ERDC/CERL SR-06-53

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Fort Bliss Main Post Early Cold War BASOPS Building Inventory and Evaluation, 1951-63

Susan Enscore, Adam Smith, and Sunny Stone

December 2006

Construction Engineering Research Laboratory

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Final Report

Prepared for Conservation Division,
Directorate of Environment, Fort Bliss, Texas

Under 21/2020/220/A/MIPR5K5192C162/PO

Abstract: This report inventories all of the Base Operations (BASOPS) buildings constructed at Fort Bliss Main Post between the years of 1951 and 1963. Determinations of Eligibility (DOE) to the National Register of Historic Places (NRHP) are then made based on the significance of the buildings and the degree to which they retain their integrity for conveying that significance. The authors inventoried and evaluated 160 properties on the installation constructed during these years. As previous studies had established the Fort Bliss properties that are directly related to exceptionally important Army Cold War activities, this research effort will contribute to the future determinations of standard eligibility to the NRHP for properties at Fort Bliss. The currently existing Program Comments for Unaccompanied Personnel Housing was taken into consideration when making DOEs for relevant buildings.

Contents

Figures and Tables

Figures

Tables

Preface

This study was conducted for the U.S. Army Garrison Fort Bliss, Directorate of Environment, Conservation Division, Fort Bliss, Texas under project number 130374, "Ft Bliss Main Post Early Cold War Bldg Inventory & Evaluation." Funding was provided by Military Interdepartmental Purchase Request (MIPR) 21/2020/220/A/MIPR5K5192C162/PO, dated 11 July 2005. The Fort Bliss technical monitor was Mr. Russell Sackett, Historical Architect.

The work was performed by the Land and Heritage Conservation Branch (CN-C) of the Installations Division (CN), Construction Engineering Research Laboratory (CERL), Engineer Research and Development Center (ERDC). The CERL Project Manager was Dr. Susan Enscore. Ms. Manroop Chawla is Acting Chief, CEERD-CN-C, and Dr. John T. Bandy is Chief, CEERD-CN. The associated Technical Director is Dr. William D. Severinghaus, CEERD-CV-T. The Director of CERL is Dr. Ilker R. Adziguel.

COL Richard B. Jenkins was Commander and Executive Director of ERDC. Dr. James R. Houston was Director.

Unit Conversion Factors

Multiply	By	To Obtain
acres	4,046.873	square meters
cubic feet	0.02831685	cubic meters
cubic inches	0.00001638706	cubic meters
feet	0.3048	meters
inches	0.0254	meters
miles (U.S. statute)	1.609347	kilometers
square feet	0.09290304	square meters
square miles	2,589,998.00	square meters
yards	0.9144	meters

1 Methodology

Background

Through the years, the U.S. Congress has enacted laws to preserve our national cultural heritage. The first major Federal preservation legislation was the Antiquities Act of 1906. This Act was instrumental in securing protection for archeological resources on Federal property. The benefits derived from this Act and subsequent legislation precipitated an expanded and broader need for the preservation of historic cultural resources. With this growing awareness, the U.S. Congress codified the National Historic Preservation Act of 1966 (NHPA) on 15 October 1966, the most sweeping cultural resources legislation to date.

The U.S. Congress created the NHPA to provide guidelines and requirements aimed at preserving tangible elements of our past primarily through the creation of the National Register of Historic Places (NRHP). Contained within this piece of legislation (Sections 110 and 106) are requirements for Federal agencies to address their cultural resources, defined as any prehistoric or historic district, site, building, structure, or object. Section 110 requires Federal agencies to inventory and evaluate their cultural resources. Section 106 requires the determination of effect of Federal undertakings on properties deemed eligible or potentially eligible for the NRHP.

The main cantonment of the U.S. Army Air Defense Artillery Center & Fort Bliss is located in the western tip of Texas, bordering the city of El Paso along U.S. Highway 54. The installation, including its ranges and airfield, encompasses nearly 5,000 buildings and approximately 1.13 million acres of land, some of which the Army owns and some of which is withdrawn public land. As the Army's center for the education and training of air defense units, Fort Bliss is home to the U.S. Army Air Defense Artillery (ADA) School and four combat ADA Brigades. The U.S. Army Sergeants Major Academy and the German Air Force Air Defense School are also located at Fort Bliss.

Fort Bliss traces its history back to 1848 when the Army first established a post in the El Paso area to protect settlers from marauding Apaches. During the ensuing four decades, the post occupied five different sites in the area. In 1891, the Army chose the present site along Lanoria (La Noria) Mesa and began constructing a permanent installation. Fort Bliss was only a small infantry post in the first two decades at this location. When revolution broke out in

Mexico in 1911, the War Department began reinforcing the post with additional troops to prevent illegal arms smuggling and to discourage any hostile acts against the United States. Recognizing that mounted troops were the best way to patrol the international border, the War Department subsequently converted Fort Bliss into a cavalry post. When General John J. Pershing led the Punitive Expedition (1916-1917) into Mexico in pursuit of the Mexican revolutionary, Pancho Villa, Fort Bliss served as the major staging area and support base. In the 1920s and 1930s, mounted troops stationed at Fort Bliss continued to patrol the international border even as the Army replaced the horse cavalry with mechanized vehicles at most of its other installations.

The United States' entry into World War II saw the end of the horse cavalry era at Fort Bliss and the beginning of the installation's antiaircraft artillery (AAA) training role. Taking advantage of the wide expanse of surrounding lands and the mild regional climate, the War Department gradually consolidated all of its AAA training and testing activities at the installation during the war. Immediately after the war, Fort Bliss also began supporting the Army's first guided missile development efforts.

During the early Cold War years, the Antiaircraft Artillery and Guided Missile Center and School, the 1st Antiaircraft and Guided Missile Brigade, and Army Ground Forces Board No. 4 (later the U.S. Army Air Defense Board) transformed Fort Bliss into the Army's premier AAA and guided missile center. While the Brigade participated in the Army's early guided missile development programs, the School began training AAA gun units for deployment around the nation. When guided missiles such as Nike, Corporal, and Hawk became operational, the School and the Brigade began training the men that fielded these systems. As air defense technology advanced, new air defense systems and anti-missile systems such as Safeguard and Patriot became part of the training activities at Fort Bliss.

Fort Bliss Army Airfield was first established with an aviation section headquarters in 1919 and was known as Bliss Field. World War II sparked a large building program to support heavy bombardment training. With the creation of the Air Force in 1947, a new role for the field as an Air Force base began. Designated a Strategic Air Command (SAC) base, Biggs Air Force Base provided support for the largest bombers of the time. The airfield returned to Army ownership in 1966. Biggs Field presently operates as an Army airfield, maintaining facilities for transient fixed-wing aircraft.

Objectives

The objectives of this study were to (1) inventory 160 buildings and structures dating from 1951 to 1963; (2) research the history of those 160 buildings and structures; and (3) assess the eligibility of the buildings and structures according to NRHP guidelines. Study of the subject facilities was required for the NHPA compliance because the buildings have reached or are close to 50 years of age, at which time they become potentially eligible for the National Register. For a property to qualify for the NRHP, it must meet at least one of the National Register Criteria for Evaluation, must be significantly associated with an important historic context, and must retain sufficient integrity to convey its significance.

Approach

Per Section 110 of the NHPA, Fort Bliss needs to evaluate all of its buildings and structures 50 years of age and older. Under a Military Interdepartmental Purchase Request, the Engineer Research and Development Center's Construction Engineering Research Laboratory (ERDC-CERL) was retained to undertake the project by completing an inventory and DOEs for the Fort Bliss Main Post BASOPS properties constructed between 1951 and 1963.

This report has several parts. First is the methodology used for the report, second consists of the historic context for evaluating the buildings, third are the inventory and evaluation results, and the fourth part is historic property inventory forms for all evaluated buildings and structures.

Archival Research

Archival research involves several tasks. The first task is the initial literature review. The second is to identify and locate primary research materials.

Literature review.

The research team used secondary literature to determine the general history of Fort Bliss and the region, its natural history, and its geographical position. This involved reading published material on the history of Fort Bliss, ranging from books to government reports, to newspaper articles of the Fort Bliss vicinity found at the area libraries. In 1999, Fort Bliss tasked CERL to determine if any exceptionally significant Cold War cultural resources existed on the installation. In the project reports, "Identification and Evaluation of Cold War Properties at Fort Bliss, Texas," and "Historic Cold War Properties at Fort Bliss, Texas: National Register of Historic Places Multiple Property

Documentation Form," both by Patrick M. Nowlan, an extensive historic context covering the Cold War period was provided. Additionally, guidance was provided as to significant historic associations indicating likely eligibility for Main Post Cold War buildings as they reached fifty years of age. As these associations relevant to the current study were already included in the existing historic context, that context was utilized here, with some new information added.

In August 2006, a program comment was signed which affect this project. The *Program Comment for Cold War Era Unaccompanied Personnel Housing (1946-1974)*, is a DoD-wide agreement that declares all buildings and structures designed and built as unaccompanied personnel housing (UPH) to be eligible to the NRHP.[1] For the Army, this includes barracks, transient lodging, dining facilities, laundry facilities, garages and carports, hutments, tent pads, and bachelor officer quarters.[2] A historic context for the Army UPH has been completed.[3] The context provides guidance for assessing integrity of UPH buildings, and recommends that if the primary housing properties retain integrity, then a potential historic district may exist comprising the housing and its associated support buildings. A significant number of UPH type buildings were included in the list of buildings at Fort Bliss to be inventoried for this study. As we had already inventoried these buildings, and because some of them contribute to a historic district, they are included in this report, although they are now considered eligible for the NRHP for purposes of Section 106 compliance.

Research material.

The research team then located primary research materials and additional secondary materials to establish a strategy to best utilize these resources. This report is based primarily on the collections found at Fort Bliss, including the review of cultural resource studies, historical accounts, real property data, construction program documentation, and visual information (photographs, technical illustrations, architectural drawings, maps, charts, etc.). The Conservation Division, Fort Bliss, provided most of these resources. The Office of the Historian, Air Defense Artillery (ADA) provided textual and photographic information on missile systems. The Fort Bliss Air Defense Artillery (ADA) Museum provided textual and photographic resources, and relevant photo-

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[1] Advisory Council on Historic Preservation, *Program Comment for Cold War Era Unaccompanied Personnel Housing (1946-1974),* (2006), *https://www.denix.osd.mil/denix/Public/Library/NCR/program_alternatives.html?fm-culres*

[2] The program comment covers Army buildings with a 5 digit Category Group Code starting with 72xxx.

[3] Kathryn M. Kuranda et al, *Unaccompanied Personnel Housing (UPH) During the Cold War (1946-1989),* (Aberdeen Proving Ground, MD: U.S. Army Environmental Center, 2003).

graphic information was also found at the Fort Bliss Museum. A member of the research team conducted a visit to the National Archives at College Park, Maryland, the Library of Congress, and the History Office of the United States Army Corps of Engineers on 12 December to 16 December 2005 to locate additional historic photographs. A follow-up visit to the National Archives at College Park occurred 30 October to 3 November 2006 to gather additional textual material.

Site Visits

The research team conducted a site visit to familiarize themselves with the buildings on the list provided by Fort Bliss; and to survey and identify the buildings and structures (see Table 1 and Figures 1-7). The initial site visit occurred on 12 September to 17 September 2005.

During the site visit, two researchers conducted site reconnaissance on foot using photography, sketches, and note-taking to help determine the level of integrity remaining in the buildings, while one researcher collected archival information such as real property cards, engineering drawings, and historic photographs from the installation and nearby repositories. Follow-up site visits occurred 10 October to 14 October 2005 and 25 June to 29 June 2006.

Table 1. List of buildings inventoried.

BLDG #	YEAR BUILT	HISTORIC FUNCTION	CAT CODE	SQUARE FEET
56	1961	ADMINISTRATION	13115	26,049
735	1960	STORAGE	44220	384
736	1960	SUB/SWIT STA	89113	384
737	1960	SUB/SWIT STA	89113	384
738	1960	GEN REP INST	17132	15,083
739	1960	VEH MAINT INST	17133	15,081
740	1960	VEH MAINT INST	17133	15,068
741	1960	VEH MAINT INST	17133	4,722
742	1960	SUB/SWIT STA	89113	384
743	1960	VEH MAINT INST	17133	4,722
744	1960	ACCESS CNT FAC	14113	45
745	1960	VEH MAINT INST	17133	21,108
746	1960	GEN REP INST	17132	14,947
747	1960	GEN REP INST	17132	14,922
748	1960	SUB/SWIT STA	89113	384
749	1960	ORG STORAGE	44224	384
750	1960	ORG STORAGE	44224	384
751	1960	ACCESS CNT FAC	14133	44

BLDG #	YEAR BUILT	HISTORIC FUNCTION	CAT CODE	SQUARE FEET
756	1960	VEH MAINT INST	17133	15,118
771	1960	STORAGE	44220	384
772	1960	STORAGE	44220	44
777	1959	ADMINISTRATION	61050	47,827
1001	1956	CO HQ BLDG/ENL UPH	72122	47,649
1002	1956	CO HQ BLDG/ENL UPH	72122	47,635
1003	1956	CO HQ BLDG/ENL UPH	72122	47,649
1004	1956	CO HQ BLDG/ENL UPH	72122	47,649
1005	1956	CO HQ BLDG/ENL UPH	72121	47,649
1006	1956	CO HQ BLDG/ENL UPH	72122	47,649
1007	1956	CO HQ BLDG/ENL UPH	72111	47,649
1008	1956	CO HQ BLDG/ENL UPH	72122	47,649
1009	1956	DINING FACILITY	72210	47,649
1010	1956	BN HQ BLDG	72121	47,325
1011	1956	CO HQ BLDG/ENL UPH	72121	47,305
1012	1956	CO HQ BLDG/ENL UPH	72121	47,649
1013	1956	CO HQ BLDG/ENL UPH	72121	47,649
1014	1956	CO HQ BLDG/ENL UPH	72121	47,649
1015	1956	EXCHANGE BRANCH	74050	4,107
1016	1957	ORG CLSRM/ENL UPH	17199	7,794
1017	1958	CO HQ BLDG/ENL UPH	14185	2,581
1022	1956	BN HQ BLDG	14183	2,530
1023	1957	ORG CLSRM/ENL UPH	17119	3,475
1025	1956	BN HQ BLDG	14183	2,541
1026	1957	ORG CLSRM/ENL UPH	17119	3,293
1029	1957	ORG CLSRM/ENL UPH	17119	3,473
1030	1957	BN HQ BLDG	14183	2,560
1031	1963	BN HQ BLDG	14182	9,183
1046	1957	FUEL/POL BUILDING	14165	208
1048	1957	OIL STORAGE FAC	21470	320
1050	1957	VEH MAINT INST	21410	9,725
1063	1957	FUEL/POL BUILDING	14165	192
1065	1957	OIL STORAGE FAC	21470	319
1067	1957	VEH MAINT INST	21410	9,740
1069	1959	ENG/HOUSING MNT	21910	2,215
1070	1956	SEW/WTR TRT BLDG	89131	87
1071	1957	ENG/HOUSING MNT	21910	420
1073	1957	MNT GEN PURP	89131	9,402
1075	1957	OIL STORAGE FAC	21910	319
1077	1959	STORAGE	21885	744
1078	1959	STORAGE	21470	394
1084	1959	VEH MAINT SHP	21410	5,119
1085	1959	VEH MAINT SHP	21410	4,692
1087	1959	STORAGE	44220	288
1088	1959	STORAGE	44220	255

BLDG #	YEAR BUILT	HISTORIC FUNCTION	CAT CODE	SQUARE FEET
1089	1959	VEH MAINT SHP	21410	5,119
1090	1959	VEH MAINT SHP	21410	4,692
1091	1960	ACCESS CNT FAC	14113	39
1095	1959	ACCESS CNT FAC	14133	37
1096	1959	STORAGE	44220	384
1097	1959	STORAGE	44220	744
1099	1960	STORAGE	44220	393
1249	1958	STORAGE	44220	4,323
1798	1960	SEW/WST TRT BLDG	89131	85
2400	1957	BN HQ BLDG	14183	3,089
2401	1957	BN HQ BLDG	14183	3,822
2402	1957	BN HQ BLDG	14183	2,560
2403	1957	BN HQ BLDG	14183	2,560
2404	1957	BN HQ BLDG	14183	2,560
2405	1957	BN HQ BLDG	14183	3,604
2406	1957	BN HQ BLDG	14183	2,622
2407	1957	BN HQ BLDG	14183	2,560
2408	1957	CONSOL OPEN DINING	74046	4,177
2433	1956	EXCHANGE BRANCH	74050	4,076
2437	1957	BN HQ BLDG	14183	3,430
2438	1957	BN HQ BLDG	14183	2,560
2439	1957	ACES BLDG	74025	3,510
2440	1961	BDE HQ BLDG	14182	8,972
2442	1953	CO HQ/ENL UPH	72111	26,010
2454	1957	BN HQ BLDG	14183	3,684
2492	1956	BN HQ BLDG	14183	4,087
2493	1957	BN HQ BLDG	14183	3,348
2495	1956	AUDITORIUM	74010	16,463
2497	1957	BN HQ BLDG	14183	3,447
2498	1961	CHAPEL	73017	7,453
2499	1962	PHYS FIT CTR	74028	20,560
2525	1961	BDE HQ BLDG	14182	8,897
2536	1959	MNT GEN PURP	21885	7,000
2537	1959	MNT GEN PURP	21885	7,000
2538	1959	MNT GEN PURP	21885	7,000
2599	1957	MNT GEN PURP	21885	700
2601	1957	BN HQ BLDG	14183	2,565
2602	1957	BN HQ BLDG	14183	3,517
2605	1957	BN HQ BLDG	14183	3,517
2606	1957	BN HQ BLDG	14183	2,648
2608	1957	ORG CLASSROOM	17119	3,744
2660	1960	FUEL/POL BLDG	14165	192
2665	1960	OIL STORAGE	21470	120
2667	1960	VEH MAINT SHOP	21410	9,720
2671	1960	OIL STORAGE	21470	120

BLDG #	YEAR BUILT	HISTORIC FUNCTION	CAT CODE	SQUARE FEET
2673	1960	FUEL/POL BLDG	14165	96
2674	1960	VEH MAINT SHOP	21410	9,720
2677	1960	GREASE RACK	unknown	unknown
2678	1960	OIL STORAGE	21470	120
2680	1960	VEH MAINT SHOP	21410	9,720
2684	1960	OIL STORAGE	21470	120
2910	1957	CO HQ/ENL UPH	17119	3,348
2911	1957	BN HQ BLDG	14183	2,478
2912	1957	ORG CLASSROOM	17119	3,360
2913	1957	BN HQ BLDG	14183	2,508
2914	1957	BN HQ BLDG	14183	2,508
2915	1957	ORG CLASSROOM	17119	3,360
2916	1957	ORG CLASSROOM	17119	3,360
2917	1957	BN HQ BLDG	14183	2,508
2918	1957	BN HQ BLDG	14183	2,484
2919	1957	ORG CLASSROOM	17119	3,348
2920	1957	ORG CLASSROOM	17119	3,348
3600	1958	ORG CLSRM/ENL UPH	17119	1,919
3659	1960	GAS CHAMBER	17170	1,680
3671	1960	ACCESS CNT FAC	14113	80
3672	1960	WPN QA/CAL DEP	21522	18,120
3673	1960	FLAM MAT STOR	44240	100
3675	1959	ORG STORAGE	44224	1,680
3676	1959	ORG STORAGE	44224	794
3677	1959	ORG STORAGE	44224	784
3678	1959	ORG STORAGE	44224	784
3679	1959	ACCESS CNT FAC	14113	36
3688	1955	ACCESS CNT FAC	14113	864
3698	1956	WTR SUP/TRT BLDG	89141	420
3700	1961	FLT/UTL BLDG	89120	672
3701	1961	ORG STORAGE	44224	6,367
3702	1961	ORG STORAGE	44224	7,591
3703	1961	ORG STORAGE	44224	2,994
3704	1961	ORG STORAGE	44224	2,947
3705	1961	ORG STORAGE	44224	2,947
3706	1961	ORG STORAGE	44224	2,994
3707	1961	ORG STORAGE	44224	5,867
3785	1963	XMITTER BLDG	13160	2,953
3796	1960	WTR SUP/TRT BLDG	89141	72
3797	1959	WTR SUP/TRT BLDG	89141	151
3798	1960	WTR SUP/TRT BLDG	89141	130
5035	1950	INDOOR SWIMMING POOL	74072	27,093
5822	1959	STORAGE	44220	952
5827	1959	STORAGE	44220	2,072
5832	1959	STORAGE	44220	2,072

BLDG #	YEAR BUILT	HISTORIC FUNCTION	CAT CODE	SQUARE FEET
5837	1959	STORAGE	44220	2,072
5842	1959	STORAGE	44220	1,456
5861	1959	STORAGE	44220	1,173
5862	1959	STORAGE	44220	1,173
5880	1960	ACCESS CTR FAC	14113	84

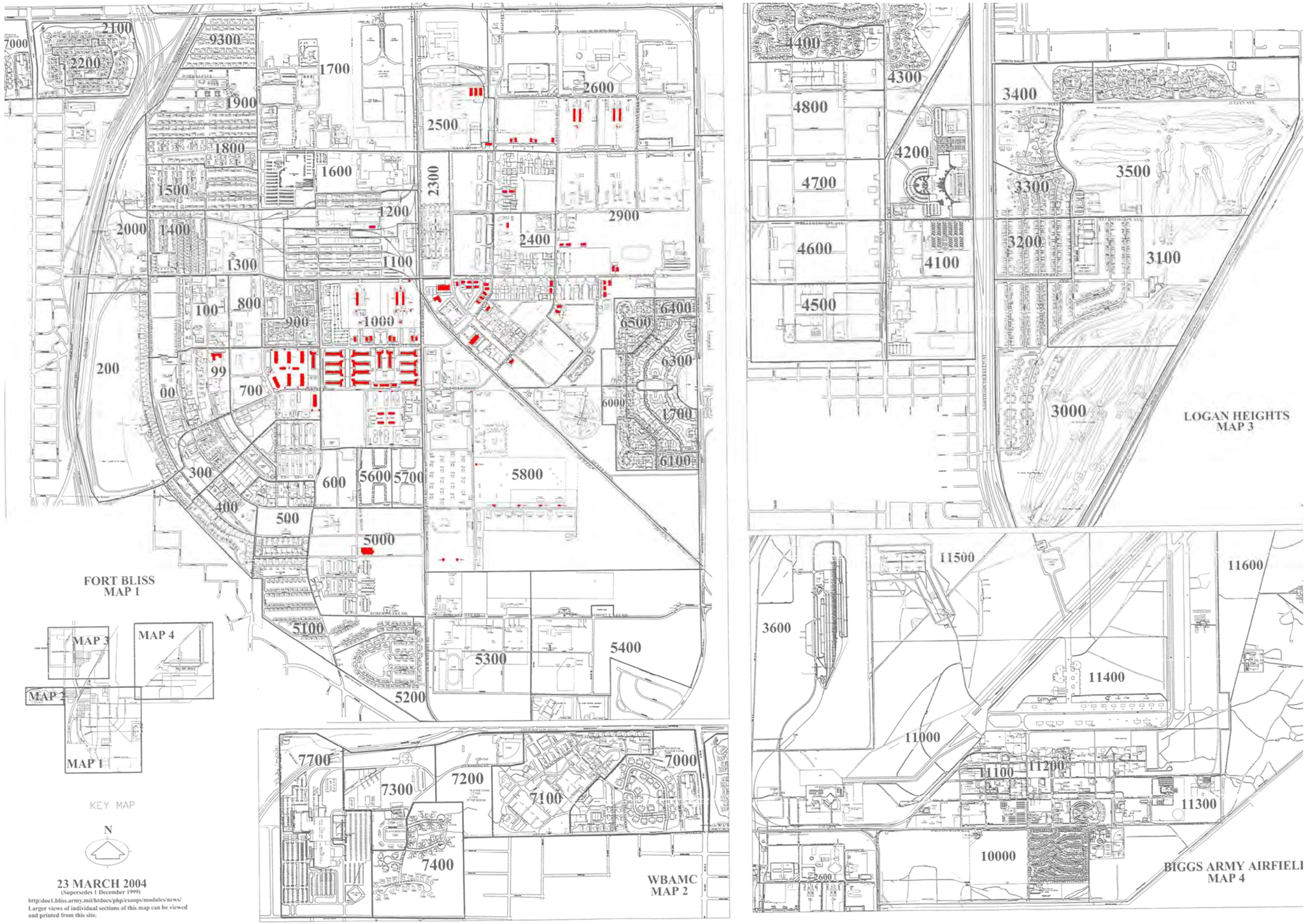

Figure 1. Buildings inventoried on the Main Post.

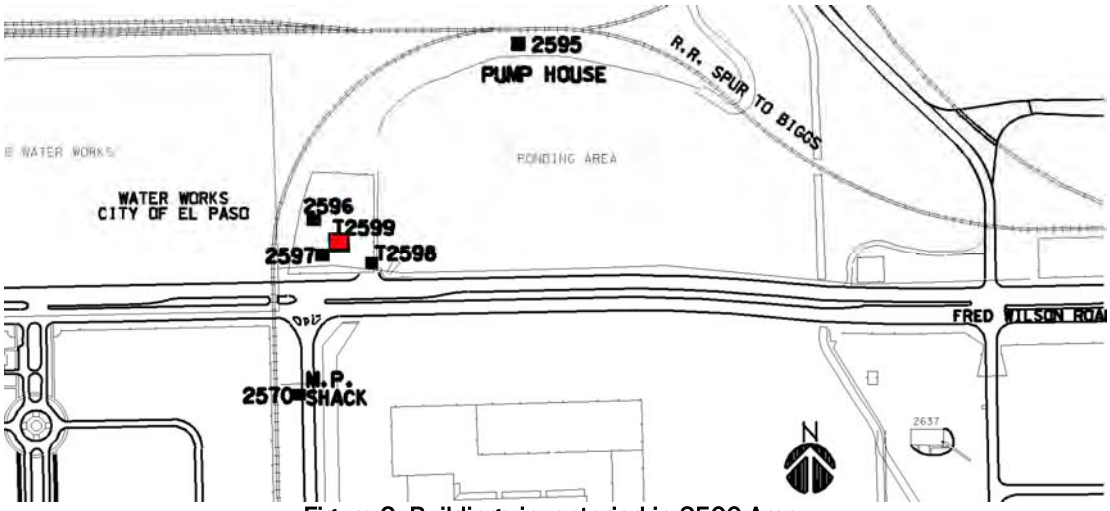

Figure 2. Buildings inventoried in 2500 Area.

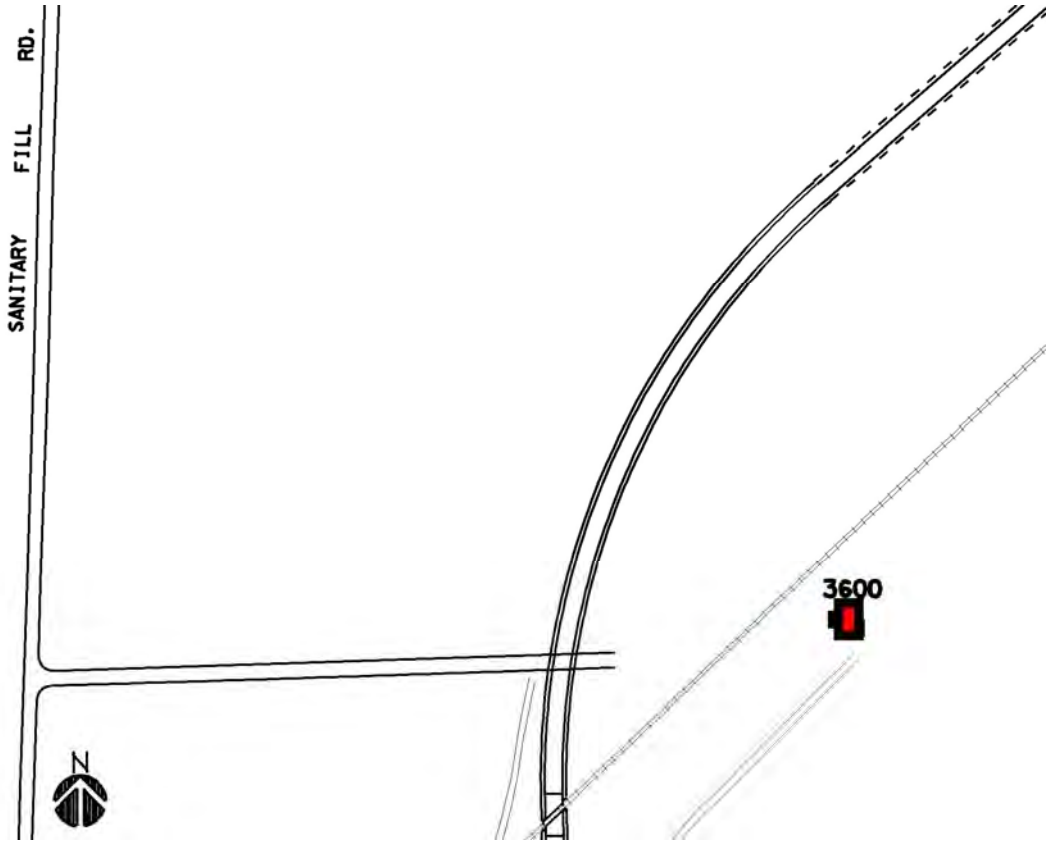

Figure 3. Buildings inventoried in 3600A Area.

