CP-112003-011

⁸¹³ CP-031407-029

⁸¹⁴ Bearss, Edwin C. 1982. p. 57.

⁸¹⁵ Toxicological Profile for Wood Creosote, Coal Tar Creosote, Coal Tar, Coal Tar Pitch, and Coal Tar Pitch Volatiles, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, September 2002. pp. 3, 5, 8, 233, 270.

Approximately 99% of the PCBs used by U.S. industry were produced by the Monsanto Chemical Company. Prior to 1971, the Monsanto Chemical Company produced Aroclors 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268.⁸¹⁶

During production, Aroclor mixtures were contaminated by small amounts of polychlorinated dibenzofurans (PCDFs) as impurities. Although PCDFs are formed during the pyrolysis of PCBs, in the absence of fire, PCDF levels do not appear to increase during the normal use of PCBs in electrical equipment.⁸¹⁷

Because they don't burn easily and are good insulating materials, PCBs were used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. Consumer products that may contain PCBs include electrical devices or appliances containing PCB capacitors made before PCB use was stopped and old hydraulic oil.⁸¹⁸

Prior to 1974, the production of capacitors and transformers involved filling them with Aroclors through a small hole in the unit and then sealing the hole. While smaller capacitors contained smaller amounts, the production of large capacitors generally required at least 2–3 pounds (1 kg) of Aroclors; many times that amount was required to produce the transformers. Ninety-five percent of the capacitors produced in the United States were filled with PCBs. The life expectancy of transformers containing PCBs is greater than 30 years, and the life expectancy of capacitors ranges from 10 to 20 years, depending on the electrical application.⁸¹⁹

4.2.2.12 Sewage Treatment

There was no Sewage Disposal Plant at the installation. Raw sewage was discharged through 2,420 feet of cast iron pipe into Pensacola Bay by gravity flow via an outlet at the Ferry Slip.⁸²⁰
⁸²¹ It appears that individual batteries were serviced by interior latrines and septic tanks.^{822, 823}
According to Mr. Ogden, the Fort Pickens Unit of the Gulf Islands National Seashore is serviced by septic tanks.

4.2.2.13 Rifle Range

First echelon (Operator) maintenance of weapons systems included proper care, cleaning, and lubrication of weapons. For small arms ranges, cleaning racks or tables were provided in the vicinity of the range firing line. The following materials were normally issued in the first echelon (Operator) maintenance of small arms: bore cleaner; issue soap; soda ash; carbon-removing compound (PC111-A); sperm oil; general purpose lubricating oil; special lubricating

⁸¹⁶ Toxicological Profile For Polychlorinated Biphenyls (PCBs), U.S. Department Of Health And Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, November 2000.

⁸¹⁷ Ibid.

⁸¹⁸ Ibid.

⁸¹⁹ Ibid.

⁸²⁰ CP-112003-011

⁸²¹ CP-031407-029

⁸²² CP-031207-021

⁸²³ CP-031207-011

oil (PL); weapons lubricating oil (LAW); OE 10 engine oil; SAE 10 or SAE 30 engine oil; light preservative lubricating oil; lubricating oil for aircraft instruments and machine guns; rifle grease; special light buffer oil; rust preventive compound; and dry-cleaning solvent (petroleum distillate). These materials and their associated COPCs are presented in **Table 4-6** below.⁸²⁴

Table 4-6: Authorized On-Range Maintenance Materials COPCs

Maintenance Material	Composition	COPCs
Bore Cleaner	See Table 4-3 above	
	Cresylic Acid	Mixture of o-cresol, m-cresol, and p-cresol
Castile Soap/Issue Soap	See Table 4-4 above	
Soda Ash	See Table 4-4 above	
Carbon-Removing Compound	Unknown	
General Purpose Lubricating Oil	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Sperm Oil	Animal oil	Oleic acid Dodecatyl alcohol (C ₁₂ H ₂₅ OH).
Special Lubricating Oil	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Weapons Lubricating Oil	Unknown	
Engine oil	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Light Preservative Lubricating Oil	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
	Rust inhibitor	Unknown
Lubricating Oil for Aircraft Instruments and Machine Guns	Petroleum oils	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Rifle Grease	Unknown	
Special Light Buffer Oil	Unknown	
Rust Preventive Compound	See Table 4-4 above	Paraffins, Isoparaffins, Napthenes, Olefins, Aromatics
Dry-Cleaning Solvent (petroleum distillate)		Paraffins (30-50%) Cycloparaffins, naphthenes (30-40%) Aromatics (10-20%) Lead (less than 1 ppm) Sulfur (3.5 ppm).
Gasoline	See Table 4-2 above	

⁸²⁴ Range Operations Report No. 1 (RO-1) Small Arms Range. October 2006. Prepared by: US Army Corps of Engineers, St. Louis District. FOUO. pp. 76, 77.

4.2.2.14 Miscellaneous Potential Sources of COPCs

Metals

More than 260,000 pounds of sheet lead, most of it for covering the casemate arches, had gone into building Fort Pickens. On 14 August 1832, an order was placed for 2,000 square feet of copper, 400 pounds of copper nails, and 200 pounds of solder. The copper was used principally in the magazines and construction of the wharves.^{825, 826} In 1904, copper was used in the traverse of Battery Trueman for waterproofing and an increase in width and depth of the rear retaining wall.⁸²⁷

Deterioration of the lead sheeting was a constant concern.⁸²⁸ The magazines and shot room ceilings in Battery Cullum-Sevier were lined with lead.⁸²⁹ An interior detached ceiling of lead was installed in Battery Pensacola in FY1901, to the magazine, shellroom, storage battery room, etc. of Emplacement No. 1 to correct the dampness. By 1902, the lead had corroded through as a result of water percolation.⁸³⁰

The communication system at the Fort Pickens Military Reservation consisted mostly of buried lead covered cable connecting the various fire control stations and searchlights as well as the guardhouses, officers quarters, ordnance storehouses, loading rooms, plotting rooms, and other buildings on the reservation.^{831, 832, 833} In 1949, there was estimated to be approximately 160 tons of lead covered trenched and submarine communication and electrical cable.⁸³⁴

PAHs

Six shot furnaces were constructed in the scarp of the Southeast Bastion of Fort Pickens. Each of the six shot furnaces was divided into three divisions, each division being 8'3" in length. Each furnace would hold 45 32-pounder shot, or a total of 270 for the six. These furnaces were used to heat the solid shot.⁸³⁵

In anticipation of receiving troops in 1842, sand was hauled and tamped for the glacis and the paved slopes were coated with asphalt and tar. The superior and exterior slopes of the North Curtain were paved with brick; the joints cemented with a mixture of asphalt, coal tar, pitch, and sand; and the entire pavement brushed with boiled coal tar brushed on to stop water intrusion.⁸³⁶

⁸²⁵ PIRS-022807-002

⁸²⁶ Bearss, Edwin C. 1983. pp. 71, 73, 77, 88, 92, 98, 99.

⁸²⁷ Bearss, Edwin C. 1982. p. 171.

⁸²⁸ Bearss, Edwin C. 1983. pp. 123, 175, 238, 287, 288, 293, 294, 426, 429, 440-448

⁸²⁹ Bearss, Edwin C. 1982. pp. 48, 50, 51.

⁸³⁰ *Ibid.*, pp. 110-112.

⁸³¹ ATL-030707-015

⁸³² ATL-030707-028

⁸³³ ATL-030807-013

⁸³⁴ ATL-030907-087

⁸³⁵ Bearss, Edwin C. 1983. pp. 197, 399, 642.

⁸³⁶ *Ibid.*, pp. 246-249, 252, 253, 320.

Asphalt contains coal tar pitch. In addition to PAHs, coal tar pitch contains phenol and cresols.⁸³⁷

In 1846-47, seepages had been observed in some of the casemate arches. To combat this leakage, Major Chase proposed to cover the pavements of the terreplein above these arches with mastic.⁸³⁸ Mastic appears to have been liberally used on Fort Pickens.⁸³⁹ During the construction of Battery Worth in 1898, the magazines were waterproofed using a layer of Portland cement on which was laid a coat of mastic.⁸⁴⁰ In the 1850's, mineral tar was used to prepare the vertical (scarp and parade) walls of Fort Pickens for the reception of asphalt required by the instructions. Under no circumstances was coal tar to be substituted for mineral tar, as the former was known to be "perishable." Asphalt was used around the columbiad platforms on the south Curtain during the repairs of 1865/1866.⁸⁴¹ The magazines of Battery Pensacola Emplacement No. 2 were covered with asphalt.⁸⁴²

Mosquito Control

From 1926 through 1942, mosquito control operations appeared to be yearly maintenance item.^{843, 844, 845} The most effective mosquito larvicide as a 5 percent oil solution of dichlorodiphenyltrichloroethane (DDT) (QM stock No. 51-L-120) applied at 1 to 2 quarts an acre of water surface. Suitable oils for the solution included fuel oil; Diesel oil No. 2; kerosene; a mixture of 20 parts kerosene and one part black oil; and kerosene diluted in half with waste oil. For indoor adult mosquito control, pyrethrum, thiocyanate, and DDT sprays were recommended for indoor use. Specifically targeted were screen doors, windows, light cords, ceilings, corners, closets, and the undersurfaces of chairs, tables and beds. Recommended dosage was 1 quart of 5 percent oil solution of DDT to 250 square feet. This dosage was estimated to leave a residue of 200 milligrams per square foot and be effective for up to 3 months. For outdoor control, a 5 percent oil solution of DDT is also recommended. Dosages were to be obtained from service command headquarters. The same dosage of DDT used for mosquito control was recommended for indoor control of houseflies. For latrines, an additional application of 2 ounces of residual DDT spray or 1 ounce of 10 percent DDT powder to the latrine box was recommended.⁸⁴⁶

⁸³⁷ Toxicological Profile for Wood Creosote, Coal Tar Creosote, Coal Tar, Coal Tar Pitch, and Coal Tar Pitch Volatiles, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, September 2002. pp. 3, 25.

⁸³⁸ The Coast Defense Journal. August 2002. Coastal Defense in Florida During the Mexican War. Pp. 83-87.

⁸³⁹ Bearss, Edwin C. 1983. pp. 426, 429, 440-446.

⁸⁴⁰ Bearss, Edwin C. 1982. p. 72.

⁸⁴¹ Bearss, Edwin C. 1983. pp. 474, 475, 498, 654.

⁸⁴² Bearss, Edwin C. 1982. p. 105.

⁸⁴³ CP-031407-014

⁸⁴⁴ CP-031407-029

⁸⁴⁵ CP-031507-003

⁸⁴⁶ Final Support Service Operation Report (CO-7), Civil Engineering. May 2006. Prepared by: HydroGeoLogic, Inc. FOUO. pp. 9-13, 35, 36, 39, 40, 41, 45, 46, 48, 50.

Asbestos

Asbestos may have been encountered during locomotive maintenance operations. Initially, asbestos was essentially used to insulate boilers, mains and gaskets; subsequently, it was employed to insulate the entire locomotive carriage.⁸⁴⁷ Asbestos may have been associated with boiler and pipe insulation.⁸⁴⁸

Miscellaneous COPCs

In FY1900, a mixture of resin and boiled linseed oil, in proportion of one to three, was applied to the gun platforms of gun No. 1 in Battery Pensacola to prevent seepage into the dynamo and storage battery rooms. This same mixture was applied to steps and other irregular spaces. The thickened, unabsorbed resin was allowed to stand for two weeks and then scraped off.⁸⁴⁹ Type A raw linseed oil is a vegetable oil containing Palmitic acid (5-7%), Stearic acid (3-5%), Oleic acid (18-26%), Linoleic acid (14-20%), and Linolenic acid (51-56%).⁸⁵⁰

On 23 October 1942, the Fort Pickens Military Reservation had 83 antifreeze type extinguishers on hand.⁸⁵¹ This antifreeze may have been ethylene glycol.

4.3 Map Analysis

4.3.1 General Area Map Analysis

Map analysis was performed on the Fort Barrancas, FL 1:24,000 scale, 1970 (photorevised 1987, minor revisions 1992) and Gulf Breeze, FL 1:24,000 scale, 1969 (photorevised 1987, minor revisions 1992) USGS quadrangles. These quadrangles show hydrographic, planimetric, and topographic features. The quadrangles show that the FUDS property lies on the flat terrain of Santa Rosa Island southeast of the city of Pensacola, Florida. The Gulf of Mexico lies to the south and Pensacola Bay is to the north. Several areas of Fort Pickens Military Reservation ruins are noted across the island.

4.3.2 Site Specific Map and Drawing Analysis

Due to the large number of maps and drawings obtained as part of the archives search, only select maps are presented in this section. The remaining maps and drawings are specifically referenced in the text footnotes and identified by their unique alpha-numeric document number (e.g., CP-031307-228).

⁸⁴⁷ Battista, G., et. al. 1999. Mortality Due to Asbestos-Related Causes Among Railway Carriage Construction and Repair Workers. *Occup. Med.* Vol. 49, No. 8, pp. 536-539.

⁸⁴⁸ Toxicological Profile for Asbestos, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, September 2001. pp. 161, 170, 171, 173.

⁸⁴⁹ Bearss, Edwin C. 1982. p. 110.

⁸⁵⁰ Material Safety Data Sheet 2001/58/EC Raw Linseed Oil.

⁸⁵¹ CP-031307-211

Appendix I-1

July 1936

NARA College Park (Cartographic), RG 77, Records of the U.S. Marine Corps, Entry OCE, Real Estate Division, Fort Pickens, Florida, Map, CP-031607-302, Fort Pickens & McRae and the Pensacola Military Reservation, Florida, Boundary Map, 6232-108, July 1936.

