



**US Army Corps  
of Engineers®**  
Rock Island District

**FINAL**

DEFENSE ENVIRONMENTAL  
RESTORATION PROGRAM

FOR

FORMERLY USED DEFENSE SITES  
ORDNANCE AND EXPLOSIVES  
ARCHIVES SEARCH REPORT

FOR

**INDIAN ROCKS  
AIR-TO-GROUND GUNNERY RANGE  
BELLEAIR BEACH, FLORIDA  
PROJECT NUMBER I04FL033701**

14 JUNE 1994



**DEPARTMENT OF THE ARMY**  
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS  
CLOCK TOWER BUILDING - P.O. BOX 2004  
ROCK ISLAND, ILLINOIS 61204-2004

REPLY TO  
ATTENTION OF

<http://www.mvr.usace.army.mil>

CEMVR-EC-DO

15 September 2009

MEMORANDUM FOR RECORD

SUBJECT: Missing Technical Advisory Group (TAG) Package for Indian Rocks Air-To-Ground Gunnery Range, Project Number I04FL033701

1. Project records present at the U.S. Army Corps of Engineers, Rock Island and Jacksonville Districts and Huntsville Center, were reviewed to locate the TAG package for the subject project ASR. However, the TAG package was not located.
2. The subject project Archives Search Report has been finalized without the TAG package based on a memorandum from Rock Island District dated 14 June 1994 transmitting final copies of the report. The original risk assessment (RAC) form in the report has been used as the final RAC, and the date of the final report, 14 June 1994, is the date of the Rock Island District memorandum transmitting the initial final report.
3. If the TAG package is located after the subject report has been finalized, the report will be revised to reflect the content of the TAG package.

A handwritten signature in black ink, appearing to read "Christopher J. Churney".

Christopher J. Churney  
Chief, Ordnance and Explosives Section  
Rock Island District  
U.S. Army Corps of Engineers



REPLY TO  
ATTENTION OF:

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CENCR-ED-DN

14 June 1994

MEMORANDUM FOR Commander, U.S. Army Engineer Division,  
Huntsville, ATTN: CEHND-PM-OT (Britton)  
P.O. Box 1600, Huntsville, AL 35807-4301

SUBJECT: OEW Archives Search Report for the Former Indian Rocks  
Air-To-Ground Gunnery Range, Belleair Shores, Florida, Project  
Number IO4FL033701

1. This memorandum transmits 15 copies of the Final subject report.
2. Minor editing/changes have been made to the Draft Report prior to its finalization.
3. The POC for this office is Mr. Dan E. DeWease, CENCR-ED-DN, telephone (309) 794-5808.

FOR THE COMMANDER:

ORIGINAL SIGNED BY  
GARY LOSS

Encl (15 cys)

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Chief, Engineering Division

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## **DISCLAIMER**

The purpose of this archives search report is to present the findings of research undertaken for this specific Formerly Used Defense Site (FUDS) property. All of the factual information found during the research is included in this "Findings" volume. Reference may be made in this volume to a separate "Conclusions and Recommendations" volume. In some instances, the Conclusions and Recommendations volume contained recommendations of individuals performing the analysis that may contain inferences or conjecture not supported in subsequent reviews. Because these statements are not always factual in nature, the US Army Corps of Engineers has determined the Conclusions and Recommendations volumes, where they exist, do not necessarily represent the opinion of the USACE and are not available for public release. The Risk Assessment Code (RAC) form that was contained in the Conclusions and Recommendations volume has been inserted in a separate Appendix of this finalized report.

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For  
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BELLEAIR BEACH, FLORIDA  
PROJECT NUMBER I04FL033701

14 JUNE 1994

Prepared For  
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ORDNANCE AND EXPLOSIVE  
 ARCHIVES SEARCH REPORT  
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 BELLEAIR BEACH, FLORIDA  
 PROJECT NUMBER I04FL033701

**ACKNOWLEDGEMENT**

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ORDNANCE AND EXPLOSIVES  
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1. INTRODUCTION

**a. Subject and Purpose**

(1) This report presents the findings of an historical records search and site inspection for the presence of ordnance and explosive waste (OEW) at the Former Indian Rocks Air-to-Ground Gunnery Range, located on the present day site of Belleair Beach and Belleair Shores in Pinellas County, Florida. The investigation was performed under the authority of the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP FUDS).

(2) The purpose of this investigation was to characterize the site for confirmed and/or potential OEW contamination, to include chemical warfare materiel (CWM) and conventional munitions.

**b. Scope**

(1) The investigation initially focused on the 180.30 acres of land that was leased by the War Department during World War II as an air-to-ground gunnery range for aircraft and an anti-aircraft gunnery range for air defense personnel. Information discovered during the course of the investigation resulted in the expansion of the scope to include adjacent areas of potential use/contamination.

(2) This report presents the site history, site description, real estate ownership information, and confirmed ordnance presence (prior to and after site closure), based upon available records, interviews, and the site inspection. It further provides a complete evaluation of all information to assess actual and potential present day ordnance contamination.

## 2. PREVIOUS INVESTIGATIONS

### a. 1992 Preliminary Assessment

(1) In 1992 a preliminary assessment of the Former Indian Rocks Air-to-Ground Gunnery Range was conducted under DERP FUDS by the U.S. Army Corps of Engineers, Jacksonville District (CESAJ). At that time, the Findings and Determination of Eligibility (FDE), dated September 9, 1992, concluded that 180.30 acres of land at Belleair Beach and Belleair Shores, Florida (Pinellas County), had been formerly leased and used by the War Department (DOD) as the Indian Rocks Air-to-Ground Gunnery Range (see document E-1).

(2) The investigation concluded that there was an eligible category under DERP FUDS, see document E-2 and TABLE 2-1. Due to the fact that the land had been used by the U.S. Army as a gunnery range, an OEW project was recommended - DERP FUDS OEW Project Number I04FL033701, the principle subject of this report.

### b. Other Investigations

No other relevant investigations were discovered during this archives search report (ASR) records search.

TABLE 2-1 DERP-FUDS PRELIMINARY ASSESSMENT PROJECTS				
Project Number	DERP Category	Present Phase	Comments	Location
I04FL033701	OEW	SI	Ordnance or explosive contamination	Entire 180.30 acres (see Plate 1)
-	HTRW	-	None	-
-	BD/DR	-	None	-

## 3. SITE DESCRIPTION

### a. Existing Land Usage

(1) The former Indian Rocks Air-to-Ground Gunnery Range consisted of two parcels of land on Sand Key, a barrier island located off the western coast of Florida in the vicinity of Tampa Bay. The larger parcel comprised 177.8 acres in what is now Belleair Beach, two miles southeast of Clearwater and three miles north of the city of Indian Rocks Beach. The smaller parcel comprised 2.5 acres in what is now Belleair Shores, approximately one half mile south of the larger site (see document L-2 and Plate 1).

(2) The northern border of the larger site is the current northern city limit of Belleair Beach and the southern city limit of Clearwater. The southern border of the larger site is approximately midway between 19th and 20th streets in Belleair Beach. The eastern border is defined by the Intracoastal Waterway and the western border by the Gulf of Mexico. In total, this site comprised the whole of Section 30 Township 29 South, between Sections 19 and 31, and was approximately 4400 feet long from north to south, and 1000 feet to 1200 feet wide from east to west. The land area is currently privately owned and is utilized for hotels, multifamily condominiums, and single family residences (see photos J-8, J-13, K-4, and K-5).

(3) The eastern border of the smaller site is Gulf Boulevard and the western border is the Gulf of Mexico. The northern border of the smaller site begins at a small city park on the western side of Gulf Boulevard across from 6th street in Belleair Shores. The southern border of the smaller site is across from 4th street. This site was approximately 500 feet long from north to south, and 250 feet wide from east to west. The addresses of the five privately owned, single family residences that comprise this site are 420, 440, 500, 520 and 540 Gulf Boulevard (see photos J-17, J-18, J-19, and K-6).

(4) For the purposes of this report, the larger, 177.8 acre site, the Indian Rocks Air-to-Ground Gunnery Range, will be hereafter referred to as "Area A", and the smaller, 2.5 acre site, the Indian Rocks Anti-Aircraft Gunnery Range, will be referred to as "Area B" (see Plate 6).

(5) TABLE 3-1 represents the current land usage of Areas A and B depicted on Plates 1, 3 and 4.