Figure 4. Buildings inventoried in 3600E Area.

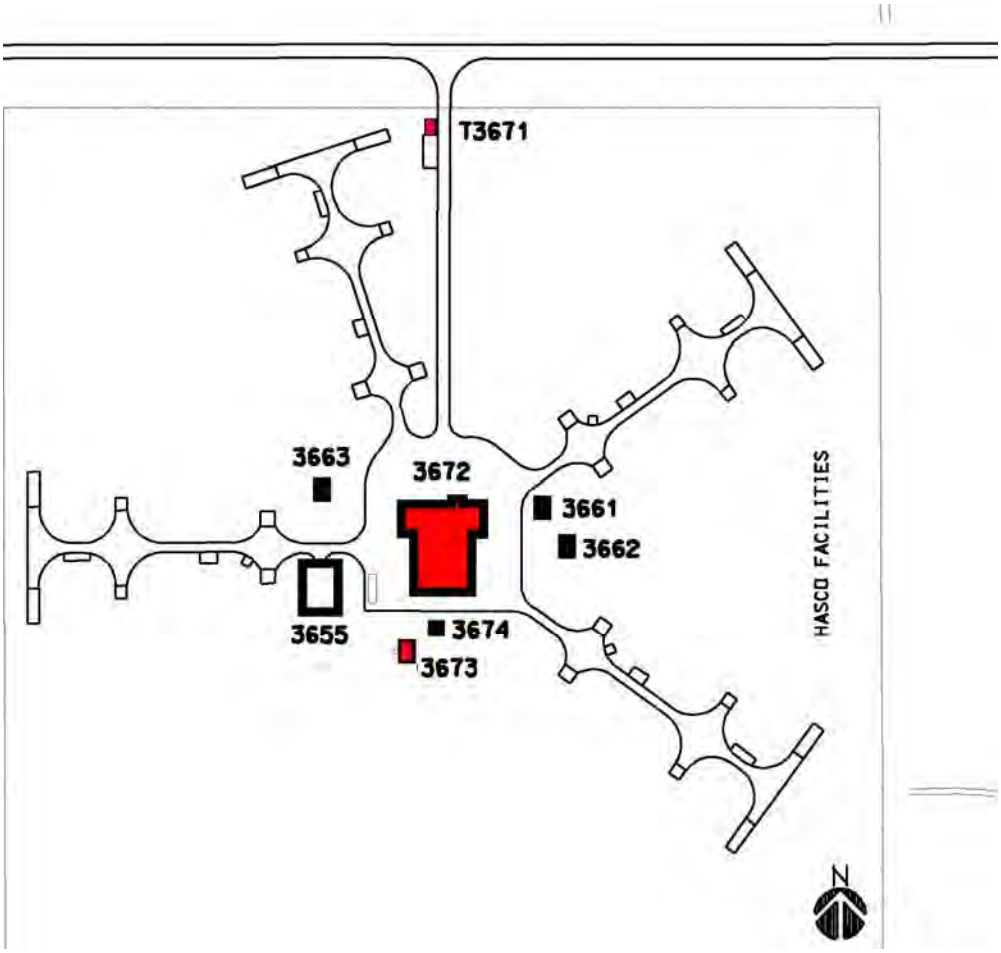

Figure 5. Buildings inventoried in 3600F Area.

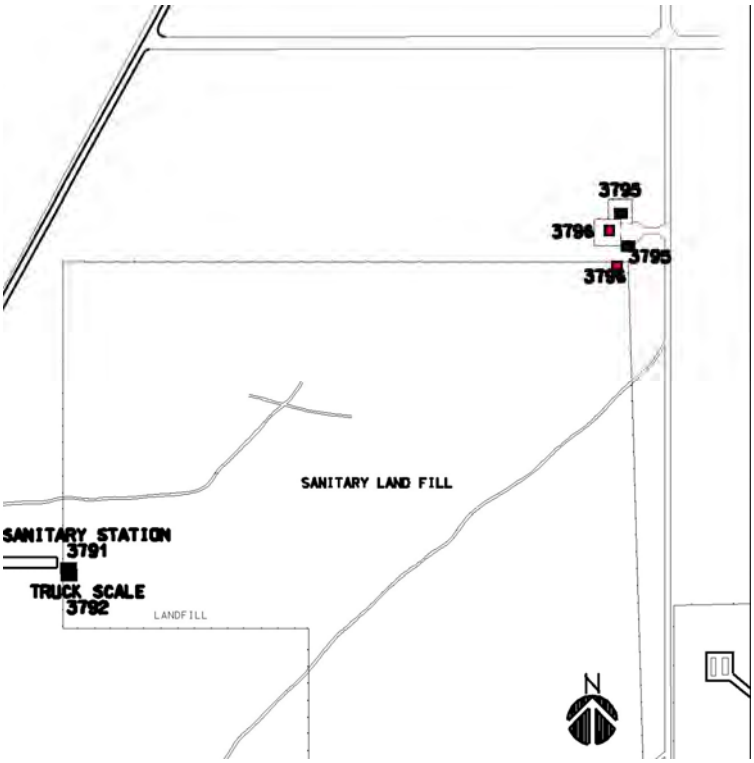

Figure 6. Buildings inventoried in 3700A Area.

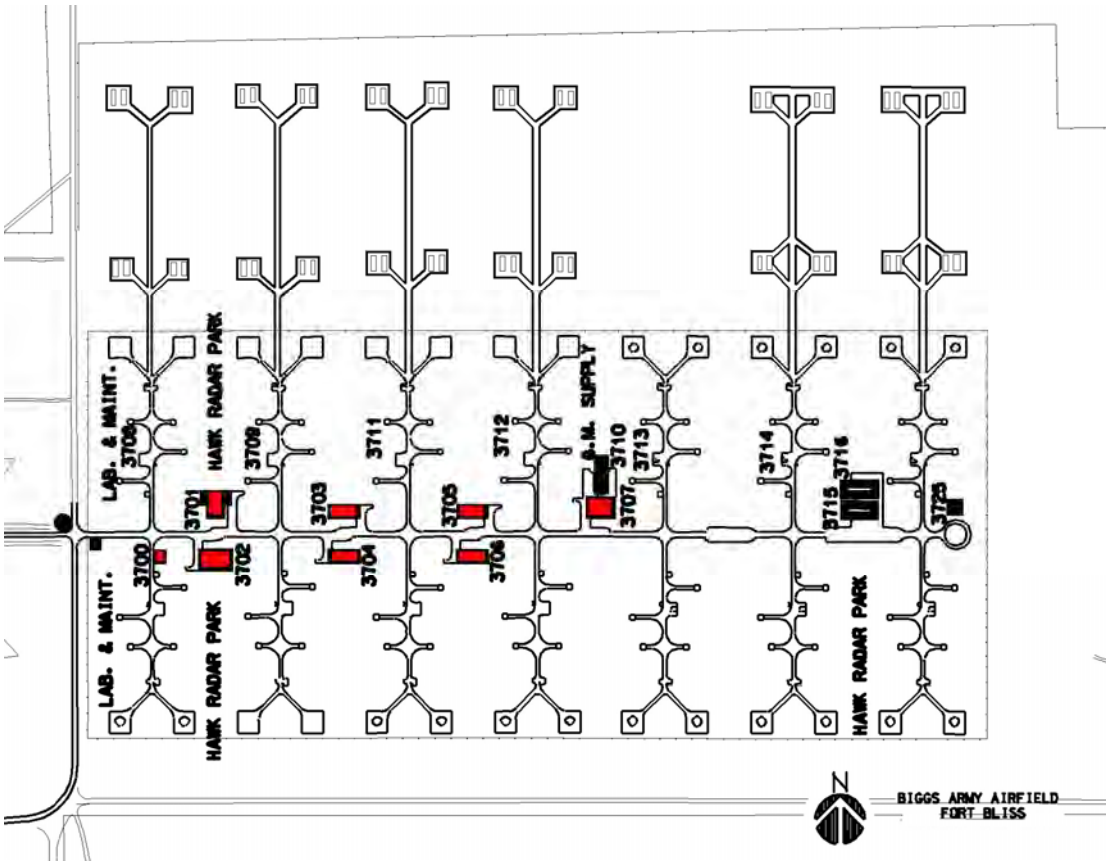

Figure 7. Buildings inventoried in 3700 Area.

Analysis

After the initial research was complete, the team analyzed the gathered information. Archival and field information was integrated throughout the course of the research. Using the archival sources, the research team discovered relevant historical information. As the field research identified specific building and structure type characteristics or relationships, the research team refined their questions and looked further in the archival records for answers. The integration of archival and field methods necessitated an integration of visual and written sources in the final report.

This inventory and evaluation relied on historic maps and photographs to illustrate findings and provide evidence of the historical characteristics of the structures surveyed. For determining integrity of the buildings, the researchers relied heavily on real property cards and engineering plans, and historic photographs when available, for the original conditions. The researchers relied on the information from the real property office and the engineering plans to determine size, areas, and costs of the buildings. Some information

on the construction and development of the buildings and structures under study was located in back issues of the local newspapers and at the National Archives. Determinations of NRHP eligibility were conducted through the application of the National Register Criteria for Evaluation and the seven aspects of integrity as provided in *National Register Bulletin #15: How to Apply the National Register Criteria for Evaluation* (1991). For purposes of determining eligibility, a period of significance from 1951 – 1989 is used. This encompasses the period from earliest construction through the end of the Cold War.

The inventory is a series of forms, containing a site map, photographs, description of the building; history; architectural integrity, landscape integrity, continuity of use over time; Universal Transverse Mercator (UTM) coordinates, owner, owner's address, general condition of property, additions or alterations, bibliography, and building plans. The inventory/building forms chapter presents buildings by type. They are grouped together to provide one set of forms for each type, such as battalion headquarters or mess halls. For each set of building types, the relevant forms begin with color-coded maps that highlight in red the buildings of that type surveyed at Fort Bliss for this study. These maps do not directly correspond to the color-coded maps located in the survey results chapter regarding eligible districts.

Acknowledgements

People that assisted with the formation of this report are Russell Sackett, Fort Bliss Historic Architect; Hugo Gardea, Fort Bliss Historic Architect; Susie Payne, Fort Bliss Cultural Resources Specialist; John Hamilton, ADA Historian, James D'Angina, ADA Museum Curator; Floyd Geery, Fort Bliss Museum Archivist; Susan Martinez, Fort Bliss Real Property Office; and Darryl Williams, Engineering Office. Also extremely helpful were the photograph archivists in the Still Pictures room at the National Archives in College Park, Maryland.

2 Fort Bliss Cold War Historic Context

Cold War Overview

From World War II to the Cold War

The seeds of the Cold War were sown during World War II when the United States and the Soviet Union found themselves allies in the fight against Nazi Germany. Although they fought together against a common enemy, both countries had vastly different world views and ideologies. When it became clear that Germany would be defeated, the uneasy cooperation that had existed between the countries steadily fell apart as each sought to strengthen its position and influence in the post-war world. In the years that followed World War II, the antagonisms that developed between the two countries became so severe that a war between the former allies became a very real possibility. Such a war was guaranteed to be catastrophic on an unprecedented level because of two technologies that were developed during World War II. These technologies were guided missiles and the atomic bomb.

Guided Missiles and the Atomic Bomb

Germany ushered in the era of guided missiles in 1944 when it began launching its V-1 "buzz bombs" and V-2 rockets against Allied targets. Although these weapons were introduced too late to affect the outcome of the war, it was apparent to leaders in both the United States and the Soviet Union that these types of weapons would play a key role in future warfare. Not surprisingly, both countries were eager to acquire and exploit the new technology.

As the U.S. Army pushed eastward through Germany late in World War II, it raced to capture German rockets, technical documents, and scientists before they fell into the hands of the Soviet Union. This effort paid large dividends as huge quantities of rocket parts and technical documents were discovered and shipped to the United States. In a related effort known as "Operation Paperclip," the U.S. Army also began importing captured German rocket specialists to the United States. The technical expertise and support of these specialists combined with the large cache of captured rocket parts would jump-start an American guided missile development program. Similarly, the Soviet Union also began a guided missile development program of its own. Like the American program, the Soviet effort benefited from captured German hardware and rocket specialists.

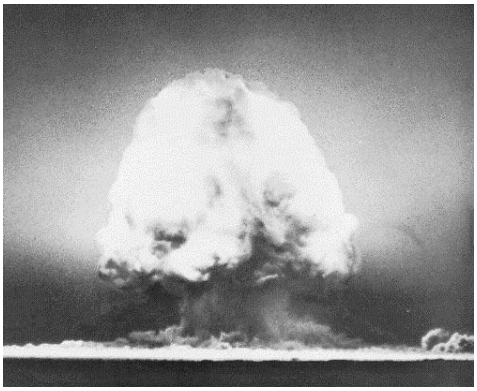

Figure 8. First U.S. Atomic Bomb Test. July 16, 1945

The guided missile development efforts of the United States and Soviet Union were both greatly impacted by the atomic bomb. Begun as a top secret American wartime program known as the Manhattan Project, the atomic bomb was the result of the collaborative work of hundreds of leading scientists working in the United States. Between 1942 and 1945, the American government spent nearly $2 billion to produce the bomb whose unprecedented explosive force came from a chain reaction based on nuclear fission. This effort bore fruit on July 16, 1945 when scientists produced the world's first atomic explosion at a site roughly 120 miles south of Albuquerque, New Mexico. Several weeks later, the United States dropped atomic bombs on the Japanese cities of Hiroshima and Nagasaki, effectively ending the war in the Pacific. Although the Soviet Union was a wartime ally of the United States, American leaders purposely withheld all information concerning the Manhattan Project from the Soviets. Troubled by the American monopoly of this new technology, Soviet Premier Joseph Stalin secretly began his own atomic bomb development program.

Post-War Developments

Tensions between the Soviet Union and the United States developed quickly after World War II as each country struggled to create a post-war world based upon its own political ideologies. Particularly troubling to leaders in the United States was the Soviet backing of communist forces in countries such as Hungary, Czechoslovakia, Greece, Turkey, Korea, and Vietnam. It appeared to American leaders that the Soviet Union was an aggressor nation bent on world conquest. Fearing that the fall of one nation to communism would have a "domino effect" on surrounding nations, President Truman's administration adopted a policy of opposing communism anywhere and everywhere in the world. This policy of "containment" would see every regional conflict as a struggle between the United States and the Soviet Union.

Tensions between the United States and Soviet Union reached a critical point in 1948-49 when the Soviet Union blocked access to West Berlin. Although a massive airlift campaign by the United States prevented war, the incident highlighted the military strengths and weaknesses of both countries. The Soviets held a substantial advantage in conventional forces while the United States was still the sole possessor of the atomic bomb. Leaders in the United States, faced

with post-war budgetary restrictions, soon came to view nuclear weapons as a relatively inexpensive and politically acceptable means to offset any Soviet military advantages. The United States soon began producing smaller, more powerful nuclear bombs while at the same time dramatically reducing its defense budget.

In April 1949, the United States, Canada, and ten West European countries joined together in a military and political alliance known as the North Atlantic Treaty Organization (NATO). Greece, Turkey, and West Germany joined the ranks of NATO within the next six years. The NATO treaty provided for U.S. military assistance to Western Europe in the event of a Soviet-backed invasion. To fulfill its NATO commitment, the United States looked to its nuclear bomber force as a relatively cheap and effective solution. The new B-36 intercontinental bomber could threaten targets deep within the Soviet Union from bases on United States soil.[4]

Although the United States viewed NATO as a defensive alliance, Soviet officials viewed NATO as an organization whose ultimate aim was to push the Soviet Union back to its pre-war position. The Soviets responded by creating an alliance of their own with the communist governments of Eastern Europe. This alliance was formalized in 1955 with the signing of the Warsaw Pact.

U.S. Defense Policies of the 1950s and 1960s

A number of significant developments greatly impacted the defense policy of the United States in the 1950s and 1960s. The first was the Soviet detonation of an atomic bomb in August 1949. This event ended the nuclear monopoly of the United States and provided the impetus for the United States to develop the more powerful hydrogen bomb. Only a few months after the Soviet atomic detonation, Mao Tse-tung's Red Army defeated the forces of Chiang Kai-shek, the United States' long time ally in China. Mao established the People's Republic of China the following year. When the Soviets consolidated their alliance with the Chinese, it appeared as if half a billion people had joined the enemy camp. Faced with these new threats, troubled leaders in the United States began to reassess the nation's defense policies. Greatly coloring that reassessment was a document known as National Security Council Report 68 (NSC-68). NSC-68 portrayed the Soviet Union as a dangerous opponent armed with nuclear weapons and bent on world domination. Warning that the Soviet Union could

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[4]The Weapon of Choice. War and Peace in the Nuclear Age Series: program 2, produced by WGBH/ Boston and Central Independent Television/England in association with NHK/Japan, 60 min., Annenberg/ CPB Project, 1988, videocassette.

have as many as 200 atomic bombs by 1954, the report urged an immediate build-up of the United States' nuclear and conventional forces.[5]

Adding to the anxiety generated by the NSC-68 report was the invasion of South Korea by communist North Korean forces in June of 1950. Suspecting that the invasion was undertaken with Soviet approval and fearing that the Korean development might be a prelude to similar action in Europe, Congress drastically increased the U.S. defense budget.

While U.S.-dominated United Nations forces fought in Korea, America's efforts to create a hydrogen bomb proceeded rapidly. In November 1952, America's scientists detonated the world's first thermonuclear device at Eniwetok Atoll, paving the way for the development of the hydrogen bomb. The explosion was 600 times more powerful than the bomb dropped on Hiroshima. Despite this remarkable achievement, the security of the United States was far from being ensured as the Soviet Union detonated its first hydrogen bomb only ten months later. At that point, the Cold War acquired a new and much more disturbing character. For the first time in history, two competing powers possessed the means to completely destroy the human race.

Although both superpowers possessed the hydrogen bomb in the early 1950s, the United States maintained a strategic advantage in the form of a fleet of long range bombers. Loaded with hydrogen bombs, these aircraft could deliver their deadly payloads to Soviet targets within two hours. American military planners made these long range bombers the centerpiece of the nation's defense force, reasoning that the best deterrent to a possible Soviet nuclear attack was the threat of a devastating retaliation visited upon targets within the Soviet Union. The Air Force's Strategic Air Command (SAC) was the primary instrument for this policy known as "massive retaliation."

Figure 9 - SAC's Boeing B-29 "Superfortress" Long Range Bomber

Painfully aware of the American strategic advantage in bombers, Soviet leaders initiated a large-scale military production campaign aimed at narrowing the strategic gap. The Bull bomber, introduced in the late 1940s, was the first Soviet plane that had intercontinental ability. By the late 1950s, the Soviet Union was

[5]Ibid.

producing several other long-range bombers capable of reaching mainland United States targets with nuclear bombs.[6] This development greatly increased the importance of a strong U.S. air defense.

Concurrent with the effort to produce a fleet of long-range bombers, the Soviet Union also began investing heavily in the development of long range missiles. Although the United States had also begun a long range missile program, by the mid-1950s, the Soviets' long range missile program began to pull ahead of U.S. efforts. Several achievements by the Soviets began to make this clear. In August of 1957, the Soviets announced the launching of a multi-stage long range ballistic missile that had reached a "very high, unprecedented altitude."[7] They claimed that this accomplishment would make it possible to reach remote areas without resorting to a strategic air force. Further proof of the advanced state of the Soviet missile program came on October 4, 1957 when one of their rockets placed the world's first man-made satellite, Sputnik, into orbit. The Soviets quickly followed this launch with an even more impressive launch. During the following November, a Soviet rocket placed the 1,120-pound Sputnik 2 satellite, carrying a live dog, into orbit. This launch had tremendous strategic implications. A booster capable of carrying such a payload into space would also be capable of delivering a nuclear bomb to targets within the United States. Leaders in both countries realized that such a development would effectively offset the American advantage in long range bombers.

Figure 10 - Sputnik I

At the time of the Soviet Sputnik launches, the U.S. Army, Air Force, and Navy were all involved in their own long range missile research and development efforts. These efforts had begun in earnest directly after World War II. For a brief period, it appeared that a single national guided missile program might be established to eliminate duplication of effort among the services. The Army and Navy both favored such a development. The Air Force however, strongly opposed such a plan, fearing that a single program would jeopardize its chance of gaining sole responsibility for development and deployment of long range guided missiles.[8] A

[6]Ibid.

[7]Carl Berger and Warren S. Howard, History of the 1st Strategic Aerospace Division and Vandenberg Air Force Base, 1957-1961, (Vandenberg Air Force Base, California: Headquarters, 1st Strategic Aerospace Division, April 1962), 8.

[8]Jacob Neufeld, The Development of Ballistic Missiles in the United States Air Force, 1945-1960, (Washington, D.C.: Office of Air Force History, United States Air Force, 1990), 50-52. The Air Force was a branch of the Army until 1947 when the National Security Act divided the military services into the three separate departments of the Army, the Navy, and the Air Force.

fierce interservice rivalry over control of guided missiles ensued as each service sought to define its role and mission.

Fueling the interservice missile controversy was the ambiguous nature of guided missiles themselves. These weapons could be viewed as either extensions of conventional artillery, as Army officials argued, or they could be viewed as "robot aircraft" or "pilotless aircraft" as Air Force officials argued.[9] Army and Air Force officials vociferously argued their viewpoints. Meanwhile, both services proceeded with missile development efforts that were overlapping and duplicative.

In an attempt to clarify the roles of each service branch and to reduce the waste resulting from the duplicative efforts, Secretary of Defense Louis A. Johnson initiated a review of the nation's missile programs in 1949. The review resulted in the creation of a priority list of missiles to be developed and the assignment of separate missile test ranges to each service branch. Although the Air Force emerged from the review with "formal and exclusive" responsibility for developing long range strategic missiles and short-range tactical missiles, the missile development controversy was far from resolved. Both the Army and Navy continued to conduct missile "studies" that eventually progressed to the development stage.[10]

The Air Force initially invested heavily in air-breathing winged missiles, namely the Snark and Navaho. By the mid-1950s however, the service turned the bulk of its efforts towards the development of ballistic missiles.[11] The Air Force's Thor Intermediate Range Ballistic Missile (IRBM) became operational in 1959. Based in England, these missiles acted as a stopgap measure until the Air Force's Intercontinental Ballistic Missiles (ICBMs) became operational. By the early 1960s, the Air Force's Atlas and Titan ICBMs were operational but they were soon phased out in favor of the Titan II and Minuteman ICBMs. The latter two missiles formed the backbone of SAC's landbased nuclear deterrent force for most of the remainder of the Cold War.

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[9] Ibid., 82-93.

[10] Ibid., 55-56.

[11] Ballistic missiles differed from winged or cruise-type missiles in several ways. Winged missiles were restricted to the atmosphere because they required oxygen for flight. Ballistic missiles, on the other hand, carried their own oxidizer and were thus able to fly out of the atmosphere. Faster and more effective than winged missiles, ballistic missiles flew in a long arc similar to artillery shells and hit their targets in a matter of minutes.

Figure 11 - Titan II ICBM

Meanwhile, the Navy developed its own nuclear deterrent force. This force consisted of a fleet of nuclear powered submarines armed with ballistic missiles that could be launched while the submarines were submerged. The Navy's submarine-launched ballistic missiles included the Polaris, Poseidon, and Trident.

Despite the protestations of the Air Force, the Army continued to play a major role in the development of short-range and long-range missiles. In fact, a major portion of the technological base of the Air Force's missile programs came from pioneering missile research and development efforts of the Army.

Early Army Missile Program

Although the Army had experimented with some crude guided missiles during World War II, interest in advanced rocketry remained low until intelligence reports indicated the existence of the German V-1 and V-2 weapons. Received before the end of the European Campaign, the intelligence reports prompted the Army Ordnance Department to establish a Rocket Branch in September of 1943 and to begin its own rocket research and development efforts. The first of these began in January of 1944 when the Ordnance Department awarded the California Institute of Technology's Jet Propulsion Laboratory (JPL) a contract to conduct general research on guided missiles. The emphasis of this effort was to be on rocket propulsion and supersonic dynamics. Reflecting the identity of the sponsors and participants, the effort became known as the ORDCIT Project. This project eventually expanded to include development of several different missiles.

By late 1944, early experimental work at JPL confirmed the feasibility of guided missile development. This prompted the Ordnance Department to begin other rocket projects. In November, the Ordnance Department awarded a project, known as Hermes, to the General Electric Company. The Hermes project was originally designed to study a number of long range ballistic missile concepts. By December, the Ordnance Department decided that this project would mainly study captured German guided missile systems and related technology.[12]

Soon after awarding the contract for the ORDCIT project, the Ordnance Department began searching for a suitable missile firing range. A team of ex-

[12] Joel W. Powell and Keith J. Scala, "Historic White Sands Missile Range," (Alberta, Canada: Space Information, n.d.), 83.

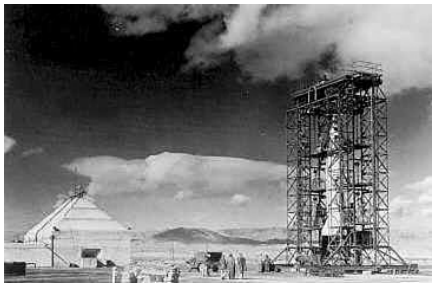

Figure 12 - Launch Complex 33 at White Sands

perts was dispatched across the United States to find a large, isolated site in a location with good weather and a proximity to rail facilities. The team was drawn to the desert of the Southwest. In July of 1945, the Army established the White Sands Proving Ground in the Tularosa Basin in New Mexico, very near to where the first atomic explosion had taken place during the Manhattan Project. The new missile range was approximately 45 miles north of Fort Bliss. Almost immediately, construction began on a launch facility for the ORDCIT and Hermes V-2 rockets. This facility would later become known as Launch Complex 33. The Army also established a series of missile radar and tracking sites around the range.[13] The White Sands Proving Ground, renamed the White Sands Missile Range in May of 1958, became the Army's primary rocket testing and launch facility.[14]

Project ORDCIT Missiles

The first missiles developed under the ORDCIT project were known as the Privates. Developed in two versions, Private A and Private F, these solid-fuel missiles were experimental in nature and designed solely to test missile propulsion and guidance systems. JPL personnel, assisted by Battery C of the 69th AAA Gun Battalion, began conducting test launches of the eight-foot long Private A in late-1944 at a temporary test range set up at Camp Irwin, California. By early 1945, the team had conducted a total of twenty-four such launches. Moving to New Mexico in February of 1945, the JPL team and Battery C began preparations for launching the Private F. This missile featured only small variations from the Private A. Personnel from JPL and Battery C conducted a total of 17 Private F launches at Fort Bliss's Hueco Range between April 1 and 13, 1945.[15]

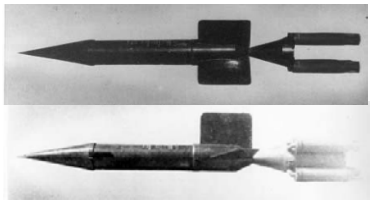

Figure 13 - Private A (top) and Private F (bottom)

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[13] Ibid.

[14] Under an agreement with the Army, the Navy also established a rocket launch and test complex at the White Sands Proving Ground in June of 1946. The Navy has since conducted numerous missile research and development programs at the range.

[15] John C Lonnquest and David F. Winkler, To Defend and Deter: The Legacy of the United States Cold War Missile Program, USACERL Special Report 97/01 (Washington, D.C.: Government Printing Office, November 1996), 16; Lieut. Col. J. W. Rawls, Jr., "The 1st Antiaircraft Artillery Guided Missile Battalion," Coast Artillery Journal, May-June 1946, 14; "Rockets and Missiles In the Southwest--Historical Summary: Private F at Fort Bliss" TMs [photocopy], archives of the U.S. Army Air

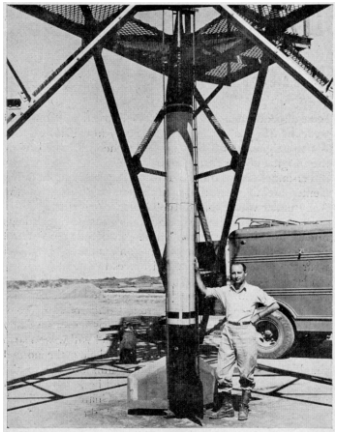

Figure 14 - WAC-Corporal ready for launch

As the Private missile test program proceeded, the JPL team received a request from the Army Ordnance Department to produce a sounding rocket capable of carrying a payload of 25 pounds to an altitude of 100,000 feet, or nearly 19 miles. The Ordnance Department envisioned using such a missile for atmospheric research. To fulfill this request, the JPL team began development of the liquid-fueled WAC-Corporal missile.

The first test of a scaled-down version of the WAC-Corporal took place on September 26, 1945 at the White Sands Proving Ground. The missile ascended to an altitude of 43.5 miles. Only weeks later, on October 11, the team successfully launched the first full scale WAC-Corporal.[16] Over the next year and a half, the JPL team conducted a total of 19 WAC-Corporal launches from Complex 33 at the White Sands Proving Ground.