Map delineates land tracts for Fort Pickens, Fort McRae, Fort Barrancas, and Pensacola Military Reservation. Land tracts for the Treasury Department and Navy Department on Santa Rosa Island are also depicted. Map includes a legend presenting the history of land acquisition for Fort Pickens, Fort McRae, and the Pensacola Military Reservation. The locations of Batteries Cooper and Worth, along with four observation towers, are identified.

Appendix I-2

No Date

NARA College Park (Textual), Fort Pickens, RG 127, Records of the U.S. Marine Corps, Entry 18B, Office of the Commandant, General Correspondence, 1939-1950, Box 212, Map, CP-031307-228, Partial USGS Quadrangle dated 1926.

Portion of 1926 USGS Quadrangle with handwritten markings showing the Rifle Range (and berms) and the route of motor boat to Rifle Range from Pensacola NAS. Map also identifies locations of permanent concrete batteries (except for Battery Langdon and Battery 234), the seawall, a number of towers, and the Coast Guard Station. The narrow gauge railroad track, as well as the wharf that served Battery Langdon, are shown.

Appendix I-3

15 June 1943

NARA Regional Atlanta, FL, Fort Pickens, RG 270, Records of the War Assets Administration, Real Property Disposal Case Files, 1942-1948, Box 281, Fort Pickens Harbor Defenses, Drawing, ATL-030907-028, Harbor Defenses of Pensacola, Florida, Fort Pickens Layout Plan, Sheet No. 1, U.S. Engineer Office, Mobile, Alabama, DRWG. No. HDP-514, 15 June 1943.

This drawing shows the layout plan of the western portion of the Fort Pickens Military Reservation in June 1943. Hand-drawn on the map is a patrol route and those buildings still remaining. Fort Pickens, the gun emplacements, water lines, narrow gauge railroad, power line, and seawall are also depicted on the drawing.

Appendix I-4

15 June 1943

NARA Regional Atlanta, FL, Fort Pickens, RG 270, Records of the War Assets Administration, Real Property Disposal Case Files, 1942-1948, Box 281, Fort Pickens Harbor Defenses, Drawing, ATL-030907-032, Harbor Defenses of Pensacola, Florida, Fort Pickens Layout Plan, Sheet No. 2, U.S. Engineer Office, Mobile, Alabama, DRWG. No. HDP-515, 15 June 1943.

This drawing shows the layout plan of the eastern portion of the Fort Pickens Military Reservation in June 1943. Those buildings still remaining are colored in. A building legend is included in the drawing. The gun emplacements, narrow gauge railroad, towers, and the 66.4 acres reserved for the Navy are also depicted.

Appendix I-5

7 February 1934

NARA College Park, FL, Fort Pickens, RG 77, Records of the Office of the Chief of Engineers, Entry 1007 Geographic File 1918-45, Box 109, Harbor Defenses of Pensacola, Showing Location of Battery DPs, Stations, Searchlights, Map, CP-031407-012, U.S. Engineer Office, Jacksonville, FL Fort Myers Army Air Field and Cantonment, 24 April 1944.

This map shows the various permanent concrete batteries, 155-mm gun locations, and anti-aircraft battery locations.

Appendix I-6

Undated

NARA Regional Atlanta, FL, Fort Pickens, RG 270, Records of the War Assets Administration, Box 281, Fort Pickens Harbor Defenses, Declaration and Classification, Map, ATL-030907-029, No Date.

This map depicts the various acreages to be acquired by Escambia County (134 ± acres), proposed park and recreational area (1,484.6 acres), and proposed historical monument (87 acres). Also shown are the Coast Guard (17 acres) and U.S. Navy property (66.4 acres).

4.4 Aerial Photographic Interpretation

Government and contractor personnel conducted an aerial photography search to obtain available imagery that covers the FUDS Property. Generally, the search was limited to imagery with less than 1:24,000 scale and that provided stereo viewing; however, other aerial photography was acquired as needed. The aerial photographs obtained for the Fort Pickens FUDS property are presented in **Table 4-7** below.

Table 4-7: Aerial Photographic Imagery for Fort Pickens, Pensacola, Florida

Date	Scale	Source	Frame Identifier(s)
22 January 1951	1:20,000	National Archives (USDA)	CPF-4H 19, 20, 24, 25 (partial coverage; western portion)
4 January 1958	1:20,000	USDA	CPF-2V-51 thru 82
27 November 1999	1:40,000	USGS	NAPP 11037 157 and 158

Imagery listed above provides full coverage of the project area as known at the time of preparation of this report and was acquired or downloaded from <http://terraserver-usa.com/>. The Fort Barrancas, FL 1:24,000 scale, 1970 (photorevised 1987, minor revisions 1992) and Gulf Breeze, FL 1:24,000 scale, 1969 (photorevised 1987, minor revisions 1992) USGS Quadrangle maps were used as a reference for natural and man-made features observed in the aerial photographs.

The features identified in the paragraphs below are based upon aerial photographic interpretation. The photographic analysis involved using stereo viewing of photography, which allows more accurate identification than monoscopic interpretations. Historic maps and drawings were used, as necessary, to aid the interpreter in identifying features of interest. Features are identified from historic maps and drawings, textual documents, and analysis of the aerial photographs themselves. Imagery of the features of interest was delineated on hard copy plots and digitized using Computer-Aided Drafting and Design (CADD) software. The scanned aerial photography was overlaid by the digitized features, resulting in the final plots. Features are depicted on the plates even though they may not be visible on the aerial photos. Feature numbers presented in **bold** parenthesis correspond with the features noted on the plates. MMRP and HTRW features of interest are identified and discussed separately below.

1951 Aerial Photographs (Plate No. 4): This set of aerial photographs is the earliest available set and covers the FUDS property with the exception of the extreme eastern portion. The photographs were reviewed and compared to the 15 June 943 Layout Plan (see **Appendix I-4**). Numerous ordnance related features are visible. They are as follows: Battery Trueman (**1**); Battery Payne (**2**); Battery Van Swearingen (**4**); Battery Cullum/Sevier (**5**); Battery Air (four gun emplacements) (**6**); AMTB Battery (**7**); magazines (**8**); Battery Pensacola (**9**); Magazine(**10**); Mine Casemate (**11**); Mine Storehouse (**12**); Battery 234 (**13**); Battery GPF (4 gun mounts) (**14**); Battery Cooper (**15**); Rifle Range(**16**); Battery Worth (**17**); and Battery Langdon (**20**). Other ordnance related features at the Reservation are identified from historic maps and confirmed by the Property Visit, but are not discernible on these aerial photos. These features include the approximate location of a Magazine (**19**); Battery Fixed (**21**) (aerial photo does not cover area); and another Magazine (**22**).

1958 Aerial Photographs (Plate No. 6): This set of aerial photographs cover the entire Fort Pickens Military Reservation. The same ordnance related features visible on the 1951 aerial photographs are also visible on the 1958 photos. Battery Fixed (**21**) is barely discernible in the aerial photographs.

1999 Aerial Photographs (Plate No. 8): The same ordnance related features visible in the 1958 aerial photographs are visible in the 1999 aerial photographs. The features that were identified on historic maps and confirmed by the Property Visit are still not discernible on the 1999 aerial photos.

For simplicity, the analysis of MMRP and HTRW building presence or absence is presented in **Table 4-8** below. Building numbers are based upon building numbers listed in historical documents and identified on historical maps and drawings. The date columns correspond with the years of aerial photography. Notes are included in the columns to indicate if the building was still visible during the year of aerial photography. In some case, due to the small size of the features, they may not be visible due to the scale or resolution of the aerial photographs. The building features of interest are presented on 1951, 1958, and 1999 aerial photography in **Plate Nos. 5, 7, and 9**, respectively.

Table 4-8: Fort Pickens Building Features of Interest

Bldg. No.	Past Use(s)	1951	1958	1999
5	Carpenter Shop (Ordnance Storehouse) (Storeroom) (Storehouse Shop)	NI	NI	Razed
7	Ordnance Tractor Shed (Artillery Barracks)	Vis	Vis	Razed
10	Coal Shed	Vis	Vis	NI
12	Ordnance Repair Shop	Vis	Vis	NI
15	Q.M. Wharf	Vis	Vis	Remnants remain
17	RR Round House	Vis	Vis	Razed (foundation present)
24	Mine Store Room (Mine Load Room)	Vis	NI	Razed
25	Locomotive Repair Shop (Mine Store Room) (Mine Loading Room)	Vis	Vis	Park Storehouse
28	Oil House (Engineers Mess Hall & Kitchen)	NI	NI	NI
32	Transformer Building (Engineering Storeroom)	NI	NI	Razed
33	Battery Langdon Wharf	Vis	Vis	NI
39	Oil House	NI	NI	Razed
41	1000' Range House	NI	NI	Razed
45	Search Lights 4 and 5 Power Plant	Vis	Vis	Razed
46	Magazine	Vis	Vis	Razed
50	Day Room (Oil House)	NI	NI	NI
51	Mechanics Shop (Langdon Guardhouse) (Oil House)	NI	NI	NI

Bldg. No.	Past Use(s)	1951	1958	1999
53	Magazine	NI	NI	Razed
E-100	Ordnance Repair Shop	Vis	Vis	Foundation and partial walls present
E-101	Ordnance Warehouse	Vis	NI	Razed
E-102	Ordnance Warehouse	Vis	NI	Razed
E-103	Ordnance Boiler House	Vis	Vis	Present (abandoned)
E-120	Fire Station	Vis	Vis	Present
T-105	PE Paint Shop (Carpenter Shop)	NI	NI	NI
T-126	Fire Station	Vis	Vis	NI
T-691	S. L. Store Room (Range House)	NI	NI	NI
T-694	Range House	NI	NI	NI

Note: Vis = Visible for specified year
 NI = Not identified in aerial photograph due to scale

5.0 EVALUATION OF THE PRESENCE OF MILITARY MUNITIONS AND TECHNICAL DATA

5.1 General Evaluation of Conventional MEC Presence

In this section, the process of evaluation and general summary evaluation/interpretation of MEC use on the Fort Pickens FUDS property is presented. This evaluation/interpretation is based on archival records, property visits, aerial photography, and interviews. Based on the operations and activities that occurred on Fort Pickens and the time frame when the property was under DoD jurisdiction, MEC potentially remaining on the FUDS property are identified.

A certificate of clearance was requested in an 18 August 1948 letter to the District Engineer, Mobile District.⁸⁵² As of October 1948, a certificate of clearance had yet to be furnished for the Fort Pickens Military Reservation.⁸⁵³

5.1.1 Fort Pickens

The original fort was constructed in 1829 and designed to accommodate 171 guns.⁸⁵⁴ Over the next 70 years, numerous changes took place. Several times, the guns emplaced and removed. The years 1861-1865 (Civil War) found the Fort's armament at its peak. The Fort remained in Federal hands throughout the war, and skirmishes and major bombardments occurred. The most significant occurred on 22 and 23 November 1861. A two day bombardment took place involving guns from Fort Pickens and Confederate held Forts McRee and Barrancas. During the exchange, the estimated number of shells fired totaled 1,000 by the Confederates and 5,000 from the Federals.⁸⁵⁵

The first guns were emplaced at Fort Pickens on 13 December 1835.⁸⁵⁶ Throughout the decades to follow, numerous changes were made to the fort's armament. Portrayed in **Table 5-1** below is the armament in place at Fort Pickens by year.^{857 858 859 860 861 862 863 864}

⁸⁵² ATL-030907-120

⁸⁵³ ATL-030907-118

⁸⁵⁴ Bearss, Edwin C. 1983. p. 124.

⁸⁵⁵ Ibid., p. 607.

⁸⁵⁶ Ibid., p. 185.

⁸⁵⁷ CP-031907-015

⁸⁵⁸ CP-032107-004

⁸⁵⁹ CP-032107-012

⁸⁶⁰ CP-031907-001

⁸⁶¹ CP-031907-003

⁸⁶² Bearss, Edwin C. 1983. p. 388.

⁸⁶³ Ibid., pp. 600-601.

⁸⁶⁴ Ibid., p. 185.

Table 5-1: Fort Pickens Armament, 1835-1897

Mounted Armament	1835	1855	1861	1863	1867	1872	1885	1897
32-pounder		55	12	23	23			
8-inch Columbaids		10	5	5	6			
24-pounders	16	52		19	6			
24-pounder Flanking Howitzer		26			16			
18-pounder		6						
12-pounder		14		7	7			
8-inch seacoast howitzer		12		3	4			
10-mortar		4			3			
10-inch Columbaids			6	4	10			
42-pounder (rifle)			9	8	9			
42-pounder (smoothbore)			2	5	2			
Mortar (assumed to be 10-inch)			4					
18-pounder				4	3			
COL P				3				
8-inch				1				
10-inch siege mortar				1			2	
13-inch Mortar						4	4	
8-inch Howitzer						11	8	
15-inch Rodman						4	4	1
10-inch Rodman							4	
300-pounder Parrott							6	
200-pounder Parrott							6	
100-pounder Parrott							4	

The general location of a reported cache of cannon balls has been reported to be in the marsh area west of the assistant engineer's quarters. The exact location has not been verified.⁸⁶⁵

5.1.2 Civil War Earthen Batteries

During the Civil War, a number of outlying batteries were hastily erected in April 1861 and subsequent months to assist in the defense of Fort Pickens. Battery Scott was constructed at the southwestern point of Santa Rosa Island opposite Fort McRee and mounted two 10-inch columbiads and one 42-pounder rifle *en barbette* and two 10-inch seacoast mortars. Battery Cameron was located approximately 580 yards west of Fort Pickens on the bay side of the island and had two 10-inch columbiads *en barbette*. Battery Lincoln was constructed about 803 yards west of the fort on Pensacola Bay and mounted four 8-inch seacoast howitzers, one 42-pounder rifle mounted *en barbette*, and two 10-inch seacoast mortars. Battery Totten was located approximately 400 yard west of Fort Pickens on the Gulf side and contained one 13-inch and one

⁸⁶⁵ Ibid., pp. 119.