TABLE 3-1 LAND USAGE				
FORMER USAGE	PRESENT OWNER	PRESENT USAGE	SIZE/ ACRES	COMMENTS
Area A: Gunnery Impact Range	Private (150+ owners)	Residential, Condominiums, Hotels	177.8	See Plate 3
Area B: Anti- Aircraft Gunnery Range	Private (5 owners)	Single Family Residences	2.5	See Plate 4
			180.30	TOTAL

(6) The Gulf beaches bordering this site are very narrow or nonexistent and, consequently, are not very popular for recreational activities such as swimming or sunbathing. The Intracoastal Waterway shoreline has no beach and consists of private property to the waterline with numerous private boat docks.

(7) There is only a small local fishing industry in the area immediately off the Gulf Coast of Sand Key; the principal catch is mullet (see document I-14).

(8) The gunnery impact range consists of flat, open, sandy beach subdivided into numerous small lots upon which are built hotels, condominiums, and single family residences, rather uniformly distributed (see documents K-4, K-5 and Plate 3). Several small city parks are also located within this area. There is one major north-south traffic artery, Gulf Boulevard, and numerous, short, east-west streets. While some individual properties may have fences or walls, access to virtually any or all of the former site is uncontrolled, except for normal ownership and trespassing considerations. The beach itself can be reached by the public via a number of city parks that allow access.

(9) The anti-aircraft gunnery range consists of flat, open, sandy beach subdivided into five single family residential properties, two of which consist of double lots (see document K-6 and Plate 4). There are no streets on this site. While some individual properties may have fences or walls, access to virtually any or all of the former site is uncontrolled, except for normal ownership and trespassing considerations. The beach itself can be reached by the public via a number of city parks that allow access.

#### **b. Climatic Data**

(1) The area has long humid summers and mild winters. Annual rainfall is about 55 inches, of which 60 percent falls from June through September; the rest is more or less evenly distributed throughout the remainder of the year. Temperatures are moderated by the waters of the Gulf of Mexico and Tampa Bay. (For a monthly breakdown of temperature and precipitation, see document E-6.)

(2) Air temperatures range from mean monthly values of 60°F in January to 82°F in August. Summer temperatures vary little from day to day, and seldom reach 95°F. Periodic invasions of cold, dry air from the north cause considerable daily variation in temperature in winter. A temperature of 32°F occurs on an average of 5 to 10 days every year. Temperatures drop to 28°F or lower about three times every year.

(3) Water temperatures are mild. Water on the open shelf to the northwest of the area ranges from 65°F in winter to 100°F in the summer. Fluctuations of a few degrees may occur in a short period of time in coastal waters as storm systems pass over the area.

(4) In summer, rain falls mainly in afternoon and evening thundershowers. Sometimes as much as 2 or 3 inches fall within 2 hours. Thunderstorms may be very intense along the Florida coast with an average occurrence of 91 days per year. Rainfall in autumn, winter, and spring usually is not as intense as in summer. Day-long rains are rare in summer. When they occur, they are almost associated with a tropical storm. A 24-hour rainfall in excess of 8 inches can be expected one year in ten on the average. Extended periods of dry weather occur in any season, but are most common in spring and fall. Hail falls occasionally in thundershowers, but the hailstones usually are small and seldom cause much damage. It rarely snows in the area.

(5) Prevailing winds are from the south in March and from the north and east the rest of the year. Windspeeds are usually 10 to 15 miles per hour in the afternoon and 5 to 10 miles per hour at night.

(6) Tropical storms affect the area from early in June through mid-November. The probability that wind speeds of hurricane force, 74 miles per hour or more, will occur in the area in any given year is about 1 in 20. Heavy rainfall during tropical storms may cause considerable flood damage.

(7) The combination of a broad, gently sloping continental shelf and the limitations on fetch result in a low wave energy level reaching the Pinellas County barrier coast. Even offshore values show that during October-April 65% of wave heights are less than 1 meter and during May-August nearly 90% of the waves are in this range. Estimated mean wave height for the Pinellas County coast is 20-25 cm. A 1976 field study gave wave heights of 6-30 cm with periods of 2-4 seconds during most of the year with frontal systems generating waves averaging 50-60 cm with periods of 5 seconds.

(8) The Pinellas County coast is subjected to a mixed tidal system with semi-diurnal cycles of unequal heights during most of the lunar month. Mean neap range is 60 cm and mean spring range is 90 cm on the open Gulf coast (REF B-5, B-6 and B-7).

### **c. Topography**

The area is characterized by flat, featureless terrain, barely above sea level.

### **d. Geology and Soils**

(1) Regional Geology/Soils

(a) The two major geologic formations in Pinellas County are the Hawthorn Formation of the lower Miocene and Caloosahatchee Marl of the lower Pliocene. The border between these formations extends across the peninsula north of the Cross Bayou Canal through Safety Harbor and Oldsmar. Soils north of this line are underlain by the Hawthorn Formation.

1 Caloosahatchee Marl is of marine origin. It consists of sand, sandy clay, and marl and is from 2 to 85 percent shell. The maximum thickness of this formation is about 50 feet.

2 Hawthorn Formation consists of interbedded sand, clay, marl, limestone, lenses of fuller's earth, and land- pebble phosphate.

(b) During the Pleistocene these formations were covered with marine deposits that formed the following four terraces: Pamlico, Talbot, Penholoway, and Wicomico. These terraces were covered by a mantle of sand that ranges from 2 to 35 feet in thickness.

(c) With few exceptions, individual soils are not confined to a particular geologic formation or marine terrace. For example, Pinellas soils that formed in fresh-water alkaline deposits on upland terraces are very similar to Pinellas soils that formed in alkaline sediments of Caloosahatchee Marl. Though variations in characteristics of the parent material are apparent in the field, they do not affect soil classification (REF B-5).

## (2) Site Specific Geology/Soils

(a) Characteristics of coastal barrier islands - the geologic history of northern Pinellas County indicates that Miocene limestones served as the foundation upon which the present barrier system developed. A shallow limestone platform which slopes gradually gulfward under the present coastal zone was exposed and eroded then at least partially covered by the Pleistocene clay and sand during high stands of sea level. Remnants of these strata were preserved during the low stand of sea level. As sea level rose during the Holocene, this platform first became intertidal and supported an extensive mangrove community. Continued increase in sea level inundated the platform and permitted development of the present barrier island system and its associated wide shallow bay adjacent to the mainland coast (REF B-6).

(b) Sand Key is long, narrow and rather straight. It was developed as a spit formed by sediment that was eroded from the headland at Indian Rocks Beach and transported northward. It is primarily "coastal beach" composed of St. Lucie fine sand, shell substratum. Much of the land along the eastern shore of the intracoastal waterway is classified as "made land" and was created after the site was used as a gunnery range. The

180.30 acres comprising the former Indian Rocks Air-to-Ground Gunnery Range consists of the four distinct varieties of soil or land types listed below (see Document L-3):

(c) Coastal Beaches

1 "Coastal beaches" consist of narrow strips of tide-washed sand bordering islands and parts of the mainland. Most areas are covered during storms and daily at high tide. These beaches range from a few feet to as much as 500 feet in width. Long stretches are practically without vegetation, but sparse salt-tolerant grasses and other plants grow in places. Depth to the water table varies with the tide.

2 The beach sand has been deposited, mixed, and reworked by waves. It is firm or compact when moist and loose when dry. This sand is light gray to white and consists mainly of fine quartz particles in which there are varying quantities of medium to coarse shell fragments. The sand contains a few fine, rounded, weakly cemented very dark gray to very dark brown particles.

(d) Made Land - in coastal areas it has been built up to provide desirable locations for residential development (see document L-4 for an illustration of how the shoreline was changed from 1943 to 1981).

1 "Made land" consists of mixed sand, clay, hard rock, shells, and shell fragments that have been transported, reworked, and leveled by earth-moving equipment. Many areas consist of material that has been dredged from the bay and used to fill diked areas. Coarser sludge materials are deposited near the outlet of discharge pipes and finer materials settle in more distant positions. Rocks 1/2-inch to 12 inches in diameter are common. Numerous silicified oyster shells and some animal fossils occur in these materials.