Although its inability to reach altitudes much greater than 44 miles limited its usefulness, the WAC-Corporal did fulfill the JPL's goal of developing an upper atmosphere research tool. In addition, several important applications evolved from the WAC-Corporal. The Navy upgraded the missile and created the very successful Aerobee sounding rocket. This vehicle has been launched over 650 times at the White Sands Proving Ground since 1947.[17] In 1949, the WAC-Corporal made history when it was mated to a modified V-2 rocket, a combination designated as Bumper. The first full-powered Bumper launch at White Sands, conducted on February 24, soared to a record altitude of 250 miles and became the first man-made object to leave the earth's atmosphere. A total of eight Bumper launches, six at White Sands and two at Cape Canaveral, Florida, helped demonstrate the feasibility and usefulness of multi-stage rockets. This concept was utilized in many later long-range missile and space programs.

Building on its success, the JPL team went on to develop the Corporal E and the tactical Corporal missiles. The Corporal E, a scaled-up version of the WAC-Corporal, was a prototype of the tactical Corporal missile. JPL techni-

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Defense Artillery Museum at Fort Bliss, Texas.; "Missile Activity at Fort Bliss" TMs [photocopy], archives of the U.S. Army Air Defense Artillery Museum at Fort Bliss, Texas.

[16] "Missile Activity at Fort Bliss, Texas."

[17] "Historic White Sands Missile Range," 95.

cians launched the Corporal E a total of ten times at White Sands between May of 1947 and October of 1951.[18] The first tactical Corporal launch took place in August of 1952. With a range of over 75 miles, the all-weather Corporal could be equipped with either a conventional or an atomic-type warhead. Fielded by the Army in 1955, it was deployed in Italy and also saw service with the British Royal Artillery. The Corporal was the first battlefield guided missile armed with an atomic warhead to be deployed by NATO forces.[19]

The Hermes Project and Operation Paperclip

The Hermes Project was an Army effort to build on the advances in rocketry made by the Germans during World War II. Late in war, the Army Ordnance Department learned of a secret underground V-2 factory at Nordhausen, Germany. With the intention of obtaining captured V-2 rockets for use in the Hermes program, the Ordnance Department sent personnel to Europe to bring back up to 100 of the V-2 rockets. The Army also sought to find and obtain the services of the top German rocket specialists. Colonel Holger N. Toftoy, Chief of Army Ordnance Technical Intelligence in Europe, was in charge of the special mission. The considerable job of coordinating the transportation of the V-2s fell to Major James P. Hamill who rushed to complete this assignment before the Soviet Army reached Nordhausen. During the last half of May 1945, American troops hurriedly loaded V-2 parts on trains bound for Antwerp, Belgium. The rocket parts were then loaded onto 16 Liberty ships and transported to New Orleans. Three hundred rail cars moved the parts to New Mexico where the Army rented all available transport in Doña Ana County for the final haul to the White Sands Proving Grounds.

Figure 15 - Wernher von Braun (cast) surrenders to U.S. forces

Meanwhile, on May 2, 1945, a group of leading German rocket scientists, including Dr. Wernher von Braun, surrendered to American forces near the village of Oberjoch. Other important German rocket scientists were also rounded up and information gained from them led to the discovery of an abandoned mine containing 14 tons of technical documents that detailed the German rocket program. The Ordnance Department realized that with these documents, and with the help of the leading German rocket scientists, it could continue where the German wartime rocket program had left off. This would save the United

[18] Ibid., 94.

[19] Ibid., 94-95.

States military precious time and money as it developed its own rocket program.

Under an effort known as "Operation Paperclip", the Army Ordnance Department imported 118 (later increased to 130) German rocket scientists and engineers, including Wernher von Braun, to the United States. The Army offered these specialists contracts to lend their knowledge and expertise to the neophyte American guided missile program. Arriving at Fort Bliss in February of 1946, the Germans were soon at work conducting studies and making recommendations on the development of long-range guided missiles for the Army. Their first tasks included indexing and translating the vast quantity of captured documents and assisting with the assembly and firing of captured V-2s at White Sands in conjunction with the Hermes project. The Army sent thirty of the scientists to White Sands to work full-time on the Hermes V-2 launches with General Electric and personnel from Fort Bliss's 1st Antiaircraft and Guided Missile Battalion.

The first goal of Project Hermes was to gain experience in launching the large V-2 rocket while collecting valuable information on all aspects of rocket flight. The Project eventually expanded into a larger research and development effort aimed at building upon and improving V-2 technology.

Of the considerable quantity of V-2 parts transported from Germany, a large proportion had sustained damage due to corrosion and deterioration. Consequently, only two V-2 rockets could be assembled solely from the original captured components. Although the German scientists were sometimes able to construct missing, defective or experimental parts in their shops at Fort Bliss and White Sands, American companies had to supply copies of many critical components.[20]

The first V-2 firing under the Hermes Project took place on March 15, 1946 at a special static test facility at White Sands. This test cleared the way for the first V-2 launch attempt at Complex 33 on April 16. Unfortunately, a faulty steering vane caused the engine of the V-2 to cut off after only 19 seconds of flight. The next launch attempt, conducted on May 10, was a success as the rocket ascended to an altitude of over 70 miles. Over the next six and half years, the Army conducted a total of 73 V-2 launch attempts at Launch Complex 33.[21]

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[20] Ibid., 87-88.

[21] Ibid., 88.

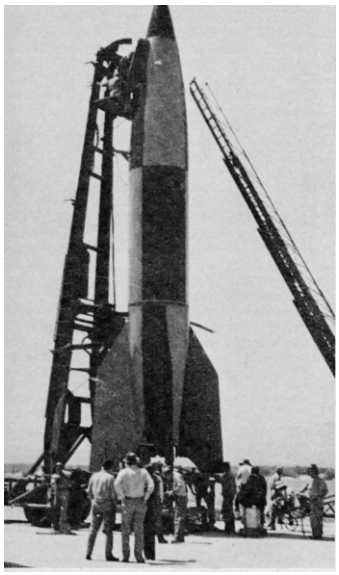

Figure 16 - V-2 being readied for launch at White Sands

Many of the V-2 launches at White Sands supported an upper atmosphere research program. An array of government, industry, and university groups participated in this program by developing special scientific payloads designed to study various aspects of the upper atmosphere. The V-2 Upper Atmosphere Research Panel, an advisory body formed in early 1947, coordinated the development of the scientific payloads.[22] These payloads were placed in a modified warhead compartment on the V-2. A special air burst technique and parachute system allowed the Army to recover many of the payloads. In this way, scientists were able to gather previously unavailable data on upper atmosphere physics and chemistry, cosmic radiation, solar spectroscopy, and Earth photography. Another test series, known as Project Blossom, carried special biological experiments that included mice and monkeys. These experiments yielded valuable information on the physiological effects of space flight.[23]

The German scientists assisted General Electric and the 1st Antiaircraft and Guided Missile Battalion with only the first thirteen V-2 launches at White Sands. In the process, they imparted invaluable rocket experience and technical knowledge to the rapidly expanding American guided missile program. After General Electric personnel took over the tasks of the Germans, the Army assigned some the scientists to another part of the Hermes project. Specifically, the Army tasked the scientists with designing and developing a ramjet propulsion system for use in the Hermes II missile. Unlike the ballistic-type V-2, the Hermes II was designed as an atmospheric cruise-type missile. In support of this effort, the Army moved Battery B of the 1st Antiaircraft and Guided Missile Battalion to the Rocket Branch, Research and Development sub-office at Fort Bliss in April of 1947. General Electric was the primary contractor for Hermes II.

[22] The V-2 Upper Atmosphere Research Panel later became known as the Upper Atmosphere Rocket Research Panel and then as the Rocket and Satellite Research Panel (Wernher von Braun and Frederick I. Ordway III, History of Rocketry and Space Travel, (New York: Thomas Y. Cromwell Company, 1969), 123.

[23] "Historic White Sands Missile Range," 88, 90; (von Braun & Ordway, 123).

Several V-2 launches conducted between 1947 and 1950 tested Hermes II components, nosecones in particular. Despite some successes, the Hermes II program proved to be short-lived. The Army first reduced this effort to engine development only and then canceled it altogether in 1953. Despite its short life, the Hermes II program provided valuable information for many subsequent missile programs, most notably the Air Force's Navaho program.

Figure 17 - Hermes II at White Sands

By 1950, it was becoming apparent that a larger missile testing ground would be needed to keep pace with advancements in missile design and technology. Additionally, the Army Ordnance Department wanted to centralize all of its missile research and development, procurement, and field service activities at one installation.[24] Fort Bliss was not a viable choice because its increasing training mission meant less room for new missile research and development facilities. It was also much more cost effective to move into existing buildings rather than construct new facilities at Fort Bliss. Those existing buildings turned out to be two adjacent wartime ammunition manufacturing installations near Huntsville, Alabama. The Ordnance Department created an enlarged Redstone Arsenal out of the former Redstone and Huntsville Arsenals and then designated the new facility as the Army's Guided Missile Center in April of 1950. Besides its existing facilities, the Redstone Arsenal also had the benefit of being closer to the newly established long range missile proving ground at Cape Canaveral, Florida.

Between April and November of 1950, the Ordnance Department's Rocket Research and Development sub-office at Fort Bliss transferred to Huntsville, as did Wernher von Braun and the other German scientists. This team subsequently helped develop the Redstone and Jupiter missiles for the Army and sent the United States' first satellite into orbit.[25] They also played a prominent role in the American manned space program of the 1960s.

Despite the transfer of the German scientists to Huntsville, General Electric continued development work under the Hermes program at White Sands. Between May of 1950 and April of 1951, General Electric, assisted by personnel

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[24] General H.N. Toftoy, "The History of Army Missile Development," TMs [photocopy], n.d., 23.

[25] The Redstone missile program was a continuation of the Hermes C-1 study. As the Army began phasing out the Hermes II cruise missile program in mid-1950, it initiated the study of a multi-stage long-range surface-to-surface ballistic missile. Dr. von Braun and his group continued this program at the Redstone Arsenal under various names including C1, MAJOR, URSA, XSSM-G-14, XSSM-A-14. The program officially became known as Redstone in April of 1952 (Julius H. Braun).

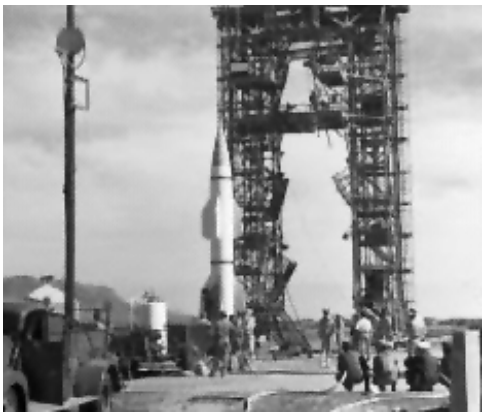

Figure 18 - Hermes A-1 launch preparations at White Sands

from the 1st Antiaircraft and Guided Missile Battalion, launched five Hermes A-1 test vehicles. This anti-aircraft missile, featuring four wings on its mid-body, was virtually identical to the German "Wasserfall" designed during World War II. The Army canceled the Hermes A-1 program in 1952 as other antiaircraft missiles, namely Nike and Terrier, were nearing operational status. Despite the program cancellation, the Army adopted many of the Hermes A-1 subsystems for other missile projects.

The surface-to-surface Hermes A2 and Hermes A3 missiles were other development efforts carried out under the Hermes program in the early 1950s. The Hermes A2 was a solid-fueled missile derived from the Hermes A1. General Electric tested the A2 motor successfully in late 1951 but by mid-1953 the Army had canceled the effort. The A3, intended to be a smaller but improved version of the V-2, flew thirteen times between 1951 and 1954. The Korean War prompted the Army to accelerate development of the A3 missile but by 1954 Army officials canceled the program after deciding that the Corporal missile could achieve operational capability sooner.[26]

ORDCIT and Hermes Legacy

The ORDCIT and Hermes Projects provided an enormous amount of valuable technical data and proved to be a windfall for many of the missile programs that followed. The Viking, Navaho, Polaris, Sergeant, Pershing, Redstone, Jupiter, Thor, Atlas, Juno, and Saturn programs all incorporated components that were derived from V-2 and Hermes missiles. The projects also provided invaluable experience to the scientists, engineers, and military personnel who went on to take part in this nation's missile and space programs.

Although the Army subsequently developed such surface-to-surface missiles as the Honest John, Lacrosse, Little John, Sergeant, Lance, Redstone, and Pershing missiles, the Air Force ultimately gained primary responsibility for the development and control of long-range surface-to-surface missiles. The Army did, however, play a major role in the development and control of sur-

[26] Toftoy, 21.

face-to-air antiaircraft missiles. The forerunner of these sophisticated weapons were the antiaircraft guns used by the Army during the World Wars.

Army Air Defense

Antiaircraft Artillery in World War II

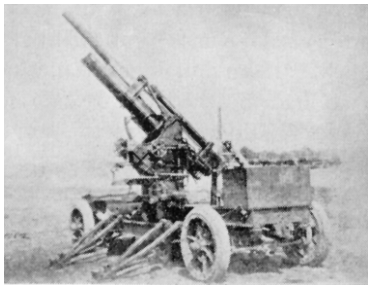
Figure 19 - 3 inch M1918 Gun

At the beginning of World War II, the only antiaircraft weapon the U.S. Army possessed was the 3-inch M1918 gun. Dating from the World War I era, the M1918 required a tractor to position it and at least six men to operate it. This gun became outdated in the years between the two World Wars as advances in aviation technology reduced its effectiveness. The Army quickly came to realize this in the early stages of World War II and hurriedly initiated development of more sophisticated antiaircraft weapons. The 40mm Bofors automatic cannon and the radar-directed 90mm antiaircraft gun, along with various heavy machine guns, soon replaced the M1918 gun.

Antiaircraft artillery (AAA) played a major role in many of the decisive battles of World War II. One particular action in which AAA alone decided the outcome was in the defense of the port of Antwerp, Belgium. By the fall of 1944, Allied forces had advanced across France, stretching their supply lines to the breaking point in the process. The strategic port of Antwerp, captured by British forces that September, became critical to the Allied cause. Well aware of this, German military leaders immediately began efforts to destroy the port area with their V-1 "buzz bombs." Although crude by today's standards, the winged pulse-jet V-1 bomb nevertheless represented a remarkable advance in warfare technology. To counter the V-1 threat, Allied forces organized a line of antiaircraft guns, radar, and searchlights along V-1 approach corridors. This proved extremely effective as only 211 of the nearly 4900 V-1s launched at Antwerp between October of 1944 and March of 1945 hit the vital port area.[27]

AAA went on to play a critical role in other major battles of the European and Pacific Theaters of Operation. By defending landing beaches, airfields, ports, and major military installations, the AAA helped secure the final Allied victory.

[27] "A Pocket History of Air Defense Artillery," n.d. A Publication of the U.S. Army Air Defense Museum, Fort Bliss, Texas.

Army Air Defense During the Cold War

Interservice Rivalry

When the Army demobilized after World War II, it placed most of its AAA units in reserve status. Defending the United States from an enemy air attack was viewed as only a secondary mission, especially since the soon-to-be nemesis Soviet Union did not have bombers that were capable of threatening the American continent. Soon however, air defense became a heated topic of contention between the Army and the newly created Air Force. Similar to the struggle for control of guided missiles, a struggle for control of AAA arose from the disagreement over missions and roles. The Army argued that it should have control of AAA because it provided defense of ground targets from airstrike. The Air Force countered that it should control AAA because of its responsibility for aerial warfare.

The first attempt to settle the air defense issue came in a provision of the National Security Act of 1947. Under the provision, both the Army and Air Force would activate, train, and control their own AAA units. Although the Army would utilize its AAA units in field roles, Air Force AAA units were to provide the bulk of aerial defense. The Army, however, would be responsible for providing sufficient AAA units to accomplish the air defense requirements of the Air Force. Under this arrangement, Air Force AAA units would defend the United States during an enemy air attack. If, however, these units were insufficient to ward off the attack, the Air Force would "borrow" Army AAA units to supplement its air defenses.[28] Ultimately, this arrangement pleased neither the Army nor the Air Force.

The AAA control issue came up again at an interservice conference held in March of 1948 at Key West, Florida. At this conference, the Joint Chiefs of Staff agreed that the Air Force would have overall operational control of the nation's air defense but that the Army would supply all of the AAA units to defend the United States against air attacks.[29]

With the air defense roles and mission controversy seemingly behind it, the Air Force reorganized its Air Defense Command and began training Regular Services and National Guard personnel for service in interceptor fighter, aircraft control, and warning units. It also proceeded with its plans to erect a nationwide radar network.[30] Meanwhile, the Army began training National

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[28] "The National Security Act's Effect on AAA," The Coast Artillery Journal, September-October 1947, 16.

[29] Lonnquest and Winkler, 55.

[30] Lieut. Col. Floyd A. Lambert, "Air Defense of the United States," Antiaircraft Journal, May-June 1949, 31; Lieut. Col. Floyd

Guard AAA gun and automatic weapons units. As Cold War tensions increased with the Communist takeover of China, the blockade of Berlin by the Soviet Union, the emergence of the Soviet intercontinental Bull bomber, and the Soviet detonation of an atomic bomb, the Air Force began exerting pressure on the Army to deploy AAA units around strategic sites throughout the United States.[31]

Deployment of Army AAA Gun Units and the Korean War

The Army's AAA forces, along with the rest of the U.S. military, had shrunk dramatically after World War II. By late 1947, the Army had only two AAA battalions.[32] To compensate for this shortcoming, the Army relied on the National Guard to provide AAA personnel and units. This reliance on the National Guard continued when the Army began its AAA deployment plans in 1948. These plans called upon the National Guard to furnish 123 antiaircraft battalions for deployment by 1952.[33]

Figure 20 - Army AAA unit in action in Korea.[35]

The first AAA battery, armed with 120mm guns, was in place at Hanford, Washington by March of 1950. Two months later, an interservice committee identified 60 other critical sites that required protection by AAA units. The Army later reduced this to 23 sites and began making plans to defend them with 66 AAA battalions.[34]

In June of 1950, as the expansion and training of the Army's National Guard AAA units was proceeding, communist forces from North Korea invaded South Korea. President Truman quickly sought and received congressional approval to send U.S. forces to Korea to help repel the invasion. A United Nations Security Council resolution supporting the action soon followed. Of the

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A. Lambert, "Air Defense of the United States: National Guard Troops Provide Large Per Cent of Manpower for Air Defense System," Antiaircraft Journal, September-October 1949, 10-11.

[31] Lonnquest and Winkler, 55.

[32] Kenneth P. Werrell, Archie, Flak, AAA, and SAM: A Short Operational History of Ground-Based Air Defense, (Maxwell Air Force Base, AL: Air University Press, 1988), 72.

[33] Colonel Stephen P. Moeller, "Vigilant and Invincible," 1:3. [Online] Available: http://michp753.redstone.army.mil/history/vigilant/sus_intro.html. Colonel Moeller's article first appeared in the May-June 1995 issue of ADA Magazine.

[34] Ibid., 2:4.

[35] Coast Artillery Journal, Jan.-Feb. 1952, 2.

U.S. Army forces sent to Korea, AAA units were among the first to see action. They quickly neutralized the North Korean air threat. Later, when Chinese troops poured over the border to join the war, the Army used some of its AAA guns as field artillery. AAA automatic weapons battalions also used their mounted .50 caliber machine guns and twin 40mm automatic cannon in an anti-personnel role to help repel the mass Chinese attacks.[36]

ARAACOM and ARADCOM

While U.S. troops fought in Korea, the Army continued with its plans to deploy National Guard AAA units around the United States. Concluding that a separate command structure for AAA was necessary to control this deployment, the Army formed the Army Antiaircraft Command (ARAACOM) in July of 1950. ARAACOM, which became the U.S. Army Air Defense Command (ARADCOM) in 1957, assumed command of the gun batteries being activated and coordinated its activities with the Air Force Air Defense Command (and later the Air Force Continental Air Command). ARAACOM had deployed dozens of AAA batteries around major urban areas and important military installations in the United States by 1952.[37]

The three types of AAA battalions in the early 1950s were 90mm battalions, 120mm battalions, and Automatic Weapons battalions. Of these, 90mm battalions were the most numerous. The very accurate, high-velocity 90mm guns had proven extremely effective during World War II. With a rate of fire of 20 to 25 rounds per minute, they had an altitude capacity of 30,000 feet, a range of 14 miles, and were linked to a fire control computer. Peak deployment of 90mm battalions occurred in 1953 when 42 such units were deployed.[38]

The 120mm AAA battalions fielded the 120mm M-1 "Stratosphere Gun." This 31-ton gun was a trailer-type, mobile weapon that hurled 50-pound projectiles. Requiring a 13-man crew, the M-1 had a maximum vertical range of nearly 58,000 feet and a rate of fire of 10 to 15 rounds per minute. Like the 90mm AAA battalions, 120mm battalion deployment reached its peak in 1953 with 14 battalions, totaling 224 guns, deployed. [39]

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[36] "A Pocket History of Air Defense Artillery," 14.

[37] Col. Lamar C. Ratcliffe, "Antiaircraft Artillery in the Air Defense Team," Antiaircraft Journal, September-October 1951, 14; Lonnquest and Winkler, 56.

[38] Moeller, 2:5.

[39] Ibid.

Automatic Weapons (AW) battalions defended linear targets, such as locks and airfields, from attacks by low-flying enemy aircraft. The 40mm cannon and .50-caliber machine guns used by the AW battalions were replaced by the 75mm Skysweeper in the early 1950s. This fully integrated gun and fire control system consisted of a radar, computer, and gun, all on one carriage. It could locate and track approaching aircraft from distances of up to 15 miles and could destroy targets as far as four miles away. With its automatic loading and firing capability, the Skysweeper could fire 45 rounds per minute. Skysweeper battalion deployment reached its peak in the mid-1950s with a total of eight battalions deployed.[40] By that time, jet bombers and guided missiles were making AAA guns outmoded. Fortunately, the Army had earlier begun development of the Nike anti-aircraft missile.

Nike Ajax

The Nike project first began in February of 1945 when the Army Ordnance Department awarded a contract to the Western Electric Company and its research affiliate, Bell Telephone Laboratories, to conduct a feasibility study of a surface-to-air antiaircraft missile. Several months later, representatives of Western Electric and Bell Telephone outlined a plan for the development of a 1,000-pound guided missile that was to be 19 feet long, sixteen inches in diameter, have a range of 20,000 yards, and an altitude capability of 60,000 feet. The rocket's motor was to use an acid-aniline liquid fuel and be capable of attaining speeds of 23,000 feet per second. A target tracking radar, a missile tracking radar, and a computer to compare data from the two radar would make up the control system. Remarkably, the system fielded by the Army eight years later closely resembled this initial plan.[41]

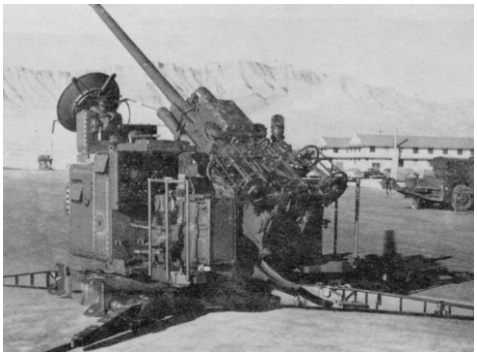

Figure 21. 75mm "Skysweeper"

Western Electric became the primary contractor for development of the Nike missile system. Bell Telephone was responsible for developing the control radar and computer. As a major subcontractor, the Douglas Aircraft Company was responsible for conducting aerodynamic studies for the missile. The

[40] Ibid.

[41] Ibid., 1:4.

Army initially projected 1949 as the year the weapon system would be ready for production but design and technical problems forced this schedule back.[42]

White Sands Proving Grounds was the site for all of the Nike research and development launches. It was also the site of the first static firing of the missile, which took place on September 17, 1946. The first actual launch of a test missile occurred one week later. Meanwhile, tracking experiments using monopulse radar began at Whippany, New Jersey.[43]

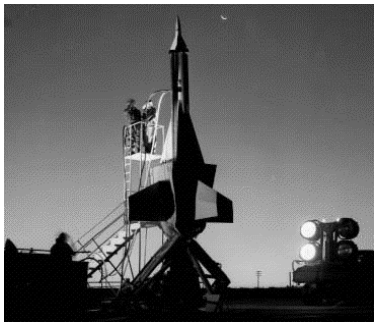

Figure 22. Nike Ajax prototype test launch, 1947

In the late 1940s, the Navy was also developing an antiaircraft missile known as Terrier. Originally, this ship-launched missile was scheduled to become operational before the Army's Nike. Based on that projection, the Army decided to use Terrier as an interim weapon and began developing a suitable ground control system for the missile.[44] Navy schedules slipped however, and in October of 1950 K.T. Keller, the newly appointed Department of Defense Director of Guided Missiles, reviewed the progress of all antiaircraft guided missile programs. Concluding that the Army's Nike was furthest along, he recommended accelerating the program. Keller established the goals of building 1,000 production-model Nike missiles by late December of 1952, attaining a capacity to produce 1000 missiles per month thereafter, producing 20 tactical battalions by December 21, 1952, and establishing production facilities capable of producing Nike ground support equipment for three tactical battalions per month by December 31, 1953.[45]

Although the Nike system still had many bugs to be worked out, Secretary of Defense Charles Wilson approved Keller's plan in January of 1951. Soon thereafter, the Army let a contract to Western Electric, Bell Telephone, and Douglas Aircraft to produce the first 1000 Nike missiles and 60 sets of ground equipment.[46] At the time, the Nike missile was known as Nike I. The Army changed this designation to Nike Ajax in November of 1956.

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[42] Lonnquest and Winkler, 170.

[43] Ibid.

[44] Toftoy, 22.

[45] Lonnquest and Winkler, 56; Moeller, 2:8.

[46] Lonnquest and Winkler, 171.

Meanwhile, Nike testing continued at White Sands. Technicians experienced an impressive success in November of 1951 when a Nike missile scored a direct hit on a QB-17 drone. Test launches with live warheads conducted the following April were equally impressive and in July of 1952 contractors conducted the first launch of a production model Nike Ajax. Over the following months, technicians continued to conduct test launches to improve the missile. In its final form, the Nike Ajax weighed 1,000 pounds, was 12 inches in diameter, and, with its solid propellant booster and liquid propellant sustainer, measured 34 feet 10 inches long. Reflecting the technology of the time, the Nike Ajax utilized vacuum tube electronics. Contractors turned over the first complete missile battery to ARAACOM in the summer of 1953. By that time, Nike Ajax combat and maintenance training was taking place at Fort Bliss. [47]

Figure 23. Operational Nike Ajax

ARAACOM intended the Nike Ajax to first supplement and then replace its AAA gun batteries around the United States. After choosing appropriate site locations near major cities, ARAACOM tasked the Army Corps of Engineers with acquiring the land and constructing the necessary Nike Ajax facilities. Local opposition to the Army's use of both public and private lands complicated this assignment. Other hurdles had to be overcome as well. The first Nike Ajax installations featured above-ground launchers. By late 1952 however, ARAACOM planners concluded that locating some Nike-Ajax sites close in to major cities would provide greater protection than locating all of the sites further out. Unfortunately, the availability and/or acquisition of the projected 119 acres per site was sometimes not feasible at close-in locations. Consequently, the Army modified its Nike Ajax installation design to reduce the required acreage. A major feature of this new site design was an underground missile storage magazine equipped with a hydraulic elevator. This reduced the required acreage from 103 to 40. After the Army constructed and successfully tested a prototype underground magazine at White Sands in mid-1953, ARAACOM decided to use the underground design in most of its Nike Ajax installations.[48]

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[47] Ibid., 165.

[48] Lonnquest and Winkler, 171-172; Moeller, 2:10.