12-inch seacoast mortar. One 10-pounder Parrott was mounted on the “Spanish fort” located about 2,612 yards west of Fort Pickens on the Bay side. It is possible that this “Spanish fort” was the site of the fort built by the Santa Rosa Island settlers in the eighteenth century. After nightfall on the 22nd, the 10-pounder Parrott was moved from the old Spanish Fort to Battery Cameron.^{866, 867}

5.1.3 Battery Cullum/Sevier

The battery originally mounted four 10-inch guns (Model 1888 M2).⁸⁶⁸ In May 1918, two were dismantled and shipped to Watervliet. In 1921 they were replaced with two 10-inch, (Model 1895). A 6 June 1914 documents included a request to use the guns for the next annual service practice. It also states the total number of shots fired from this battery for the four guns was 582.⁸⁶⁹ Battery Cullman was identified to conduct target practice May 1925 by firing against a moving target at a range of 8,000 – 10,000 yards. During the third firing, the battery was to be subjected to a cloud of tear gas. There were to be three practices, 10 shots for each practice.⁸⁷⁰

Although the 10-inch guns were removed, the relocation of the two 3-inch rapid fire guns from Battery Trueman to Battery Cullum was approved in early 1942. The battery was modified and the guns were in place as of June 1944.⁸⁷¹ In June 1946, the guns in Battery Cullum were dismantled and turned over to the Post Salvage Officer for disposal.^{872, 873}

5.1.4 Battery Pensacola

Mounting of two 12-inch rifled guns (Model 1895) on disappearing carriages (Model 1897) at Battery Pensacola was completed on 27 November 1899. The 12-inch guns were capable of firing 1,070-pound (lb.) shells approximately eight miles. Defensive weapons associated with the Battery included Gatling guns. In May 1917, it was stated that 12 automatic machine guns were needed to replace Gatling guns.⁸⁷⁴ A 28 July 28 1941 Report on Obsolete Batteries at Fort Pickens states the two 12-inch guns had been removed.⁸⁷⁵

5.1.5 Battery Worth

Construction of Battery Worth began in 1897 and was completed in 1898. The battery housed eight 12-inch mortars (Model 1890 M1) in two gun pits of four mortars each..^{876, 877} The ammunition allowance for Battery Worth allowed for two thirds of the War allowance to be

⁸⁶⁶ ATL-030707-094

⁸⁶⁷ Bearss, Edwin C. 1983. p. 601, 605.

⁸⁶⁸ CP-031307-001

⁸⁶⁹ ATL-030707-026

⁸⁷⁰ CP-031507-001

⁸⁷¹ CP-031207-012

⁸⁷² Roberts, Robert B. pp. 195-198.

⁸⁷³ Bearss, Edwin C. 1982. pp. 178.

⁸⁷⁴ ATL-030707-111

⁸⁷⁵ CP-031307-008

⁸⁷⁶ CP-031307-001

⁸⁷⁷ ATL-030707-006

stored at the battery: 120 each DP (Deck Piercing), 60 each HE (High Explosive).⁸⁷⁸ In mid-November 1942, it was reported by the Southern Defense Command that the mortars and their carriages had been salvaged.⁸⁷⁹

5.1.6 Battery Van Swearingen

Two 4.7-inch British Armstrong guns were mounted on pedestal carriages (Model 1897) at Battery Van Swearingen and turned over to the artillery on 29 June 1898. The guns were dismantled in the winter of 1917-1918 and shipped to Watervliet in February 1918.⁸⁸⁰

5.1.7 Battery Payne

Battery Payne was constructed in 1904 and ready for its armament on 11 May 1904. Soon thereafter, the two three-inch guns Model 1902 R.F were mounted. In the spring of 1913, Gun No. 16 and its carriage was dismantled from Battery Payne. In August 1913, Gun No. 29 and its carriage were moved from Battery Trueman to Battery Payne. In the summer of 1916, Gun No. 16 was returned and mounted in Battery Trueman. Ten months after V-J Day, the two 3-inch guns and carriages were marked for disposal. In October 1941, Battery Payne was identified as being retained as part of the modernization program for the Harbor Defenses of Pensacola.^{881, 882, 883, 884} In 1945, two caliber .50 machine guns were installed at Battery Payne.⁸⁸⁵ On 27 June 1946, the three inch guns and carriages were dismantled and turned over to the post salvage officer for disposal.⁸⁸⁶

5.1.8 Battery Trueman

Battery Trueman was completed in the winter of 1904 and mounted two 3-inch rapid-fire guns (Model 1902) on pedestal mounts. The two 3-inch guns were relocated to Battery Cullum in 1943.^{887, 888} It was proposed in November 1942 to install two 37-mm guns on top of Battery Trueman. In 1945, two caliber .50 machine guns were installed at the Battery.⁸⁸⁹

⁸⁷⁸ CP-032307-302

⁸⁷⁹ CP-031207-023

⁸⁸⁰ CP-031207-019

⁸⁸¹ CP-031307-001

⁸⁸² Roberts, Robert B. pp. 195-198.

⁸⁸³ CP-031307-021

⁸⁸⁴ Bearss, Edwin C. 1982. pp. 172-176.

⁸⁸⁵ Ibid., p. 291.

⁸⁸⁶ Ibid., p. 178.

⁸⁸⁷ Roberts, Robert B. pp. 195-198.

⁸⁸⁸ PIRS-022807-002

⁸⁸⁹ Bearss, Edwin C. 1982. p. 291.

5.1.9 Battery Cooper

Battery Cooper was constructed in 1905. In 1906, two 6-inch rapid fire guns (Model 1903) were mounted on disappearing carriages. In November 1917, the guns were dismantled.^{890, 891, 892, 893,}
⁸⁹⁴ Two 37-mm guns were also positioned at Battery Cooper.⁸⁹⁵

5.1.10 Battery Langdon

Two 12-inch guns (Model 1895 M1) were mounted at Battery Langdon in March 1923.^{896, 897} In 1941, four 37-mm and three caliber .50 machine guns were present.⁸⁹⁸ In 1945, four 40-mm and four caliber .50 machine guns were installed.⁸⁹⁹ During June and July 1947, the two 12-inch guns and Barbette carriages at Battery Langdon were completely demilitarized, removed, mutilated, and sold for scrap.^{900, 901}

5.1.11 Battery Air

Battery Air had four 3-inch guns (Model 1917).⁹⁰² By March 1937, the original guns had been shipped to the National Guard and replaced with three 3-inch guns, Model M-3, on spider mounts.⁹⁰³

5.1.12 Battery 234

The 6-inch guns for Battery No. 234 were never received. In the summer of 1947, the carriages and shields were demilitarized, mutilated, and sold for scrap.^{904, 905} In 1945, two 37-mm guns and four caliber .50 machine guns were installed at Battery 234.^{906 907}

⁸⁹⁰ CP-031307-001

⁸⁹¹ ATL-030807-011

⁸⁹² Roberts, Robert B. pp. 195-198.

⁸⁹³ American Seacoast Defenses, A Reference Guide. January 1999. Edited by Mark A. Berhow. Coast Defense Study Group Press. Pp. 308, 309, 320.

⁸⁹⁴ Bearss, Edwin C. 1982. pp. 158-162.

⁸⁹⁵ CP-031307-022

⁸⁹⁶ CP-031207-021

⁸⁹⁷ ATL-030707-011

⁸⁹⁸ CP-031307-022

⁸⁹⁹ Bearss, Edwin C. 1982. p. 291.

⁹⁰⁰ CP-112003-011

⁹⁰¹ Bearss, Edwin C. 1982. p. 288.

⁹⁰² ATL-0030807-027

⁹⁰³ CP-031307-031

⁹⁰⁴ CP-112003-011

⁹⁰⁵ Bearss, Edwin C. 1982. p. 295.

⁹⁰⁶ Ibid., p. 291.

⁹⁰⁷ CP-031307-022

5.1.13 Battery Fixed

Battery Fixed was constructed between November 1917 and March 1918. Two 3-inch guns (Model 1917) mounted on anti-aircraft pedestals were emplaced by June 1921.^{908,909, 910, 911, 912} In the mid-1930's, Battery Fixed was relocated to a site east of Battery Langdon (see **Appendix I-5**). Construction of the new platforms for Battery Fixed several hundred yards east of Battery Langdon was initiated in August 1939 and completed in March 1940. When Battery Fixed was relocated, the battery was armed with different 3-inch guns (Model 1917 MII). In 1941 and 1945, four caliber .50 machine guns were present at the battery.^{913 914} On 1 April 1945, the guns were declared obsolete. WWII ended before it was determined what armament would replace them.⁹¹⁵

5.1.14 AMTB Battery

The AMTB Battery was completed on 16 June 1943 and was composed of two 90-mm M1 guns on fixed T-3 fixed carriages.^{916, 917, 918} The extreme range of the guns was 12,000 yards with a maximum effective range of 8,000 yards. The rate of fire was 25 rounds per gun per minute.^{919, 920, 921, 922} In 1945, two 37-mm guns and four caliber .50 machine guns were installed at the AMTB battery.⁹²³

5.1.15 Battery GPF

In the spring of 1937, two emplacements for 155-mm GPFs (Model 1918) were constructed in front of Battery Cooper. These guns were numbered 806 and 932. A third emplacement was constructed to the right of Battery Cooper, the fourth to the left. These guns were used for training R.O.T.C., C.M.T.C., and O.R.^{924, 925} Battery GPF remained part of the Harbor Defense Project until 5 April 1945, when it was disarmed.^{926, 927, 928}

⁹⁰⁸ ATL-030707-074

⁹⁰⁹ ATL-030707-007

⁹¹⁰ ATL-030707-060

⁹¹¹ ATL-030707-063

⁹¹² Bearss, Edwin C. 1982. p. 289.

⁹¹³ Ibid., p. 291.

⁹¹⁴ CP-031307-022

⁹¹⁵ Bearss, Edwin C. 1982. p. 290.

⁹¹⁶ American Seacoast Defenses, A Reference Guide. January 1999. Edited by Mark A. Berhow. Coast Defense Study Group Press. Pp. 308, 309, 320.

⁹¹⁷ CP-031407-002

⁹¹⁸ CP-031207-013

⁹¹⁹ CP-032207-004

⁹²⁰ CP-031407-005

⁹²¹ CP-032207-003

⁹²² CP-032207-005

⁹²³ Bearss, Edwin C. 1982. p. 291.

⁹²⁴ CP-031207-015

⁹²⁵ ATL-030807-052

⁹²⁶ Roberts, Robert B. pp. 195-198.

5.1.16 Magnitude of Fort and Battery Firing

In general, there were five types of service practice conducted with coast artillery weapons: preliminary, record, advanced, special, and battle. These five types are described below:

- 1) Preliminary – A preliminary service practice was a service practice conducted in preparation for record service practice. Battery and target practice officials, including recorders, performed the duties during preliminary service practice that they would perform during record service practice.
- 2) Record – A record service practice was the service practice conducted for the purpose of affording experience to and testing the efficiency of a single battery. Results of this service practice determined how an organization was classified. Record practice was conducted at least annually.
- 3) Advanced – Advanced service practice was a practice in which more difficult problems were presented for solution than those generally presented in the normal record service practice. It was conducted by an organization that had previously demonstrated its ability to conduct an excellent record service practice. Advanced practice was conducted at least annually, but could be fired in lieu of record service practice.
- 4) Special – Special service practice was a practice fired primarily in order to test methods or materiel.
- 5) Battle – Battle service practice was a service practice conducted by two or more batteries in accordance with a tactical program.

Additionally, trial fire in preparation for record fire consisted of not more than eight rounds for guns less than 8-inch, four rounds for 8-inch and larger guns, and eight rounds for mortars. Sub-caliber weapons were used in training in preparation for service practice firing.

Sub-caliber practice was conducted by each organization prior to firing service practices. A sufficient number of these practices were analyzed to insure that officers and enlisted men of the organization concerned with the firing and preparation of records of service practices were fully competent to perform their duties. Sub-caliber practices were conducted as nearly as practicable according to the rules for conduct of service practice.⁹²⁹

It is unknown to what extent the guns emplaced at the Fort Pickens Military Reservation, both at Fort Pickens as well as the separate batteries, were fired. Documents recovered during the archives search make reference to test firing and training. In 1856, an Ordnance officer was sent to Pensacola to evaluate test firing. It was concluded that all guns in the Pensacola Harbor Defense should be test fired with five rounds each⁹³⁰ Another reference states that target

⁹²⁷ American Seacoast Defenses, A Reference Guide. January 1999. Edited by Mark A. Berhow. Coast Defense Study Group Press. Pp. 308, 309, 320.

⁹²⁸ Bearss, Edwin C. 1982. pp. 162, 163.

⁹²⁹ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. p. 16.