2 "Made land" is underlain at a depth of 2 to 8 feet by various kinds of materials. In some areas it is underlain by the sandy bay bottom, and in others by Tidal swamp that has layers of fibrous peat 20 inches or less thick. Some of the material transported by truck has been deposited over solid rubble consisting of chunks of concrete, discarded appliances, and broken asphalt.

(e) Type Sand

1 St. Lucie fine sand, shell substratum - nearly level soil on low ridges on barrier islands in the western part of Pinellas County. In most places the surface layer is very dark gray fine sand about 3 inches thick. Below this is light-

gray loose fine sand about 34 inches thick. The next layer is very pale brown, loose, fine sand that extends to a depth of 40 inches or more. This is underlain by layers of mixed light-gray or white sand, seashells, and shell fragments (see photo J-20).

2 Palm Beach sand - nearly level, well-drained sand mixed with shells and fine shell fragments. It consists mainly of material dredged from shallow water to fill dikes. This material has been reworked and leveled. Many areas contain lumps of clay and rock fragments. In most places the material has been deposited only recently and no soil development has occurred. This soil is used mainly for waterfront homesites (REF B-5).

#### **e. Hydrology**

(1) There is no flowing surface water within either of the two areas that comprise the former Indian Rocks Air-to-Ground Gunnery Range.

(2) The water table is very near the land surface and the depth to water table varies with the tide. The water table is at a depth of 40 to 60 inches for 6 months or more in most years. It is within 40 inches for less than 60 days. The Floridian aquifer underlies these sites and consists of a thick sequence of carbonate rocks (limestone and dolomite) (REF B-7).

#### **f. Natural Resources**

(1) Although there are numerous animals on the "Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida," published by the Florida Game and Fresh Water Fish Commission, the small size (180.30 acres) of the former Indian Rocks Air-to-Ground Gunnery Range makes it an unlikely refuge for threatened species. Furthermore, since virtually every available parcel of land within these sites has been developed, there is no natural barrier island habitat remaining in this area. Neither is there designated shelter for endangered species in the immediately adjacent offshore area (REF B-8).

(2) Although the Tampa Bay estuary contains many protected areas for seagrasses, mangroves, salt marshes, mud flats, oyster bars, and submerged aquatic preserves, none of these have been identified in the vicinity of the former Indian Rocks Air-to-Ground Gunnery Range. Furthermore, since virtually every available parcel of land within these sites has been developed, there is little natural plant life remaining in this area. The predominant vegetation is residential lawns, decorative shrubbery, and artificially located palm trees (REF B-9).

## **g. Historical/Cultural Resources**

According to Mrs. Ralph Finke, Indian Rocks Area Historical Society, there are no specific archaeological or paleontological or historic sites known to exist on the former Indian Rocks Air-to-Ground Gunnery Range (see document I-14).

### **4. HISTORICAL ORDNANCE PRESENCE**

#### **a. Chronological Site Summary**

(1) When the United States entered the Second World War in December 1941, the northern half of Sand Key was simply a wind-swept, desolate barrier island off the Gulf coast of Florida. Pictures from that period show a barren, uninhabited stretch of sand, bisected by a single, unimproved road, Gulf Boulevard (see photos K-1 and K-3).

(2) As the U.S. mobilized for the war, the entire state of Florida, to include the Tampa Bay region, became a center of military construction activity. Florida's mild climate made it ideal for pilot training and air bases sprang up around the state. Quickly joining the already operational MacDill Field in Tampa were Drew, Henderson, and Pinellas Army Airfields. As these bases were being constructed and outfitted, the search began for suitable bombing and gunnery ranges within the vicinity upon which young aviators could hone their skills (see document F-1). Florida in 1940 was home to only 2 million residents and, consequently, there was an abundance of available, undeveloped land upon which to conduct training for war. One such parcel was the area about 3.5 miles north of the Indian Rocks Beach community on Sand Key.

(3) At some point during this period, negotiations commenced with the owner of said property and a lease between the War Department and the lessor was eventually agreed upon for the 177.8 acres that was designated as the Indian Rocks Air-to-Ground Gunnery Range (for a further description of this real estate transaction, see paragraph 5a(2) below). Upon execution of the lease, this range was assigned to the 3rd Army Air Forces, III Fighter Command, stationed at Pinellas Army Airfield (see document E-3).

(4) Most likely at the coincident time, a lease was being negotiated between the same parties for a smaller tract of beach to be used as an anti-aircraft gunnery range. This agreement covered a 2.5 acre site that was designated as the Indian Rocks Anti-Aircraft Gunnery Range (for a further description of this real estate transaction, see paragraph 5a(2) below). Upon execution of this lease, the range was assigned to Drew Field (see document E-3).

(5) The military first occupied the Air-to-Ground Gunnery Range on 7 May 1943 and used it for several years as a target/impact area for machine gun and rocket fire and small practice bombs.

(6) On 7 January 1947, the lease for the Air-to-Ground Gunnery Range was canceled and on 25 January 1947, the lease for the Anti-Aircraft Gunnery Range was canceled (see document L-1). From that time onward, these sites and the surrounding properties were subdivided numerous times until the current state of real estate affairs was reached. The 177.8 acre site has well over 150 separate parcels of land which are occupied by hotels, condominiums, and single family residences. The 2.5 acre site now consists of five single family residences. During this period, two townships were incorporated to govern the land between the Indian Rocks Beach community and the city of Clearwater. The northern town was given the name Belleair Beach, about half of which is the former Air-to-Ground Gunnery Range. The southern town took the name Belleair Shores and contains the former Anti-Aircraft Gunnery Range.

**b. Review of Ordnance Related Records**

(1) No contemporary official records were located that identified the type of ordnance employed at this site. As established previously, the Air-to-Ground Gunnery Range was assigned to Pinellas Army Airfield (AAFld) which was home to the 304th and 337th Fighter Squadrons, as well as one of the few aircraft gunnery schools in existence at that time. Table 4-1 lists the warplanes these squadrons flew, as well as the weapons/ordnance with which they were armed when they trained upon this air-to-ground gunnery range (REF: B-10 and B-11; see documents D-2 and E-5).

TABLE 4-1 PINELLAS AAFLD WARPLANES	
Warplane Type	Armament
P-39 Airacobra (all types)	.50 inch machine guns .30 inch machine guns Small practice bombs
P-40 Warhawk Tomahawk Kittyhawk	.30 inch machine guns .303 inch machine guns .50 inch machine guns 4.5-inch rockets Small practice bombs
P-51 Mustang (all types)	.303 inch machine guns .50 inch machine guns 5.0-inch rockets Small practice bombs

(2) From site closure to 1972, no written record could be located that noted the discovery of OEW at this location. However, newspaper articles describing post-1972 OEW discoveries often made reference to ordnance items washing up on shore during this period (see documents H-2b, H-2h, H-2q, H-2z, and H-2ad).

(3) On 13 June 1972, a small rocket was found about 40 feet offshore at Belleair Beach. Air Force explosives experts identified it as a dud World War II naval barrage rocket (see document H-1).

(4) In July 1975, the discovery of a "barnacle-encrusted bomb" off shore triggered a summer-long search for ordnance involving both Army and Navy EOD teams. These "bombs" were initially described as being "about 32-inches long and 17-inches in circumference" and weighing about "30 pounds." As the cleanup operation progressed, numerous newspaper articles made reference to "bombs," "shells," "mines," and "rockets" that had been "fired," "dropped," or "dumped" in the area during World War II training operations (see documents H-2a through H-2ad). The following represents a summary of the summer's events as described in official documents and newspaper accounts:

(a) On 30 July 1975, the mayor of Belleair Beach sent a formal request to the 547th Ordnance Detachment requesting their assistance in clearing the beach area of "all explosive or simulated explosive devices" (see document F-2).

(b) A joint Army-Navy EOD team responded to the mayor's request and conducted a search of the beach and immediate area off shore.

(c) On 15 September 1975, the mayor of Belleair Beach sent correspondence to the Secretaries of the Army and Navy commending the military personnel participating in this operation. The mayor noted that "132 items of ordnance were recovered and detonated, 21.6 miles of swimming were done and 21,000 square yards of underwater landscape were explored" (see documents F-3 and F-4).

(d) Though no official EOD record could be located concerning this exercise, interviews with EOD personnel at the time were reported in the local newspapers. These interviews indicated the following:

1 That these "bombs" were 2.25-inch and 4.5-inch aircraft rockets.

2 That many of the rockets were found offshore in the vicinity of the Serena Del Sol condominiums, 2900 Gulf Boulevard.

3 That the initial EOD sweep in early August located 14 rockets, all of which contained high explosive, none of which were fused.