The typical Nike Ajax installation consisted of an administrative area, an integrated fire control (IFC) area, and a launch area. The administrative area, usually located either near the IFC or launch area, included barracks, a mess hall, a combined recreation, administration, and supply building, and a large motor maintenance building complete with wash and grease racks and a fuel tank. The IFC area was always located at least 1000 yards, and sometimes as far away as a mile, from the launch area. It consisted of three acquisition and tracking radar, a battery control trailer, a radar control trailer, maintenance and spares trailer, a power plant, and an electric cabling system. s[49]

The underground Nike launchers constructed at later sites held 12 Nike Ajax missiles. A hydraulic elevator lifted the missiles to the surface in a horizontal position. Once at the surface, the missile had to be manually pushed along a railing to one of four launchers that typically sat above the magazine. Near the launchers was a trailer that housed the launch controls, a generator building, and several missile assembly and maintenance structures.[50]

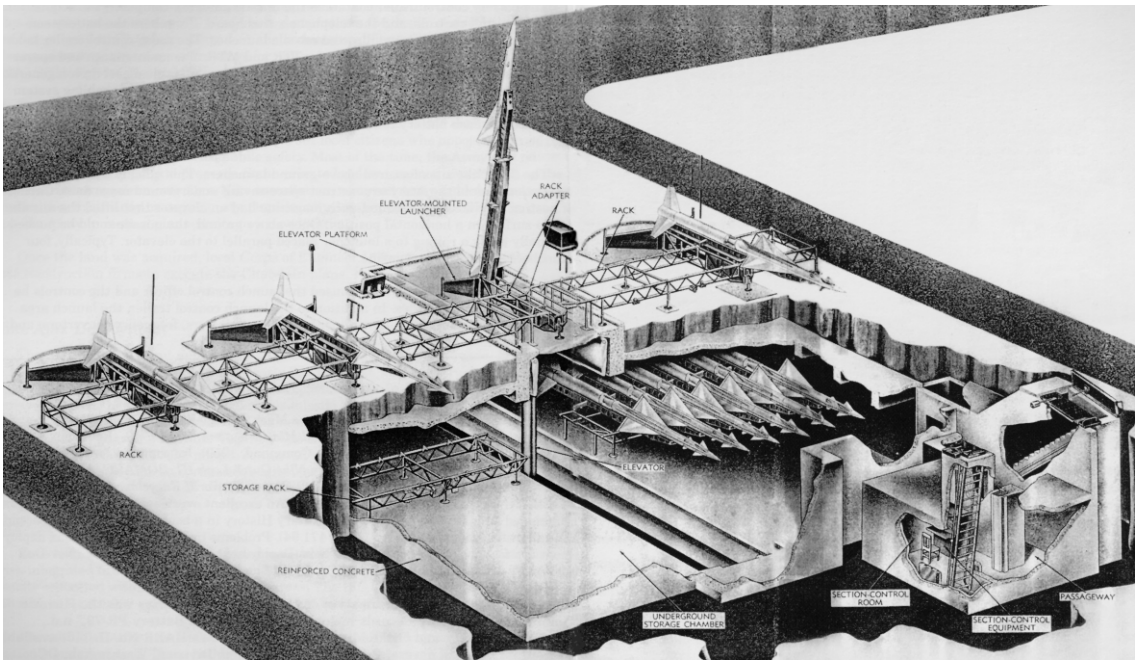

Figure 24. Cut-away drawing showing Nike Ajax magazine and above-ground launchers.

ARAACOM deployed the first Nike Ajax unit to an above-ground site at Fort Meade, Maryland in March of 1954. Over the next four years, nearly 200 Nike Ajax batteries were deployed around major cities in the United States as well

[49] Lonnquest and Winkler, 173.

[50] Ibid.

as in Japan and in Europe with NATO forces. In 1957, the year ARAACOM became ARADCOM, the Army began the process of converting its National Guard AAA gun battalions into Nike Ajax missile battalions. Completed over the next several years, this process ended with the Army National Guard furnishing 76 Nike Ajax batteries in 14 states.[51]

When the Army first deployed the Nike Ajax, there was no system in place to coordinate the fire of multiple batteries. This meant that several batteries could be shooting at the same target at the same time. The Army addressed this problem by establishing command centers that manually plotted incoming targets and relayed engagement orders to the various batteries. To improve its command and control procedures, the Army later developed and deployed several different automated systems. The first system was known as the Interim Battery Data Link system. The Army eventually replaced this system with the Missile Master and Battery Integration and Radar Display Equipment (BIRDIE) systems. Missile Master, used in major defense areas, featured automatic data communications, processing, and display equipment. It allowed an area commander to coordinate his batteries to engage up to 24 different targets. The Army used the compact, transportable BIRDIE system in smaller defense areas that had fewer batteries.[52]

Nike Hercules

Although automated command and control systems could solve the Nike Ajax coordination problems they could not overcome the system's inability to engage more than one target at a time nor its difficulty with discerning targets in closely packed aircraft formations. Recognizing these shortcomings early on, the Army proceeded with development of the Nike Ajax but also asked Bell Laboratories in May of 1952 to study possible improvements to the system. The Army ideally wanted to increase the range of the Nike Ajax and make it capable of carrying a nuclear warhead. This would force an attacking enemy to space its aircraft to avoid multiple losses from a single missile. After Bell Telephone's studies proved the feasibility of such a missile, the Army authorized the major contractors of the Nike Ajax to proceed with development of the Nike B, later designated as Nike Hercules.[53]

Designers of the Nike Hercules expanded upon the Nike Ajax design by strapping together four Ajax solid-fuel boosters. The number of sustainer engines

[51] Moeller, 3:6.

[52] Lonnquest and Winkler, 168-69.

[53] Ibid., 179.

was increased to four as well. Originally, the sustainer engines used liquid fuel just like the Nike Ajax. However, the low reliability of the liquid-fueled engines, coupled with an accident during a static test, convinced the designers to switch to solid-fueled sustainer engines.[54]

Figure 25. Nike Hercules

The Nike Hercules missile featured several significant improvements over its predecessor. It was 41 feet long, had a range of over 75 miles, an altitude capability of 150,000 feet, and could carry either a conventional or a nuclear warhead. Unlike the Ajax, the Hercules contained no vacuum tubes, only solid state components, with the exception of its beacon transmitter. This not only increased its reliability, it also eliminated the thousands of tubes that had to be kept on hand. [55]

Test launching of the Nike Hercules missile began at White Sands in 1955. The first launch with the new solid-fueled sustainers took place in March of 1957. During the following summer, the Nike Hercules system proved its ability to single out a target within a formation during a special test held at Eglin Air Force Base, Florida. [56]

While Nike Hercules test launches were taking place, efforts to improve the Nike system's radar began. Designated as "Improved Hercules", this effort led to the addition of the High Powered Acquisition Radar (HIPAR), a Target Ranging Radar, and improvements to the existing Target Tracking Radar. The Improved Nike Hercules system demonstrated its potential in June of 1960 when a Nike Hercules missile shot down a Corporal missile during a special test at White Sands.[57]

Figure 26. Improved Nike Hercules radars (HIPAR enclosed in dome)

[54] Ibid., 180.

[55] Ibid.; Moeller, 2:12.

[56] Lonnquest and Winkler, 180.

[57] Ibid.

Although Nike Hercules was designed to use existing Nike Ajax facilities, some modifications for the improved missile were necessary. For example, the larger size of the Nike Hercules missile reduced the capacity of the underground magazine to eight and necessitated modifications to the missile storage racks, launcher rails, and elevators. This process began at some of the Nike Ajax sites while the Nike Hercules was still in its testing phase. The Improved Hercules system required even further modifications to Nike sites as new radar needed to be added. The Army began this process in June of 1961 although not all sites received all of the Improved Hercules radar.[58]

Because of the longer range and nuclear capability of the Nike Hercules, sites farther away from protected areas were more ideal than sites closer in. Consequently, in addition to converting some Ajax sites, the Army initiated construction of new sites for Nike Hercules batteries.[59] The Corps of Engineers supervised the conversion process as well as the new construction.

The first Nike Hercules batteries entered service in June of 1958 around New York, Philadelphia, and Chicago. Over the next several years, the Army gradually began phasing out its Nike Ajax missiles in favor of the Improved Nike Hercules. Nike Hercules reached its peak deployment of 134 batteries in 1963. This deployment was not without controversy though. In a continuation of the interservice rivalry for control of guided missiles, the Air Force waged an aggressive public relations campaign against the Army's Nike missiles, arguing that its Bomarc anti-aircraft missile and Semi-Automatic Ground Environment (SAGE) command control system were superior to the Army's Nike systems. This campaign ultimately failed and although the Air Force did deploy some Bomarc squadrons, the Army eventually gained primary responsibility for the nation's continental air defense.

As with the Nike Ajax, the Army eventually turned over the mission of manning its Nike Hercules sites to the Army National Guard. In May of 1962, the Army phased out its first National Guard Nike Ajax site and began retraining National Guardsmen on the Nike Hercules system. The Army deactivated the last Nike Ajax sites in May of 1964 and, by the following year, Army National Guardsmen were manning 48 Nike Hercules batteries in 16 states.[60]

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[58] Ibid., 182. Geographical restraints and duplicative coverage by other nearby Nike sites prevented the Army from installing HIPAR radars at all of its Nike sites.

[59] The longer range and nuclear capability of the Nike Hercules also enabled the Army to permanently deactivate several of its Nike Ajax batteries.

[60] Moeller, 3:6.

Army Air Defense in the 1960s

The 1960s was a decade of both positives and negatives for Army air defense. On the positive side was the emergence of air defense artillery as its own separate combat branch within the Army. The decade also saw the introduction of several new air defense weapon systems that filled the Army's need for protection against hostile low- to medium-altitude aircraft. The downside came in the form of a decision to gradually phase out ARAADCOM Nike units. This decision resulted largely from the emergence of new Soviet nuclear-tipped ballistic missiles and funding restrictions caused by increasing involvement in Vietnam.

After achieving stunning successes in long range missile development during the late 1950s, the Soviet Union came to see ballistic missiles as a means to overcoming the strategic superiority of America's long range bomber fleet. When the Soviet Union attempted to deploy ballistic missiles on the island of Cuba in 1962, a severe international crisis developed. During what became known as the Cuban Missile Crisis, President Kennedy demanded that the missiles be removed. He placed the military on high alert and authorized a naval blockade around Cuba to halt shipment of offensive weapons to the island. With the United States and Soviet Union on the brink of nuclear war, Soviet Premier Khrushchev backed down and removed the missiles. Tensions were momentarily eased, however, Khrushchev was determined not to be humiliated again. He subsequently began a massive Soviet build-up of a variety of nuclear-tipped ballistic missiles. This development, in turn, affected U.S. thinking on air defense strategy as the large deployment of Nike missile systems around the United States would be ineffective against Soviet missiles. Voices clamoring for downsizing or complete elimination of the costly Nike deployment could soon be heard.

Bolstering the call for the elimination of the Nike systems was the nation's increasing involvement in Vietnam. The mounting costs of this war began siphoning away increasingly scarce Department of Defense funds from ARADCOM. The result was a downsizing of the Nike defense structure. ARADCOM began this process in the mid-1960s and continued it throughout the rest of the decade. By 1969, only 82 Nike batteries remained deployed.

Figure 27. Hawk test firing.

Buoying ARADCOM officials in the wake of the downsizing of its Nike force was the introduction and fielding of several new Army air defense systems. Chief among these was the Hawk guided missile system. Development of the Homing All The Way (Hawk) anti-aircraft missile system began in 1952 as the Nike Ajax was first being deployed.[61] Since the Nike Ajax was focused on high-speed, high-altitude aircraft, a need for defense against low-to-medium altitude, high-speed aircraft led to the development and ultimate deployment of the medium-range Hawk.

Figure 28. Public display of Hawk missiles, 1960s.[62]

The Nike had been designed in three separate component systems: missiles and launcher, radar, and control system. The Hawk followed the same three-

[61] The Hawk was originally named for the predatory bird but the name was later turned into an acronym for "Homing All the Way Killer;" "Raytheon Celebrates 50th Anniversary of Hawk Air Defense System's First Successful Aerial Engagement," Raytheon Press Release, 2006, http://www.raytheon.com/feature/hawk50/.

[62] Photograph courtesy of the ADA Museum, Fort Bliss.

part design using separate mobile launchers, radar, and control units. Unlike Nike, each piece of the Hawk system was designed to be completely mobile, either vehicle mounted or trailered to the firing site (also transportable by fixed wing aircraft or cargo helicopter).[63] The system was designed for field reliability, mobility, accuracy, and the ability to engage multiple targets simultaneously. [64]

Figure 29. Hawk system on the move, 1969.[65]

Three missiles were mounted on each launcher. The missiles were 16.8 feet long, 14-inch diameter, and weighed 1,290 pounds.[66] The missiles used solid propellant and could travel at supersonic speeds.

Production configuration provided three launchers per system. The multi-part radar system was less mobile than the launchers and the single control unit and consisted of two acquisition radar units, one illumination radar unit, and one ground range-only radar. The continuous-wave acquisition radar was used for scanning the horizon for possible targets. It was advantageous in that it could scan large areas looking for moving signals or possible targets. Pulse acquisition radar was used for fast and accurate identification and tracking of targets. The continuous-wave illumination radar was designed to direct an electromagnetic energy beam at the acquired target that the Hawk missile used to home in on and destroy the target. Several targets could be illuminated at once. Each system also had a small mobile range-only radar unit that traveled with the launchers for additional range information about the targets.[67]

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[63] US Army Air Defense Digest, 1961, 38.

[64] US Army Air Defense Digest, 1967, 59.

[65] Air Defense Trends, January 1969, 26.

[66] US Army Air Defense Digest, March 1959, 34.

[67] Ibid.

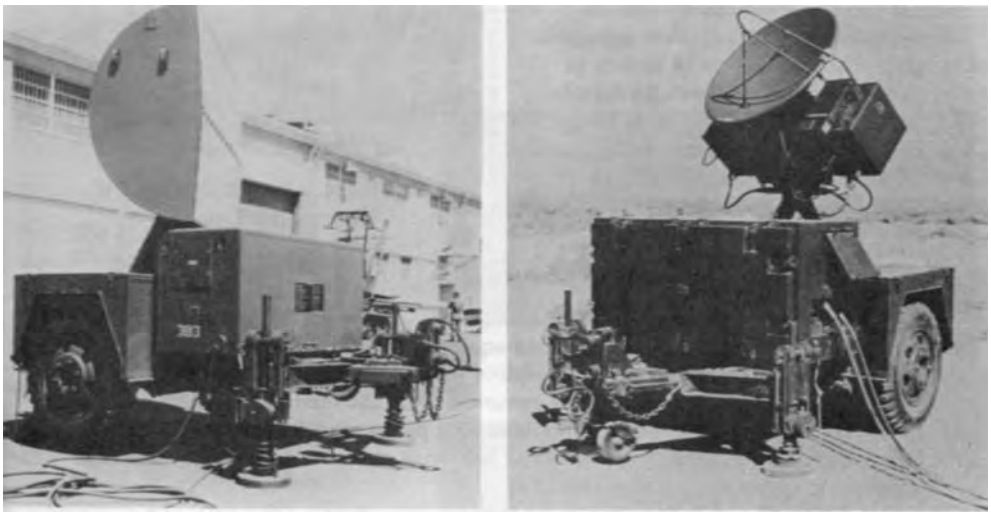

Figure 30. Hawk CW Acquisition radar (left) and range-only radar (right).[68]

The Battery Control Central (BCC) was the control unit for the Hawk. This control unit was capable of tracking a number of targets simultaneously, either single, massed, or widely separated. With a magagine capacity of 48 missiles per battery, and with constant re-supply, the BCC was capable of firing one missile every three seconds.[69]

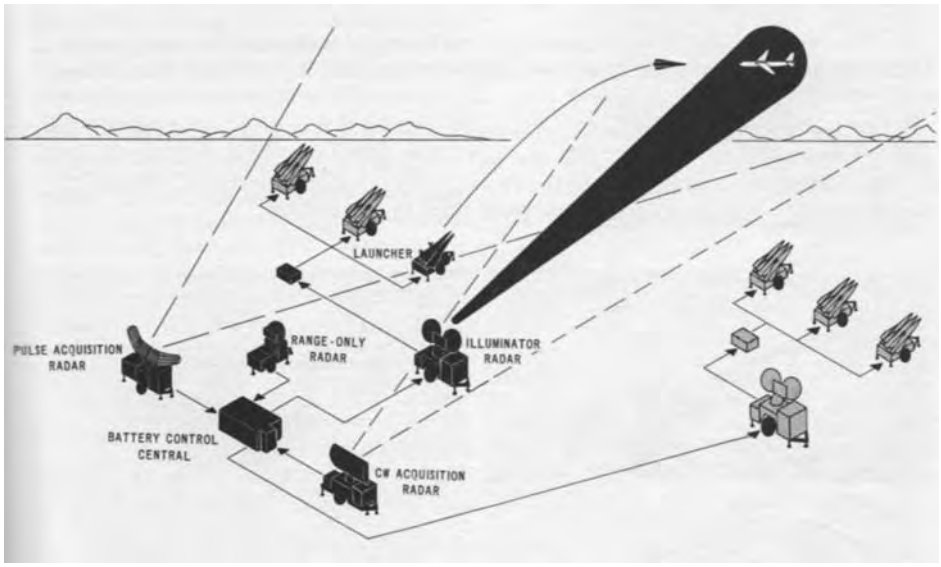

Figure 31. Schematic of Hawk battery system, 1960.[70]

[68] US Army Air Defense Digest, 1962-63, 41.

[69] US Army Air Defense Digest, 1961, 39.

[70] US Army Air Defense Digest, 1960, 35.

Initial testing began by the Army in 1952, and manufacturing was awarded to Raytheon and Northrop in July 1954.[71] The first live Hawk firing was June 22, 1956.[72] By 1957, development was complete enough to begin full-scale production. Early tests showed promise when the Hawk succeeded in destroying its test aircraft targets. By 1961 the Hawk had successfully engaged test missiles including the Little John, the Honest John, and the Corporal.[73]

The Hawk was initially deployed by the Army in 1959 and the Marine Corps in 1960.[74] ARADCOM initially wanted to deploy Hawk battalions with all of its Nike units to prevent enemy aircraft from sneaking under its defenses. Although funding restraints prevented this, the Army did deploy eight Hawk batteries around population centers by 1963. Two Hawk battalions were deployed to Florida in 1962 during the Cuban missile crisis and, in the mid-1960s, Hawk units were deployed to Vietnam to protect air bases and port facilities.[75]

There were several early problems with field deployment including propulsion irregularities that were soon ironed out. The initial electronics were vacuum tube-based, which gave the field units low reliability and increased downtime for the systems. The horizon-scanning continuous-wave radar initially had problems picking out extremely low flying aircraft against the ground clutter; this was also remedied. These adjustments, among others, were part of the Hawk Improvement Program instigated during the 1960s to upgrade the anti-aircraft and anti-missile defense system, resulting in the Improved Hawk by 1972.

Three major upgrades (Phase 1 in 1979, Phase 2 in 1983, and Phase 3 in 1990) to each component of the system and several minor intervening upgrades were made that kept the Hawk in use from the Cuban Missile Crisis through the Persian Gulf War.[76] The changes were focused on field reliability by converting to solid-state from vacuum tubes, increasing the power and burn time of the engines without increasing weight, increasing warhead size and effectiveness, radar improvements to the point where the system required only two radar units while increasing effectiveness, and improved electronic counter-

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[71] "Raytheon's Roots in Missile Simulation Technology," http://wwwxt.raytheon.com/technology_today/2005_i2/section_1.html

[72] "50th Anniversary," Raytheon press release, 2006.

[73] US Army Air Defense Digest, 1961, 39.

[74] Ibid.

[75] Moeller, 3:5.

[76] "50th Anniversary," Raytheon press release, 2006.

countermeasures (ECCM) as the technology of tracking and evasion improved.

The Army deployed Hawk until April 1994. The last remaining active Army Hawk battalion, 2d/1st ADA Battalion, was deactivated at Fort Bliss in April 1994. The Marine Corps maintained Hawk in its arsenal until 2002.[77]

Other antiaircraft weapons fielded by the Army in the 1960s include Redeye, Chaparral, and Vulcan. These weapon systems served as key components of the Army's air defense for the next two decades.

The Redeye was the first man-portable surface-to-air missile system. With its supersonic infrared homing missile, the Redeye provided close-in defense against low-flying aircraft. Entering the Army inventory in 1964, Redeye was operational worldwide with Army and Marine Corps units until the early 1980s when it was replaced with Stinger, an improved version of Redeye.[78]

Chaparral and Vulcan were two complementary weapon systems designed to protect ground troops in forward combat areas from low-flying hostile aircraft. The mobile Chaparral featured a turret mounted on a track vehicle that carried four infrared homing antiaircraft missiles. The Vulcan, coming in both self-propelled and towed versions, was based on the famous Gatling gun. It could fire 3000 rounds per minute through revolving barrels. The Army began activating Chaparral/Vulcan battalions for overseas assignments in 1968. [79]

Figure 32. Redeye.

An integral component of Chaparral, Vulcan, and Redeye fire units was the Forward Area Alerting Radar (FAAR). Introduced in 1968 and fielded in the early 1970s, this D-band pulse doppler AN/TPQ-32 radar detected hostile aircraft and provided alerting and tentative identification. FAAR sections consisted of three men, a vehicle, and a trailer.[80]

A particularly noteworthy development for the Army's air defense occurred near the end of the 1960s. Prior to

[77] http://www.redstone.army.mil/history/systems/HAWK.html

[78] "Redeye," [Online] Available: http://michp753.redstone.army.mil/history/systems/CHAPP.html.

[79] "Chaparral Unit Activated," El Paso Times, 10 October 1968; "Chaparral," [Online] Available: http://michp753.redstone.army.mil/history/systems/CHAPP.html; "A Pocket History of Air Defense Artillery," 18.

[80] "Chaparral," Available Online: http://michp753.redstone.army.mil/history/systems/CHAPP.htm.

1968, air defense had only been a component within the Army's artillery branch. This situation changed in May of 1968 when the Army made air defense artillery a separate combat branch.

Anti-Ballistic Missile Systems

In addition to its antiaircraft role during the 1960s, the Army also played a primary role in efforts to protect the nation against the increasing threat of enemy ballistic missiles. At first, the Soviet Union was the major source of this threat. By the late-1960s, the United States began to recognize China as a possible missile threat as well. Having detonated its first nuclear device in 1964, communist China went on to detonate a thermo-nuclear device in 1967. These troubling developments led U.S. military planners to predict that China would be able to threaten the United States with nuclear-tipped missiles by the early- to mid-1970s. The next logical step in U.S. air defense planning, therefore, was the deployment of some sort of anti-ballistic missile (ABM) system. Fortunately, the United States' ABM development efforts had begun many years earlier.

The initial interest of the United States in developing an ABM system stemmed from the German V-2 attacks on Great Britain during World War II. Sensing that long range missile attacks would likely pose a future threat, the War Department began investigating the possibility of protecting the United States against such a threat. In May of 1946, the War Department Equipment Board issued a report concluding that a defense against rockets and missiles would require advanced interceptor missiles, computers, and radar.

The Air Force, when it was still a branch of the Army, was also interested in the possibility of developing an ABM system. This interest led to a missile defense study of its own. With conclusions similar to the Equipment Board's, the Air Force's study led to Project Wizard, an effort that provided the theoretical basis for the development of a high speed anti-missile missile. The Air Force funded Project Wizard until 1958. [81]

While the Air Force proceeded with Project Wizard, the Army became involved in an ABM development effort, albeit with a different approach. Instead of developing an entirely new missile system, the Army envisioned an ABM system that merely built upon the technology developed for its Nike antiaircraft systems. To find out if this was feasible, the Army asked Bell Laboratories in March of 1955 to conduct a study aimed at projecting advances in

[81] Lonnquest and Winkler, 108.

defensive missile technology through the next several years. Bell scientists reported the following year that new computers and advanced radar would make the development of an ABM system possible. Encouraged by this news, the Army awarded Western Electric and Bell Laboratories a contract to develop the Nike II ABM system. This system later became know as Nike Zeus.

Not surprisingly, the question of who would build and deploy an ABM system quickly became enmeshed in the interservice battle over missions and roles. Already upset with the Army's deployment of Nike Ajax missiles and the upcoming deployment of the Nike Hercules, the Air Force objected vehemently to the Army's Nike Zeus development efforts. These objections ultimately fell on deaf ears. Based on the progress of the Nike Zeus program, Secretary of Defense Neil McElroy assigned the Army the lead role in developing an ABM system in January of 1958.[82]

The Nike Zeus system featured four target-tracking and guidance radars, a computer, and a three-stage, solid-fueled missile armed with a nuclear warhead. The system was designed to defend American cities and industrial centers against only light missile attacks as it could only track and intercept one target at a time. This limited ability was a major drawback. As critics pointed out, the Soviet Union could easily overwhelm the system by launching a barrage of missiles simultaneously. Incoming missiles armed with decoys and chaff would further confuse it. Wary of these shortcomings, the U.S. Congress and the White House provided only enough funds for the research and development portion of the Nike Zeus program. In the meantime, the bigger question of whether to even deploy an ABM system became the subject of much controversy as disagreements arose as to the amount of security such a system would ultimately provide.

Figure 33. Nike Zeus ABM missile during testing at White Sands

While the ABM deployment debate raged, the Army achieved its first significant success in the Nike Zeus program. On July 19, 1962, a Nike Zeus missile launched from Kwajalein Island intercepted an Atlas ICBM launched from Vandenberg Air Force Base (AFB). Despite a subsequent string of successful tests, Secretary of Defense Robert McNamara ultimately decided against de-

[82] Ibid., 109.

ploying the Nike Zeus system. McNamara's primary reason was his belief that the system would not be effective against the large number of ballistic missiles the Soviet Union was planning to deploy. Instead of canceling the ABM program altogether, McNamara instead ordered the Army to begin development of a more advanced ABM system designated Nike X.[83]

Unlike the Nike Zeus system, the Nike X system utilized two missiles that provided a "layered" defense against incoming warheads. A reconfigured Nike Zeus missile designated Spartan was designed to intercept warheads at altitudes of 70 to 100 miles. Any warheads slipping through that defense would be intercepted by a new short-range missile known as Sprint. Another distinguishing feature of the Nike X system was its use of phased array radar. This new radar could track several targets and guide multiple interceptor missiles simultaneously. The Nike X system would use one phased array radar for long-range target acquisition and another for short-range target discrimination and missile guidance.[84]

The Army proceeded with development of the Nike X system between 1963 and 1967. During that time, several prominent scientists and politicians argued against the deployment of an ABM system. This group believed that such a deployment would increase the chance of a pre-emptive ballistic missile strike by the Soviet Union. It would at the very least, they argued, encourage the Soviet Union to deploy more missiles in an attempt to overwhelm the defensive system. McNamara generally agreed with this argument, viewing the deployment of an ABM system as a costly and wasteful escalation of the arms race. Nonetheless, the Johnson administration came under increasing pressure to deploy an ABM system as intelligence reports indicated that the Soviets were moving forward with plans to deploy their own ABM system. The emerging Chinese missile threat also remained a concern. McNamara hoped to convince Soviet leaders of the danger of deploying ABM systems but when these efforts failed,

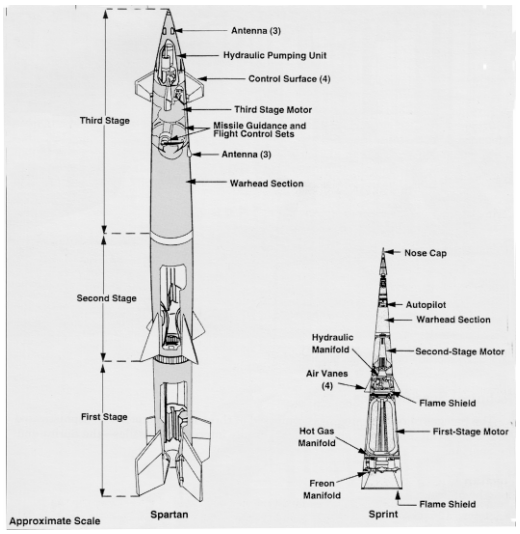

Figure 34. Spartan and Sprint scale drawings.

[83] Ibid., 110.

[84] Ibid., 111.

he hesitantly gave in and announced in September of 1967 that the United States would deploy a new ABM system designated Sentinel. This system, incorporating many components of the Nike X, was designed to provide protection to U.S. cities from Soviet and Chinese missile attacks as well as from accidental attacks from any nation. It was also designed to protect the U.S. Minuteman ICBM force.[85]

Using the same Spartan and Sprint missiles as the Nike X system, the Sentinel system also featured a huge perimeter acquisition radar (PAR) and a shorter-range missile site radar (MSR). The PAR would acquire and track incoming warheads at ranges exceeding 1,000 miles while the MSR would provide close-in targeting information at a range of several hundred miles. The MSR would also control the launching of the interceptor missiles and then guide them to their targets.[86]

McNamara's plan called for deploying the Sentinel system around 15 to 20 American cities. As construction began at several sites, the Sentinel deployment plan came under increasing criticism. There was concern that the large ABM construction program would lead Soviet leaders to believe that the United States was preparing to achieve a first-strike capability. Hoping to convince the Soviet Union that the United States had no such intentions, newly elected President Nixon decided to modify the Sentinel deployment plan. Instead of protecting American cities, President Nixon advocated a plan to protect only the retaliatory capability of the United States, namely its Minuteman ICBM sites. The president announced this modified Sentinel deployment plan in March of 1969, naming it Safeguard.[87]

Figure 35. Perimeter Acquisition Radar (PAR)

The Safeguard plan initially called for the deployment of twelve ABM sites around SAC missile bases. Not surprisingly, this plan also had its critics and heated debate raged in Congress through the summer of 1969. The opponents of the Safeguard plan argued that a deployed U.S. ABM system would dangerously alter the strategic balance that hypothetically ensured restraint by the superpowers. Countering this argument were those

[85] Ibid., 112; Terrie Cornell, "Early U.S. Army Air Defense Missile Systems," (Fort Bliss, TX: U.S. Army Air Defense Artillery Museum, 1995), 8.

[86] Lonnquest and Winkler, 112.