⁹³⁰ Bearss, Edwin C. 1983. pp. 411-413

practice was the culmination of the training period and the only adequate test of a battery's fitness for action.⁹³¹

From 6 to 18 January 1921, Battery Worth (mortar) and Battery Pensacola (12-inch gun) participated in a test firing on the U.S.S. Massachusetts. The Massachusetts was an obsolete battleship sunk off the coast of Santa Rosa Island and used as a target. As recorded, at least 28 Explosive D loaded shells were fired at the target.⁹³² A report dated 5 June 1914 states that the guns in Battery Cullum/Sevier were desired for the next annual target practice. The report further stated that the number of shots fired from this battery were as follows: gun #1 - 155 shots, gun #2 - 171 shots, gun #3 - 104 shots, and gun #4 - 152 shots.⁹³³ A 4 June 1925 report on target practice states three batteries were involved in a test conducted under simulated gas presence. Battery Cullum, 3-inch rapid fire guns, and 155-mm guns participated. Firing was conducted over a two week period. Sub-caliber ammunition was mentioned briefly, but it is not known if this was the only ammunition used. Three hundred fifty Lachrymatory 1 lb CN candles were furnished. Targets were identified as towed.⁹³⁴ Seacoast Artillery Batteries were required to fire target practice at least once per year, some twice.⁹³⁵

The guns emplaced at Fort Pickens were sited to protect the entrance to the harbor, as well as the harbor itself. Therefore, it is expected that the guns were fired more into the harbor and channel, than out to the Gulf. Because the mainland was populated, it is assumed firing would have been limited to the waters of the harbor, channel, or the Gulf. A reduction of powder charge would have been necessary for guns capable of reaching the mainland.

It is evident from reference documents that the guns emplaced during the 1900s fired seaward at towed or stationary targets. There is little or no referenced evidence to identify all firing areas.

Studies of UXO in underwater environments indicate that UXO can last a long time in an underwater environment (at least 50 years).⁹³⁶ Thus, the shells fired into the harbor, channel, and Gulf of Mexico may still be present.

5.1.17 Rifle Range

The Rifle Range was originally requisitioned on 10 July 1918. The requisition called for a 600-yard length, elevated firing points, and target pits. No backstop was required because the existing sand dunes offered protection and shooting was directed into the Gulf of Mexico.^{937, 938} A U.S. Marine Corps report on the condition of the range in 1939 stated that, although there were

⁹³¹ CP-032307-301

⁹³² CP-031207-035

⁹³³ ATL-030707-026

⁹³⁴ CP-031507-001

⁹³⁵ CP-032307-301

⁹³⁶ Darrach, M. and Chutjian. 1997. Trace Explosives Signatures from Unexploded Undersea Ordnance. Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California. Prepared for Coastal Systems Station, Panama City, Florida.

⁹³⁷ CP-031407-010

⁹³⁸ CP-031407-011

no facilities for throwing fragmentation hand grenades, such facilities could easily be constructed on, or near, the rifle range. Additionally, no facilities were available for firing the live rifle grenade (VB). The necessary facilities, however, could be constructed on, or near, the rifle range, if permission was granted by the Army.⁹³⁹ A document dated 12 February 1948 describes the range as consisting of 20 target butts, 200 and 300 yard firing lines, and a partial 500 yard firing line.⁹⁴⁰ According to an August 1948 Preliminary and Fire Inspection Report, indirect information indicated that the Rifle Range was used by the Army and Navy for grenade practice. It was also indicated that the Army Range Officer had cleared the range of all duds prior to deactivation. Form 1005 indicated the property would be checked again and a Certificate of Clearance furnished.⁹⁴¹ No other information was obtained during the archives search regarding the use of the Rifle Range for hand and/or rifle grenades.

Reference is made in a 13 January 1949 memorandum of a range located on Santa Rosa Island used by the Marine Corps.⁹⁴² No information was uncovered during the archives search that indicated whether or not the range was used by the Marine Corps beyond 1949. It is assumed that the range mentioned in the referenced document was the Rifle Range on the Fort Pickens Military Reservation.

The former Rifle Range appears to have been a known distance range with firing lines at 200, 300, 500, and 600 yards. The range is currently recognizable, although totally abandoned. The firing lines at 500 and 600 yards were not investigated during the Property Visit. The 300 yard firing line is intact but overgrown with vegetation. It is elevated approximately 3-4 feet compared to the surrounding landscape. The 200 yard firing line is also evident, but less elevated than the 300-yard line. Target frames are present, but for the most part, rotted and/or corroded nearly beyond recognition (see **Appendix M**). Sand has covered the target pits and much of the target frames. There is no evidence of a backstop, either man-made or natural sand dunes.

Suspected residual MEC includes small arms ammunition of caliber .30 and less. Common practice on military ranges was to police spent cartridge cases and complete rounds in the immediate vicinity of the firing lines.⁹⁴³ Regardless of how well the lines were policed, there is always a possibility that some spent cases and complete rounds were overlooked. Numerous empty (spent) small arms (.30 caliber) cartridge cases were observed on the ground surface during the Property Visit. Live rounds, if present, would be expected in and around the firing lines, but potentially anywhere within the MRA.

5.1.18 Possible Minefield

A 23 October 1941 meeting of a local board of officers approved the proposed anti-mechanized defense of the Harbor Defenses of Pensacola of sixty-eight hundred anti-tank mines. It was

⁹³⁹ CP-031307-226

⁹⁴⁰ CP-031507-005

⁹⁴¹ CP-112003-011

⁹⁴² CP-102003-003

⁹⁴³ Range Operations Report No. 1 (RO-1), Small Arms Range. January 2006. Prepared by: US Army Corps of Engineers, St. Louis District. FOUO. pp. 11, 88, 90.

contemplated that the anti-mechanized defense would consist of the installation of three mine fields covering all possible approaches to the Harbor Defenses. One mine field was to be installed in the vicinity of the Three Lakes area on the Fort Pickens Military Reservation, covering a probable approach to the Defenses from the east. Another mine field was to be installed on the western boundary of Fort McRee covering a probable approach from the west along Foster's Bank. The third mine field was to be installed along the western boundary of the Fort Barrancas Military Reservation covering all possible approaches from the west.⁹⁴⁴

It is unknown if this mine field was ever emplaced.

5.1.19 Conventional MEC Technical Data

Contained in **Appendix F** are Ordnance Technical Data Sheets of typical examples of MEC identified as having been stored and/or utilized on the Fort Pickens Military Reservation. These Ordnance Technical Data Sheets were prepared by U.S. Army Corps of Engineers - St. Louis District, Ordnance and Technical Services Branch. These data sheets are general descriptions and may not include every specific variation of a particular ammunition item. This list is compiled from information obtained regarding the FUDS property and may not be comprehensive.

<u>Ordnance Item</u>	<u>Page</u>
Munitions Constituents Table	F-3
Cartridge, .30 Caliber	F-25
Cartridge, .50 Caliber	F-32
Cartridge, 37-mm, HE, Fixed, M54 w/Tracer	F-47
Cartridge, 37-mm, Practice, M55A1	F-48
Cartridge, 37-mm, TP, M63 Mod 1	F-49
Cartridge, 37-mm, TP M92	F-50
Cartridge, 40-mm, AP-T, M81 Series	F-51
Cartridge, 40-mm, HE-T & HEI-T, Mk2	F-54
Cartridge, 40-mm, TP-T, M91	F-59
Shell, 3-inch, TP, MkVII & MkVIIA1	F-62
Projectile, 3-inch, AP, M62	F-65
Shell 3-inch, Fixed, AP, M79	F-66
Cartridge, 3-inch, Drill, M9 & M10	F-67
Shell, 3-inch, HE, M1915	F-68
Shell, 3-inch, Fixed, HE, M42 & M42A1	F-69
Shell, 3-inch, HE, Mk IX	F-70
Shell, 3-inch, Practice, M42B2	F-74
Shell, 3-inch, Shrapnel, Mk I	F-75
Cartridge, Ammunition for 4.7-inch Gun, Armstrong	F-79
Projectile, 155-mm, Shrapnel, Mk I	F-80
Projectile, 155-mm, AP, M112	F-81

⁹⁴⁴ CP-031307-021

Propelling Charge, 155-mm, M3 Series	F-82
Propelling Charge, 155-mm, M4 Series	F-83
6-inch Seacoast, AP, M1911	F-84
Shell, 6-inch Seacoast Gun HE, Mk II	F-88
Shell 10-inch Seacoast (General)	F-92
Projectile, 12-inch, AP, Mk 18 Mod 1	F-95
Projectile, 12-inch, AP, Mk 15 Mod 6	F-96
Projectile, 12-inch, High Capacity Mk 16 Mod 1 & 2	F-97
Projectile, 12-inch, TP, Mk 19	F-99
Ammunition for 12-inch Mortar	F-100
Civil War Projectiles (General)	F-101
Smoothbore Projectiles	F-106
Time Fuzes (Civil War)	F-116
Mine, Anti-Tank, M4	F-118
Grenade, Hand, Fragmentation, MkII & MkIIA1	F-119
Rifle Grenade, VB, MkI & Dummy	F-123
Tear Gas, Agent, CN	F-126
Black Powder (general)	F-128
Commercial Straight Dynamite	F-130

5.1.20 MRSPP Evaluation

DoD uses the Munitions Response Site Prioritization Protocol (MRSPP) modules to assign a relative priority for munitions responses for each MMR Area in the DoD's inventory of defense sites. The MRSPP assigns a relative priority for response activities based on the overall conditions at each Area, taking into consideration various factors related to safety and environmental hazards. The MRSPP process replaces the former Risk Assessment Code (RAC) scoring used to assess the MEC component of MMRP projects within the FUDS program. In the MRSPP, the Explosive Hazard Evaluation (EHE) module is used to evaluate MEC and the Chemical Warfare Material Hazard Evaluation (CHE) module is used to evaluate CWM. The Health Hazard Evaluation (HHE) module provides a process similar to the Relative Risk Site Evaluation (used for prioritizing HTRW projects) to evaluate MC. Because the HHE module requires results from quantitative sampling data that are not available at the PA stage of the CERCLA process, this module is given an alternative priority of Evaluation Pending. Subsequent investigations will evaluate the HHE module, as necessary.

The MRSPP Prioritization Summary Form encapsulates the scoring of the modules. The MRSPP Prioritization Protocol rule can be found at 32 CFR Part 179. The result of the MRSPP for the Fort Pickens Military Reservation is Priority 4, a relatively high priority. The MRSPP is presented in **Appendix N**.

5.2 General Evaluation of MC Presence

The associated chemical constituents of standard coast artillery ammunition propellants, explosives, and pyrotechnics components included ammonium picrate (Explosive D), lead azide, trinitrotoluene (TNT), tetryl, nitrocellulose, nitroglycerin, ethyl centralite, carbon black,

potassium perchlorate, white phosphorus, hexachloroethane, zinc, stearic acid, lead styphnate, tetracene, barium nitrate, antimony sulfide, lead thiocyanate, potassium chlorate, and pentaerythrite tetranitrate (PETN).⁹⁴⁵ Many of the projectile casings were composed of steel (see **Appendix F**). Standard steels can be classified into three major groups: carbon steels, alloy steels, and stainless steels.⁹⁴⁶ Carbon steels contain the alloying elements of carbon, copper, manganese, phosphorus, silicon, and sulfur. Alloy steels also contain elements not found in carbon steels such as nickel, chromium, cobalt, etc. Stainless steels contain chromium, with or without other elements such as nickel, aluminum, and titanium.^{947,948,949} Many of the Civil War munitions were made of cast iron. The MC of these casings may include, therefore, iron, copper, manganese, phosphorus, silicon, sulfur, nickel, chromium, cobalt, aluminum, and titanium.

Studies of UXO in underwater environments indicate that UXO can last a long time in an underwater environment (at least 50 years).⁹⁵⁰ Thus, the metal casings may still be present and releasing metal constituents. The MC of concern with these casings are metals such as tungsten, chromium, antimony, lead, aluminum, tin, copper, and zinc (see **Appendix F**).

The MC associated with small arms are primarily lead, antimony, and copper for projectiles with zinc, strontium, and magnesium present in tracer munitions (see **Appendix F**). Lead is released into the environment through the dissolution of the lead compounds found in the oxidized crust that forms around a projectile in the environment. Site-specific environmental factors affect the weathering rates of lead (e.g. precipitation, pH of rainfall, slope, soil type, presence of organic matter). Disintegration of lead projectiles is less for fully or partially jacketed bullets frequently found at military ranges.⁹⁵¹

The types of MC released when a munition functions differ somewhat from their original state. A comprehensive determination of MC released during detonation does not currently exist. The only information regarding munitions detonation releases as of this writing is the USEPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: *Stationary Point and Area Sources*, Chapter 15: Ordnance Detonation. The eleven sections that make up Chapter 15 are:

1. Small cartridges (less than 30-mm)
2. Medium cartridges (30-75-mm)
3. Large cartridges (greater than 75-mm)
4. Projectiles, canisters and charges

⁹⁴⁵ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. p. ES-2

⁹⁴⁶ Internet, http://www.efunda.com/materials/alloys/alloy_home/steels.cfm.

⁹⁴⁷ Sax's Dangerous Properties of Industrial Materials, 11th Edition. 2004. John Wiley & Sons, Inc., pp. 2107, 3301.

⁹⁴⁸ Internet, http://www.efunda.com/materials/alloys/alloy_home/steels.cfm.

⁹⁴⁹ Internet, <http://www.admiralsteel.com/reference/alcomp.html>.

⁹⁵⁰ Darrach, M. and Chutjian. 1997. Trace Explosives Signatures from Unexploded Undersea Ordnance. Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California. Prepared for Coastal Systems Station, Panama City, Florida.

⁹⁵¹ U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, March 2003, TRW Recommendations for Performing Human Health Risk Analysis on Small Arms Shooting Ranges, OSWER #9285.7-27.