4 That a more thorough sweep by EOD at the end of August located at least another 76 rockets which were detonated at the nearby Avon Park Bombing Range, Florida.

(5) In June 1977, rockets again began appearing off the shores of Belleair Beach (see document F-5). This discovery resulted in requests for assistance from the mayor to the Secretary of the Navy and the Commanding Officer of Naval Air Station (NAS), Cecil Field, Florida (see documents F-6 and F-7). Replies to the mayor from the Deputy Chief of Naval Operations (Surface Warfare) and the Acting Commander of NAS, Cecil Field (see documents F-8 and F-10), as well as message traffic (see document F-9), indicate that such help would be forthcoming. However, no official record could be located that reveals the results of such assistance or the number of rockets found, other than the three "4.2 rockets" mentioned in the mayor's original request.

(6) In June 1980, two youths diving in the Gulf behind the condominiums at 2900 Gulf Boulevard found a "bomb" in about eight feet of water roughly ten yards from shore. Shortly thereafter, two more "bombs" were found in the vicinity (see document H-3a). A Navy EOD team was called in and a newspaper reported that they found eight more "war relics" in about five feet of water roughly 50 yards from the shore (see document H-3b).

(7) In May 1986, a snorkeler off Belleair Beach dragged in a World War II "practice bomb" and told police that he had seen three to five more in the area (see document H-4a). This incident prompted another request for assistance from the Mayor to the commander of the 66th Ordnance Detachment (EOD), Patrick Air Force Base, Cape Canaveral, Florida (see document F-11). Shortly thereafter, a naval EOD team arrived and began a sweep of the area (see document H-4b). Following this operation, the Navy Officer in Charge of the EOD Detachment sent a trip report to the Belleair Police Department that "thirteen items and pieces were recovered" (see document F-12). The mayor then followed up with a request to the commanding officer, NAS Cecil Field, for another visit to "grid search and sweep the area" (see document F-13). Belleair Beach departmental correspondence dated July 10, 1986, indicates that a subsequent visit was made by Navy EOD and that some additional ordnance had been found (see document F-14).

(8) On 29 January 1993, a practice bomb was unearthed during a road-widening construction project on Gulf Boulevard. It is possible that additional such items were also located during this project, but this incident is the only one on record at the supporting area EOD detachment (see document I-11).

(9) Continuing interest in the possibility of OEW incidents was shown by a 6 May 1993 article in the St. Petersburg Times which has served to remind the public of the OEW dangers that remain within the state of Florida; the Belleair Beach site received prominent play (see document H-5).

### c. Interviews with Site Related Personnel

(1) The following represents summaries of interviews with personnel who trained upon this gunnery range when it was active or had knowledge of how it was used during that period of time (for greater detail, please refer to the full transcripts of the interviews located in Appendix I):

(a) Brigadier General (Ret) James H. Howard was a World War II fighter pilot who once commanded Pinellas AAFld. He flew P-40s and P-51s against the Indian Rocks Air-to-Ground Gunnery Range, but only recalls strafing this site with machine gun fire, not with rockets or bombs. He mentioned that the planes would use the Biltmore Hotel in Belleair as a guide and bank toward the range just south of the hotel, fly westward across the Intracoastal Waterway, and fire at targets on shore (see document I-1).

(b) Mr. Garland V. Fory was a World War II fighter pilot stationed at Pinellas AAFld as a gunnery instructor. He recalls firing 5.0-inch High Velocity Aircraft Rockets (HVAR) and .50 inch machine guns at this range. He did not remember launching 4.5-inch rockets at this site, though he does not discount that possibility. He stated that pilots also dropped numerous practice bombs which he described as "little blue training bombs with smoke charges." He was quite certain that no high explosive bombs or 20mm cannon were employed against this gunnery range. As far as he knew, the rockets were fuzed and set to detonate on impact, thereby allowing the spotters to score the results. All targets for all types of firing and practice bombing were located on land, but he does recall that rockets would occasionally miss their target by enough distance to land in the water immediately off the Gulf shore. He confirmed that the warplanes always flew and fired from east to west - they NEVER fired towards the east (see document I-2).

(c) Mr. Norman Starks was a World War II fighter pilot stationed at Pinellas AAFld as a gunnery instructor and was a colleague of Messrs. Fory and Pursley. He also recalls firing .50 inch machine guns and aircraft rockets at this range, but could not remember the exact size of the rockets. He too dropped small practice bombs on this site and confirmed that none of the planes mounted 20mm cannon, thereby eliminating the possibility of those rounds being found at this location. As far as he knew, the rockets were fuzed and set to detonate on impact and recalls an incident in which a rocket he fired blew a crater in what was then an unimproved Gulf Boulevard. He confirmed that the warplanes always flew and fired from east to west - they never fired toward the east (see document I-3).

(d) Major (Ret) Walter Pursley was a World War II fighter pilot who commanded Pinellas AAFld immediately prior to BG Howard. Though he never flew against this site he did confirm that, to his knowledge, Pinellas AAFld was the only field that used this range. He could recall only machine guns being fired, not rockets (see document I-4).

(e) Mr. Ansley Watson was a World War II fighter pilot who was once stationed at Pinellas AAFld. He flew a P-51 Mustang and recalls strafing the Indian Rocks Air-to-Ground Gunnery Range with his .50 inch machine guns. He does not recollect any bombing or rocket launching at this site (see document I-5).

(f) Mr. Willie O'Donnel was a former World War II fighter pilot who also flew against this gunnery range. He too remembers .50 inch as being the largest ammunition fired (see document I-6).

(g) Mr. "Cappy" (Otto) Bie was a young boy when the range was in use and he recalls P-40 warplanes mounting six .50 inch machine guns firing at a bed sheet attached to a frame of 2x4s. He indicated that he never saw any rockets fired or bombs dropped. He also remembers a .50 inch gun emplacement at the site in Belleair Shores which would fire at balloons floating at the water's edge, thereby resulting in numerous spent rounds falling into the Gulf (see document I-7).

(h) Mrs. Hazel Geissler also lived nearby when the range was in use and she recalls that "bombers" from MacDill and fighters from Orlando would shoot at a 10-12 foot high sand barricade (see document I-8).

(i) Mr. Bob Harris, Curator of Collections, Heritage Park, said that Belleair Beach was a "bombing area" during World War II and that small bombs were dropped and .50 inch machine guns were fired there (see document I-9).

(2) The following represents summaries of interviews with personnel who are familiar with or aware of OEW contamination on the site after its deactivation (for greater detail, please refer to the full transcripts of the interviews located in Appendix I):

(a) Mrs. Hazel Geissler resided in the first area of development at Belleair Beach after the government canceled the lease, and she remembers ordnance washing up on shore on a weekly basis, even though she thought the site had been combed for OEW prior to the commencement of private development. She said the items were about 32 inches long with a flange at the end and that someone would come around occasionally to detonate them. After the initial influx of ordnance, she said there would be recurrences at two year intervals. Following storms, the items would wash up on the Gulf-side beaches (see document I-8).

(b) The officer-in-charge of the Naval EOD team that responded to the 1975 OEW cleanup operation, CW03 (Ret) Henry (Bud) S. Thrift, Jr., confirmed much of what was reported in the newspapers at that time, with special note made of the following (see document I-10):

- 1 That only 4.5-inch rockets were discovered;
- 2 That many of the rockets were likely fuzed;
- 3 That due to electronic search equipment malfunction, the underwater sweep was conducted completely by sight; and,
- 4 That Army EOD destroyed all rockets found and indicated that many had live high explosive (HE) warheads.

(c) Mr. Buell Vann, Director of Public Works for Belleair Beach, indicated that a number of practice bombs have been discovered on land by road construction and telephone crews, but that the majority of ordnance is found offshore in the Gulf. He knew of no ordnance being found on the eastern side of the key in the Intracoastal Waterway. He described these items as "4.5-inch rockets with fins and blunt noses that could be screwed out, about 1 foot long." When shown a picture of the Army 4.5-inch rockets in use during World War II, he indicated that they resemble the items he has seen (see document I-12).