[87] Ibid., 113.

claiming that, in addition to providing security to the United States, a deployed Safeguard system would give President Nixon a stronger bargaining position in the upcoming strategic arms negotiations with the Soviet Union. Ultimately, the proponents of Safeguard won out, but just barely. In August of 1969, Congress approved, by only a one-vote margin, the deployment of Safeguard at two sites. Soon thereafter, construction began at Malmstrom AFB, Montana and Grand Forks AFB, North Dakota.[88]

Meanwhile, strategic arms limitation talks between the United States and Soviet Union had begun in November of 1969. The deployment of ABM systems was a major subject of these talks during the next several years. Ultimately, with construction of the two Safeguard sites well underway, President Nixon and General Secretary Leonid Brezhnev signed the ABM Treaty at the May 1972 Moscow Summit. This treaty allowed each country to deploy only two ABM facilities - one around each nation's capital and another around an ICBM launching site. Because the Safeguard construction at Grand Forks AFB was much further along than the construction at Malmstrom AFB, the Nixon administration decided to cease activity at Malmstrom and complete the facility at Grand Forks. Utilizing salvaged material from Malmstrom, the Army completed the Safeguard site at Grand Forks, naming it the Stanley R. Mickelsen Safeguard Complex (SRMSC).[89]

The subsequent decision by Congress not to authorize construction of a Safeguard site around Washington, DC made the SRMSC the only ABM facility ever deployed by the United States. However, the life of the SRMSC was short-lived. In 1974, while construction of the facility was still proceeding, Congress decided to terminate the Safeguard program altogether. This decision came about because some influential leaders in Congress feared that Soviet missiles armed with multiple independently targetable reentry vehicles (MIRVs) would make the single ABM system vulnerable. Furthermore, the Strategic Arms Limitation Treaty (SALT) weakened the justification for the Safeguard complex. Despite the termination of the program, the Army decided to operate the SRMSC for a year to gain operational experience but even this plan was cut short. After becoming completely operational on October 1, 1975, the SRMSC had operated for only two months when Congress ordered its deactivation. The Safeguard mission officially ended on February 10, 1976,

[88] Ibid., 113-114; Moeller, 3:8.

[89] Lonnquest and Winkler, 115; Moeller, 3:8. Lt. General Stanley R. Mickelsen was a strong proponent of ABM systems when he served as Commanding General of the United States Army Air Defense Command (ARADCOM).

although the PAR continued to remain active as a tracking component of the North American Air Defense Command (NORAD).[90]

Beyond Safeguard

The Army's work on ABM systems did not end with the deactivation of its Safeguard site. Throughout the remainder of the 1970s, the Army continued to conduct research on advanced ballistic missile defense systems, albeit at a greatly reduced level. In the 1980s, President Ronald Reagan renewed the ABM debate when he proposed his Strategic Defense Initiative (SDI). Dubbed "Star Wars" by the media, SDI called for the creation of a nationwide ballistic missile defense shield using advanced and exotic technologies. The Army's Ballistic Missile Defense Organization (BMDO) oversaw a major portion of the research related to the SDI effort. The collapse of the Soviet Union in 1989 led to major cutbacks in funding for SDI and, by the early 1990s, the United States began focusing its efforts on localized theater missile defense.[91]

Modern Air Defense Weapons

While the Safeguard drama was being played out in the early 1970s, major changes in the nation's air defense policy were underway. In 1973, Secretary of Defense Melvin Laird came to the conclusion that it was beyond the technological capabilities of the United States to adequately protect the nation's cities from a well-coordinated ballistic missile attack. Believing the Nike deployment to be ineffective as well as costly, Laird initiated a process that ultimately led to the complete phase out of all Nike sites by the end of 1976. This was the beginning of the end for ARADCOM. After transferring control of its last brigade to the United States Army Forces Command (FORSCOM) in October of 1974, ARADCOM was no more.[92] Deactivation of the last National Guard Nike Hercules sites took place over the next several years.

Concurrent with the phase out of the Nike systems was a renewed Army effort to gain new air defense weapons. Research and development activity for weapons had come nearly to a standstill during the Vietnam War and the Army was now eager to update its air defense capabilities. New Army air defense weapon programs that began in the 1970s included Roland, Division Air Defense (DIVAD) system, Stinger, and Patriot.

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[90] "Historic Context for Cold War Significant Properties at the Stanley R. Mickelsen Safeguard Complex," (Huntsville, AL: United States Army Space and Strategic Defense Command, n.d.), 2, 30.

[91] Lonnquest and Winkler, 116; "Historic Context for Cold War Significant Properties at the Stanley R. Mickelsen Safeguard Complex," 34-37.

[92] Moeller, 4:4.

The Army initiated the Roland program in response to a need for a short-range, all-weather air defense system that could counter low-flying aircraft. The Army envisioned replacing its fair-weather Chaparral system with the Roland system in the 1980s. Either mounted on a wheeled or track vehicle or employed on a trailer, the European-designed Roland system carried 10 missiles and included surveillance and tracking radar as well as power generation, fire control, and environmental control equipment.[93] Due to budget cuts, political considerations, and competition from other weapon research and development programs, particularly Patriot, Roland was discontinued in the early 1980s.

During the Vietnam War, the Army relied upon the Vulcan gun as an "interim" weapon to provide protection to its front-line troops against low-flying aircraft.[94] Desiring a more advanced division air defense weapon to counter this threat, the Army initiated development of the Sergeant York DIVAD system. Testing of this self-propelled, radar-aimed antiaircraft gun proceeded through the mid-1980s. Despite the expenditure of nearly $1.8 billion, DIVAD never lived up to the high expectations placed upon it. Poor system performance ultimately led Secretary of Defense Caspar Weinberger to cancel the program in 1985.[95] As a replacement for DIVAD, the Army initiated development of the Forward Area Air Defense (FAAD) system. FAAD consists of a package of advanced weapons designed to neutralize enemy air power in forward battle positions. Development of these systems proceeded in the mid- and late-1980s.[96]

Figure 36. The all-weather Roland system.

The man-portable, shoulder-fired Stinger is an improved version of the Redeye. Like its predecessor, the Stinger provides short-range, low-level air defense. After undergoing testing throughout much of the 1970s, the weapon system was fielded by the Army in the early 1980s. The Army has since mounted Stinger missiles on its Avenger system, its Bradley Fighting Vehicles, and its combat helicopters.

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[93] "The Roland Story," Air Defense Bulletin, March 1977.

[94] The Army's surface-to-air missiles were ineffective against low-flying aircraft because they were too complicated, too hard to set up, and could be used only to defend rear-area targets (Gregg EasterBrook, "DIVAD," The Atlantic Monthly, October 1982, 29).

[95] David Griffiths, "Cap the Knife Cuts His Losses (C. Weinberger kills DIVAD)," Business Week, 9 September 1985, 41.

[96] John S. DeMott, "Son of Sergeant York (Army Proposes Forward Area Air Defense Systen (FAAD)," Time, 11 August 1986, 16.

Studies for the Patriot missile system actually began in the 1960s under the name Army Air Defense System for the 1970s (AADS-70s). Later designated as Surface-to-Air Missile, Development (SAM-D), the system became known as Patriot in the bicentennial year of 1976. As successor to the single-kill Nike Hercules and Hawk systems, the Patriot was to be capable of engaging multiple targets simultaneously. In addition, it was to have the ability to shoot down ballistic missiles as well as enemy aircraft. Development of the Patriot system progressed through the 1970s and into the early 1980s when it became operational.[97] Used during the 1990 Persian Gulf War to intercept Iraqi SCUD missiles, the Patriot system has been steadily upgraded to provide greater theater defense against both aircraft and tactical ballistic missiles.[98] It is currently the U.S. Army's most advanced air defense system.

The Air Defense and Guided Missile Role of Fort Bliss

Figure 37. Patriot missile system.

To carry out its critical Cold War air defense role, the Army needed facilities to support the massive training effort necessary to form its tactical air defense units. Fort Bliss, with its spacious ranges and moderate year-round climate, was ideal for this purpose. Consequently, the installation known primarily for its horse cavalry before World War II, became the Army's premier air defense training installation during the Cold War. In addition, the installation played important roles in the Army's early guided missile programs as well as the Army's ongoing air defense weaponry testing activities.

The Establishment of Antiaircraft Artillery at Fort Bliss

When World War II broke out in Europe in 1939, Fort Bliss was somewhat of an anachronism. The horse cavalry, long since replaced by mechanized vehicles at most Army installations, was still prominent at Fort Bliss. Since its activation at Fort Bliss in 1921, the First Cavalry Division had used mounted troops to patrol and maintain order along the international border between

[97] "Patriot," [Online] Available: http://michp753.redstone/army.mil/history/systems/PATRIOT.html; Moeller,3:5.

[98] "Patriot," First to Fire Brochure, [Online] Available: http://147.71.152.73/adapubs/brochure/broch_1.htm.

Mexico and the United States. This practice continued because the rugged terrain of the Southwest did not lend itself well to the use of motorized vehicles. The entry of the United States into World War II, however, signaled the end of the horse cavalry. Although the Army did utilize horse cavalry in the very early stages of the war, it soon became clear that the horse cavalry was no match for the tanks and airplanes of modern warfare.[100] In addition, the need to maintain an outdated horse cavalry along the border all but vanished in 1942 when Mexico declared war on the Axis powers. The end of the horse cavalry came in 1943 when the War Department converted the First Cavalry Division into a mechanized infantry unit and sent it to the Pacific theater. By that time, Fort Bliss had already begun its transformation into a major AAA training installation.

Soon after England and France declared war on Germany, Congress approved a peacetime mobilization plan to prepare for the possibility of America's entry into the war. As the nation's military expanded, the War Department began looking for suitable locations to conduct various types of training activities, including AAA training. Taking notice of the mild regional climate and large expanses of land surrounding Fort Bliss, the War Department established the Antiaircraft Training Center (ATC) at Fort Bliss in September of 1940. Located northwest of the main post on an 1,800-acre tract of land known as Logan Heights, the Center was set up to train complete antiaircraft units.

Figure 38. Cavalry troops on maneuver near Fort Bliss during the 1930s.[99]

As World War II progressed, the War Department decided to consolidate all of its AAA activities at Fort Bliss. In April of 1944, the War Department moved the Antiaircraft Artillery Replacement Training Center (AAA RTC) from Camp Callan, California to Fort Bliss. Housed on the main post, the AAA RTC trained men fresh from reception centers for duty in antiaircraft battalions. During the following September, the War Department took the further step of moving both the Antiaircraft Artillery School and the Antiaircraft Artillery Board from Camp Davis, North Carolina to Fort Bliss. The School, which traces its lineage back through the Coast Artillery School to the Artillery Corps of In-

[99] Leon C. Metz, Desert Army: Fort Bliss on the Texas Border, (El Paso: Mangan Books, 1988), 135.

[100] The last major action to be undertaken by mounted cavalry came early in 1942 when the 26th Cavalry covered the Army's retreat to Bataan during the Philippine Campaign.

struction established at Fort Monroe, Virginia in 1824, trained both officers and enlisted personnel in antiaircraft doctrine and technique. By war's end, the School had graduated more than 60,000 students. These trained artillerymen made up the 80 antiaircraft artillery battalions that saw action during the war. The Antiaircraft Artillery Board, consisting of 364 personnel by 1946, was responsible for developing and testing antiaircraft equipment and material. During the war, the number of projects before the Board often ran as high as one hundred at a time.[101]

When World War II finally came to a close, the Soldiers who had fought in the war were naturally eager to resume their civilian lives. With world peace seemingly secured, the U.S. military underwent a rapid demobilization. This process began at Fort Bliss in November of 1944 when the War Department established a separation center at Logan Heights. This center began discharging men from service during May of the following year.[102]

Although AAA activity at Fort Bliss experienced a temporary lull after World War II, the installation was in no danger of becoming irrelevant. This was because the Army planned to have Fort Bliss play a major role in its nascent guided missile programs.

The Beginning of the Guided Missile Era

The Army Ordnance Department had initiated both the ORDCIT and Hermes programs in 1944. Fort Bliss and the nearby White Sands Proving Grounds were to be the primary support installations for these efforts. Immediately following the end of World War II, the Army began consolidating the necessary organizations and personnel at these installations to support its guided missile research and development efforts.

In October of 1945, the Army organized the 1st Antiaircraft Artillery and Guided Missile (AAA & GM) Battalion at Fort Bliss to support the Ordnance Department's guided missile activities. As the only Army unit of its kind, the 1st AAA & GM Battalion would gain valuable experience with guided missiles by assisting in the assembly, testing, and launching of the Hermes V-2 rockets and other early guided missiles at White Sands. In this way, the Army hoped to develop a nucleus of trained and experienced personnel from which it could draw instructors as well as personnel for its future tactical guided missile units. In addition, the Army expected the 1st AAA & GM Battalion to play an

[101] Major A. R. Badger, "AA Service Test Section Notes," Coast Artillery Journal, May-June, 1946, 70.

[102] "The Story of Fort Bliss", n.d. TMs [photocopy], 32. On file in vertical files of Fort Bliss Museum, Fort Bliss, Texas.

integral role in the development of doctrine for the tactical employment of ground-launched guided missiles.[103]

To coordinate the Army's rocket programs at Fort Bliss and White Sands, the Ordnance Department established the Research and Development Division Sub-Office (Rocket) at Fort Bliss in the fall of 1945.[104] Major James P. Hamill, the officer who coordinated the shipment of captured V-2's from Germany to White Sands, was in charge of this office. Hamill was also in charge of the German rocket specialists.

The Ordnance Department's plans to bring the German specialists to Fort Bliss under its "Operation Paperclip" project were well underway by the summer of 1945. Dr. Wernher von Braun arrived at the installation in October of 1945. The others soon followed and by February of 1946 all of the German rocket specialists were at Fort Bliss. The Army initially housed these specialists in World War II temporary-type barracks in an ordnance area on the post. Later that year, Major Hamill arranged for them to be moved to converted wards in the William Beaumont General Hospital Annex, then located in the northeast corner of Fort Bliss.[105] The German specialists were soon at work assisting Army and General Electric personnel with the Hermes V-2 program.

In July of 1946, in an effort to coordinate all of the antiaircraft and guided missile activities of the Army Ground Forces, the War Department activated the Antiaircraft Artillery and Guided Missile Center at Fort Bliss. General John L. Homer was the first commander of this center, which had its headquarters in Building 515. With a primary mission of training antiaircraft artillery and guided missile units, the Center was composed of the post at Fort Bliss, the Antiaircraft Artillery School, Army Ground Forces Board No. 4 (formerly the Antiaircraft Artillery Board), the 1st AAA & GM Battalion, the Research and Development Division Sub-Office (Rocket), the 9330th

Figure 39. Ordnance Department's rocket sub-office at Fort Bliss.

[103] Lieut. Col. J.W. Rawls, Jr., 14; Dr. Ancel St. John, "Ordnance Guided Missile Program," Coast Artillery Journal, September-October 1946, 20.

[104] A temporary-type construction World War II barracks housed the Research and Development Division Sub-Office (Rocket) at Fort Bliss. The building has since been demolished.

[105] None of the buildings in the William Beaumont General Hospital Annex remain extant at Fort Bliss.

Technical Service Unit, and the 1852nd Area Service Unit. The Center also had general reserve units attached.[106]

To keep pace with the new guided missile role of Fort Bliss, the Antiaircraft Artillery School added a Guided Missile Department and made guided missile instruction an official part of its curriculum in September of 1946. A nine-month Guided Missile Course used classroom instruction and hands-on experience to train officers to be commanders of guided missile units, instructors in guided missile subjects, range officers, test officers, and liaison officers on missile development projects. Other courses trained enlisted men to be leaders in guided missile units, missile technicians, and instructors in Regular Army, National Guard, Organized Reserve Corps, and Reserve Officers Training Corps (ROTC) guided missile units. The Navy joined in the guided missile effort of the School in 1947 by providing a number of instructors for guided missile courses. Soon, Navy, Air Force, and Marine Corps students were completing coursework alongside their Army counterparts.[108]

In addition to its training role, the Guided Missile Department of the School was also responsible for developing tactics and doctrine for the use of guided missiles. The staff and faculty of the department contributed to this effort by engaging in studies and making recommendations. The development of doctrine was also part of the Department's curriculum, as student officers were required to submit papers covering some aspect of the tactical employment of missiles. A guided missile doctrine board composed of representatives of the Department, the 1st AAA & GM Battalion, and Army Field Forces Board No. 4 evaluated the various recommendations and worked toward establishing approved doctrine for guided missiles before they became operational.[109]

Figure 40. Figure 29 - Instruction on V-2 motor at Fort Bliss, 1948.[107]

In November of 1946, the Antiaircraft Artillery School received a new designation that more accurately reflected the scope of its activities. In conjunc-

[106] Prior to its move to Camp Ord in 1946, the Antiaircraft Replacement Training Center was also under the command of the Antiaircraft Artillery and Guided Missile Center.

[107] Antiaircraft Journal, Nov-Dec, 1948, 36.

[108] Colonel John H. Madison, "Guided Missiles Instruction at Fort Bliss," Coast Artillery Journal, March-April 1947, 33-34; Lieutenant Colonel Lawrence W. Byers, "Guided Missile Instruction at Fort Bliss, Texas," Coast Artillery Journal, November-December 1948, 35.

[109] Byers, 35-36.

tion with a reorganization of all of the Army's service schools, the War Department redesignated the School as the Antiaircraft Artillery and Guided Missile (AAA & GM) School. At that time, the School officially became a branch of the Artillery School located at Fort Sill, Oklahoma. Over the next decade, the School concentrated on training officers and enlisted men in AAA and guided missile subjects.

Coordinating its activities with the Antiaircraft Artillery and Guided Missile Center, the School, and the 1st AAA & GM Battalion was Army Field Forces Board No. 4. Known as the Antiaircraft Artillery Board during World War II, the Board changed designations several times over the years. In 1948, the Board became known as Army Field Forces Board No. 4. It continued under that designation until August of 1962 when it became the U.S. Army Air Defense Board under the Army Material Command.[110] Originally occupying buildings in the 500 and 600 areas of Fort Bliss, the Board moved into a new complex of buildings in the 1600 area in 1952.

As a research and development agency within the Department of Defense, the Board's primary mission was to conduct user tests of antiaircraft artillery and guided missile equipment that had potential to be adopted as standard equipment by the Army. The 1st AAA & GM Battalion provided the necessary troops for these service tests. In addition to testing antiaircraft guns and surface-to-air and surface-to-surface guided missiles, the Board also tested radars, electronic devices, and the various types of radio controlled aerial targets (RCATs) used as training aids for AAA and guided missile units. Other responsibilities of the Board included reviewing and studying foreign equipment, preparing military characteristics and recommendations for the development of new equipment, recommending modifications, classifications, and maintenance procedures for new and standard equipment, and assisting in the preparation of basic training literature.[111]

The concentration of the Center, School, Board, Ordnance sub-office, 1st AAA & GM Battalion, and German rocket specialists at Fort Bliss made the installation the Army's premier center of expertise in the guided missile field. Together, these organizations and personnel formed the core of the Army's pioneering missile programs during the early Cold War years.

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[110] "50th Anniversary History of the Air Defense Artillery Test Directorate, Test and Experimentation Command," (Fort Bliss, TX: Test and Experimentation Command, Air Defense Artillery Test Directorate, 9 March 1992), 12. The Board became the Test and Experimentation Command Air Defense Artillery Test Directorate in November of 1990.

[111] "Guided Missile Center Established at Fort Bliss," Coast Artillery Journal, July-August 1946, 9; Lieutenant Colonel Peter S. Peca, "AGF Guided Missile Activities at Fort Bliss, Texas," Coast Artillery Journal, November-December 1947, 34.

Fort Bliss During the Cold War

In the years just after World War II, while the Army was gaining experience with the German V-2's and its first guided missiles, the ranges of Fort Bliss were supporting men training on AAA guns of all types. By the early 1950s, when the Army's first tactical guided missiles became operational, the Fort Bliss ranges also began supporting training launches of Corporal, Nike, and Honest John missiles. As the population of Fort Bliss swelled with AAA and guided missile students, the installation began expanding significantly. Thousands of new buildings were constructed at the installation and vast new training lands acquired. As Army air defense requirements changed through the years, the various organizations at Fort Bliss involved in training and testing underwent changes and reorganizations to keep pace. The following sections describe these various activities and changes.

Antiaircraft Artillery Training at Fort Bliss

The end of World War II greatly diminished the Army's need for AAA units and AAA activity at Fort Bliss consequently experienced a momentary decline. As part of the general demobilization that followed the end of the war, the War Department deactivated the Antiaircraft Training Center in November of 1945. One year later, the AAA RTC moved to Camp Ord, California. During this period, the Army lost many of its most experienced AAA personnel. To compensate for this loss, the Army looked to its reserve components to meet its future AAA requirements. ROTC offered the Army an opportunity to provide AAA training to men who could later be integrated into Regular Army AAA units.

In 1947, the Army began conducting annual AAA ROTC summer camps at Fort Bliss. First utilizing housing, administrative, and recreational facilities at the main post, and later at the Logan Heights area, the camp trained ROTC cadets in AAA gun and automatic weapons subjects and methods during a six-week period. After two weeks at Logan Heights, the cadets moved to the Orogrande Range where they received intensive basic and specific AAA training. This training climaxed with live firings at towed targets or RCATs.[112]

Despite the summer ROTC camps, AAA activity at Fort Bliss remained at a relatively low level until 1950 when North Korea invaded South Korea. This development prompted the Army to begin sending troops, including the

[112] Colonel E.W. Timberlake, "The Fort Bliss ROTC Summer Camp," Coast Artillery Journal, September-October 1947, 34; "ROTC Cadets in Field," Antiaircraft Journal, July-August 1952, 32. The Air Force's First Tow Target Squadron at nearby Biggs Air Force Base towed the targets during AAA training at the Fort Bliss ranges.

102nd Brigade from New York and the 108th Brigade from Georgia, to Fort Bliss to receive AAA training.[113] As this activity proceeded, ARAACOM began the massive process of activating and deploying National Guard AAA gun and automatic weapons units around major U.S. cities. With the renewed demand for trained AAA officers and enlisted men, AAA activity at Fort Bliss expanded tremendously.

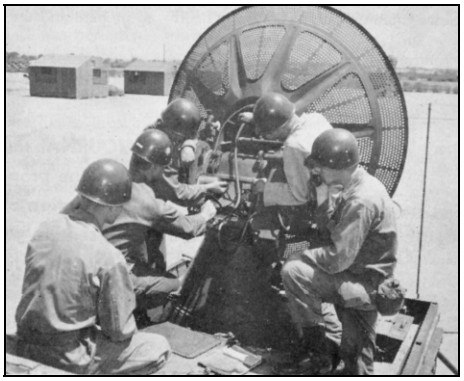

Figure 41. Radar instruction at the AAA RTC, 1952.[114]

To meet the demand for trained AAA personnel, the Army reactivated the AAA RTC at Fort Bliss on August 10, 1950. The primary mission of the AAA RTC was to train fire control, director, and radar operators, operations assistants, and aircraft warning specialists for Army AAA units. The AAA RTC 5th Training Battalion was responsible for this task.

Training at the AAA RTC consisted of eight weeks of basic combat training at Castner Range and eight weeks of specialized training at the AAA & GM School. Courses for officers provided students with a firm grounding in the principles and techniques of AAA and prepared them for positions as battery grade officers. Courses for enlisted men provided specialized technical instruction in fire control and radar repair and maintenance. This instruction emphasized hands-on experience with the various pieces of equipment the students were expected to master. Fire-control operators practiced their skills on specialized trainers before tracking and firing on RCATs or airplane-towed targets at one of the Fort Bliss ranges. Radar operators gained practical experience with various radar sets at the AAA RTC radar park and then participated in realistic exercises at one of the ranges. Graduates of the AAA RTC were assigned to AAA units in the United States and overseas.[115]

The AAA RTC became the U.S. Army Training Center (Antiaircraft) in March of 1956. Redesignated as the U.S. Army Training Center (Air Defense) in 1958, the Center continued training AAA students until 1960 when the last of the Army's AAA gun units were phased out.

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[113] "National Guard Training At Fort Bliss," Antiaircraft Journal, January-February 1951, 53-54.

[114] Antiaircraft Journal, Nov-Dec, 1952, 27.

[115] "The AAA RTC, Fort Bliss, Texas," Antiaircraft Journal, July-August 1951, 35; "AAA Specialist BN at Bliss," Antiaircraft Journal, November-December 1952, 27-28.

The AAA Ranges of Fort Bliss

The primary factor in the Army's decision to consolidate its AAA testing and training activities at Fort Bliss was the existence of large tracts of nearby land that were ideal for supporting these activities. Fort Bliss had first begun the process of acquiring some of this land back in 1911 when it gained the Doña Ana Target Range in the Organ Mountains of New Mexico. In the mid-1920s, Fort Bliss purchased approximately 4,500 acres of land near the installation and used it for Biggs Army Airfield and Castner Target Range. Another land purchase in 1931 added an additional 2,700 acres around the main cantonment.[116] World War II served as the impetus for the acquisition of more training lands. Between 1938 and 1945, Fort Bliss expanded through land leases and acquisitions between the Organ and Hueco Mountains in Doña Ana and Otero counties, New Mexico. Fort Bliss used this land to establish Hueco Range, Alvarado Antimechanized Range, and Orogrande Range. Some of this land later became part of McGregor Range. By the mid-1940s, Fort Bliss had also acquired a 52,000-acre maneuver area directly east of the main post. As AAA and guided missile training expanded at Fort Bliss after the war, the Army continued to purchase or lease additional land to support testing and training activities.

By 1953, the ranges of Fort Bliss totaled nine in all and covered an area in excess of 20 miles wide by 90 miles long.[117] At that time, the ranges included Castner Range, two Orogrande Ranges, three McGregor Ranges, and the Hueco, Doña Ana, and Alvarado Antimechanized Ranges. These ranges supported tactical employment and firing of weapons from the .45 caliber pistol to the 120mm AAA gun and early guided missiles.

Castner Range, directly to the north of Fort Bliss, supported basic combat training and small arms firings.[118] The Orogrande North and South Ranges, situated 51 miles northeast of the installation, supported firings of automatic weapons (North) and 90mm and 120mm guns (South). By the mid-1950s, these two ranges became known simply as Orogrande Range.

Hueco Range, 28 miles northwest of Fort Bliss, contained four firing points and supported School training on all kinds of AAA guns and automatic weap-

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[116] Kenneth V. Faunce, "The Fort Bliss Preacquisition Project: A History of the Southern Tularosa Basin," (Fort Bliss, Texas: Conservation Division, Directorate of Environment, United States Army Air Defense Center, 1997), 115, 118.

[117] "Missile Activity at Fort Bliss."

[118] By the 1960s, the city of El Paso had expanded to the edges of Castner Range. The Army subsequently donated and sold much of the range back to the city during the 1970s and 1980s. This allowed for the construction of the North-South Freeway.

ons. Further to the west, the Doña Ana Range supported tests of various antiaircraft weapons and related equipment conducted by Army Field Forces Board No. 4. The Alvarado Antimechanized Range, situated roughly 6 miles northeast of Hueco Range, supported automatic weapons and 90mm guns that fired armor piercing ammunition at simulated ground targets.[119]

The McGregor Ranges, located from 26 to 50 miles northeast of Fort Bliss, encompassed 374,000 acres in Otero County, New Mexico. The Army began the process of forming these ranges in 1948 when it initiated a series of negotiations with area ranchers. With the active support of Malcom McGregor, a rancher who owned over half of the lands to be acquired by the Army, the Army entered into a five-year exclusive use lease agreement. The Army then established McGregor North, McGregor South-Automatic Weapons, and McGregor South Ranges, named to honor the man who had helped make their existence possible. McGregor North supported 90mm guns, McGregor South-Automatic Weapons supported light antiaircraft weapons, and McGregor South supported 90mm and 120mm guns. By 1958, the two McGregor South ranges came to be known as the Desert Range.

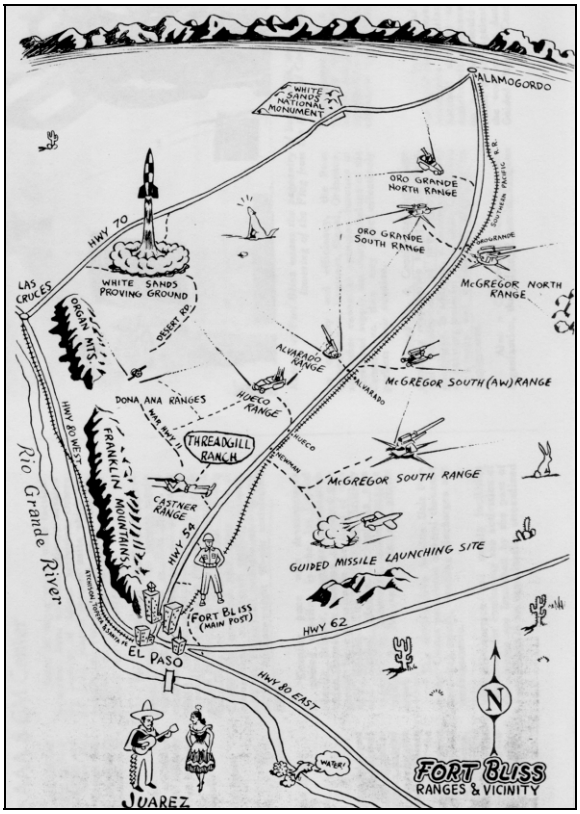

Figure 42. Illustration showing Fort Bliss ranges in the early 1950s.