5. Grenades
6. Rockets, rocket motors, and igniters
7. Mines and smoke pots
8. Signals and simulators
9. Blasting caps, demolition charges, and detonators
10. Fuzes and primers
11. Guided missiles

An emission factor is a representative value that attempts to relate the quantity of an air pollutant released to the atmosphere with an activity associated with the release of that pollutant. These factors are usually expressed as the weight of the air pollutant divided by a unit weight, volume, distance, or duration of the activity emitting the pollutant (e. g., kilograms of particulate emitted per megagram of coal burned). Such factors facilitate estimation of emissions from various sources of air pollution. In most cases, these factors are simply averages of available data of acceptable quality, and are generally assumed to be representative of long-term averages. The emission factors presented in AP-42, however, are only determined for criteria pollutants, hazardous air pollutants as defined by the Clean Air Act (CAA), and toxic chemicals (i.e., those chemicals regulated under Section 313 of the Emergency Planning and Community Right-to-Know Act [EPCRA]).

5.3 General Evaluation of RCWM Presence

The investigation team did not uncover evidence of the use of CWM at Fort Pickens Military Reservation. The activities at this site did not include the storage, disposal or use of CWM in training.

5.4 Property-Specific Locations

5.4.1 1800s Gun Emplacements

For the most part, guns emplaced during the 1800s were primarily limited to Fort Pickens. Their fields of fire would have been designed to protect the channel and harbor from a naval assault. References suggest that test firing of emplaced armament would have been conducted.⁹⁵² During the years 1861 through 1865 (the Civil War), a new threat emerged from an unanticipated front. Additional earthen emplacements were constructed and armament was added. Limits of fire would have been redesigned. Limits would have increased, not only by width, but distance. It is assumed, because any firing could be construed as an offensive move, it is unlikely any test firing, or practice firing of main guns/cannons took place during the Civil War. In November 1861, there was an exchange of cannon fire from both the Federals and Confederates. An estimated 5,000 shells were fired from Fort Pickens' guns.⁹⁵³

Suspected residual MEC includes projectiles and mortars ranging from 12-pounders to 15-inch shells. Live rounds, if present, would be expected in the harbor, channel, or open waters of the

⁹⁵² Bearss, Edwin C. 1983. pp. 411-413

⁹⁵³ Ibid., p. 607

Gulf of Mexico, but potentially anywhere within the MRA. Studies of UXO in underwater environments indicate that UXO can last a long time in an underwater environment (at least 50 years).⁹⁵⁴ No MEC or evidence of MEC was observed during the Property Visit. Potential underwater locations of expended projectiles were not investigated during the Property Visit.

5.4.2 1900s Gun Emplacements

Modernization of Fort Pickens Military Reservation began in the late 1800s with the construction of new gun batteries. As early as 1900, modern guns were either emplaced or soon to be. A total of twelve new batteries were eventually constructed. Guns and mortars emplaced included caliber .50, 37-mm, 40-mm, 3-inch, 90-mm, 4.7-inch, 6-inch, 155-mm, 10-inch, and 12-inch. In general, there were five types of service practice conducted with coast artillery weapons: preliminary, record, advanced, special, and battle.⁹⁵⁵ Actual locations of the gun emplacements (batteries) are depicted on **Plate No. 3** (see **Appendix R**).

As previously stated in Section 5.1, the guns at the Fort Pickens Military Reservation were fired for testing and practice. Suspected residual MEC includes small arms (.50 caliber) and projectiles and mortars ranging from 37-mm to 12-inch. Live rounds, if present, would be expected offshore in the open waters of the Gulf of Mexico, but potentially in the harbor and channel or anywhere within the MRA. Studies of UXO in underwater environments indicate that UXO can last a long time in an underwater environment (at least 50 years).⁹⁵⁶ No MEC or evidence of MEC was observed during the Property Visit. Potential underwater locations of expended projectiles were not investigated during the Property Visit.

5.4.3 Rifle Range

The former Rifle Range appears to have been a known distance range with firing lines at 200, 300, 500, and 600 yards. The range is currently recognizable, although totally abandoned. Numerous empty (spent) small arms (.30 caliber) cartridge cases were observed on the ground surface of the 200-yard and 300-yard firing lines during the Property Visit. The firing lines at 500 and 600 yards were not investigated during the Property Visit. Target frames are present, but for the most part, rotted away and/or corroded nearly beyond recognition (see Appendix M). Firing on the range was directed offshore, in a south-southeast direction. The safety fan extends offshore.

MC for small arms ammunition is discussed in Section 5.2 above. Spent bullets and elevated concentrations of lead would have been expected within the target backstop/sand dunes (leveled), directly behind static targets. Areas to the side and beyond the targets may also

⁹⁵⁴ Darrach, M. and Chutjian. 1997. Trace Explosives Signatures from Unexploded Undersea Ordnance. Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California. Prepared for Coastal Systems Station, Panama City, Florida.

⁹⁵⁵ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. Prepared by: US Army Corps of Engineers, St. Louis District. FOUO. p. 16.

⁹⁵⁶ Darrach, M. and Chutjian. 1997. Trace Explosives Signatures from Unexploded Undersea Ordnance. Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California. Prepared for Coastal Systems Station, Panama City, Florida.

include rounds/fragments, typically resulting from ricochet. The ground between the firing line and the targets, with a width equal to the width of the range lanes (approximately 75-yards), rarely receives direct fire. As such, the particulates are shallow as compared to the berm. The resulting projectile/fragments may typically be found lying on the surface or embedded in the root mass of range vegetation, likely within the top 6 inches.⁹⁵⁷

5.4.4 Magazine and Powder Storage

Ammunition, explosives, and powders were stored throughout the Fort Pickens Military Reservation in separate igloos or dedicated storage rooms within the batteries. In December 1883, three of the casemates at Fort Pickens were used as an ordnance storehouse.⁹⁵⁸ The interior of each battery was composed of a number of connected rooms and passageways. Each battery had magazines, rooms or galleries for the storage of the powder charges, and shell or shot rooms (or galleries) for the storage of projectiles.^{959, 960, 961, 962} For the locations of the various storage facilities, refer to **Plate No. 3** (see **Appendix R**).

In the years between 1893 and 1895, casemate Nos. 86 and 87 in the northeast bastion of Fort Pickens had been converted into a mining casemate. Two tons of dynamite had been shipped to Fort Pickens for arming the mines. After the restoration of peace with Spain, the mines and cables were taken up and stored.^{963, 964, 965, 966, 967}

The submarine mine defense system was lacking in several key structures. Among these were the torpedo storehouse, cable tank, and loading room. Until these could be built, emergency locations for these activities were found near the mining casemate.⁹⁶⁸

No residual MEC is suspected in any of the remaining igloos or storage rooms. Facilities remaining intact were visually inspected during the Property Visit.

MC for ammunition, explosives and powders is discussed in Section 5.2 above. The manner in which explosives and powders were maintained and distributed is unknown. It is possible MC may be present in drains, sumps and floors associated with Fort Pickens and the grounds around the existing and razed magazines.

⁹⁵⁷ Characterization and Remediation of Soils at Closed Small Arms Ranges. January 2003. Interstate Technology and Regulatory Council.

⁹⁵⁸ Bearss, Edwin C. 1983. pp. 744, 745.

⁹⁵⁹ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp. 20, 21.

⁹⁶⁰ CP-031907-021

⁹⁶¹ CP-032107-014

⁹⁶² ATL-030907-040

⁹⁶³ Bearss, Edwin C. 1982. pp. 177, 179-181.

⁹⁶⁴ CP-032207-035

⁹⁶⁵ CP-031307-208

⁹⁶⁶ CP-031307-209

⁹⁶⁷ CP-031907-026

⁹⁶⁸ Bearss, Edwin C. 1982. p. 181.

5.4.5 Possible Cannonball Cache

A possible cannon ball cache was reported to be in the marsh area west of the assistant engineer's quarters, ES71.⁹⁶⁹ The source and location were not reported. The existence of the cache has not been verified. The potential exists for discarded military munitions to be present in this location.

5.5 Munitions Response Areas (MRA)

If the target impact area was unknown, then the length of the range was based upon the maximum range of the weapons being fired. Left and right lateral limits of fire shown on coast defense maps represented the total area the gun was capable of engaging. The left and right boundaries of the impact area used in training were considerably less. It is assumed that within the maximum area of engagement, an impact area for training firing was established and that it was located totally over water and in a location to minimize interference with ship traffic. The actual maximum range is a function of the model of the weapon, the weight of the projectile, and the chamber pressure developed (amount and type of propellant) when the gun is fired. If the actual maximum range was required, the firing tables for each projectile for each weapon needed to be consulted.⁹⁷⁰

Although the guns emplaced during the 1800s likely followed similar training guidance, there are expected differences. The guns employed in Fort Pickens were emplaced to protect the entrance to, as well as, the harbor itself. Therefore it is expected that the guns were fired more in the harbor and channel, than toward the Gulf of Mexico. No historical references were obtained that provide information regarding the extent to which these guns were fired. Because the mainland was populated, it is assumed firing would have been limited to the waters of the harbor, channel, or the Gulf. A reduction of powder charge would have been necessary for guns capable of reaching the mainland.

Evident from reference documents firing of the guns emplaced during the 1900s was conducted seaward at towed or stationary targets. There is little or no referenced evidence to identify all firing areas. The U.S.S. Massachusetts, an obsolete battleship was positioned off shore to be used as a target. However, the ship was unexpectedly grounded off the southwest tip of Santa Rosa and for the most part only available for some guns. Downrange distance of the danger areas are based on the maximum range of the round.

In addition to the gun emplacements within Fort Pickens, earthen works were also constructed during the Civil War years (1861 – 1865). A number of outlying batteries were hastily erected in April 1861 and subsequent months to assist in the defense of Fort Pickens. During the month of November 1861, an exchange of cannon fire took place between the Federals at Fort Pickens and the Confederates at Fort McRee and Fort Barrancas. During the two day bombardment, approximately 6,000 shells were fired at and from Fort Pickens (Santa Rosa Island). Shells fired

⁹⁶⁹ Bearss, Edwin C. 1983. p 119

⁹⁷⁰ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. p. 30.

from Fort Pickens were directed mainland toward Forts Barrancas, Fort McRee, and Pensacola. A number of these rounds found the shoreline but many may have fallen short and landed in the harbor. It would be impossible to discern which shells in the harbor, if still present, were fired for training and which were fired in time of war.

5.5.1 Old Fort Pickens (Guns of the 1800s)

As mentioned previously, it is assumed that firing would have included the harbor, channel, and waters of the Gulf of Mexico. The MRA for the 1800s Gun Emplacements include approximately 6,431 acres. There is no available documentation to provide an accurate depiction of an MRA. As records indicate, it is assumed that all emplaced guns at Fort Pickens were fired for testing and practice. What is unknown is, at what and where they fired. Therefore, the MRA is based solely on the following assumptions: 1) targets were located off shore; 2) guns fired from their permanent emplacements; 3) firing would have been anywhere within the guns' limits of fire; 4) guns facing the mainland would have restricted the range so as not to fire beyond the harbor; and 5) guns facing open waters were allowed to fire at maximum range. Based on these assumptions, an MRA was developed and is depicted on **Plate No. 10** (see **Appendix R**). The maximum ranges of ammunition were obtained from Range Operations Report No. 23 (RO-23) Coast Artillery Range or a popular reference book on Artillery and Ammunition of the Civil War.⁹⁷¹

5.5.2 Civil War Earthen Works Batteries

During the first year of the Civil War, a number of outlying batteries were hastily erected to assist in the defense of Federal held Fort Pickens. The only record of these guns firing was on 22 and 23 November 1861. During the two day exchange the guns from these batteries along with those emplaced in the old fort, pounded the Confederate held positions on the mainland with an estimated 5000 shells. Targets included Fort McRee, the Navy Yard, the Navy Wharf, Fort Barrancas, Villages of Wosley, Village of Warrington, and Confederate gun positions along the coast.⁹⁷²

5.5.3 Battery Cullum/Sevier

The maximum range of Battery Cullum/Sevier's 10-inch guns was 14,700 yards. Firing would have been offshore into the Gulf of Mexico. The MRA includes approximately 32,933 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).⁹⁷³

5.5.4 Battery Pensacola

The battery mounted two 12-inch rifled guns (Model 1895) on disappearing carriages (Model 1897). The maximum range of the 12-inch guns was 18,400-yards. Firing would have been

⁹⁷¹ Ripley, Warren. 1984. *Artillery and Ammunition of the Civil War*. pp 367-375.

⁹⁷² Bearss, Edwin C. 1983. pp. 601-607

⁹⁷³ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO., pp. 24-30.

offshore into the Gulf of Mexico. The MRA includes approximately 40,788 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).⁹⁷⁴

5.5.5 Battery Worth

The battery housed eight 12-inch mortars (Model 1890 M1). Maximum range of the 12-inch mortar was 14,650 yards. Firing would have been offshore into the Gulf of Mexico. The MRA includes approximately 22,010 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).⁹⁷⁵

5.5.6 Battery Van Swearingen

Two 4.7-inch British Armstrong guns were mounted on pedestal carriages (Model 1897). Maximum range of the 4.7-inch gun was 28,250 yards.⁹⁷⁶ Firing would have been offshore into the Gulf of Mexico. The MRA includes approximately 85,667 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).⁹⁷⁷

5.5.7 Battery Payne

Battery Payne mounted two 3-inch rapid fire guns (Model 1902). In 1945, two caliber .50 machine guns were installed.⁹⁷⁸ Maximum range of the 3-inch gun was 11,000 yards. Maximum range for the caliber .50 machine gun was 7,500 yards.⁹⁷⁹ Firing would have been offshore, into the Gulf of Mexico. The MRA includes approximately 15,057 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).⁹⁸⁰

5.5.8 Battery Trueman

Battery Trueman mounted two 3-inch rapid-fire guns (Model 1902) on pedestal mounts. It was proposed in November 1942, to install two 37-mm guns on top of the Battery. In 1945, two caliber .50 machine guns were installed at the Battery.⁹⁸¹ Maximum range of the 3-inch gun was 11,000 yards. Maximum range for 37-mm gun was 9,050 yards. Maximum range for the caliber .50 machine gun was 7,500 yards.⁹⁸² Firing would have been offshore, into the Gulf of Mexico.