(d) One of the homeowners on the former Indian Rocks Anti-Aircraft Gunnery Range site, Mr. Lee Hanna, mentioned his discovery of spent .30 and .50 inch bullets while walking along the beach. He reports no other encounters with OEW and says his neighbors have never mentioned ordnance being found on their properties. As a city official and 22 year resident of Belleair Shores, he stated that discovered ordnance has never been an issue brought before city government. Finally, he and two of his neighbors have had pools dug in their yards and no ordnance was unearthed during these excavations (see document I-13).

## 5. SITE ELIGIBILITY

### a. **Confirmed Formerly Used Defense Sites**

(1) Former land lease and usage by the War Department was previously confirmed for the entire site during the preliminary assessment phase of DERP FUDS conducted by USACE, Jacksonville District and described in paragraph 2a. It was noted that the terms and conditions of the lease and termination notice, or if there were any restorations required, are unknown as copies of those instruments could not be located. Disposal information was taken from the real estate map (see document L-2).

(2) Further research by the site investigation team confirmed the lack of real estate documents concerning this lease and its termination. Local real estate transactions are officially recorded in the Pinellas County Courthouse, Court Street, Clearwater, Florida. However, interviews with staff members in the recorder's office revealed that the recording of leases is not required and, therefore, is not always done. A perusal of the "Grantor Index" for the period of 1935 to 1946 reveals no record of a lease between the U.S. Government and the landowner for the Indian Rocks Gunnery Range site.

(a) One of only two official documents located concerning this lease is the aforementioned real estate map which notes two leases between the War Department and a "Arnold S. Kirkeby, et ux." Lease Number W09-026 ENG 159 was for 177.8 acres under the name of "AIR TO GROUND GUNNERY RANGE" and Lease Number W2287 ENG 15861 was for 2.5 acres under the name of "ANTI-AIRCRAFT GUNNERY RANGE" (see document L-2).

(b) The other official document located is a "Leased Property Inspection Report" completed by the Corps of Engineers, South Atlantic Division, on 6 March 1945 which notes the lessor as being "Kirkeby Hotels, Inc." This report indicates the annual rental for the property was \$2,499.96 and the site was first occupied by the military on May 7, 1943 (see document E-4).

(c) Additional study of the Grantor Index discloses numerous real estate transactions during the 1940s by "Arnold S. and Carlotta Kirkeby of Cook County, Illinois," involving Belleair Beach land. It is therefore likely to conclude that the land comprising the former Indian Rocks Gunnery Range sites was leased to the War Department by this Arnold S. Kirkeby individual in some form or the other.

#### **b. Potential Formerly Used Defense Sites**

(1) All information obtained during the archives search, site visit, and personal interview has verified, as much as necessary, the accuracy of the overall scope and boundaries of the 180.30 acre lease. However, additional consideration should be given to those two areas that have proven to be contaminated with OEW due to their proximity to the ranges themselves; specifically, the two underwater areas adjoining the Gulf shore side of Area A and Area B (see Plate 6).

(2) A good approximation of the size of these two areas would be based upon the danger areas delineated in the 1944 sectional aeronautical chart (see document L-1) and superimposed over the current map of the area (see Plate 2). For the purposes of this report, the underwater area adjoining the western edge of the former Indian Rocks Air-to-Ground Gunnery Range (Area A), will be hereafter referred to as "Area C" and comprises approximately 277 acres. The underwater area adjoining the

former Indian Rocks Anti-Aircraft Gunnery Range (Area B), will be referred to as "Area D" and comprises approximately 8884 acres. The remainder of the circular danger area defined by the 1944 sectional aeronautical chart will be referred to as "Area E" and comprises approximately 1595 acres.

TABLE 5-1 POTENTIAL FUDS				
FORMER USAGE	PRESENT OWNER	PRESENT USAGE	SIZE/ ACRES	COMMENTS
Area C: Gunnery Impact Range (underwater)	None (within U.S territorial waters)	Swimming, Boating, Diving	277	See Plate 6
Area D: Anti-Aircraft Gunnery Range Impact Area	None (within U.S. territorial waters)	Swimming, Boating, Diving	8884	See Plate 6
Area E: None, area bordering impact Area	Land: many owners Water: none	Residential, Condos, Hotels Swimming, Boating, Diving	1595	See Plate 6
			10756	TOTAL

(3) No other information was obtained to indicate that any other additional acreage/sites were used as a part of, or in conjunction with, the former Indian Rocks Gunnery Range.

## 6. VISUAL SITE INSPECTION

### a. **General Procedures and Safety**

(1) During the period 6-14 December 1993, members of the Assessment Team traveled to the former Indian Rocks Gunnery Range in Pinellas County, Belleair Beach, Florida. The primary task of the Assessment Team was to assess OEW presence/potential due to the usage of the area as an air-to-ground gunnery range. This inspection was limited to nonintrusive methods; i.e., subsurface sampling was not authorized or performed.

(2) Real estate rights of entry were not obtained by inspection personnel due to the accessibility of most of the property by way of city parks, roads, or public beaches. Private property rights were respected at all times by the inspection team and access to such was deemed not necessary to mission accomplishment.

(3) A site safety plan was developed and utilized by the assessment team to assure safety from injury during the site inspection. A preinspection briefing was conducted which stressed that OEW should not be handled (REF. B-4).

(4) Prior to the on-site visit, a thorough review of all available reports, historical documents, and available reference material gathered during the records search was made to ensure awareness of the types and uses of the ordnance most likely to be encountered at this site.

(5) Site visits occurred on two days.

(a) The initial visit took place on 8 December 1993, and began at the Belleair Beach Police Department and City Hall. The assessment team met with Mr. Buell Vann, Director of Public Works, who provided anecdotal evidence of OEW discovered during his tenure with the city, as well as copies of their plat maps. Following this session, which lasted about two hours, the assessment team conducted an unescorted site visit, as described below.

(b) The second visit took place on Sunday morning, 11 December 1993, and virtually retraced the steps taken during the initial visit described above. The primary purpose of this visit was to take additional photographs to better illustrate the archive search report (see Plate 5 for photograph locations).

#### **b. Area A: Air-to-Ground Gunnery Range Impact Area**

(1) The inspection team entered the beach area through the Morgan Drive city park which is located at the approximate north-south midpoint of the old site. Even during a low tide period, there is virtually no beach between the surf and the sea wall north of this park (see photos J-1 thru J-4). This lack of beach made it difficult to actually walk that section of the site and the team restricted itself to the taking of photographs. (During the second site visit, the team walked the seawall as far north as the Serena Del Sol Condominiums located at 2900 Gulf Boulevard [see photo J-5]). The team thereupon walked southward along the beach until they reached the 19th Street city park which is located at the southern boundary of the old site (see photos (see photos J-6 and J-7).

(2) The inspection team drove northward the length of Gulf Boulevard with several detours down side streets to take photographs (see photos J-9, J-10, and J-20).

(3) At the northernmost city limits of Belleair Beach, which coincide with the northern boundary of the site, the inspection team again entered the beach area. As before, there was no beach area between the surf and sea wall, and the team restricted itself to the taking of photographs (see photos J-11 and J-12). No OEW was observed by the inspection team in this area.

**c. Area B: Anti-Aircraft Gunnery Range Gun Emplacement Area**

The inspection team entered the beach area through the 6th Street city park which is located at the northern boundary of the old site (see photos J-14 and J-15). The team walked southward along the beach to 420 Gulf Boulevard which approximates the southern boundary of the old site (see photo J-16). No OEW was observed by the inspection team in this area.

**d. Area C: Air-to-Ground Gunnery Range Underwater Impact Area**

The inspection team viewed this offshore coastal area from the beach. No OEW was observed by the inspection team in this area.

**e. Area D: Anti-Aircraft Gunnery Range Impact Area**

The inspection team viewed this offshore coastal area from the beach. No OEW was observed by the inspection team in this area.

**f. Area E: 1944 Aeronautical Chart Danger Area**

The inspection team drove through the land area on Gulf Boulevard and viewed the Intracoastal Waterway portion from the adjoining land and the Belleair Beach Causeway. No OEW was observed by the inspection team in this area.

**7. EVALUATION OF ORDNANCE HAZARDS**

**a. General Procedures**

(1) Each area was evaluated to determine confirmed, potential, or uncontaminated ordnance presence. Confirmed ordnance contamination is based upon verifiable historical evidence or direct witness of ordnance items since site closure. Verifiable historical record evidence consists of ordnance items located on site and documented by local bomb squads, Army Explosive Ordnance Disposal (EOD) Teams, newspaper articles, correspondence, and any other findings. Direct witness of ordnance items consists of the inspection team directly locating ordnance items by visual inspection. Additional field data is not needed to identify OEW presence at a confirmed site.