By the mid-1950s, several of the Fort Bliss ranges were also supporting firings of the Army's new 75mm Skysweeper antiaircraft gun. These ranges included Doña Ana, Hueco, and Orogrande South as well as all three of the McGregor Ranges.[120]

[119] "U.S. Army Air Defense Center: The Second Hundred Years," (Fort Bliss, TX: U.S. Army Air Defense Center, n.d.) 16-17.

[120] "Analysis of Existing Facilities," (Fort Bliss, Texas: Center Engineer, January 1958), 45-46, 49, 53. By 1958, the Hueco, Doña Ana, and Orogrande Ranges all were considered part of a larger complex designated as AAA Range #1.

Activities and Growth of the 1st Antiaircraft and Guided Missile Battalion

All the while AAA training was taking place at Fort Bliss in the 1950s, the 1st AAA & GM Battalion was busy participating in the Army's pioneering missile programs. Although headquartered at Fort Bliss, the 1st AAA & GM Battalion was stationed and quartered at the White Sands Proving Ground. Personnel from this unit began assisting General Electric and the German rocket specialists with V-2 launches at White Sands in the spring of 1946. This participation continued through September of 1952 when the 73rd and last V-2 launch took place.

The 1st AAA & GM Battalion also participated in the JPL guided missile development efforts, beginning with the WAC-Corporal program. During a WAC-Corporal launch on February 24, 1947, a contingent of 1st AAA & GM Battalion personnel became the first all-Soldier crew to fire a missile in the United States.[121] The 1st AAA & GM Battalion went on to assist the JPL with its Corporal research and development program as well.

Figure 43. 1st Guided Missile Battalion and JPL personnel at White Sands in the early 1950s.

During April of 1947, Battery B of the 1st AAA & GM Battalion moved to the Ordnance Department's Rocket Branch, Research and Development sub-office at Fort Bliss to assist General Electric and the German scientists with the Hermes II ramjet cruise missile development effort. This participation lasted until 1953 when the Army canceled the program. By that time, the German scientists and Ordnance sub-office had already moved to the new Army Guided Missile Center at Redstone Arsenal in Alabama.

The 1st AAA & GM Battalion contributed to the Army's guided missile projects in a variety of ways. Furnishing project officers was one of the most important of these contributions. Project officers served as liaisons between civilian contractors and the various agencies at White Sands. Their considerable responsibilities included scheduling launches, supervising the assembly, erection, servicing, and pre-launch testing of missiles, and commanding the net of

[121] Major Ralph M. Rogers, "Baby Takes Its First Step," Coast Artillery Journal, March-April 1947, 28-29.

instrumentation support facilities at White Sands. The 1st AAA & GM Battalion also furnished ground crews that actually carried out the transportation, erection, fueling, and pre-launch tests of the missiles. Other Battalion personnel served in various instrument sections working with radar, plotting boards, optical instruments, and precision cameras. At Fort Bliss, Battalion machinists, sheet-metal workers, and welders worked in shops making minor repairs and fabricating missile parts. 1st AAA & GM Battalion personnel also served as clerks, cooks, drivers, mechanics, and duty Soldiers to carry out the more mundane administrative and housekeeping duties of the organization.[122]

As the Army's guided missile development efforts expanded, so did the organization responsible for supporting these efforts. The 1st AAA & GM Battalion became the 1st Guided Missile Regiment on May 31, 1948 and then, on April 25, 1950, became the 1st Guided Missile Group. The Group consisted of the 1st, 2nd, and 3rd Battalions. The original surface-to-air 1st Battalion continued supporting launches at White Sands. The 2nd Battalion, also a surface-to-air unit, and the 3rd Battalion, a surface-to-surface unit, were primarily involved in training with specific tactical missiles as well as training personnel to become guided missile crewman and technical specialists.[123]

In order to be ready when the Army's tactical missiles became operational, the 1st Guided Missile Group looked for any and all opportunities to gain experience with guided missiles. The Air Force JB-2, a copy of the German V-1 "buzz bomb", and the Navy-developed Lark antiaircraft missile provided such opportunities to the Group in the early 1950s.

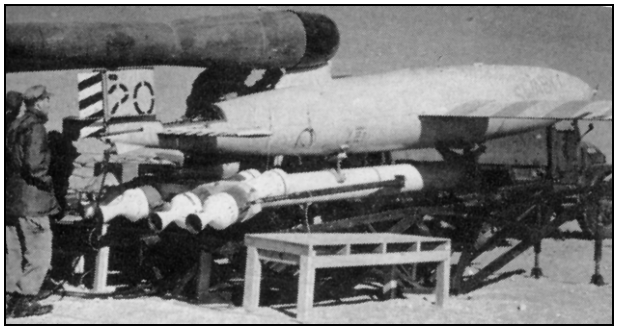

Figure 44. Loon being prepared for launch, 1952.[124]

After developing the JB-2 in the latter stages of World War II, the Army Air Force quickly decided that this crude missile was inadequate for tactical use. Having no use for the excess missiles after the war, the Air Force made them available to the Army and Navy for testing and training purposes. After acquiring 66 of the JB-2s from the Air Force in April of 1950, the Army renamed the missile the Army Loon. In ad-

[122] "1st Guided Missile Regiment," Antiaircraft Journal, March-April 1949, 27-28.

[123] Captain Andrew G. Favret, "The First Guided Missile Group," Antiaircraft Journal, November-December 1952, 21-22.

[124] Antiaircraft Artillery Journal, Nov-Dec 1952, 21.

dition to providing hands-on experience to its first missilemen, the Army hoped that the Loon would also be able to serve as a target drone for practice firings of the Nike-Ajax missile, then under development. Personnel from the 1st Guided Missile Group 3rd Battalion were soon busy modifying the propulsion, guidance systems, and airframes of these missiles in their shops at Fort Bliss in preparation for training launches. The 3rd Battalion viewed the Loon as their first 'basic trainer."[125]

The 3rd Battalion conducted its first Loon launch on December 15, 1950 at the McGregor South Range. Although continuing to experiment with Loon launches from both short-length and long-length launchers at McGregor Range and White Sands over the next several years, 3rd Battalion personnel were never able to get the missile to perform well enough for it to be used as a drone target. These launches did, however, provide Battalion personnel with valuable training and operational experience.[126]

Soon after the 3rd Battalion began its Loon launchings, the Army directed the 1st Guided Missile Group to begin a surface-to-air missile training program in anticipation of an operational Nike-Ajax system. Plans for this effort included launching Lark missiles to provide training for the Group's personnel and to produce information concerning the future handling and tactical employment of surface-to-air guided missiles.[127]

The liquid-fueled antiaircraft Lark missile dated from World War II when the Navy developed it and used it mainly against Japanese aircraft. Several years after the war, the Air Force obtained the missile and began using it as a training vehicle for its guided missile technicians. With the Nike Ajax still in its development phase, the Army also decided to take advantage of the Lark, viewing it as an ideal training vehicle for its first missile training unit.

Figure 45. Lark prior to launching at McGregor Range, 1950.

To prepare for the Lark launches the 1st Guided Missile Group selected a small group of officers and enlisted men from its 2nd Battalion to un-

[125] Ibid.; Phone Interview with Colonel Ashby Foote (ret), 3 March 1998. Colonel Foote was a battalion commander with the 1st Guided Missile Brigade in the early 1950s.

[126] Favret, 23.

[127] Ibid.

dergo an intensive eight-week Lark familiarization course given by the makers of the missile. Upon completion of the course, this group began training other Battalion personnel. Before any launches could take place, the Battalion had to improvise and fabricate several pieces of equipment needed to conduct the launches out on the range. While these preparations proceeded, the Battalion engaged in drills, practices, and dress rehearsals to help insure success and to increase the training value of the operation. Finally, on July 25, 1951, the Battalion successfully launched its first Lark missile in an area near the present-day McGregor Range Control Tower. Over the next several years, the Battalion conducted approximately 19 additional Lark launches, integrating new personnel and improved procedures and techniques in the process.[128]

Although the Loon and Lark missiles were fairly primitive and outdated by the time the 1st Guided Missile Group began working with them, they provided valuable training experience under operational conditions to the men who would train the Army's first tactical guided missile units. In addition, the launchings produced a variety of technical specialists who would soon transition to other Army missile programs.

As 2nd and 3rd Battalions were completing the last of the Loon and Lark launches, the 1st Guided Missile Group experienced yet another expansion, becoming the 1st Guided Missile Brigade in November of 1952. Like its predecessor organizations, the Brigade continued to participate in the development of missiles, missile doctrine, and procedures. These efforts paid dividends when the unit took on its biggest challenge yet - training and evaluating ARADCOM's Nike units as well as the Army's first surface-to-surface tactical guided missile units. Through its work with guided missiles at White Sands and the ranges of Fort Bliss, the Brigade had cultivated highly experienced missilemen and technicians that were well prepared for that challenge.

Nike Ajax Training

While the Nike Ajax missile was moving closer to operational status, the Army began making preparations for the Nike training program at Fort Bliss. These preparations included finding a suitable range that could support launches of the Nike Ajax under combat conditions and also finding suitable facilities at Fort Bliss to accommodate the influx of Nike students to the AAA & GM School. The Army accomplished the first task when it acquired land approximately 175 miles north of Fort Bliss and then established the Red Can-

[128] Ibid.; Valdemar M. Sorensen, "Historical Information of Surface to Air Missile Firings," TMs [photocopy], 22 January 1968. On file in ADA Historian's Office, Fort Bliss, Texas.

yon Guided Missile Range in October of 1953. With a small base camp and Nike Ajax launch facilities, the Red Canyon Range became the Army's primary Nike Ajax launch training facility.

Figure 46. Applied instruction buildings in the 2300 area.

Back at Fort Bliss, the Army also made progress in securing new School training facilities for Nike students. In 1952, the Army initiated construction of thirty-two new applied instruction buildings in the present-day 2300 area of Fort Bliss. By then, the Army had also begun the process of converting eleven former stables in the 600 area of Fort Bliss into classrooms and guided missile laboratories for use in the Nike training program.

The Nike Package Training Program began at Fort Bliss in late-1953. Under this program, instructors from the Brigade's 1st Guided Missile Group trained "packages" of 14 officers and 123 enlisted men that served as the nucleus of each Nike battalion. Before undergoing a five-week integrated training segment, individual groupings of these men learned specialized skills in the classrooms and laboratories of the AAA & GM School. The climax of the training was a live missile launch at the Red Canyon Range.

After this final phase, the Nike crewmen returned to Fort Bliss to gather their equipment and move it, usually via railroad, to their assigned destination.[129] Each year, Nike units returned to the Red Canyon Range to conduct Annual Service Practice (ASP) launches to ensure and confirm their operational capability.[130] During these exercises, units fired on RCATs simulating air attacks.

The nation's first Nike Ajax unit completed its training at Fort Bliss in early 1954 and then deployed to Fort Meade, Maryland. Over the next three years, all of the nearly 200 Nike Ajax batteries ARAACOM deployed around the nation received their initial training at Fort Bliss. By the mid-1950s, National Guard units and units from Allied NATO countries began receiving Nike training at Fort Bliss. The first National Guard Nike units arrived at Fort

[129] Moeller, 2:9. In addition to the 1st Guided Missile Brigade, the Army Training Center (Air Defense) also briefly participated in the training of Nike crewman at Fort Bliss. In 1959, when the Army was well into the process of replacing its AAA gun and automatic weapons units with Nike units, the Army Training Center (Air Defense) activated the 7th Training Battalion and began training Reserve Forces Act Soldiers called up for active duty as Nike crewman. The center continued training Nike crewman until it was discontinued in 1963.

[130] In the early 1960s, annual service practice firings became known as Short Notice Annual Practices (SNAP).

Bliss in 1957 when ARAACOM began the process of phasing out its AAA gun and automatic weapon units. The first NATO units had arrived one year earlier. These units were from Italy, Norway, and the Federal Republic of Germany. Over the next 15 years, Nike units from 53 countries received training at Fort Bliss.

Expansion of McGregor Range and Nike Hercules Training

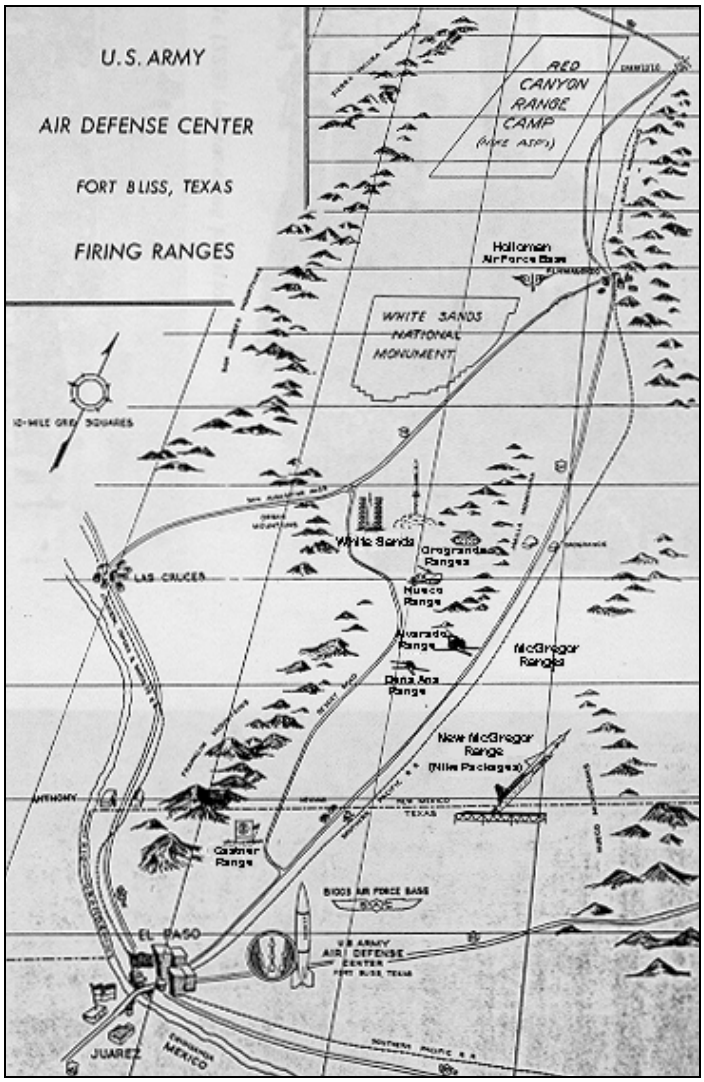

Figure 47. 1957 map showing location of Red Canyon and new McGregor Nike missile ranges.

While the Nike Ajax training program was in its early years, the Army began looking for another missile training range that was closer to Fort Bliss than the distant Red Canyon Range. With the longer range Nike Hercules under development, the Army hoped to find a range that could support the training requirements of both Nike missiles. After ruling out other options, the Army decided to expand the McGregor Ranges. Before the Army could implement this plan, it had to purchase the land it was then leasing from area ranchers. By 1954, after extended negotiations with the ranchers, the Army had acquired nearly all of the previously privately owned land, including the Otero Mesa and the Sacramento Mountains.[131]

[131] Lonnqust and Winkler, 422; "McGregor Range Marks 10th Birthday," El Paso Times, 15 January 1967; "History of McGregor Range," [Online] Available: http://www.bliss.army.mil/mrlwr/fact/fs_hist.htm. The Army's negotiations with the

This land, combined with the McGregor North and South Ranges, formed a new single McGregor Range. In 1957, Congress withdrew the over 680,000 acres of public land in Otero County for use as a missile range for a period of 10 years with a provision for an additional 10 years.[132]

On July 13, 1956, the Army activated the McGregor Range Headquarters and Service Battery. Construction of a small range camp, situated roughly 27 miles northeast of Fort Bliss, began later that year. The initial facilities at the camp included a missile assembly building, range headquarters, barracks, a mess hall, a range control building, and several Nike IFC and launching sites. By the spring of 1957, the McGregor Range was ready to support Nike Ajax firings. On May 3, the 495th Guided Missile Battalion conducted the inaugural Nike launch at the new range.[133]

When the McGregor Range became operational, the Army decided to conduct all of its Nike Ajax training launches at the new range and to use the Red Canyon Range only for Nike Ajax ASP exercises. This arrangement lasted until the summer of 1959 when the Army began using the McGregor Range for both training and ASP launches. No longer needing the Red Canyon Range, the Army officially closed the facility on June 19, 1959 after removing the few permanent facilities that had been constructed there. During its years of operation, the Red Canyon Range had supported a total of 2,952 Nike Ajax firings.[134]

The Army's Nike Hercules missile became operational in 1958 and training of Nike Hercules units at Fort Bliss began that same year. Mirroring the training conducted for the Nike Ajax units, Nike Hercules training consisted of classroom instruction at the School and training and ASP launches at McGregor Range. In order to accommodate the larger Nike Hercules, several launchers at McGregor Range underwent modification.

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ranchers of New Mexico did not always go smoothly. One rancher, John Prather, steadfastly refused to move off of or accept government payment for his ranch land. The Army eventually condemned and acquired Mr. Prather's land with the exception of 15 acres that the Army reserved for Prather's use until his death in 1965. The story of Mr. Prather's holdout became the subject of Edward Abbey's 1962 novel Fire on the Mountain.

[132] "History of McGregor Range." In 1986, Congress renewed the withdrawal of over 600,000 acres of land in Otero County through the Military Lands Withdrawal Act of 1986 for a period ending in the year 2001. The Army began the process of applying for renewal of the McGregor Range land withdrawal in the late 1990s.

[133] "History of the McGregor Range Camp 1st Guided Missile Group," TMs [photocopy], n.d. On file in ADA Historian's Office, U.S. Army Air Defense Artillery Center, Fort Bliss, Texas. The McGregor Range Camp expanded considerably over the next decade, growing to include approximately 100 buildings. By 1967, these buildings included mess halls, theaters, a post exchange, a chapel, garages, motor and swimming pools, officer, NCO and service clubs, a dispensary, repair and maintenance shops, two water towers, and an automated telephone exchange.

[134] Sorensen.; Lonquest and Winkler, 422.

The first units to receive Nike Hercules training at Fort Bliss were Regular Army and NATO units. By 1962, National Guard units were at Fort Bliss receiving Nike Hercules training as well. Although the Army phased out its Nike force during the 1970s, Nike Hercules launches continued at McGregor Range into the early 1990s as Allied countries contracted to use the range to train its Nike Hercules units. A Japanese crew conducted the last Nike Hercules firing at McGregor Range in December of 1992.

Surface-to-Surface Missile Training

When the Nike Ajax training program began at Fort Bliss in the early 1950s, the Army's first surface-to-surface missiles were nearing operational status. These missiles included the Corporal and Honest John. The 1st Guided Missile Brigade and its predecessor organizations participated in the research, development, testing, and evaluation of these missiles at the White Sands Proving Grounds. When the missiles became operational, the Brigade then began training the units that fielded them.

The 1st Guided Missile Brigade's participation in the Corporal program began in 1950 when the unit began conducting Corporal test launches for the JPL. This provided the Brigade with valuable experience that it could impart when it began training the Army's first tactical Corporal units. In 1952, while the Brigade and JPL continued the Corporal testing program at White Sands, the AAA & GM School at Fort Bliss began conducting the first Corporal courses for warrant officers and enlisted men.[135]

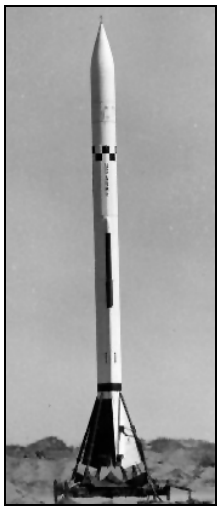

Figure 48. Corporal missile.

The Army began activating its first tactical Corporal battalions in late 1953. During December of the following year, the Army announced its intention to assign several Corporal battalions to Europe. That same month, the 259th Field Artillery Missile Battalion, working with the Brigade's 2nd Guided Missile Group, successfully conducted four Corporal training launches at Red Canyon Range. During the following January, the 259th Battalion became the Army's first ballistic missile unit to be deployed overseas when it was stationed in West Germany with the 7th Army Command.

By early 1956, the Army had organized seven additional Corporal battalions. These units all received classroom training at the AAA & GM School and con-

[135] "History of the U.S. Army Air Defense School," Vertical File School Files, U.S. Army Air Defense Artillery Museum, Fort Bliss Texas, n.d., 39.

Figure 49. 762mm Honest John missile.

ducted training launches under Brigade supervision at a site 15 miles west of the Orogrande Range camp. The Army eventually deployed six of these battalions overseas to Germany and Italy. These units remained on alert until the Army began replacing them with Sergeant units in 1962. The Army inactivated its last Corporal unit in June of 1964.[136]

The 762mm Honest John missile was an unguided solid-propellant rocket that was aimed and fired like artillery from a mobile launcher. Seen as a replacement for the Army's conventional artillery, the Honest John underwent a rapid development program. Design of the missile began in May of 1950 with the first test firing taking place at White Sands in August of 1951. By January of 1953, the Army had signed a production contract with the Douglas Aircraft Company. Soon afterwards, the 1st Guided Missile Brigade 2nd Guided Missile Group began conducting training for Honest John units at the Red Canyon Range. The first of these units deployed to Germany in 1955.[137]

Honest John training continued at the Red Canyon Range until late-1956 when the Army transferred primary responsibility for doctrine and training of surface-to-surface missile units to the Artillery and Missile Center at Fort Sill, Oklahoma. Although no longer responsible for training surface-to-surface missile units, the 1st Guided Missile Brigade continued to provide range support for various surface-to-surface missile units when they traveled to the Fort Bliss ranges for annual practice firings.

Expansion of Facilities

Fort Bliss could not have supported the host of AAA and guided missile activities that began at the installation after World War II without expanding considerably. New facilities and housing were essential to accommodate the new training activities and the greatly increased population of the installation.

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[136] David A. Anderton, "Corporal Gives Army Nuclear Capability," Aviation Week, 9 July 1956, 50.; "The Corporal Program." [Online] Available: http:// www.wsmr.army.mil/paopage/Pages/Corppr.htm; "History of the 1st Guided Missile Brigade," TMs [photocopy], n.d. On file in Office of the ADA Branch Historian, U.S. Army Air Defense Artillery Center, Fort Bliss, TX; "Fact Sheet on Guided Missile Programs," (Washington, DC: Office of the Secretary of Defense, 1 February 1963), 1; Analysis of Existing Facilities, 49.

[137] "Missions Unlimited: U.S. Army Air Defense Center and Fort Bliss," (Fort Bliss: Headquarters, U.S. Army Air Defense Center and Fort Bliss, August 1970), 10-11; "Honest John Replacing Medium Artillery," Aviation Week, 30 January 1956, 41. By the end of 1962, Army artillery battalions in the United States and overseas were equipped with the Honest John. The Army began converting the Honest John from active to Reserve and National Guard status in 1964 when the Lance system became operational.

Consequently, the years between 1948 and 1966 saw unprecedented construction activity at Fort Bliss. In 1946, there were approximately 645 buildings and structures at Fort Bliss and its ranges. By the end of 1966, this number had swelled to over 3700 as a massive building program added new housing, training, administration, and support facilities of all types.

The most pressing need at Fort Bliss in the immediate post-World War II years was additional housing. The installation was not alone in this as a severe housing shortage plagued the entire U.S. military in the late 1940s. This situation had arisen largely because of the changed nature of the armed forces after World War II. In addition to its larger than expected size, the post-war U.S. military experienced a dramatic rise in the number of married personnel, especially in the lower ranks. This change placed an increased importance on housing, especially family housing. This became crucial not only for maintaining morale but also for promoting re-enlistment. And, in an era of increasingly complex weapons systems, retaining trained personnel was a high military priority. Training represented a considerable investment on the part of the military and this investment was lost if the men did not re-enlist. Given the fact that inadequate housing was the number one reason cited for not re-enlisting, military leaders had considerable cause for alarm.

Figure 50. 1948 Officer's family housing duplex

In 1948, only 29,000 family housing units were available at Army installations and many of these were temporary or had been converted from some other use. This number fell woefully short of the projected need for 193,000 units for the Congressionally authorized 947,000-man Army. The Army attempted to address the situation by initiating construction of several thousand family housing units and establishing numerous trailer parks at its installations between 1948 and 1950. During this effort, Fort Bliss gained a new trailer park as well as 17 officer's family housing duplexes and 54 non-commissioned officer (NCO) and enlisted men's family housing complexes. The latter complexes, located in the southeastern portion of Fort Bliss, eventually became known as George Moore Park, named in honor of Major General George F. Moore, a hero at Corregidor during World War II.

To further address the desperate housing shortage at Fort Bliss, the Fort Bliss Housing Board instituted a cooperative low-cost housing project in 1949.

Figure 51. Sears, Roebuck and Company pre-fabricated house at Fort Bliss, 1949.[139]

This effort entailed the creation of a Fort Bliss Housing Association as well as the construction of 211 prefabricated houses purchased from the local Sears, Roebuck and Company. Constructed by volunteer troop labor on 50' x 75' lots between McNair Road and Victory Avenue, these two-bedroom, one bath prefabricated houses included a seven-cubic-foot electric refrigerator, a gas stove, a kitchen sink with dartboard and cabinet, and a space heater. Two different colored roofs were used with the trim paint color matching the roof color. Non-commissioned officers of the first three grades and their families put down a down payment of $300 and then paid the Association $40 per moth to occupy these houses. Routine maintenance was the responsibility of the occupants while the Association assumed responsibility for major repairs. All of the prefabricated houses were constructed in 1949, with the first occupants moving in during April of that year.[138]

Despite the Army's efforts, the need for housing continued to far outpace its availability. Ultimately, it took action on the part of the United States Congress to relieve the crisis. This action came in the form of the Wherry and Capehart Housing Programs, named after the U.S. Congressmen who sponsored them - Senator Kenneth Wherry of Nebraska and Senator Homer Capehart of Indiana.

The Wherry Housing program relied on private developers to construct housing units and then act as act landlords, collecting rents and maintaining the units. Construction under this program, consisting of multi-unit townhouses based on standard plans, began in 1949. After the first year, Wherry housing began to include duplexes and single family detached units.[140] The Department of Defense made good use of the Wherry program as approximately 85,700 Wherry units were constructed at military installations across the nation between 1949 and 1957.[141] Although the program was a good first attempt to relieve the military's housing shortage, several problems plagued the pro-

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[138] General R.W. Berry, "Fort Bliss Low Cost Housing Plan," Antiaircraft Journal, March-April 1949, 9-12. The pre-fabricated homes were all demolished in the mid to late 1960s.

[139] Antiaircraft Journal, March-April 1949, 11.

[140] Virge Jenkins Temme, "Aero Vista Wherry Housing at Fort Bliss, TX," (Champaign, IL: Tri-Services Cultural Resource Research Center, United States Army Construction Engineering Research Laboratories, September 1995), 11.

[141] John H. Meyers, "Historical Overview and Determination of Eligibility of Military Family Housing at Vandenberg Air Force Base, California," (Georgia Institute of Technology: Center for Public Buildings, October 1995), 5.

gram. These problems included the use of inferior construction materials and property neglect by the developers.

The Capehart Housing Program, begun in 1956, was an attempt to correct the problems associated with the Wherry Program. Capehart units, although constructed by civilian contractors, were designed, owned, and maintained by the Department of Defense. Like Wherry housing, Capehart housing units were based on standard plans although they were larger and more expensive. In the first year of the program alone, the Department of Defense approved construction of an estimated 79,131 Capehart units. Many thousands more had been constructed at installations across the country by the mid-1960s.[142]

Because Capehart units were larger and often of better quality than Wherry units, Wherry developers feared that, given the choice between the two types of housing, residents would surely choose a Capehart unit. The Department of Defense addressed this concern by guaranteeing that it would buy all the Wherry housing at an installation before allowing Capehart housing to be constructed. Consequently, between 1956 and 1993, the Department of Defense acquired nearly all of the Wherry housing that was built.[143]

Figure 52. Wherry unit in 6500 area of Van Horne Park.

Fort Bliss benefited greatly from the Wherry and Capehart programs as thousands of housing units were added to the installation under these programs between 1951 and 1963. Wherry housing made its appearance at Fort Bliss in 1951 with the completion of the 801-unit Van Horne Park at the east end of installation. This was the nation's second Wherry project to be started and completed and included the first single family housing units. Also completed in 1951 was the 800-unit Aero Vista Wherry housing complex at nearby Biggs Air Force Base. These units became part of Fort Bliss when the installation reacquired Biggs in 1966.

Figure 53. Capehart duplex in 1500 area of Fort Bliss.

Fort Bliss experienced additional housing relief in 1956 and 1957 with the completion of 138 NCO and enlisted men's family housing

[142] Temme, 11; Meyers, 6.

[143] Temme, 11.

duplexes. Eighty-one of the duplexes were constructed north of the parade in the 1400 and 1500 areas with the other 57 being added to George Moore Park in the 5700 area. Construction of family housing continued the next year when two multi-million dollar Capehart projects began. These projects added 345 buildings to the 1500, 1900, 2100, 2200, and 7400 areas. Capehart construction continued over the next several years and by 1963, over 400 additional Capehart buildings were completed at various locations around the installation.