⁹⁷⁴ Ibid.

⁹⁷⁵ Ibid.

⁹⁷⁶ AR 750-10, Range Regulation for firing Ammunition for Training and Target Practice, January 1944, p 23

⁹⁷⁷ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp 24-30.

⁹⁷⁸ Bearss, Edwin C. 1982. p. 291.

⁹⁷⁹ Range Operations Report No. 13 (RO-13) Anti-Aircraft Artillery Range. January 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO, p 20.

⁹⁸⁰ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp 24-30.

⁹⁸¹ Bearss, Edwin C. 1982. p. 291.

⁹⁸² Range Operations Report No. 13 (RO-13) Anti-Aircraft Artillery Range. January 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO, p 20.

The MRA includes approximately 13,628 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).⁹⁸³

5.5.9 Battery Cooper

Battery Cooper mounted two 6-inch rapid fire guns (Model 1903). Two 37-mm guns were also positioned. Maximum range of the 6-inch gun on a disappearing carriage was 14,600 yards. Maximum range for the 37-mm gun was 9,050 yards. Firing would have been offshore into the Gulf of Mexico. The MRA includes approximately 50,603 acres; based on historical manuals and depicted on **Plate No.10** (see **Appendix R**).⁹⁸⁴

5.5.10 Battery Langdon

Battery Langdon mounted two 12-inch guns (Model 1895 M1). In 1941, four 37-mm and three caliber .50 machine guns were present.⁹⁸⁵ In 1945, four 40-mm and four caliber .50 machine guns were installed at Battery Langdon.⁹⁸⁶ Maximum range of the 12-inch gun was 18,400 yards. Maximum range for the 37-mm was 9,050-yards. Maximum range for the 40-mm was 10,800 yards. Maximum range for the caliber .50 machine gun was 7,500-yards.⁹⁸⁷ Firing would have been offshore into the Gulf of Mexico. The MRA includes approximately 42,539 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).⁹⁸⁸

5.5.11 Battery Air

Battery Air mounted four 3-inch guns (Model 1917), each mounted on a mobile trailer. These target practice positions were selected in order to reduce interference from shipping or other battery firings and to improve flank spotting conditions when the Langdon station is used.⁹⁸⁹ By March 1937, these guns had been shipped to the National Guard and replaced with three 3-inch guns, Model M-3, on spider mounts. In 1937, the battery was used by the Regular Army, Reserve Officers Training Corps (R.O.T.C.), Organized Reserve, and National Guard units.⁹⁹⁰ Maximum range of the 3-inch gun was 11,000-yards.⁹⁹¹ Firing would have been offshore into the Gulf of Mexico. The MRA includes approximately 16,169 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).⁹⁹²

⁹⁸³ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp 24-30.

⁹⁸⁴ Ibid.

⁹⁸⁵ CP-031307-022

⁹⁸⁶ Bearss, Edwin C. 1982. p. 291.

⁹⁸⁷ Range Operations Report No. 13 (RO-13) Anti-Aircraft Artillery Range. January 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO, p 20.

⁹⁸⁸ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp 24-30.

⁹⁸⁹ ATL-0030807-027

⁹⁹⁰ CP-031307-031

⁹⁹¹ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. p 30

⁹⁹² Ibid., pp 24-30.

5.5.12 Battery 234

The 6-inch guns were never mounted. In 1945, two 37-mm guns and four caliber .50 machine guns were installed at Battery 234.^{993, 994} Maximum range of the 37-mm gun was 9,050-yards. Maximum range for the caliber .50 machine gun was 7,500-yards.⁹⁹⁵ Firing would have been offshore into the Gulf of Mexico. The MRA includes approximately 16,488 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).⁹⁹⁶

5.5.13 Battery Fixed

Battery Fixed mounted two 3-inch guns (Model 1917) on anti-aircraft pedestals. In the mid-1930's, Battery Fixed was relocated to a site east of Battery Langdon. Construction of the new platforms for Battery Fixed several hundred yards east of Battery Langdon was completed in March 1940. When Battery Fixed was relocated, the battery was armed with different 3-inch guns (Model 1917 MII). In 1941 and 1945, four caliber .50 machine guns were present at the battery.^{997, 998} Maximum range of the 3-inch gun was 11,000-yards.⁹⁹⁹ Maximum range for the caliber .50 machine gun was 7,500-yards.¹⁰⁰⁰ Firing would have been offshore into the Gulf of Mexico. The MRA includes approximately 16,169 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).¹⁰⁰¹

5.5.14 AMTB Battery

The AMTB Battery was composed of two 90-mm M1 guns on fixed T-3 fixed carriages. The extreme range of the gun was 12,000 yards with a maximum effective range of 8,000 yards. In 1945, two 37-mm guns and four caliber .50 machine guns were installed at the AMTB battery.¹⁰⁰² Maximum range for the 37-mm gun was 9,050-yards. Maximum range for the caliber .50 machine gun was 7,500-yards.¹⁰⁰³ Firing would have been offshore into the Gulf of Mexico. The MRA includes approximately 73,374 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).¹⁰⁰⁴

⁹⁹³ Bearss, Edwin C. 1982. p. 291.

⁹⁹⁴ CP-031307-022

⁹⁹⁵ Range Operations Report No. 13 (RO-13) Anti-Aircraft Artillery Range. January 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO, p 20.

⁹⁹⁶ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp 24-30.

⁹⁹⁷ Bearss, Edwin C. 1982. p. 291.

⁹⁹⁸ CP-031307-022

⁹⁹⁹ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. p 30

¹⁰⁰⁰ Range Operations Report No. 13 (RO-13) Anti-Aircraft Artillery Range. January 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO, p 20.

¹⁰⁰¹ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp 24-30.

¹⁰⁰² Bearss, Edwin C. 1982. p. 291.

¹⁰⁰³ Range Operations Report No. 13 (RO-13) Anti-Aircraft Artillery Range. January 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO, p 20.

¹⁰⁰⁴ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp 24-30.

5.5.15 Battery GPF

Battery GPF was a series of four 155-mm GPFs (Model 1918).^{1005, 1006} Maximum range of the 155-mm gun was 17,400-yards. Firing would have been offshore, into the Gulf of Mexico. The MRA includes approximately 71,300 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).¹⁰⁰⁷

5.5.16 Rifle Range

The Rifle Range originally called for a 600-yard length, elevated firing points, and target pits. No backstop was required because the existing sand dunes offered protection and shooting was to be into the Gulf of Mexico.^{1008, 1009} The MRA includes approximately 1,239 acres; based on historical manuals and depicted on **Plate No. 10** (see **Appendix R**).¹⁰¹⁰

¹⁰⁰⁵ CP-031207-015

¹⁰⁰⁶ ATL-030807-052

¹⁰⁰⁷ Range Operations Report No. 23 (RO-23) Coast Artillery Range. October 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp 24-30.

¹⁰⁰⁸ CP-031407-010

¹⁰⁰⁹ CP-031407-011

¹⁰¹⁰ Range Operations Report No. 1 (RO-1), Small Arms Range. January 2006, *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp. 16-19.

6.0 EVALUATION OF HTRW PRESENCE AND AREAS

The evaluation and interpretation of HTRW findings presented in Section 4.2.2 are discussed in this section.

6.1 General Evaluation of HTRW Presence

Numerous operations and activities conducted by DoD at the Fort Pickens Military Reservation may have caused the release of hazardous substances, pollutants, or contaminants to the environment. These operations included POL-related activities such as underground fuel storage tanks. Coal was utilized for heating. Vehicle, locomotive, and ordnance maintenance and repair were also conducted on the FUDS property. Carpentry, blacksmith, and mechanics shops were present on the Reservation. Transformers were utilized in the power distribution system. Some of the wastes generated on the FUDS property were disposed of at incinerators. Lead acid storage batteries were utilized to store power. The wharves, telephone poles, and railroad crossties were constructed out of creosote-treated wood. Asphalt, coal tar, pitch, and mastic were used for waterproofing. Sheet lead and copper sheeting were used as protective surfaces. Underground cables were shielded in lead. The searchlights, steel towers, and emplacements were regularly painted with lead-based paint. Mosquito control measures were practiced at the Fort Pickens Military Reservation, likely using DDT.

The Fort Pickens Military Reservation FUDS property is surrounded by water on three sides. As noted during the Property Visit, residential development is taking place on the western boundary of the FUDS property. It is unlikely that this development outside the property boundary harbors the potential for HTRW COPC migration onto the FUDS property.

6.2 Property-Specific Locations

6.2.1 Weapons Maintenance

Bldg. 12 and Bldg. E-100 are identified as Ordnance Shops. Bldg. 7 was identified as the Ordnance Tractor Shed for the two mobile 155-mm guns. In addition to the normal first and second echelon (operator and organizational) maintenance, third and even fourth echelon maintenance would have been performed at the gun emplacement. Materials utilized may have included various petroleum-based products, mineral spirits, paints, metal finishes, and solvents.

Bldgs. 12, E-100, and 7 had concrete floors. Thus, it is not known if any of the maintenance materials utilized on these buildings were released into the environment or contained within the buildings. It is not known if drains were present in these buildings. The chemical handling and disposal practices employed at these Repair Shops are unknown. It is likely that, because they were exposed to the elements, the maintenance materials utilized at the gun emplacements themselves were eventually released to the environment via wind and rainfall runoff. Environmental sampling would be necessary to determine if residual COPCs are present in the area of the Ordnance Repair Shops and the gun emplacements.

6.2.2 Miscellaneous Shops

In the rear and to the right of Battery Pensacola was a blacksmith shop and carpenter shop. Other shops included Bldg. 5 (Carpenter Shop), Bldg. T-105 [PE Paint Shop (Carpenter Shop)], and Bldg. 51 (Mechanics Shop). Glues and other chemicals may have been utilized in the carpenter shops. If painting was done, paint pigments may have included lead chromates, oxides, sulfates, and chromates as well as zinc chromate. Some commonly used solvents and thinners during WWII included benzene, toluene, xylene, carbon tetrachloride, methanol, acetone, ethyl alcohol, and turpentine. Coal may have been used to heat the forge and scrap metal may have been generated by blacksmith shop operations.

The chemical handling and disposal practices employed at the various shops on the Fort Pickens Military Reservation are unknown. It is possible that COPCs were released into the environment from these operations or they may have been contained within the buildings. It is not known if drains were present in these buildings. Environmental sampling would be necessary to determine if residual COPCs are present in the areas of these shops.

6.2.3 Coal Storage Areas

Coal storage appears to have occurred in Bldg. 10 (Coal Shed), the casemate on the left of the sally port, and the Ordnance Boiler House (Bldg. E-103). The Central Power Plant may have been powered by coal.

Polynuclear aromatic hydrocarbons (PAHs) and acid mine drainage are associated with coal piles. Residual COPCs may be present from the storage of coal in these areas. Environmental sampling would be necessary to determine if residual COPCs are present.

6.2.4 Lead Acid Batteries

The Central Plant at the Fort Pickens Military Reservation contained storage batteries as did Batteries Cullum-Sevier, Worth, and Pensacola. While it is possible that COPCs were released into the environment from these battery storage areas, it is more likely that any releases were contained within the storage areas.

6.2.4.1 Paint

Searchlight ironwork, B'' station ironwork, instrument house interiors and exteriors were painted. The interior, exterior, and ironwork at the batteries were also painted. Paints and paint pigments potentially utilized at Fort Pickens Military Reservation may have included lead chromates, oxides, sulfates, and chromates as well as zinc chromate. Other painting materials utilized on army installations included water-resisting spar varnish; varnish-type floor sealer; shellac; asphalt varnish; shellac varnish; interior varnish; rubbing varnish; and wood filler.

Because lead does not degrade and is strongly absorbed to soil, the lead released from past uses still remains in the soil. Releases from lead-based paints are frequently confined to the area in the immediate vicinity of painted surfaces, and deterioration or removal of the paint by sanding

or sandblasting can result in high localized concentrations of lead dust in both indoor and outdoor air. Lead concentrations of 1–5 milligrams per square centimeter (mg/cm^2) have been found in chips of lead-based paint. Damaged lead-based paint is associated with excessive dust lead levels. Soils adjacent to houses with exterior lead-based paints may have lead levels of $>10,000$ micrograms per gram ($\mu\text{g}/\text{g}$).¹⁰¹¹

It is assumed that the weathering of painted surfaces released lead into the environment. Environmental sampling would be necessary to determine if residual COPCs are present in the soil in the vicinity of these structures.

6.2.4.2 Wharves

The Quartermaster Wharf (Bldg. 15), Engineer Wharf, and Langdon Wharf (Bldg. 33) were constructed of creosoted piling and creosoted pine decking. Coal tar creosote is a wood preservative and water-proofing agent for marine pilings and contains a complex mixture of PAHs, phenol, and cresols. While it is likely that creosote constituents have been released into the environment from these wharves, environmental sampling would be necessary to determine if residual COPCs are present.

6.2.5 Locomotive Maintenance

Bldg. 25 is identified as the Locomotive Repair Shop and Bldg. 17 is identified as the Railroad Round House. As noted during the Property Visit, Bldg. 25 is still present and Bldg. 17 has been razed; however, the foundation, floor, and some trackage remain (see Appendix M). No staining was visible in the area of Bldg. 17.