(2) Potential ordnance contamination is based upon a lack of confirmed ordnance presence since site closure. Potential ordnance contamination is inferred from records. Inference from historical records would include common practice in production, storage, usage, or disposal, at that time, which could have allowed present day ordnance contamination. Potential ordnance contamination could also be based on indirect witness or from present day site features. Additional field data is needed to confirm potential ordnance areas.

(3) Uncontaminated ordnance areas are based on a lack of confirmed or potential **energetic** ordnance contamination. There is no reasonable evidence, either direct or inferred, to suggest present day energetic ordnance contamination. Additional field data is not needed to assess uncontaminated ordnance areas.

**b. Area A: Air-to-Ground Gunnery Range Impact Area**

(1) Area A should be considered a confirmed ordnance area based upon its use when it was active and evidence of residual OEW contamination since it was closed.

(2) Historical documents and interviews with individuals who trained at this site confirm that ordnance was employed at this location during the period within which it was active. It is likely that the some or all the following ammunition was used during training at this range: .30 inch and .50 inch machine gun bullets; 3 and 4.5 pound practice bombs; and 2.25-inch, 4.5-inch, and 5.0-inch aircraft rockets.

(3) Newspaper accounts and interviews with individuals knowledgeable of the area confirm OEW contamination since site closure. It appears that the majority of ammunition discovered on this site since closure has been the practice bombs.

(a) The most likely potential OEW hazard would be from the practice bombs dropped on this site. However, the shell bodies of these practice bombs were inert and designed to be rugged enough to allow for reuse. The only explosive component was an AN-Mk.4 Signal Cartridge consisting of a long 10-gauge blank shotgun shell containing an ejection charge and a pyrotechnic charge which would burn above water after impact, forming a large puff of white smoke (see document D-1c). It is highly unlikely that an open-end device of this sort, if not activated when initially dropped, would be still active after 50 years of burial in wet sand. Therefore, the hazard from these practice bombs should be considered minimal. Furthermore, this area has been totally developed and there are few, if any, lots left upon which to build, thereby also minimizing the possibilities of a chance encounter with a buried object.

(b) The following information cited previously is likely accurate concerning this area:

1 That this area was used for its intended purpose during World War II. Interviews with pilots stationed at its controlling fighter base and historical documentation tend to support the premise that it was an air-to-ground gunnery range used to train young fighter pilots. Testimony from contemporary site-related personnel points toward .50 inch machine gun rounds, aircraft rockets, and practice bombs as the predominant ordnance employed upon this gunnery range. Though the exact length of time this site was active could not be determined, it is safe to assume that it was at least two years. The amount of ammunition fired at this location could not be quantified, but was likely great for the short period of time it was open for business.

2 That no documentation could be located concerning a pre-site closure sweep for unexploded ordnance, although standard practice would dictate that such an operation be conducted prior to the return of a gunnery range to the public domain. The testimony of Mrs. Geissler, who moved onsite shortly after the lease was canceled by the War Department, indicates that such a search was accomplished, but to what degree of effectiveness cannot be ascertained.

3 That extensive anecdotal evidence and some official documentation exists concerning residual OEW contamination at this location after the lease was canceled in January 1947. While the vast majority of this contamination has occurred offshore and consists of aircraft rockets, onshore contamination seems to consist mainly of practice bombs containing smoke charges. Many spent .30 and .50 inch rounds have also been encountered since site closure (see Plate 5).

(c) The following information is likely inaccurate concerning this area or cannot be verified:

1 That the aircraft rockets were "de-fused to prepare them for use in mock attacks in support of practice beachhead landings during World War II," as stated in an August 1975 press release from the Mayor of Belleair Beach. Testimony from the Naval EOD team officer-in-charge of the 1975 cleanup operation and the pilots who fired the rockets indicate that these items were fused to detonate upon impact.

2 That this Air-to-Ground Gunnery Range was possibly used by Navy ships as a gunnery range as speculated in the Site Survey Summary Sheet prepared during the Preliminary Assessment phase of the DERP FUDS process. Considering the rudimentary nature of rockets in use during World War II, it appears unlikely that the Navy would be authorized to launch a rocket assault against an Army Air Force Gunnery Range separated from a populated shoreline by one mile of Intracoastal Waterway. The danger of a "hot" rocket motor propelling the warhead past the intended target area and coming to rest in downtown Belleair Bluffs would seem too great to allow such an exercise to occur.

**c. Area B: Anti-Aircraft Gunnery Range Gun Emplacement Area**

(1) Area B should be considered an uncontaminated ordnance area based upon its use when it was active and the lack of evidence of residual OEW contamination since it was closed. This site was more likely an anti-aircraft gun emplacement than an air-to-ground gunnery range, as indicated by:

(a) Mr. Bie's comment in paragraph 4c(1)(g);

(b) The notation on the real estate map, as described in paragraph 5a(2)(a);

(c) Its assignment as such to Drew Field, as described in paragraph 4a(4);

(d) The caption accompanying a 1946 photograph of Belleair Shore (see photo K-2);

(e) The distinctive firing fan delineated on the 1944 Restricted Area Aeronautical Chart (see document L-1); and,

(f) Its 2.5 acre size which is too small to be used as a target or impact range.

(2) As a gun emplacement, it is likely that the only residual OEW present would be spent bullets, since whatever ammunition was brought to the site was probably fired or returned to the point of issue. An interview with one of the homeowners on this old site, Mr. Lee Hanna, reveals his discovery of spent .30 and .50 inch bullets while walking along the beach. He reports no other encounters with OEW and says his neighbors have never mentioned ordnance being found on their properties. As a city official and 22 year resident of Belleair Shores, he stated that discovered ordnance has never been an issue brought before city government. Finally, he and two of his neighbors have had pools dug in their yards and no ordnance was unearthed during these excavations (see document I-13).

(3) No documentation could be located concerning a pre-site closure sweep for unexploded ordnance, though it is doubtful that it would be necessary since this site was not used as a target range or impact area. More likely would be a site inspection for unexpended ammunition prior to cancellation of the lease in January 1947.

**d. Area C: Air-to-Ground Gunnery Range Underwater Impact Area**

(1) Area C should be considered a confirmed ordnance area based upon its proximity to the air-to-ground gunnery range impact area (Area A) when it was active and evidence of residual OEW contamination since the range was closed.

(2) The size of Area C was based upon the probability of rocket overshoot distance, fifty years of wave and tidal action, size of the original target area on land, and size of previous EOD sweeps, plus some additional expansion in the interests of safety.

(3) Interviews with individuals who trained at the range confirm that some ordnance overshoot the targets and landed in the Gulf. It is likely that the some or all the following ammunition fell into this underwater area: .30 inch and .50 inch machine gun bullets; 3 and 4.5 pound practice bombs; and 2.25-inch, 4.5-inch, and 5.0-inch aircraft rockets.

(4) Newspaper accounts and interviews with individuals knowledgeable of the area confirm OEW contamination since site closure. The preponderance of evidence indicating post-site closure OEW contamination is anecdotal in nature and appears mainly as newspaper accounts. Discovery of OEW contamination runs in periodic cycles and may be a function of Gulf storm and wave patterns that disturb the seabed sufficiently to uncover old ordnance and propel it ashore. The majority, if not the totality, of ammunition discovered in this area since the range was closed has been 4.5-inch aircraft rockets.

(5) Therefore, the primary potential OEW hazard is the aircraft rocket with a live HE warhead, such as have been discovered on numerous occasions since the range was deactivated and returned to the private sector. However, the overwhelming majority, if not the totality, of rockets found have been located underwater and, thereby, constitute a minimal hazard to residents living onshore. Insofar as the existence of an underwater hazard is concerned, the following must be considered:

(a) That the targets for these rockets were positioned on land and those rockets that struck water were not aimed there on purpose. Therefore, the quantity of rockets underwater should be a small percentage of the total number fired. Considering the number found by EOD to date, in addition to the unsubstantiated claims of "hundreds" more being found by swimmers since the range closed, it seems likely that most of the mistargeted rockets may have been located.