Family housing was only one part of the massive post-World War II building program at the main post of Fort Bliss. New facilities were also needed to house and train the many personnel operating or attending the AAA & GM School. By 1952, $20.5 million worth of new construction was underway as part of a three year expansion program (1951-1953), including barracks, headquarters buildings, repair shops, utilities, and guard houses. An additional $1.5 million was spent in 1952 alone on post maintenance. Local El Paso firms including R. E. McKee & Sons, C. H. Leavell & Co., and J. E. Morgan & Sons were recipients of government contracts for construction as part of the expansion program.[144] As of October 1952, the program included "...31 permanent barracks, now 40 per cent completed; a $2 million antiaircraft artillery school building; a $750,000 laboratory and class room building; a $225,000 printing plant."[145] The new masonry barracks (2400 area) were built on previously open desert land on the eastern edge of the installation by Robert E. McKee & Sons, who employed 1,100 men for the task. The $10 million project started in March 1952 and the first set of barracks were open for occupancy in April 1953, with the rest being completed within six months.[146] The barracks design represented the Army standard for new permanent barracks, with painted masonry walls, finished concrete floors, steel window frames and all contain a kitchen, dining hall, day room, squad room, and offices. They vary in size from 105-man barracks to 225-man barracks and together house six battalions of Soldiers. The contract also included six associated motor parks, complete with repair shops, gasoline stations, and grease and wash racks.[147]

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[144] "$21 Million Plan Set for Fort Bliss," El Paso Times, 22 October 1952, 1, 3.

[145] Ibid, 3.

[146] "31 Three-Story Barracks Being Built At Ft. Bliss," El Paso Times, 14 December 1952, 10.

[147] Ibid, "First of 31 New Barracks at Fort Bliss Near Completion; Will House 6000 Men," El Paso Herald Post, 17 January 1953.

Figure 54. Barracks under construction, 1952.

Also completed at the main post in 1952 was Building 1656, a multipurpose laboratory and computer building for Army Field Forces Board No. 4. This was the first of three new buildings constructed for the Board in the 1600 area. By 1955, Building 1660, a new Board headquarters building, was completed directly to the east of Building 1656. The Army dedicated this building as Shedd Hall in 1956 in honor of Major General William E. Shedd, Jr., a past president of the Coast Artillery Board and an early advocate of antiaircraft technology and doctrine. Building 1658, a photographic instrumentation laboratory, was completed just north of the other two Board buildings in 1963. Consolidating the Board's activities in one area, these buildings became the home of antiaircraft artillery testing.[148]

Figure 55. Air Defense Board complex circa 1960.

By mid-summer 1953, local contractors had completed the construction of Building 60, a new guided missile laboratory and classroom building for the AAA & GM School's Department of Guided Missiles. This building featured 22 laboratories and classrooms as well as a 50' x 100' missile assembly shop.

[148] "50th Anniversary History of the Air Defense Artillery Test Directorate, Test and Experimentation Command," 12, 18.

Two additional wings were added to the building in 1960, the same year the Army dedicated it as Wilson Hall in honor of Major General Walter B. Wilson.

There was no let up in installation expansion and construction after the initial 1951-53 period. Continued growth in the levels of personnel training on the new guided missile systems required new facilities. The Department of Defense requested over $8 million for construction at Fort Bliss for the fiscal year 1954 which included items for additional troop housing and support facilities and range land acquisition for the post.[149]

In August of 1953, the local firm of R.E. McKee broke ground in front of Building 1 for Hinman Hall, a massive new administration and classroom building for the AAA & GM School.[150] Completed in 1954 at a cost of approximately $2.6 million, this building contains numerous classrooms and laboratories, an auditorium used for student instruction, and a three-story administrative wing. It occupies most of the area bounded by Pershing Drive and Sheridan Road on the east and west respectively, and Adair Road and Pershing Circle on the north and south. Serving as headquarters of the School, Hinman Hall is a major landmark at Fort Bliss.

During the remainder of the 1950s, enlisted men's barracks, dining halls, company headquarters buildings, administration buildings, post exchanges, classrooms, guided missile laboratories, shops, and storage facilities sprang up all around the main post of Fort Bliss as the gigantic building program continued. This long range construction program also included the elimination of remaining World War II temporary buildings in an effort to provide modern troop housing.[151]

Figure 56. Hinman Hall, 1995.

The requested military construction budget at Fort Bliss for fiscal year 1955 totaled $13.5 million. At the same time, 1954 funds had arrived and plans were being drawn for nine large barracks to be constructed at Fort Bliss by the

[149] "$8,166,000 Requested For Bliss," El Paso Times, 10 July, 1953, 1; "Army Plans To Buy Land For Ft. Bliss Ranges," El Paso Herald-Post, 25 December 1953.

[150] Hinman Hall was named for Brigadier General Dale Durkee Hinman, an early advocate and leader of antiaircraft artillery during World War II.

[151] "New Bliss Buildings To Cost $7.9 Million: Firm Bids Low On Units of Long Range Program," El Paso Herald-Post, 26 October 1954, 1.

Leavell and Ponder, Inc. Construction Company of El Paso at a cost of $3.5 million. As with the 2400 area barracks completed in 1953, the new barracks also contained a mess hall, kitchen, supply rooms, company offices, and accommodations for 263 men. Each 245 foot long building will have three floors and a basement. They were to be built in two groups – one five barrack group and one four barrack group [152]. By mid-April 1954, construction had also begun on four materials laboratories, six battalion headquarters buildings, and expansion of cold storage facilities.[153] A bid of nearly $8 million was accepted in late 1954 from R. E. McKee of El Paso to construct 15 additional 263-man barracks on the Main Post, 37 80-man barracks at Logan Heights, and one 263-man barracks at William Beaumont Army Hospital.[154] The Main Post barracks were constructed in what became the 1000 area, a former motorized review field bounded by Jeb Stuart, Chaffee, and Pleasanton Roads. This complex included a regiment headquarters, battalion headquarters, a branch post exchange, classrooms, and motor pools. Excerpts from the 84th Congress Military Construction Appropriations for 1956 exemplify how this new barracks was perceived as a unified whole: [155]

> The battalion headquarters project is required to provide facilities fro administration, supply, and command functions for enlisted men to be assigned to the permanent barracks now under construction.
>
> These facilities are required in support of the 263-man barracks. No facilities exist that can be utilized to accommodate all repairs required by 154 self-propelled vehicles and 144 units of trailer-type equipment assigned to the AAA and GM battalions.
>
> The next item is a branch post exchange. This facility is required to permit the purchase of merchandise by the men who are housed in the new 263-man barracks. No post exchange exists in the area that could be utilized for this activity.

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[152] "$15 Million For El Paso Bases Asked," El Paso Times, 7 April 1954, 1; "Architects Draw Plans For New Bliss Buildings," El Paso Herald-Post, 16 April 1954, 1.

[153] "Ft. Bliss Payroll Biggest In Economy of El Paso," El Paso Herald-Post, 24 April 1954.

[154] "New Bliss Buildings To Cost $7.9 Million," 1.

[155] United States House of Representatives, "Military Construction Appropriations for 1956: Hearings before a Subcommittee on Appropriations," 84th Cong., 1st sess., 1955, 159-161.

Figure 57. New barracks area.

The crush of construction was evident by April 1955 when the $13.5 million in projects underway at Fort Bliss included, in addition to the 37 small and 24 large barracks, an artillery and guided missile maintenance shop for ordnance use, the administration building for Board No. 4, bachelor officers' quarters, and a very large mess hall in the School area.[156] The barracks were completed in stages between 1956 and 1958. During this time, the required supporting facilities for the barracks such as dining, motor pool, administration, storage, classroom, and recreation were also constructed in the barracks areas, largely finishing in the 2400 area by 1957 and in the 1000 area by 1959.

Figure 58. A wedding couple travels in style in front of new buildings at Fort Bliss, 1950s. [157]

[156] "Leavell Has Big Building In Sight," El Paso Times, 24 April 1955; "Ft. Bliss Packs Muscle In EP Fight For Growth," El Paso Times, 24 April 1955, B-3; "Local Military Installations Continued Expansion Programs," El Paso Times, 1 January 1956, B-2.

[157] Photograph courtesy of John Hamilton, ADA Historian, Fort Bliss.

The anti-aircraft and guided missile training program grew at such a rate in the mid-to-late 1950s that the Department of the Army had plans in place by 1957 to increase facilities at Fort Bliss to a point that would double the current investment of $61 million.[158] For fiscal year 1958, Fort Bliss received $7.7 million in construction funding. That same year, nearly 40% of all Army construction funds were allocated to Nike facilities.[159] The bulk of Fort Bliss' $7.7 million and the $8 million received the following year went toward facilities at McGregor Range to support Nike training. Some funding was utilized for expansion of Hinman Hall through the addition of two wings to provide more laboratory, office, and classroom space. A new materials laboratory for the school was also under construction.[160] For fiscal year 1960, Fort Bliss was scheduled to construct additional operational and training facilities, troop housing, supply, maintenance, and administrative buildings to support the rapidly expanding training needs of the school with $7.2 million in funds.[161] By June 1959, the Army had again doubled its expansion plans for Fort Bliss, estimating that an additional $155 million would be needed in construction funds to adequately meet the installation's mission.[162]

One particularly noteworthy project during this period was the construction of Abernathy Radar Park. Located in the southeast portion of the installation, this $1.857 million park served as a radar testing facility for the Air Defense Board as well as a radar maintenance training facility for the School. Its construction began in 1958 and was completed the following year. Complementing the park were sixteen guided missile laboratory and classroom buildings constructed at the north end of the park in 1959 at a cost of $1.5 million (Buildings 5810 – 11, 5847 – 5860). By 1964, there were 142 classrooms associated with the Army Air Defense School scattered throughout the Fort Bliss reservation.[163]

In addition to adding thousands of new buildings to the main post, the massive post-World War II construction program added many new permanent-type buildings and facilities to the ranges of Fort Bliss. Between 1956 and 1966, over 300 new buildings and structures were constructed at the McGregor, Orogrande, and Doña Ana range camps to support AAA and

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[158] "Army To Double Investment In Ft. Bliss: $136 Million Eventual Worth Of Installation," El Paso Times, 5 August 1957, 1.

[159] "Army Plans Face Snag At Ft. Bliss: Guided Missiles Eyed Cautiously By Capitol Hill," El Paso Herald-Post, 16 August 1957, 1-2.

[160] "Army To Spend $8 Million In Expansion At Ft. Bliss," El Paso Times, 13 March 1958, 1.

[161] "House OKs Bliss, Biggs Money Bill," El Paso Times, 17 April 1959, 1.

[162] "Army Doubles Plans for Bliss Expansion: Ask $155 Million For Construction At El Paso Post," El Paso Herald-Post, 22 June 1959, 1.

[163] "Ft. Bliss Trainees Selected for Specialized Job," El Paso Herald-Post, 4 February 1964, B-1.

guided missile training activities. In addition to missile launcher, storage, maintenance, and fueling facilities, construction included enlisted men's barracks, dining facilities, administration and support buildings, communications buildings, health and recreation centers, and shops of all types.

Major Organizational Changes and Redesignations

By the mid-1950s, the process of phasing out the large AAA guns in favor of the more sophisticated Nike missiles was well underway. This shift prompted the Army to redesignate the AAA & GM School as the U.S. Army Air Defense School (USAADS) in July of 1957.[164] At the same time, the AAA & GM Center became the U.S. Army Air Defense Center. The USAADS continued to train U.S. and Allied students on the Nike Ajax, Nike Hercules, and Hawk systems. More than 5,000 students graduated from the School each year, including air defense artillery personnel from approximately 58 Allied nations.[165] In addition to supporting the training activities of the USAADS, the Center's activities included supporting ASP exercises conducted by returning units as well as supporting the research and development efforts of Army Field Forces Board No. 4.

A major reorganization of the U.S. Army Air Defense Center took place in 1963. At that time both the Army Training Center (Air Defense) and the 1st Guided Missile Brigade were training men in missiles. In a move to consolidate the similar activities of these separate organizations, the Army discontinued the Army Training Center (Air Defense) and combined its personnel, equipment, and functions into the 1st Guided Missile Brigade on July 1, 1963. The result was a new organization designated the 1st Air Defense Guided Missile Brigade (Training). At that time, the Army transferred the McGregor Range function of the 1st Guided Missile Brigade to the newly organized Range Command, a major subordinate command of the U.S. Army Air Defense Center and Fort Bliss. With its headquarters at the McGregor Range Base Camp, Range Command assumed responsibility for operating and supporting all of Fort Bliss's training ranges and range camps.[166]

Another organizational change took place at Fort Bliss in 1965. In September of that year, the Army announced that Fort Bliss would become one of its ba-

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[164] Earlier, in April of 1955, the Army returned command of the AAA & GM School from Fort Sill to Fort Bliss. At that time, the School became a separate entity and was no longer a branch of the Artillery School.

[165] The Allied Student Battalion was organized at the School in 1957 to oversee the hundreds of foreign military students that yearly attended courses at the Air Defense School. By 1976, more than 20,000 foreign military students from 59 different countries had been trained at the School.

[166] "The Story of Fort Bliss," 53; "Missions Unlimited," 20-21.

sic combat training centers. During the following month, the Army reorganized and redesignated the 1st Air Defense Guided Missile Brigade (Training) as the U.S. Army Training Center (Air Defense). In addition to its mission of training air defense units, this new organization was responsible for conducting basic combat training at Fort Bliss. As this activity was slated to take place at Logan Heights, the Army initiated construction of new enlisted men's barracks and other support buildings at that location.[167]

New Air Defense Systems

As the Army's newer air defense systems became operational, the U.S. Army Air Defense Center at Fort Bliss assumed responsibility for training the units that would deploy them. In the late 1950s and 1960s, these new systems included Hawk, Redeye, Chaparral and Vulcan.

Hawk personnel training started at Fort Bliss in early 1958. A Hawk missile battery needed 47 trained personnel for optimum operation. Training lasted from 23 weeks for launcher training to 45 weeks for staff and maintenance supervisor training. The Hawk Maintenance Control Course taught Soldiers to accurately troubleshoot and quickly repair any problems with the system.[168] The first Hawk missile battalion graduated in June 1959.[169] By 1962 the school was turning out over 2,000 graduates annually trained for all phases of the operation of the Hawk system.[170] The first students went on to form the core of the 1st Guided Missile Brigade 5th Guided Missile Battalion (Hawk). This unit began training U.S. Hawk units the following year. In 1963, the 5th Battalion also began training NATO Hawk units.[171]

The USAADS supported Hawk classroom instruction and training largely in 700 and 2300 area buildings (Main Post) and 3700 area buildings north of the Main Post, while McGregor Range supported Hawk training launches. To accommodate Hawk firings, the Army modified five of its Nike launcher sites at McGregor Range to create eight Hawk firing points.

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[167] The Army discontinued basic combat training at Logan Heights in 1969 only to restart it again in 1975.

[168] "Ft. Bliss Trainees Selected for Specialized Job," El Paso Herald-Post, 4 February 1964, B-1.

[169] "First Hawk Unit To Get Official Colors Friday," El Paso Times, 19 June 1959, 1.

[170] US Army Air Defense Digest, 1961, 39; US Army Air Defense Digest, 1962-1963, 41.

[171] "The Story of Fort Bliss," 47, 52.

Figure 59. Hawk launcher with missiles on Main Post.

Hands-on system training for the radar components was conducted at the Hawk Radar Park, also known as Tobin Wells Radar Park. Buildings 3700 – 3707 at this location provided classroom space and associated hardstands with live power hookups that were utilized for radar training.

The Hawk Radar Park was co-located with a group of 3600 area buildings directly southwest known as the Hawk Assembly and System Check-Out (HASCO) facility. Operated by the Raytheon Corporation, the contractors responsible for developing the Hawk system, the HASCO facility was used for assembly of Hawk missiles from parts made all over the country. The completed missiles were then put through system checks at the facility. For later versions of Hawk, the missiles came assembled. The HASCO facility was then used to install the warhead and do a final system check while the warhead was live. The HASCO facility originally included four missile assembly and test/deployment storage buildings, a flammable material storehouse, and a shop and office/guided missile maintenance building at two sites in the 3700 area. In addition to the buildings, the HASCO facility had a series of hardstands in a extending in four directions from the central building. The hardstands were used for the check out procedures. Normally vacant, the hardstands served as anchor points for a test stand consisting of a metal support. After bolting in the test stand, the missiles would be removed from their trailer, either one at a time, or on a rack of three, and installed on the test stand. The missile would then be powered up and its systems tested. After testing, the entire assemblage would be loaded back onto its trailer for trans-

port to the firing range.[172] In the late 1980s, the facility was modified to accept Patriot missiles.[173]

Both the HASCO facility and the Hawk Radar Park were constructed in 1959-1961 as Hawk training ramped up at Fort Bliss. Funding for the Hawk Radar Park was requested in 1957 for the FY 1959 Military Construction Army program as part of a group of Hawk training facilities. The Radar Park request stipulated 7 classrooms, hardstands, utilities, and electrical converters at a cost of $1.76 million. Justification provided for the item reads:[174]

> The Hawk missile currently under test prior to procurement is forecast to be issued to this Center in numbers for instructional purposes early in 1960 when the requested facilities will be available. The student load for training on the Hawk will be increasing rapidly. The range complex is available but no other facilities are available nor provided for. Due to the crowded conditions of the Post, it will be mandatory that a new area, to the north of the Post, be exploited for Hawk training.

By September 1959, the funding go-ahead was received for the Hawk Radar Park project. At the same time, funding was made available for the launching facility at McGregor Range.[175] The park facilities provided for both classroom and instructional training for both students and tactical units returning for annual service practice. The students would bring in their assigned Hawk equipment and set it up on the hardstands near the classrooms. After some preliminary instruction inside, they would move to the hardstand areas and power up the radar systems and control system to get actual experience. This was often aided by pilots from nearby Holloman Air Force Base flying sorties for the students to track. The units returning for annual practice went through the same procedure, except they used system equipment kept at Fort Bliss.[176] Since the Hawk was a mobile system, training also took place on open land. Initial training plans foresaw a constant training load of 1,000 men, with a peak of 1,400 men.

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[172] Willie Jones, Chief of Evaluation and Standardization Branch, Fort Bliss, Phone interview with author, 19 December 2006.

[173] Lt. Col. Joe Russo, Ret., El Paso, Texas, Phone interview with author, 24 June 1998.

[174] "Training Facilities, Guided Missile "Hawk", TAS," Enclosure #4 in memo from Headquarters, fourth United States Army, Fort Sam Houston, Texas to Deputy chief of Staff for Logistics, Department of the Army, Washington, DC, 11 June 1957, Record Group 337, Entry 3 (UD-WW), Box 37, File: 600 Binder #3, National Archives and Records Administration, College Park, Maryland.

[175] "FY 1960 MCA Execution Program," Letter to Commanding General, Fourth United States Army, Fort Sam Houston, Texas, 24 September 1959, Record Group 337, Entry 6, Box 42, File: 600, National Archives and Records Administration, College Park, Maryland.

[176] Jones, interview 19 December 2006.

Training on the man-portable, shoulder-fired Redeye system began at Fort Bliss in 1967. This training consisted of a 3-week class at the USAADS. Those students graduating in the upper 20 percent of their class earned the right to travel to McGregor or Orogrande Range to fire the Redeye at an RCAT or tow target.

The USAADS continued to meet the changing requirements of Army air defense when it began conducting the pilot Chaparral/Vulcan class in May of 1968. By October, the Army had activated its first tactical Chaparral/Vulcan battalion, the 6th Battalion of the 67th Artillery. Before deploying overseas in 1969, this 393-man unit underwent an intensive five months of field training at McGregor Range. By the end of 1973, a total of 17 Chaparral/Vulcan battalions had organized and trained at the McGregor and Doña Ana Ranges.[177]

In addition to the appearance of new air defense weapons, Fort Bliss saw the reappearance of some old weapons in the mid-1960s. As the United States' involvement in Vietnam steadily increased, the Army experienced a need for weapons with rapid firepower. To meet this need, the Army brought back two Korean War-era automatic weapons - the M55 quadruple mounted .50 caliber machine gun, known as the Quad-50, and the M42 dual-mounted 40mm cannon, better known as Duster. Fort Bliss became the sole source of school-trained officers, NCOs, mechanics, and crewman for these weapons. To carry out this mission, the USAADS began offering specialized Duster and Quad-50 courses for officers and enlisted men. In addition, the Army organized the 1st Air Defense Training Battalion (AW) at the Army Training Center in 1966 to conduct Quad-50 and Duster unit training. This training took place at the Doña Ana Range through 1971.[178]

Tenants at Fort Bliss

Fort Bliss gained several new tenants during the 1960s and early 1970s. These included the U.S. Army Combat Developments Command Air Defense Agency (USACDCADA), the German Air Force Air Defense School, the Defense Language Institute Southwest Branch (DLISW), and the U.S. Army Sergeants Major Academy. In addition, Fort Bliss gained back its airfield as the Air Force deactivated nearby Biggs Air Force Base and transferred the facility back to the Army.

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[177] "Chaparral Unit Activated."

[178] "Immediate Release," (Fort Bliss, Texas: Information Office, U.S. Army Air Defense Center, n.d.)

The Army organized the USACDCADA at Fort Bliss on July 1, 1962. As an agency of the newly organized U.S. Army Combat Developments Command, the USACDCADA's primary responsibility was to determine the most efficient and effective way to organize, equip, and employ air defense units. To accomplish this, USACDCADA personnel studied the Army's future requirements and prepared tables of organization and equipment for all air defense artillery units. They also prepared doctrinal field manuals on air defense deployment and reviewed equipment technical manuals. In addition, the USACDCADA maintained liaison with a variety of American military and Allied nation commands and agencies to both coordinate national and international defense programs and to take advantage of any and all technical developments. USACDCADA coordinated its activities with the USAADS and the U.S. Army Air Defense Board.[179] When the Army eliminated the Combat Developments Command in 1973, the USAADS absorbed the personnel and mission of the USACDCADA.

Since the early days of the Cold War, the United States had provided training to military personnel from Germany at various facilities within the United States. Continuing this cooperative interaction, the United States and the Federal Republic of Germany, in October of 1965, concluded an agreement to establish an air defense training facility for the German Air Force at Fort Bliss. As a result, the German Air Force Surface-to-Air Missile School at Achen, Germany moved to Fort Bliss in 1966 and became the German Air Force Air Defense School. With a staff of approximately 250 personnel, the School officially opened in July of 1966 and began training roughly 1200 German personnel annually in air defense techniques. With headquarters in Building 512, the German Air Force Air Defense School continues this mission at Fort Bliss today.

While the German Air Force was busy moving a contingency to Fort Bliss, the United States Air Force was finalizing plans to move away from the installation. In 1966, the Air Force announced that Biggs AFB would be closed. Originally part of Fort Bliss, the airfield had been acquired by the Air Force in 1947 and placed under the Strategic Air Command. After Fort Bliss donated land south of the base, the Air Force initiated construction of the 800-unit Aero Vista development to offset the need for housing. Over the next ten years, numerous bombardment wings came and went as giant bombers such as the B-36 and B-52 replaced earlier bomber aircraft. By 1965, the Air Force felt Biggs AFB was no longer vital to national security. After the Air Force de-

[179] "Missions Unlimited," 26. With its original administrative offices in Building 512, the USACDCADA moved into a complex of eight buildings in the 1600 area in 1963. These buildings are no longer extant at Fort Bliss.

activated the base in 1966, the airfield again became part of Fort Bliss. Renamed Biggs Army Air Field, the facility maintained facilities for Army transient fixed-wing aircraft.

Soon after Biggs Army Air Field became part of Fort Bliss again, the Department of Defense activated the DLISW at the facility. As one of four branch facilities that made up the Department of Defense Language Institute System, the DLISW provided Vietnamese language instruction to Army and Air Force personnel bound for duty in Vietnam. By 1970, the DLISW had graduated over 10,000 students.[180]

Figure 60. U.S. Army Sergeants Major Academy at Biggs Army Air Field.

In July of 1972, Fort Bliss became the training ground for the Army's top enlisted leaders when the U.S. Army Sergeants Major Academy officially opened at Biggs Army Air Field. In educating more than 700 students annually, the Academy provides active Army, Army Reserve, and National Guard NCOs with the technical, tactical, and leadership standards training they need to qualify for promotion.[181]

ABM System Training at Fort Bliss

In addition to gaining new tenants in the 1960s and early 1970s, Fort Bliss also became heavily involved in the Army's ABM efforts during this period. This involvement began in 1960 when the USAADS began conducting special Nike Zeus classes for a group of 65 men. After graduating in 1961, these men went on to participate in Nike Zeus ABM tests at Point Mugu, California, the White Sands Missile Range, and the Kwajalein Atoll in the Pacific.[182]

By 1963, the Army had canceled development of the Nike Zeus system and instead was proceeding with the development of the more-advanced Nike X system. That year, representatives from the USAADS chaired a study group tasked with investigating and recommending methods of training Nike X personnel. This study group came to the conclusion that centralized training

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[180] "Missions Unlimited," 27.

[181] "History of the US Army Sergeants Major Academy," TMs [photocopy], n.d. Vertical File, Fort Bliss Museum, U.S. Army Air Defense Artillery Center, Texas.; "United States Army Sergeants Major Academy," Fort Bliss (San Diego: Marcoa Publishing Inc., 1995), 17. The Army dedicated a new complex of buildings for the Academy at Biggs Field in 1987.

[182] "The Story of Fort Bliss," 50.

would be the most cost-effective method for a Nike X training program. Under the centralized concept, to the extent possible, the training of all personnel required by the ABM system would be conducted at one installation. As the Army's premier air defense center, Fort Bliss was the natural choice for this activity. Consequently, the Army activated the Nike X Centralized Training Directorate at Fort Bliss in November of 1966. As a major element of the USAADS, the Directorate began working to implement and further refine artillery, engineer, and ordnance training for the military and civilian personnel that were to operate the Nike X system.[183]

In November of 1967, following Secretary of Defense Robert McNamara's announcement of the planned deployment of the new Sentinel ABM system, the USAADS redesignated the Nike X Centralized Training Directorate as the U.S. Army Sentinel Central Training Facility. That same month, the Army approved construction of 13 new buildings at Biggs Army Airfield and a 16,000 square-foot centralized training facility on Fort Bliss proper. Taking the name of the element responsible for organizing and conducting ABM training, the facility became known as the Sentinel Central Training Facility (SCTF). The following year, the Huntsville Division of the Army Corps of Engineers began preparing design criteria for the SCTF.[184]

Shortly after President Nixon announced his Safeguard deployment plan, the USAADS appropriately redesignated both the Sentinel Central Training Facility element and the SCTF itself. The newly designated Safeguard Central Training Facility element consisted of three departments - the Tactical Equipment Department, the Tactical Support Equipment Department, and the Combined Subjects Department. The SCTF became known as the Safeguard Central Training Facility (SAFCTF).

At first, reorientation to Safeguard did not alter the plans for the new training facility at Biggs Field. The subsequent decision by Congress to deploy only two Safeguard sites instead of the original twelve did, however. The reduced Safeguard deployment plan, coupled with new funding restrictions, instigated a complete review of the plan for the training facility. In 1970, a special task force began investigating the possibility of using existing facilities at Fort Bliss and Biggs Airfield in lieu of new construction. The plan submitted by the task force called for construction of seven new buildings at Fort Bliss as well as the

[183] "Annual Historical Supplement [1966]," TMs [photocopy]. On file in archives of U.S. Army Air Defense Museum, Fort Bliss, Texas.

[184] "History of Safeguard Central Training Facility, United States Army Air Defense School, Fort Bliss, Texas; 26 September 1967 - 24 June 1973," (Fort Bliss, TX: Department of the Army, Headquarters U.S. Army Air Defense School, n.d.), 4:1.

use of Buildings 21, 503, 1089, and 1090. In addition, the task force recommended that Building 1094 be modified to handle missile equipment training, an activity the Army had originally planned to conduct at its tactical ABM sites.[185]

After accepting the recommendations of the task force, the Army moved forward with the revised SAFCTF plan. Construction of the seven new buildings for the facility began in November of 1971. In an effort to centralize the facilities as much as possible, six of the buildings were erected near the intersection of Carter and Jeb Stuart Roads. These facilities were Buildings 1043, 1044, 1045, 5800, 5898, and 5899. Buildings 1043-45 were laboratories for environmental systems, electrical systems, and essential mechanics while the other three buildings served respectively as a weapon systems laboratory, a power generation laboratory, and a heavy diesel laboratory. The seventh structure, Building 617, was a security sentry station constructed near Buildings 614, 616, and 618, all of which were to house classrooms for Safeguard training. The new buildings for the SAFCTF, constructed at a cost of $5.3 million, were to support training on the operation and maintenance of all components of the Safeguard ABM system.