Various solvents and POLs were likely utilized in the Repair Shop and possibly the Round House. It is possible that COPCs were released into the environment from the operations conducted in these buildings or they may have been contained within the buildings. It is not known if drains were present in these buildings. Environmental sampling would be necessary to determine if residual COPCs are present in the areas of these buildings.

6.2.5.1 Incinerators

Although metals and PAHs may have been associated with the ash generated by the incinerators, the location of these incinerators was not identified in the historical documents obtained during the archives search.

6.2.5.2 Commercial Electric Power Distribution

Commercial power was distributed on creosoted pine poles. Coal tar creosote is a wood preservative and water-proofing agent for telephone poles and contains a complex mixture of PAHs, phenol, and cresols. Although the presence of transformers was noted in the historical

¹⁰¹¹ Draft Toxicological Profile For Lead, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, September 2005. pp. 19, 287, 290, 291, 307, 342.

documents obtained during the archives search, it is not clear if these transformers were mounted on the poles or were located within the various battery power stations. One transformer (SEW) was listed as a standard accessory in the new power station constructed to serve Batteries Cullum and Sevier. Bldg. 32 is identified as a Transformer Building.

While it is likely that creosote constituents were released into the environment from the pine poles, environmental sampling would be necessary to determine if residual COPCs are present. The location of these pine poles, however, is unlikely to be determined based on the information available from the historical documents obtained during the archives search.

Regarding the transformers, it is unknown if the transformers were mounted on the pine poles or placed in the power stations or both. It is also unknown if the PCBs in these transformers were released. As with the pine poles, however, the locations of these transformers is unlikely to be determined based on the information available from the historical documents obtained during the archives search. Assuming that each power station contained a transformer, environmental sampling would be necessary to determine if residual COPCs are present in the areas of these power stations and Bldg. 32.

6.2.5.3 Sewage Treatment

There was no Sewage Disposal Plant at the installation. Raw sewage was discharged via an outlet at the Ferry Slip. It appears that individual batteries were serviced by interior latrines and septic tanks. The location of these septic tanks is unknown. It appears unlikely that if these tanks are still present, that any sludge remaining in them would not be of concern.

6.2.6 Rifle Range

Because first-echelon maintenance was conducted on the range, there is the potential for COPCs related to weapons maintenance and operations to be present on the ranges, especially at the firing points.¹⁰¹² The magnitude of residual COPCs, however, is dependent upon the amount of time that the range was used. Archival research did not indicate the amount of time different units used the range. The more the units utilized the range, the more maintenance and lubrication would have been conducted, and the greater the possibility for COPCs to remain in the range area.

Residual COPCs may be present at the location of the former range firing points. Environmental sampling would be necessary to determine if residual COPCs are present in these areas.

¹⁰¹² Range Operations Report No. 1 (RO-1), Small Arms Range. January 2006. *Prepared by:* US Army Corps of Engineers, St. Louis District. FOUO. pp. 66-75.

6.2.7 Miscellaneous Potential Sources of COPCs

6.2.7.1 Metals

Lead

Lead sheeting was used to cover the Fort Pickens casemate arches, to line the magazines and shot room ceilings in Battery Cullum-Sevier, and to line the ceilings in Emplacement No. 1 of Battery Pensacola. It is possible lead sheeting was also used in the other concrete gun batteries. The communication system at the Fort Pickens Military Reservation consisted mostly of buried lead covered cable. The historical record indicates corrosion of the lead sheeting was a continual problem. In April 1949, an Agreement of Sale was entered into with the Army and Navy Surplus Stores, Inc. for removal of the underground cable. It is not known, however, if this cable was removed.

While it is likely the lead sheeting continued to corrode over time, it is unknown if the lead was released into the environment or remained within the structures where it was used. If the lead covered cable was not salvaged, lead was likely released into the environment along the cable routes. Environmental sampling would be necessary to determine if residual lead concentrations are present in the vicinity of the Fort Pickens casemates, Battery Cullum-Sevier, Battery Pensacola, underground cable routes, and possibly the other concrete gun batteries.

Copper

Copper was used in the magazines and construction of the wharves. Copper was also used in the traverse of Battery Trueman for waterproofing. The copper has likely been released into the environment at the wharves and Battery Trueman due to its deteriorated condition. Residual copper may remain in the magazines or have been released into the environment. Environmental sampling would be necessary to determine if residual copper is present in the areas of the wharves, Battery Trueman, and the magazines.

6.2.7.2 PAHs

Environmental sampling would be necessary to determine if residual PAHs are present in the areas of the six shot furnaces constructed in the scarp of the Southeast Bastion of Fort Pickens.

No tar was noted on Fort Pickens during the Property Visit. Several areas of exposed tar were noted at Battery Worth and Battery 234 during the Property Visit (see Appendix M). The magazines of Battery Pensacola Emplacement No. 2 were covered with asphalt. The asphalt, tar, pitch, and mastic used on the Fort Pickens Military Reservation has likely deteriorated over time and released PAHs, phenol, and cresols into the environment. Environmental sampling would be necessary to determine if residual PAHs, phenol, and cresols are present in the area of Fort Pickens, Battery Worth, Battery 234, and the magazine for Battery Pensacola.

6.2.7.3 Mosquito Control

DDT may have been used from 1926 through 1942 as part of the Reservation's mosquito control operations. DDT in solution (fuel oil; Diesel oil No. 2; kerosene; a mixture of 20 parts kerosene and one part black oil; and kerosene diluted in half with waste oil) may have been used on water surfaces. Pyrethrum, thiocyanate, and DDT sprays may have been used on screen doors, windows, light cords, ceilings, corners, closets, and the undersurfaces of chairs, tables, beds, and latrines. Environmental sampling would be necessary to determine if residual DDT and POL COPCs are present on the Fort Pickens Military Reservation.

7.0 EVALUATION OF CON/HTRW AND BD/DR PRESENCE

CON/HTRW containing POL and BD/DR are non-CERLCA projects. Therefore, information relative to these potential hazards is addressed separately from HTRW and MMRP.

7.1 Evaluation of CON/HTRW Presence and Areas

POL Tank

The two 25 kW General Electric gasoline generators in the power room at Battery Langdon were served by two fuel storage tank positioned in a pit. Battery 234 was powered by three 125 KVA diesel generators apparently supplied by two fuel pits. The two 25-kW gasoline powered generators at Battery Cullum were supplied with fuel from two USTs. In the 1920's, a new exterior power station was built to service Battery Pensacola. Two gasoline USTs were located near the station's west elevation. The electric plant for Battery Cooper contained one 25 kW engine and one 25 kW generator, both supplied by a gasoline UST. Two Fire Stations appear to have been present on the FUDS Property: Bldg. E-120 (Fire Station) and Bldg. T-126 (Fire Station). These fire stations may have had their own USTs for fuel storage.

It is not known if any of these tanks have been removed. It is possible that, if they are still present, they have leaked any fuel left in them. An electromagnetic survey may be necessary to determine if the USTs are still present. Environmental sampling would be necessary to determine if residual COPCs are present in the vicinity of these USTs.

POL Non-Tank

In order to construct Batteries Cullum and Sevier, a "plant" was constructed on the Fort Pickens Military Reservation. The "plant" used cylinder oil, black oil, lard oil, kerosene, gasoline, wood, and coal. The location of this plant was not identified in the historical documents collected during the archives search.

POL commodities potentially used on the Fort Pickens Military Reservation include coal oil, marine engine oil, engine oil, kerosene, and gas tar. Bldgs. 28, 39, 50, and 51 are identified as Oil Houses. The POL commodities may have been stored in these Oil Houses.

It is assumed that POL constituents may have been released in the emplacement interior power plants and searchlight power plants by the pumps, generators, and/or boilers. It is unknown if these constituents were released into the environment or contained within the power house structures. Environmental sampling would be necessary to determine if residual COPCs are present in the vicinity of these power plants.

7.2 Evaluation of BD/DR

Many remaining concrete foundations, buildings, and other structures (e.g., the concrete batteries) were observed in varying degrees of deterioration during the Property Visit. Some of these structures appear to be inherently hazardous. It is unknown if the observed conditions are

hazardous as a result of prior DoD use and were inherently hazardous when the property was transferred or disposed of . Some structures do not appear to have been beneficially used or altered subsequent to DoD ownership. These structures, however, are not on lands continuously owned by state or local governments subsequent to DoD ownership. Additionally, Mr. Ogden stated that the NPS considers these structures to be of historical value. It is their intention to allow these structures to remain in place and undisturbed. It appears, therefore, that there are no BD/DR projects on the FUDS property in accordance with ER 200-3-1.

8.0 PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENT

In the previous sections waste characteristics and the likelihood for releases at the Fort Pickens Military Reservation features of interest were presented. In this section, the physical characteristics of the FUDS property and surrounding areas, potential waste characteristics and proximity/characteristics of potential targets (e.g., people and resources that might be threatened by a release from the FUDS property) are combined to draw conclusions regarding potential exposures, or lack thereof. Chemicals or items that are not CERCLA hazardous substances or listed in Section 3-2.4.1 of ER 200-3-1, such as POLs, or hazards related to BD/DR are not evaluated in this section.

8.1 Ground Water Pathway

8.1.1 Hydrogeologic Setting

Three aquifer systems are present in Escambia County and assumed to be present on Santa Rosa Island: the Sand and Gravel Aquifer, the Intermediate Aquifer System, and the Floridan Aquifer System (FAS). The Sand and Gravel Aquifer exists under unconfined conditions and is recharged locally by infiltrating rainfall. Due to highly permeable soils and the lack of effective confinement, the entire occurrence for the Aquifer is a recharge area. In coastal areas, the aquifer discharges into the bays or the Gulf of Mexico. Due to its proximity to the land surface and lithologic characteristics, the Sand and Gravel Aquifer is highly vulnerable to contamination.

In Escambia County, the Sand and Gravel Aquifer has been informally subdivided into three zones. The uppermost zone is composed of primarily fine sands and is referred to as the surficial zone and discharges to the bays and bayous. Underlying the surficial zone is the low-permeability zone that restricts the vertical flow of ground water between the overlying surficial zone and the underlying main-producing zone. The main-producing zone is the lowermost zone and is characterized by highly permeable coarse sand and gravel beds interspersed in places with fine sand and clayey sand beds. The majority of water withdrawn from the Sand and Gravel Aquifer in Escambia County is derived from the main producing zone. The ground water within this zone exists under semi-confined conditions. The thickness of the main-producing zone ranges between 90 ft and 290 ft in southern Escambia County.

The Intermediate System is a highly efficient confining unit limiting the exchange of waters between the Sand and Gravel Aquifer and the FAS. Its thickness varies from 100 feet to over 1,000 feet. The FAS throughout the coastal portions of the panhandle is susceptible to saltwater intrusion. This results from the fact that the FAS is, to varying degrees, hydraulically connected to the Gulf of Mexico. Furthermore, the Gulf is the ultimate discharge point for groundwaters moving through the FAS.

8.1.2 Ground Water Targets

One deep and three shallow wells had been constructed on the Fort Pickens Military Reservation by March 1909. The deep well was 331 feet below ground surface (ft bgs) and each of the shallow wells was 30 ft bgs. The location of these wells was not identified in the available

historical documents. A new 10-inch diameter well was constructed during the first part of FY1940. The depth and location of this well were not identified in the available historical documents.

By 1948, water was supplied to the Fort Pickens Military Reservation by a 587-foot deep, 10-inch cased well. It appears that a 351-foot well was installed in December 1972. No information was available on the location of the well. The Fort Pickens Unit (ranger facilities and campgrounds) is currently served by one main and one auxiliary 8-inch diameter well. Each well is 300 feet deep. The files for these wells, however, do not indicate the date the wells were installed or the formation they tapped. It is assumed that each of wells installed on the Reservation were completed in the lowermost zone of the Sand and Gravel Aquifer.

The Sand and Gravel Aquifer discharges into the bays or the Gulf of Mexico. Therefore, groundwater targets also include the flora and fauna of these surface water bodies. Endangered species inhabiting these waters include the Florida manatee (*Trichechus manatus latirostrus*), four species of sea turtles (Atlantic loggerhead, green, Kemp's Ridley, and leatherback), and the Gulf sturgeon (*Acipenser oxyrinchus*). The USFWS and NMFS recently designated the area north of Santa Rosa Island as critical habitat essential to the conservation of the Gulf sturgeon. The National Marine Fisheries Service designated the saltmarsh topminnow (*Fundulus jenkinsi*) as a candidate species for protection under the Endangered Species Act in 1997. The state of Florida lists the saltmarsh topminnow as a species of special concern. The piping plover (*Charadrius melodus*) is a federally threatened species as well as a state-listed threatened species in Florida. The black skimmer (*Rhynchops niger*), reddish egret (*Egretta rufescens*), snowy egret (*Egretta thula*), and brown pelican (*Pelecanus occidentalis*) are state species of special concern.

8.1.3 Ground Water Conclusions

There are no known incidents of releases of MC or COPCs to groundwater on the Fort Pickens Military Reservation. The Sand and Gravel Aquifer is prone to contamination from overlying activities on the land surface and discharges into the bays or the Gulf of Mexico. It is possible MC may be present in drains, sumps and floors associated with Fort Pickens and the grounds around the existing and razed magazines. A possible cannon ball cache may be present on the former Reservation. If so, their deterioration would release MC into the environment. There are several activities conducted on the Fort Pickens Military Reservation that may have released COPCs into the Sand and Gravel Aquifer, especially coal storage areas, locomotive maintenance areas, potentially leaking USTs, deteriorating gun emplacements, and weapons and ammunition maintenance. While these activities may have released MC and/or COPCs to the Sand and Gravel Aquifer, such releases have not been confirmed and the magnitude of any potential releases is unknown.