(b) That the relatively small underwater section from which virtually every rocket has come has been searched by EOD on at least four occasions in 1975, 1977, 1980, and 1986. Several, if not all, of these sweeps were carefully performed utilizing both sophisticated electronic detection equipment and the practiced eye of experienced EOD professionals. It is likely that all of the easily located rockets have been found and any that remain will be difficult to detect and remove.

(c) That no record could be located of any rockets being found since 1986.

**e. Area D: Anti-Aircraft Gunnery Range Impact Area**

(1) Area D should be considered a confirmed ordnance area based upon its use when it was active and evidence of residual OEW contamination since the anti-aircraft gunnery range was closed. The spent bullets being fired at offshore targets would have fallen within this landing area. While the size(s) and type(s) of gun(s) emplaced here could not be confirmed through official records, its proximity to civilization would seem to discourage any caliber larger than .50 inch and that speculation is supported by Mr. Bie's testimony (see document I-7) and the caption under a historical photograph of Belleair Shores (see photo K-2).

(2) As an impact area for an anti-aircraft gunnery range, it is likely that the only residual OEW present would be spent bullets. Some anecdotal evidence and no official documentation exists concerning residual OEW presence at this location after the lease was canceled in January 1947. This presence consists exclusively of spent .30 and .50 inch bullets washing up onshore (see Plate 5). An interview with one of the homeowners on this old site, Mr. Lee Hanna, reveals his discovery of spent .30 and .50 inch bullets while walking along the beach.

(3) As to what type(s) of anti-aircraft (AA) gun (and therefore what type[s] of ammunition was used) was emplaced upon this range, the evidence points toward .30 inch and .50 inch machine guns based upon Mr. Bie's testimony and the spent ordnance washed up on shore. While the 40mm Bofors gun, the 37mm M1, and the 90mm M1 were the standard field army AA guns of this period, there is no evidence to indicate that shells of these sizes were ever fired from the gun emplacement into this underwater impact area.

(4) No documentation could be located concerning a pre-site closure sweep for unexploded ordnance, though it is doubtful that it would have been necessary since the only ordnance likely to be found would have been the spent bullets.

#### **f. Area E: 1944 Aeronautical Chart Danger Area**

(1) Area E should be considered an uncontaminated ordnance area based upon its use when the gunnery range was active and the lack of evidence of residual OEW contamination since it was closed.

(2) While the circular "invisible hazard - danger area" defined in the 1944 Aeronautical Chart (see document L-1) may be used as a guide for site investigators, it should by no means be considered to define an ordnance impact area in its entirety. The only portions of this circle that have shown evidence of post-site closure OEW contamination are the two areas discussed above: Area A and Area C. No incidents of OEW contamination in the remainder of this area (Area E) have ever been reported and this area should be considered uncontaminated with ordnance.

### **8. SITE ORDNANCE TECHNICAL DATA**

#### **a. End Item Technical Data**

(1) No comprehensive list of ammunition fired into the former Indian Rocks Air-to-Ground Gunnery Range could be located. However, it is logical to assume that, as a small gunnery range attached to an Army Airfield harboring nothing but fighter planes, the bulk of expended ordnance, if not the entirety, would be machine gun ammunition, aircraft rockets, and small practice bombs. No evidence exists that chemical warfare materiel (CWM) was ever used at this site.

(2) TABLE 8-1 has been developed to establish a list of those ordnance items most likely to be encountered at this site, either at the surface or below, or underwater. This table has been developed based upon a review of official records, interviews, post site closure OEW discoveries, the armament mounted by the warplanes that pilots flew when they trained upon this range, and the typical military utilization of air-to-ground gunnery ranges and anti-aircraft gunnery ranges. Exact model numbers and munition types have been included or assumed whenever permitted by available source material and are speculative.

(3) Technical data and drawings relative to the end items and component parts listed in TABLE 8-1 can be found in Appendix D.

**b. Chemical Data of Ordnance Fillers**

TABLE 8-2 lists the explosive/chemical fillers of those ordnance items identified in TABLE 8-1.

**TABLE 8-1  
AMMUNITION USED AND EXPLOSIVE/CHEMICAL FILLER**

NOMENCLATURE	MODEL/TYPE	FILLER/WEIGHT
Small Arms Ammo .30 Cal with gilding metal jacket	M2 Ball M2 AP M1 Tracer T10 Tracer M1 Incend	Lead Antimony Tungsten Chrome Steel Tracer Composition Incendiary Composition
Propellant		Single or Double-base (DB) powder
Small Arms Ammo .50 Cal with gilding metal jacket	M2 Ball M2 AP M1 Tracer M10 Tracer M17 Tracer M21 Tracer M1 Incend M23 Incend	Soft Steel Tungsten Chrome Steel Tracer Composition Tracer Composition Incendiary Mixture
Propellant		Single or Double-base (DB) powder
Bomb, Practice, 3 lb w/signal	AN-Mk.5 Mod 1 AN-Mk 4	Inert (zinc) 10 gm zinc oxide 3 gm black powder 3 gm smokeless powder Titanium Tetrachloride
Bomb, Practice, 3 lb w/signal	AN-Mk 23 AN-Mk 4	Inert (cast iron) 10 gm zinc oxide 3 gm black powder 3 gm smokeless powder Titanium Tetrachloride
Bomb, Practice, 4.5 lb w/signal	An-Mk 43 AN-Mk 4	Inert (lead) 10 gm zinc oxide 3 gm black powder 3 gm smokeless powder Titanium Tetrachloride
Rocket, Practice	2.25" SCAR	Inert warhead (machined steel, cast iron or zinc)
Motor, Rocket Igniter Propellant		14 gm black powder 1.75 lb ballistite

**TABLE 8-1**  
**AMMUNITION USED AND EXPLOSIVE/CHEMICAL FILLER (Con't)**

NOMENCLATURE	MODEL/TYPE	FILLER/WEIGHT
Rocket, H.E.	M8	4.3# Cast TNT
4.5-inch	M8A1	4.5# Cast TNT
	M8A2	4.3# Cast TNT
Fuze, P.D.	M4A2	
Primer, SQ		
Primer, Delay		
Delay Charge		
Relay Charge		
Detonator		
Booster		
Auxiliary Booster	M1A1	0.8# TNT
		0.2# tetryl ring
Motor, Rocket		
Igniter		Black powder charge
Propellant		30 sticks (4.65#) DB powder
Rocket, H.E.	T22	4.3# Cast TNT
4.5-inch		
Fuze, P.D.	M4A2	
Primer, SQ		
Primer, Delay		
Delay Charge		
Relay Charge		
Detonator		
Booster		
Auxiliary Booster	M1A1	0.8# TNT
		0.2# tetryl ring
Motor, Rocket		
Igniter		Black powder charge
Propellant		30 sticks (4.65#) DB powder
Rocket, H.E.	M16	5.2# Cast TNT
4.5-inch		
Fuze, P.D.	M81	
Fuze, P.D.	M48A2	
Detonator		
Superquick		Lead azide
Delay		Compressed black powder pellet
Relay		Lead azide pellet
Booster	M24	
Detonator		Tetryl
Booster lead		Tetryl
Booster charge		Tetryl pellet
Motor, Rocket		
Igniter		Black powder charge
Propellant		4.75# DB powder

**TABLE 8-1**  
**AMMUNITION USED AND EXPLOSIVE/CHEMICAL FILLER (Con't)**

NOMENCLATURE	MODEL/TYPE	FILLER/WEIGHT
Rocket, Practice 4.5-inch	T46	Inert
Fuze, Dummy	M6	
Motor, Rocket		
Igniter		Black powder charge
Propellant		4.75# DB powder
Rocket, Beach-barrage 4.5-inch, H.E.	Mk3	6.4# TNT
Fuze, Nose (Air)	Mk137	
Detonator		
Lead-in Cup		Tetryl
Booster		Tetryl
Motor, Rocket	2.25" Mk9	
Igniter		Black powder charge
Propellant grain		1.4# Mk 1
Rocket, H.E. Nose Fuze, AIR-SQ	5" HVAR Mk149	7.5# Cast TNT
Detonator		
Lead-in		Tetryl
Booster		Tetryl
Base Fuze, PIR	Mk159	
Detonator		
Lead-in		Tetryl
Booster		Tetryl
Motor, Rocket		
Igniter		Black powder charge
Propellant grain		24.8 lb ballistite
Rocket, Practice Motor, Rocket	5" HVAR	Inert warhead
Igniter		55 gm black powder
Propellant		24.8 lb ballistite

**TABLE 8-2**  
**CHEMICAL DATA OF ORDNANCE FILLERS**

FILLER	SYNONYM(S)	CHEMICAL FORMULA
Antimony Sulfide		$Sb_2S_3$
Ballistite	(see DB powder)	
Barium Nitrate		$Ba(NO_3)_2$
Black Powder		
74% Potassium Nitrate	Salt peter; Niter	$KNO_3$
11% Sulfur		S
16% Charcoal		C
Charcoal		C
Dibutylphthalate	gelling agent	$C_6H_4(CO_2C_4H_9)_2$
Dinitrotoluene	DNT	$C_6H_3CH_3(NO_2)_2$
Diphenylamine	stabilizer DPA	$(C_6H_5)_2NH$
Double-base (DB) Powder	Ballistite	
60% Nitrocellulose	Guncotton; Pyroxylin	$[C_6H_8O_5(NO_2)_3]_n$
39% Nitroglycerin		$CH_2NO_3CHNO_3CH_2NO_3$
0.75% Diphenylamine	stabilizer DPA	$(C_6H_5)_2NH$
E.C. Blank Powder	(single-base compound powder)	
80.4% nitrocellulose	Guncotton; Pyroxylin;	$[C_6H_8O_5(NO_2)_3]_n$
8.0% potassium nitrate	Salt peter;	$KNO_3$
8.0% barium nitrate		$Ba(NO_3)_2$
3.0% starch		
0.6% diphenylamine	stabilizer DPA	$(C_6H_5)_2NH$
FNH Powder, Type II		
Nitrocellulose	Guncotton; Pyroxylin;	$[C_6H_8O_5(NO_2)_3]_n$
Dibutylphthalate	gelling agent	$C_6H_4(CO_2C_4H_9)_2$
Dinitrotoluene	DNT	$C_6H_3CH_3(NO_2)_2$
Diphenylamine	stabilizer DPA	$(C_6H_5)_2NH$
Guncotton	(see nitrocellulose)	
13% nitrogen		$N_2$
Igniter Compositions *		
I-136 & I-136A		
10% Calcium Resinate		
90% Strontium Peroxide		$SrO_2$

\* Most frequently used chemical compositions and their major ingredients

**TABLE 8-2**  
**CHEMICAL DATA OF ORDNANCE FILLERS (Con't)**

FILLER	SYNONYM(S)	CHEMICAL FORMULA
I-194	94% Igniter Composition I-136 6% Magnesium Powder	Mg
I-276	84% Barium Peroxide 16% Magnesium Powder	BaO <sub>2</sub> Mg
I-280	85% Igniter Composition I-136A 15% Magnesium Powder	Mg
I-508	79% Barium Peroxide 14% Magnesium Powder	BaO <sub>2</sub> Mg
Incendiary Compositions *		
IM-11	50% Barium Nitrate 50% Magnesium Aluminum Alloy	Ba(NO <sub>3</sub> ) <sub>2</sub> Mg & Al
IM-23	50% Potassium Perchlorate 50% Magnesium Aluminum Alloy	KClO <sub>4</sub> Mg & Al
IM-28	40% Barium Nitrate 50% Magnesium Aluminum Alloy 10% Potassium Perchlorate	Ba(NO <sub>3</sub> ) <sub>2</sub> Mg & Al KClO <sub>4</sub>
IM-68	24% Barium Nitrate 50% Magnesium Aluminum Alloy 25% Ammonium Nitrate	Ba(NO <sub>3</sub> ) <sub>2</sub> Mg & Al NH <sub>4</sub> NO <sub>3</sub>
IM-69	40% Barium Nitrate 50% Magnesium Aluminum Alloy 10% Iron Oxide, Ferric	Ba(NO <sub>3</sub> ) <sub>2</sub> Mg & Al Fe <sub>2</sub> O <sub>3</sub>
IM-136	49% Potassium Perchlorate 49% Magnesium Aluminum Alloy	KClO <sub>4</sub> Mg & Al
IM-142	48% Barium Nitrate 46% Magnesium Aluminum Alloy	Ba(NO <sub>3</sub> ) <sub>2</sub> Mg & Al
IM-144	50% Barium Nitrate 50% Red Phosphorus	Ba(NO <sub>3</sub> ) <sub>2</sub> P
IM-162	25% Incendiary Composition IM-23 75% Zirconium	Zr
IM-163	50% Incendiary Composition IM-23 50% Zirconium	Zr
Incendiary Mixture	(see incendiary compositions)	
Lead Azide	Azide	Pb(N <sub>3</sub> ) <sub>2</sub>
* Most frequently used chemical compositions and their major ingredients		

TABLE 8-2

## CHEMICAL DATA OF ORDNANCE FILLERS (Con't)

FILLER	SYNONYM(S)	CHEMICAL FORMULA
Nitrocellulose	Guncotton; Pyroxylin; Nitrocotton; Cellulose Nitrate	$[C_6H_8O_5(NO_2)_3]_n$
Nitroglycerin		$CH_2NO_3CHNO_3CH_2NO_3$
Potassium Chlorate		$KClO_3$
Potassium Nitrate	Saltpeter; Niter	$KNO_3$
Primer Composition		
FA-90A (for percussion primers)		
25% Lead Thiocyanate		$Pb(SCN)_2$
12% Antimony Sulfide		$Sb_2S_3$
10% PETN		$C(CH_2ONO_2)_4$
53% Potassium Chlorate		$KClO_3$
FA-70		
25% Lead Thiocyanate		$Pb(SCN)_2$
17% Antimony Sulfide		$Sb_2S_3$
5% TNT	2,4,6-trinitrotoluene	$CH_3C_6H_2(NO_2)_3$
53% Potassium Chlorate		$KClO_3$
Primer Mixture *		
Mercury Fulminate	Mercuric Cyanate	$Hg(CNO)_2$
Potassium Chlorate		$KClO_3$
Antimony Sulfide		$Sb_2S_3$
Red Phosphorus		P
Smokeless Powder	(see nitrocellulose)	
Flashless-nonhygroscopic (FNH)		
Nonhygroscopic (NH)		
Sodium Nitrate		$NaNO_3$
Sodium Oxalate		$Na_2C_2O_4$
Sulfur		S
Tetryl	Trinitrophenyl- methylnitramine	$(NO_2)_3C_6H_2N(NO_2)CH_3$
TNT	2,4,6-trinitrotoluene; triton; trotyl; trilite; trinol; tritolo	$CH_3C_6H_2(NO_2)_3$

\* Most frequently used chemical compositions and their major ingredients

TABLE 8-2

## CHEMICAL DATA OF ORDNANCE FILLERS (Con't)

FILLER	SYNONYM(S)	CHEMICAL FORMULA
Tracer Compositions *		
R-256		
8.3% Calcium Resinate		
26.7% Strontium Peroxide		SrO <sub>2</sub>
26.7% Magnesium Powder		Mg
33.3% Strontium Nitrate		Sr(NO <sub>3</sub> ) <sub>2</sub>
R-284		
17% Polyvinyl Chloride		
28% Magnesium Powder		Mg
55% Strontium Nitrate		Sr(NO <sub>3</sub> ) <sub>2</sub>
R-321		
16% Polyvinyl Chloride		
26% Magnesium Powder		Mg
52% Strontium Nitrate		Sr(NO <sub>3</sub> ) <sub>2</sub>
* Most frequently used chemical compositions and their major ingredients		

9. OTHER ENVIRONMENTAL HAZARDS

**a. Hazardous, Toxic, and Radiological Waste (HTRW)**

(1) Though document E-4 indicates that the Army constructed buildings, a water pumping station, and an electric generator on this site, no visible evidence of these structures exists today. Neither is there any evidence of HTRW contamination as a result of their construction, use, or removal. There were no "closed storage or office" buildings constructed on this site.

(2) Document E-3 indicates that "hutments" sufficient to house 21 enlisted men were erected on the Air-to-Ground Gunnery Range site. Considering the temporary nature of such structures, it is unlikely that any HTRW contamination resulted from their construction, use, or removal.

**b. Building Demolition/Debris Removal (BD/DR)**

Though document E-4 indicates that the Army constructed buildings, a water pumping station, and an electric generator on this site, no visible evidence of these structures exists today.