Due to the shallow nature of the uppermost zone of the Sand and Gravel Aquifer, the shallow groundwater is expected to be an oxidizing environment. Underlying the surficial zone is the low-permeability zone that restricts the vertical flow of ground water between the overlying surficial zone and the underlying main-producing zone. The low-permeability zone provides

protection to the lowermost zone. It is assumed the two wells currently on the FUDS property are tapped into this lowermost zone.

Any MC or COPCs present in the shallow groundwater are not expected to be present at detectable levels at the point of groundwater discharge to surface water due to the dynamic nature of the surface water (tides, wind-driven currents, etc.).

8.2 Surface Water Pathway

Surface waters include streams and rivers, lakes, coastal tidal waters, and oceans. Ditches qualify as surface water if they perennially flow into other surface water, or if they occur in arid or semi-arid areas (less than 20 inches of mean annual precipitation).

8.2.1 Hydrologic Setting

The two major water bodies to which surface water ultimately drains are Pensacola Bay/Santa Rosa Sound/Choctawhatchee Bay to the north and the Gulf of Mexico to the south. Ponds and marshes are scattered throughout Santa Rosa Island, predominantly on the north (Bay) side of the island. Much of the island is subject to inundation from storm tides. The Fort Pickens State Park Aquatic Preserve and Gulf Islands National Seashore have both been designated an Outstanding Florida Water.

8.2.2 Surface Water Targets

Surface water targets include persons who use the Fort Pickens Unit for recreational fishing and beach recreation. Bay beach access is provided at Little Langdon. The fishing pier and jetty are popular destinations for fishers and SCUBA divers. The pier is officially licensed for fishing so individual fishing permits are not required. Although sections of the park, such as the campground, are closed because of hurricane damage, the NPS proposes to restore full access to the Fort Pickens Unit of Gulf Islands National Seashore and repair associated visitor use facilities and infrastructure.

Surface water targets also include the flora and fauna of the surrounding surface water bodies. The Fort Pickens State Park Aquatic Preserve surrounds the western end of Santa Rosa Island. Endangered species inhabiting these waters include the Florida manatee (*Trichechus manatus latirostrus*), four species of sea turtles (Atlantic loggerhead, green, Kemp's Ridley, and leatherback), and the Gulf sturgeon (*Acipenser oxyrinchus*). The USFWS and NMFS recently designated the area north of Santa Rosa Island as critical habitat essential to the conservation of the Gulf sturgeon. The National Marine Fisheries Service designated the saltmarsh topminnow (*Fundulus jenkinsi*) as a candidate species for protection under the Endangered Species Act in 1997. The state of Florida lists the saltmarsh topminnow as a species of special concern. The piping plover (*Charadrius melodus*) is a federally threatened species as well as a state-listed threatened species in Florida. The black skimmer (*Rhynchops niger*), reddish egret (*Egretta rufescens*), snowy egret (*Egretta thula*), and brown pelican (*Pelecanus occidentalis*) are state species of special concern.

8.2.3 Surface Water Conclusions

The deteriorating gun emplacements and other structures, spent .30 caliber cartridge cases on the rifle range, remains of the rifle range target frames, and any residual expended projectiles present in the sand dunes at the rifle range may still be releasing COPCs and MC to surface water. The magnitude of any potential releases is unknown. Detectable levels of these constituents are not expected in the surrounding saline surface waters, however, due to the dynamic nature of the surface water (tides, wind-driven currents, etc.). Due to the scattered nature of potential constituent sources and surface water bodies on the island, detectable levels are not expected in these surface water bodies.

Coastal artillery projectiles may still be present in the surrounding surface waters and continuing to degrade. The MC of concern with these casings are mainly metals such as copper, manganese, phosphorus, silicon, sulfur, nickel, chromium, cobalt, aluminum, and titanium. Studies of UXO in underwater environments indicate that UXO can last a long time in an underwater environment (at least 50 years).¹⁰¹³ Thus, the projectiles may still be present and releasing MC. Detectable levels of these MC are not expected in the surface water, however, due to the dynamic nature of the surface water (tides, wind-driven currents, etc.). The degree to which any released MC from the projectiles are bioconcentrating in the aquatic environment, if at all, is unknown. The fact that both commercial and recreational fishing occurs within Fort Pickens State Park Aquatic Preserve and Gulf Islands National Seashore and that both have been designated an Outstanding Florida Water is cause for concern.

8.3 Soil Exposure and Air Pathways

8.3.1 Physical Conditions

The soils of Santa Rosa Island are 99% quartz sand and 1% sediment of heavy minerals such as illmenite and rutile. The Island has undergone extensive morphological changes since 1979 due to hurricanes. As noted during the Property Visit, exposed soil areas are susceptible to wind and water erosion. The backshore is subjected to wind action that blows the dry sand landward, creating dunes. Wetlands provide excellent stabilization and protection from erosion for the landward shoreline.

8.3.2 Soil and Air Targets

8.3.2.1 Soil and Air Targets

An average of 717,000 visitors use and enjoy the resources of the Fort Pickens Unit each year. The Fort Pickens Unit contains about 5.5 miles of trails and about 8 miles of scenic drives. Pedestrian access to Gulf and Sound beaches is provided at 11 locations along the Fort Pickens

¹⁰¹³ Darrach, M. and Chutjian. 1997. Trace Explosives Signatures from Unexploded Undersea Ordnance. Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California. Prepared for Coastal Systems Station, Panama City, Florida.

road system. The Fort Pickens Unit offers access to bicycling, hiking, and 200 developed camping locations providing 131,600 camper nights of recreation.

The Santa Rosa beach mouse (*Peromyscus polionotus leucocephalus*) is a state-listed species of concern in Florida and is found only on Santa Rosa Island. An increase in impacts to the beach mouse that significantly threatens the population stability could result in the need for Federal protection. The American alligator (*Alligator mississippiensis*) is now considered fully recovered and is listed as threatened. The state of Florida lists the alligator as a species of special concern. The American alligator is present in wetlands in the Fort Pickens Unit. The gopher tortoise (*Gopherus polyphemus*) is a species of special concern in the state. Gopher tortoises are rare in the Fort Pickens Unit. The peregrine falcon (*Falco peregrinus*) was delisted in 1999 from a federally threatened species and is currently monitored to ensure continued recovery. Cruise's golden aster (*Chrysopsis cruiseana*) is a state-listed endangered species in Florida. Large-leaved jointweed (*Polygonella macrophylla*) is a state-listed threatened species in Florida. Coastal plain honeycomb head (*Balduinia angustifolia*) supports a solitary bee species (*Hesperapis oraria*) that is limited to the northern coastal margins of the Gulf of Mexico and is the only species of *Hesperapis* known to occur east of the Mississippi River. The plant represents a major component of the Gulf Islands National Seashore island community.

8.3.2.2 Sediment Targets

Coastal artillery projectiles may still be present in the surrounding surface waters and continuing to degrade. While detectable levels of MC are not expected in the surface water, detectable levels may be present in the sediment proximal to the projectiles. The Fort Pickens State Park Aquatic Preserve surrounds the western end of Santa Rosa Island.

Green turtles (*Chelonia mydas mydas*) may be attracted to feed in the seagrass beds north of Santa Rosa Island. Seagrasses form the basis of the food web in clear water systems and provide important nursery habitat for many species. Larval and juvenile forms of fishes and invertebrates find protection in seagrass beds and many species of fish, mammals, turtles, and birds use these areas as feeding habitat. Further, the seagrass beds occurring within Gulf Islands National Seashore and surrounding waters are vital nursery areas for Gulf of Mexico fisheries. Several species of shellfish that are of commercial, recreational, and ecological importance occur in Gulf Islands National Seashore waters, including blue crabs (*Callinectes sapidus*), stone crabs (*Menippe mercenaria*), and many species of shrimp. Water bottoms around the seashore in the Florida and Mississippi districts are important nursery areas for most species of shellfish. Blue crabs are caught recreationally.

8.3.3 Soil Exposure and Air Pathway Conclusions

Direct contact and/or ingestion of surface COPCs and MC by humans and animals is possible due to the presence of deteriorating gun emplacements and other structures, spent .30 caliber cartridge cases on the rifle range, remains of the rifle range target frames, spent projectiles in rifle range sand dunes, and the grounds around the existing and razed magazines. With the exception of Battery Cullum/Sevier, access to potential constituent sources is not prohibited. The potential for migration of constituents on soil particles via wind and surface water is

possible due to the dynamic nature of the barrier island system. This migration may also result in direct contact and/or ingestion of constituents by humans and animals. The fact that the Fort Pickens Military Reservation is a national park with virtually unrestricted access is a cause for concern.

While detectable levels of MC from residual coastal artillery projectiles are not expected in the offshore surface waters, detectable levels may be present in the sediment. The amount of munitions and/or munitions debris remaining in offshore sediments, if any, is unknown. The fact that these waters are part of the Fort Pickens State Park Aquatic Preserve and the seagrass beds occurring within Gulf Islands National Seashore and surrounding waters are vital nursery areas for Gulf of Mexico fisheries is cause for concern.

9.0 SUMMARY AND CONCLUSIONS

9.1 Areas That May Warrant No Further Action by DoD

Because of the potential for UXO, MEC, MC, and POL and/or HTRW COPCs to be present on the Fort Pickens Military Reservation FUDS property, a determination of no further action cannot be made.

9.2 Potential Hazards That May Warrant FUDS Projects

9.2.1 HTRW

While coal storage areas and vehicle, gun emplacement, locomotive, and ordnance maintenance activities conducted on the former Fort Pickens Military Reservation may have released COPCs to soil and/or the Sand and Gravel Aquifer, such releases have not been confirmed and the magnitude of any potential releases is unknown. Although the release of HTRW COPCs to soil and/or shallow groundwater by former Fort Pickens Military Reservation operations is possible, the high permeability and apparently low organic content of the property soils and the dynamic nature of the barrier island minimizes the potential for detectable concentrations of these COPCs to remain in soil. The fact that the Fort Pickens Military Reservation is a national park with virtually unrestricted access, however, is a cause for concern.

The Sand and Gravel Aquifer is prone to contamination from overlying activities on the land surface. It is assumed the two wells currently on the FUDS property are tapped into the lowermost zone of the Sand and Gravel Aquifer and are protected by a low-permeability zone. It is unknown if any of the wells previously installed on the Reservation were properly abandoned. If not, they could act as a conduit between the uppermost and lowermost zones of the Sand and Gravel Aquifer, allowing migration of any constituents released into the uppermost zone to migrate into the lowermost zone and potentially into the water supply system for the park. No visible evidence of these earlier wells was noted during the Property Visit. Environmental sampling would be necessary to determine if residual COPCs are present in FUDS property soils and/or the Sand and Gravel Aquifer.

9.2.2 MMRP

Direct contact and/or ingestion of surface MC by humans and animals is possible due to the presence of deteriorating gun emplacements, spent .30 caliber cartridge cases on the rifle range, remains of the rifle range target frames, spent projectiles in rifle range sand dunes, and the grounds around the existing and razed magazines. With the exception of Battery Cullum/Sevier, access to potential constituent sources by park visitors is not prohibited.

A possible cannon ball cache was reported to be in the marsh area west of the assistant engineer's quarters, ES71. The precise location was not reported. The existence of the cache has not been verified. The potential exists for discarded military munitions to be present in this location. If so, their deterioration would release MC into the environment.

Coastal artillery projectiles may still be present in the surrounding surface waters and continuing to degrade. Detectable levels of are not expected in the surface water, however, due to the dynamic nature of the surface water (tides, wind-driven currents, etc.). The degree to which any MC released from the projectiles are retained in sediment and/or bioconcentrating in the aquatic environment, if at all, is unknown. The fact that both commercial and recreational fishing occurs within Fort Pickens State Park Aquatic Preserve and Gulf Islands National Seashore and that both have been designated an Outstanding Florida Water is cause for concern.

9.2.3 PRP/HTRW Considerations

9.2.4 PRP/MMRP Considerations

There is no evidence to indicate that anyone other than DoD utilized the FUDS property for MMRP purposes.

9.2.5 CON/HTRW

Generators for Battery Langdon, Battery 234, Battery Cullum, Battery Pensacola, and Battery Cooper were served by fuel USTs. The two Fire Stations may have had their own USTs for fuel storage. While USTs on the former Fort Pickens Military Reservation property may have released COPCs to soil and/or the Sand and Gravel Aquifer, such releases have not been confirmed and the magnitude of any potential releases is unknown. The high permeability and apparently low organic content of the property soils minimizes the potential for detectable concentrations of these COPCs to remain in soil. It is unknown if any USTs associated with Reservation activities remain. Environmental sampling would be necessary to determine if the USTs remain and whether residual COPCs are present in FUDS property soils and/or the Sand and Gravel Aquifer.

9.2.6 BD/DR

Many remaining concrete foundations, buildings, and other structures (e.g., the concrete batteries) were observed in varying degrees of deterioration during the Property Visit. Some of these structures appear to be inherently hazardous. It is unknown if the observed conditions are hazardous as a result of prior DoD use and were inherently hazardous when the property was transferred or disposed of . Some structures do not appear to have been beneficially used or altered subsequent to DoD ownership. These structures, however, are not on lands continuously owned by state or local governments subsequent to DoD ownership. Additionally, Mr. Ogden stated that the NPS considers these structures to be of historical value. It is their intention to allow these structures to remain in place and undisturbed. It appears, therefore, that there are no BD/DR projects on the FUDS property in accordance with ER 200-3-1.