In January of 1973, as the construction and renovation of the buildings for the SAFCTF were nearing completion, the Army announced its intention to disestablish the SAFCTF and severely curtail the anticipated ABM training activity at the USAADS. This surprising decision came about as a result of a review the Army instigated shortly after President Nixon and General Secretary Brezhnev signed the ABM Treaty at the Moscow Summit. Taking a closer look at its Safeguard training concepts, the Army concluded that it would be more cost effective to use contractor personnel rather than military personnel to maintain its two planned Safeguard sites.[186] This decision eliminated the need for maintenance training at the USAADS and the SAFCTF. With its Safeguard training requirements reduced, the Army approved a plan in October of 1972 to disestablish the Safeguard Central Training Facility element at Fort Bliss. In its place, a new Ballistic Missile Defense (BMD) Department within the USAADS would conduct a greatly reduced resident training program focusing on Safeguard command and control, missile/warhead, and tactical procedures training. This training would take place at the Safeguard Missile Train-

[185] Ibid., 2-3. Building 503 was to house the headquarters and administrative offices of the Tactical Support Equipment Department. Building 21 was to be renovated and used as headquarters for the SAFCTF and Tactical Equipment Department. Buildings 1089 and 1090 were to house allied trades and welding shops.

[186] Although contractors would maintain the Army's Safeguard sites, which ultimately turned out to be only one site at Grand Forks, North Dakota, Army personnel would still be responsible for operating the site and maintaining and preparing the Spartan and Sprint missiles.

ing Facility (SMTF), consisting of Building 1094 and an adjacent launch station training area. Modifications to Building 1094 and construction of the launch station training area began in November of 1972.[187]

The disestablishment of the Safeguard Central Training Facility element began in February of 1973. Buildings 13, 21, 614, 616, 617, 618, 5800, 5898, and 5899 were all turned over to the U.S. Army Air Defense Center after the Safeguard equipment within them was removed. The new BMD Department, officially established on March 1, 1973, eventually took over Buildings 1043, 1044, 1090, 1094, and 1095 and began preparations to begin its Safeguard training program that fall.

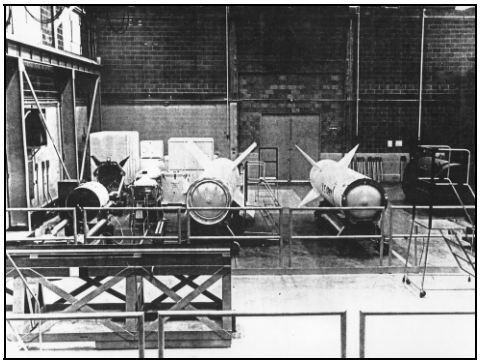

Figure 61. Spartan missile receiving area inside Building 1094.

The USAADS officially accepted the completed SMTF in late September of 1973. This facility provided all the necessary elements for realistic training in the receipt, inspection, assembly, installation, checkout, and maintenance of the tactical Sprint and Spartan missile subsystems. Building 1094, known as the Universal Missile Training Building, consisted of a tactical receiving area, a tactical missile assembly area, a tactical warhead assembly area, a vehicle storage area, and administrative and classroom space. In addition, the building contained complete Spartan and Sprint mock-up launch trainers that closely resembled tactical launch cells. The BMD Department used out-of-tolerance production line components as well as rejected components from contractors to build these trainers.[188]

The launch station area of the SMTF, directly east of the Building 1094, consisted of Spartan and Sprint maneuvering areas. The Spartan area consisted of a modified tactical launch station and two simulated launch stations. One simulated launch station was of concrete construction while the other was merely painted on the asphalt surface. The Sprint area had a tactical launch station and eight simulated launch stations. Five of the simulated Sprint launch stations were of concrete construction with the other three being painted on the asphalt surface. The launch station area simulated the tactical

[187] "History of Safeguard Central Training Facility," Ch. 18, p. 7. The Morrison-Knudson Company of Idaho constructed the SMTF launch station area under the supervision of the Army Corps of Engineers and the Western Electric Company.

[188] Major John D. Bieber and Rudy Loranca, "Antiballistic Missile Maintenance Training Facilty," Air Defense Trends, June 1974, 37; "Annual Historical Supplement [1973]."

site maneuvering constraints for the universal transporter loader, Spartan maintenance van, and Sprint service vehicle. The asphalt surface in this area was capable of supporting repeated maneuvering of the loaded vehicles.[189]

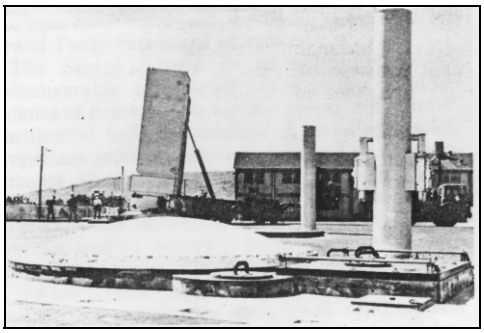

Figure 62. Sprint launch station at SMTF. Universal transporter loader and Building 1094 in background.

Safeguard training began at Fort Bliss in August of 1973 when the BMD Department welcomed the first class in its 24-week Safeguard Staff Officers course. Student officers in this course studied Safeguard system operations, control, and tactical procedures. A 26-week Safeguard Missile Maintenance Technician/Specialist course for enlisted personnel began in September, just prior to the completion of the SMTF.[190] Officers and enlisted personnel trained at the SMTF went on to take key positions at the Army's one and only deployed Safeguard site at Grand Forks, North Dakota.

During 1974, when the initial classes began graduating from Safeguard courses, the USAADS underwent a reorganization that consolidated the BMD Department with the High Altitude Missile Department of the USAADS to form a new General Support Material Department. The Safeguard Division under this department continued to train officers and enlisted men in most areas of the Safeguard system until December of 1975. That month, a class of eight officers graduated from the last Safeguard course at the SMTF. By then, the U.S. Congress had decided to deactivate the Grand Forks Safeguard site, negating the need for any further training. The elimination of the Safeguard Division of the General Support Material Department marked the end of the Safeguard training role at Fort Bliss. In all, a total of 133 students graduated from 13 classes at the SMTF.[191]

Fort Bliss from 1970 through 1989

Despite the loss of the Safeguard program, Fort Bliss remained the free world's premier air defense training center. During the 1970s, Soldiers from the United States as well as from a host of Allied nations came to Fort Bliss to receive training in the Nike Hercules, Hawk, Chaparral, Vulcan, and Redeye

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[189] Bieber and Loranca, 37-38.

[190] "Annual Historical Supplement [1973]."

[191] Ibid.; "Annual Historical Supplement [1974]."

air defense systems. Supporting this training were the USAADS's School Brigade and the Air Defense Artillery (ADA) Training Brigade, later the 1st ADA Training Brigade. As the emphasis in Army air defense shifted from a national defense to the defense of combat divisions, new air defense systems gradually began making their appearance at Fort Bliss.

Meanwhile, Fort Bliss had to adjust to the impact of a major structural change in the Army. During 1973, the Army replaced its Continental Army Command and Combats Development Command with Forces Command (FORSCOM) and Training and Doctrine Command (TRADOC). At the time, TRADOC took control of all Army training centers and installations, including Fort Bliss. Under TRADOC, the USAADS continued its basic mission of educating and training U.S. military students, civilians, and selected foreign students in air defense artillery and other selected subjects. The School did, however, undergo several major changes in organization throughout the years as courses in new air defense systems were introduced and changes were made to improve the effectiveness and efficiency of instruction at the School.

Although the U.S. Army Air Defense Center at Fort Bliss supported the training activities of the USAADS and provided support for the ASP exercises for air defense units under TRADOC, its primary mission during the last two decades of the Cold War was to maintain the combat readiness of its assigned FORSCOM units. These units included the 11th ADA Brigade and the 3rd Armored Cavalry Regiment (ACR).

The Army activated the 11th ADA Group at Fort Bliss in September of 1971. Later redesignated as the 11th ADA Brigade, this unit initially incorporated Hawk, Chaparral, and Vulcan weapons systems. It later incorporated Stinger and Patriot as well. To carry out its mission of maintaining combat readiness, the 11th ADA Brigade engaged in continuous training exercises at the ranges of Fort Bliss as well as other sites within the United States. The unit also provided material and support to the USAADS.

Figure 63. 3rd ACR personnel training with a Cavalry Fighting Vehicle.

The 3rd ACR moved from Fort Lewis, Washington to Fort Bliss in 1972. It presence at Fort Bliss marked the return of the cavalry to Southwest after a long absence. The storied 3rd ACR, a combined arms unit composed of three cav-

alry reconnaissance squadrons, an air cavalry troop, a training troop, and military intelligence and support components, had a mission of maintaining combat readiness in personnel, logistics, and training. Through frequent field exercises and semi-annual gunnery training at the Doña Ana Range and nearby maneuver areas, the unit became recognized as the Army's experts in desert warfare. The 3rd ACR was a Redeployment of Forces to Germany (REFORGER) unit and consequently had a mission to execute operations in Europe. Throughout the 1970s and 1980s, the unit made frequent trips to Germany to participate in maneuvers.

In 1983, when the Army redesignated the U.S. Army Air Defense Center as the U.S. Army Air Defense Artillery Center, the USAADS became the U.S. Army Air Defense Artillery School. By that time, Stinger and Patriot training had begun at the School. Preparations were also underway to commence Roland and DIVAD training. These plans never came to fruition however, as the Army eventually canceled both programs. Despite the cancellations, the School remained extremely busy as it continued to be the focal point of training for the air defense forces of the free world. As the 1980s progressed, this training increasingly relied on the use of advanced weapon system simulators that both added realism to training and minimized costs. When the Cold War came to an end in 1989, the School had just begun training students in the Army's new FAAD systems.

Post-Cold War Years

The end of the Cold War did not signal the end of the need for a strong Army ADA. In fact, just two years after the Berlin Wall came down, the importance of the ADA was demonstrated during the 1991 Persian Gulf War. Among the first forces deployed during the build-up phase of Operation Desert Shield, the 11th ADA Brigade performed several complex missions during Operation Desert Storm. The unit also earned distinction by shooting down numerous Iraqi SCUD missiles with Patriot missiles.

The 3rd ACR also was among the first forces deployed to the Persian Gulf. This unit protected deployed forces, logistic bases, and lines of communication along the Saudi Arabia border and also participated in the highly successful ground attack against the Iraqi elite Republican Guard.[192]

Fort Bliss today continues to be the Army's center for the education and training of air defense units. The installation is home to the U.S. Army Air Defense

[192] The 3d ACR relocated to Fort Carson, Colorado in 1996.

Artillery School and four combat ADA brigades. Its partner organizations include the William Beaumont Army Medical Center, the United States Army Sergeants Major Academy, Joint Task Force Six, the German Air Force Command (United States/Canada), and the German Air Defense School. The present-day training areas of Fort Bliss include the Doña Ana Range Complex, the Orogrande Range Complex, and McGregor Range, the largest inland air defense region in the United States. Able to accommodate live firings of every weapon system in the Army, McGregor Range allows operational units to train on modern air defense systems, such as the Patriot, Avenger, Stinger and other advanced systems. New air defense units use the range to learn basic skills, while established units conduct and participate in realistic exercises, including Roving Sands, the largest joint training exercise in the world. In addition to the Army, users of the range include Navy, Air Force, and Marine units, Reserve units, the National Guard, and air defense troops of allied nations. McGregor Range also supports tests operations conducted by the U.S. Army Test and Experimentation Command and the U.S. Army Missile Command. Equipment systems tests at the range have included the Patriot Advanced Capabilities configuration, the Army Tactical Missile System (ATACMS), and the Theater High Altitude Area Defense System (THAADS).[193]

[193] "McGregor Range Mission," [Online] Available : http://www.bliss.army.mil/mrlwr/html/fs_miss.htm

3 Survey Results

The identification of historically significant properties can be achieved only through evaluation of their position within the larger historic context. According to the NRHP, historic contexts are defined as "...the patterns, themes, or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within prehistory or history is made clear."[194] A historic property is determined significant or not significant based on the application of standardized National Register Criteria within the property's historical context.

This report contains a survey of buildings located at Fort Bliss Main Post constructed by the U.S. Army between 1951 and 1963. The Fort Bliss Real Property Officer provided a list containing 187 buildings to the survey team, of which 27 buildings were not surveyed due to a variety of reasons, leaving 160 buildings actually inventoried (see Table 1).

Criteria for Evaluation

The NRHP Criteria for Evaluation describe how properties and districts are significant for their association with important events or persons (Criterion A and Criterion B), for their importance in design or construction (Criterion C), or for their information potential (Criterion D). The following is a brief description of each of the four NRHP Criteria for Evaluation (excerpted from *National Register Bulletin #15: How to Apply the Nation Register Criteria for Evaluation*):

> **A. Event**—associated with events that have made a significant contribution to the broad patterns of our history; or
>
> **B. Person**—associated with the lives of persons significant in our past; or
>
> **C. Design/Construction**—embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represents a signifi-

[194] Department of the Interior, *National Register Bulletin #15: How to Apply the Nation Register Criteria for Evaluation,* (Washington, D.C.: National Park Service, 1991), 7.

cant and distinguishable entity whose components may lack individual distinction; or

D. Information Potential—yielded, or is likely to yield, information important in prehistory or history.

Aspects of Integrity

In addition to possessing historical significance, properties must also retain sufficient physical integrity of the features that convey its significance in order to be eligible to the NRHP.[195]

Historic properties either retain integrity (that is, convey their significance) or they do not. Within the concept of integrity, the National Register criteria recognize seven aspects or qualities that, in various combinations, define integrity.

To retain historic integrity a property will always possess several, and usually most, of the aspects. The retention of specific aspects of integrity is paramount for a property to convey its significance. Determining which of these aspects are most important to a particular property requires knowing why, where, and when the property is significant.

Districts and individual resources are considered to be significant if they possess a majority of the following Seven Aspects of Integrity:[196]

Location

Location is the place where the historic property was constructed or the place where the historic event occurred.

Design

Design is the combination of elements that create the form, plan, space, structure, and style of a property. It results from conscious decisions made during the original conception and planning of a property (or its significant alteration) and applies to activities as diverse as community planning, engineering, architecture, and landscape architecture. Design includes such elements as organization of space, proportion, scale, technology, ornamentation, and materials.

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[195] Ibid., 44.

[196] Ibid., 44-45.

Setting

Setting is the physical environment of a historic property. Setting refers to the character of the place in which the property played its historical role. It involves how, not just where, the property is situated and its relationship to surrounding features and open space.

Materials

Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.

Workmanship

Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.

Feeling

Feeling is a property's expression of the aesthetic or historic sense of a particular time period.

Association

Association is the direct link between an important historic event or person and a historic property.

Determinations of Eligibility for Subject Buildings at Fort Bliss Main Post

The findings of this report will be discussed under the two components of NRHP eligibility: Significance and Integrity. The construction dates of the 160 buildings surveyed were from 1951 to 1963. There is one period of significance: Fort Bliss Cold War: 1951 to 1989.

A. Event—associated with events that have made a significant contribution to the broad patterns of our history.

After World War II, Fort Bliss became the primary support base for the Army's pioneering guided missile development efforts as well as the Army's premier air defense training center. To properly evaluate the significance of the properties included in this survey, the buildings must be viewed from within the relevant historic contexts. The relevant historic contexts for these buildings are the "Early United States Army Missile Program, 1943-1956," "Army Air Defense During the Cold War, 1946-1989," "The Cold War Air Defense and Guided Missile Role of Fort Bliss, 1946-1989," and "Unaccompanied Personnel Housing (UPH) During the Cold War (1946-1989)."

Cold War era properties at Fort Bliss and its associated ranges that are potentially significant under the NRHP criteria are those properties that either individually or collectively convey in a meaningful way a sense of the important activities that are *directly* associated with the above-mentioned historic contexts. An extensive 1999 survey conducted by CERL of Fort Bliss and its ranges identified both properties that met Criteria Consideration G for attaining significance within the last 50 years as "exceptionally important" and properties that were directly associated with the historic contexts and would be considered eligible upon reaching 50 years of age if they retained their integrity. The identified "exceptionally important" properties included the Nike AN/FPS-36 surveillance radar at McGregor Range and the former Safeguard Missile Training Facility on the Fort Bliss Main Post. The identified 50 year NRHP-eligible properties were all located on the Main Post and were those directly associated with the early activities of the Antiaircraft Artillery and Guided Missile School (namely Hinman Hall and the early classroom and laboratories where officers and enlisted men who made up the Army's first tactical surface-to-surface and air defense guided missile units received hands-on training) and three buildings associated with the U.S. Army Air Defense Board.[197]

In addition to the mission-specific historic contexts, one other context is relevant to this study. "Cold War Unaccompanied Personnel Housing (UPH)" provides the necessary historic background to evaluate the enlisted barracks, bachelor officers' quarters (BOQs), and transient officers' quarters constructed at Army installations between 1946 and 1989 as permanent, semi-permanent, and temporary construction. The Army contracted R. Goodwin & Associates to develop this national context and the resulting January 2003 [draft] report not only provides a national context that identifies and describes most or all of the Army Cold War UPH types, but also provides guidelines for determining NRHP eligibility of Army Cold War UPH properties. Using the Army Integrated Facilities System (IFS) database, the Goodwin report identified examples of Cold War era UPH facilities at 145 Army installations. Facility standardization was so apparent that the Army opted for a programmatic approach to NHPA compliance as these properties neared their 50th year. This Army Cold War UPH national context is referenced in the individual building evaluations and the guidance provided by the report was

[197] See Patrick Nowlan, Identification and Evaluation of Cold War Properties at Fort Bliss, Texas (Champaign, Illinois: U.S. Army Construction Engineering Research Laboratory), February 1999 and Historic Cold War Properties at Fort Bliss, Texas: National Register of Historic Places Multiple Property Documentation Form, (Champaign, Illinois: U.S. Army Construction Engineering Research Laboratory), December 1999.

used to determine the significance and integrity of the UPH buildings at the ranges in 2005.

B. Person—associated with the lives of persons significant in our past.

The available historical records provided no indication that the study properties were in any way associated with the life of an individual significant in U.S. history.

C. Design/Construction—embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction.

The study buildings do not individually characterize the distinctive characteristics of a type, period, or method of construction that is architecturally significant, they do not represent the work of a master, nor do they possess high artistic values. The various groupings of the buildings were also looked at as potential districts per the guidelines in Criterion C. According to the NRHP, "Districts must be a unified entity and possess a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development."[198]

D. Information Potential—yielded, or is likely to yield, information important in prehistory or history.

The available historical records provided no indication that the study properties have yielded, or were likely to yield, any information important in prehistory or history.

State or Local Significance

There is no indication in the available historical record that these buildings and structures have any significance in a local or state context. Design and construction documents indicate that virtually all properties under study were of types commissioned by the Office of the Chief of Engineers (OCE) in Washington, DC and constructed on a nationwide scale. The involvement of local architects, engineers, fabricators, and contractors to address site-specific conditions was standard practice at the time of construction and did not produce any variations or innovations of local or state significance.

[198] *National Register Bulletin #15*, 17.

Significance

The researchers, after reading through the Fort Bliss Cold War historic context (and adding some additional information), and the UPH historic context, followed the established guidelines in those contexts to determine what could be significant for buildings that have reached or were close to reaching the 50-year old mark. It was determined that buildings associated with Soldier instruction for the various Cold War missile programs and buildings associated with UPH were the buildings that needed to be evaluated for significance. The 136 buildings with potential significance are found in Table 2.

Table 2. List of potentially significant buildings.

BLDG #	YEAR BUILT	HISTORIC FUNCTION	CAT CODE	SQUARE FEET
735	1960	STORAGE	44220	384
736	1960	SUB/SWIT STA	89113	384
737	1960	SUB/SWIT STA	89113	384
738	1960	GEN REP INST	17132	15,083
739	1960	VEH MAINT INST	17133	15,081
740	1960	VEH MAINT INST	17133	15,068
741	1960	VEH MAINT INST	17133	4,722
742	1960	SUB/SWIT STA	89113	384
743	1960	VEH MAINT INST	17133	4,722
744	1960	ACCESS CNT FAC	14113	45
745	1960	VEH MAINT INST	17133	21,108
746	1960	GEN REP INST	17132	14,947
747	1960	GEN REP INST	17132	14,922
748	1960	SUB/SWIT STA	89113	384
749	1960	ORG STORAGE	44224	384
750	1960	ORG STORAGE	44224	384
751	1960	ACCESS CNT FAC	14133	44
756	1960	VEH MAINT INST	17133	15,118
771	1960	STORAGE	44220	384
772	1960	STORAGE	44220	44
777	1959	ADMINISTRATION	61050	47,827
1001	1956	CO HQ BLDG/ENL UPH	72122	47,649
1002	1956	CO HQ BLDG/ENL UPH	72122	47,635
1003	1956	CO HQ BLDG/ENL UPH	72122	47,649
1004	1956	CO HQ BLDG/ENL UPH	72122	47,649
1005	1956	CO HQ BLDG/ENL UPH	72121	47,649
1006	1956	CO HQ BLDG/ENL UPH	72122	47,649
1007	1956	CO HQ BLDG/ENL UPH	72111	47,649
1008	1956	CO HQ BLDG/ENL UPH	72122	47,649
1009	1956	DINING FACILITY	72210	47,649
1010	1956	BN HQ BLDG	72121	47,325
1011	1956	CO HQ BLDG/ENL UPH	72121	47,305
1012	1956	CO HQ BLDG/ENL UPH	72121	47,649
1013	1956	CO HQ BLDG/ENL UPH	72121	47,649

BLDG #	YEAR BUILT	HISTORIC FUNCTION	CAT CODE	SQUARE FEET
1014	1956	CO HQ BLDG/ENL UPH	72121	47,649
1015	1956	EXCHANGE BRANCH	74050	4,107
1016	1957	ORG CLSRM/ENL UPH	17199	7,794
1017	1958	CO HQ BLDG/ENL UPH	14185	2,581
1022	1956	BN HQ BLDG	14183	2,530
1023	1957	ORG CLSRM/ENL UPH	17119	3,475
1025	1956	BN HQ BLDG	14183	2,541
1026	1957	ORG CLSRM/ENL UPH	17119	3,293
1029	1957	ORG CLSRM/ENL UPH	17119	3,473
1030	1957	BN HQ BLDG	14183	2,560
1031	1963	BN HQ BLDG	14182	9,183
1046	1957	FUEL/POL BUILDING	14165	208
1048	1957	OIL STORAGE FAC	21470	320
1050	1957	VEH MAINT INST	21410	9,725
1056	1957	VEH MAINT INST	21410	9,725
1058	1957	OIL STORAGE FAC	21470	320
1063	1957	FUEL/POL BUILDING	14165	192
1065	1957	OIL STORAGE FAC	21470	319
1067	1957	VEH MAINT INST	21410	9,740
1069	1959	ENG/HOUSING MNT	21910	2,215
1070	1956	SEW/WTR TRT BLDG	89131	87
1071	1957	ENG/HOUSING MNT	21910	420
1073	1957	MNT GEN PURP	89131	9,402
1075	1957	OIL STORAGE FAC	21910	319
1077	1959	STORAGE	21885	744
1078	1959	STORAGE	21470	394
1084	1959	VEH MAINT SHP	21410	5,119
1085	1959	VEH MAINT SHP	21410	4,692
1087	1959	STORAGE	44220	288
1088	1959	STORAGE	44220	255
1089	1959	VEH MAINT SHP	21410	5,119
1090	1959	VEH MAINT SHP	21410	4,692
1091	1960	ACCESS CNT FAC	14113	39
1095	1959	ACCESS CNT FAC	14133	37
1096	1959	STORAGE	44220	384
1097	1959	STORAGE	44220	744
1099	1960	STORAGE	44220	393
2400	1957	BN HQ BLDG	14183	3,089
2401	1957	BN HQ BLDG	14183	3,822
2402	1957	BN HQ BLDG	14183	2,560
2403	1957	BN HQ BLDG	14183	2,560
2404	1957	BN HQ BLDG	14183	2,560
2405	1957	BN HQ BLDG	14183	3,604
2406	1957	BN HQ BLDG	14183	2,622
2407	1957	BN HQ BLDG	14183	2,560
2408	1957	CONSOL OPEN DINING	74046	4,177
2433	1956	EXCHANGE BRANCH	74050	4,076
2437	1957	BN HQ BLDG	14183	3,430

BLDG #	YEAR BUILT	HISTORIC FUNCTION	CAT CODE	SQUARE FEET
2438	1957	BN HQ BLDG	14183	2,560
2439	1957	ACES BLDG	74025	3,510
2440	1961	BDE HQ BLDG	14182	8,972
2442	1953	CO HQ/ENL UPH	72111	26,010
2454	1957	BN HQ BLDG	14183	3,684
2492	1956	BN HQ BLDG	14183	4,087
2493	1957	BN HQ BLDG	14183	3,348
2525	1961	BDE HQ BLDG	14182	8,897
2536	1959	MNT GEN PURP	21885	7,000
2537	1959	MNT GEN PURP	21885	7,000
2538	1959	MNT GEN PURP	21885	7,000
2599	1957	MNT GEN PURP	21885	700
2601	1957	BN HQ BLDG	14183	2,565
2602	1957	BN HQ BLDG	14183	3,517
2605	1957	BN HQ BLDG	14183	3,517
2606	1957	BN HQ BLDG	14183	2,648
2608	1957	ORG CLASSROOM	17119	3,744
2660	1960	FUEL/POL BLDG	14165	192
2661	1960	VEH MAINT SHOP	21410	9,720
2665	1960	OIL STORAGE	21470	120
2667	1960	VEH MAINT SHOP	21410	9,720
2671	1960	OIL STORAGE	21470	120
2673	1960	FUEL/POL BLDG	14165	96
2674	1960	VEH MAINT SHOP	21410	9,720
2678	1960	OIL STORAGE	21470	120
2680	1960	VEH MAINT SHOP	21410	9,720
2684	1960	OIL STORAGE	21470	120
2910	1957	CO HQ/ENL UPH	17119	3,348
2911	1957	BN HQ BLDG	14183	2,478
2912	1957	ORG CLASSROOM	17119	3,360
2913	1957	BN HQ BLDG	14183	2,508
2914	1957	BN HQ BLDG	14183	2,508
2915	1957	ORG CLASSROOM	17119	3,360
2916	1957	ORG CLASSROOM	17119	3,360
2917	1957	BN HQ BLDG	14183	2,508
2918	1957	BN HQ BLDG	14183	2,484
2919	1957	ORG CLASSROOM	17119	3,348
2920	1957	ORG CLASSROOM	17119	3,348
3671	1960	ACCESS CNT FAC	14113	80
3672	1960	WPN QA/CAL DEP	21522	18,120
3673	1960	FLAM MAT STOR	44240	100
3675	1959	ORG STORAGE	44224	1,680
3676	1959	ORG STORAGE	44224	794
3677	1959	ORG STORAGE	44224	784
3678	1959	ORG STORAGE	44224	784
3679	1959	ACCESS CNT FAC	14113	36
3700	1961	FLT/UTL BLDG	89120	672
3701	1961	ORG STORAGE	44224	6,367

BLDG #	YEAR BUILT	HISTORIC FUNCTION	CAT CODE	SQUARE FEET
3702	1961	ORG STORAGE	44224	7,591
3703	1961	ORG STORAGE	44224	2,994
3704	1961	ORG STORAGE	44224	2,947
3705	1961	ORG STORAGE	44224	2,947
3706	1961	ORG STORAGE	44224	2,994
3707	1961	ORG STORAGE	44224	5,867

Once the research team determined which buildings were potentially significant, they researched these buildings to see how they fit into their particular contexts and what the boundaries of their prospective historic districts were per the guidelines in Criterion C.

Early Cold War Guided Missile Instruction Historic District

The Early Cold War Guided Missile Instruction Historic District is eligible for the National Register under Criterion A: Event.

The early Army missile program represents one of the United States' first efforts in experimenting with, improving, and utilizing revolutionary guided missile technology as a means of protecting itself against security threats posed by a hostile Soviet Union after World War II. Tactical surface-to-surface missiles such as Corporal and Honest John were some of the first fruits of those efforts. Experience and technological data gained during these and other early missile efforts greatly benefited the Army when the service assumed primary responsibility for the nations' air defense. The Army went on to conduct pioneering work in surface-to-air missiles leading to operational Nike Ajax, Nike Hercules, and Hawk systems. Building even further on these efforts, the Army became the lead agency for the development of highly advanced ABM systems such as Safeguard. Before the Army could deploy these new weapons and systems, it had to first test them to ensure that they were effective for their intended use. Then, the Army had to train the Soldiers needed to operate, maintain, and repair them. Fort Bliss has been and remains the nation's premier training installation for guided missiles. Properties at Fort Bliss associated with the testing and training aspects of the early Army missile program and the Army's Cold War air and missile defense missions are significant because they convey a sense of the Army's monumental effort to prepare its forces to meet the threats of an era characterized by unprecedented and rapidly advancing weapons technology.

By 2006, Fort Bliss, in consultation with the Texas Historical Commission, had determined some Cold War era properties eligible to the National Register for Historic Places. Primarily buildings identified in the 1999 CERL studies as likely to become eligible upon reaching fifty years of age, they are mostly located in the 700, 1000, and 5800 areas of the Main Post. Although none of these buildings was individually eligible for the NRHP, no formal district had been identified. As this study also found buildings in these areas eligible to the NRHP, it made logical sense to go ahead and create a historic district that would contain both those already eligible for guided missile instruction as well as the buildings identified as such in this study. As the contributing properties to the historic district are located in several discrete groups both on the Main Post and directly to the north, the district contains five discontiguous areas, A-E.

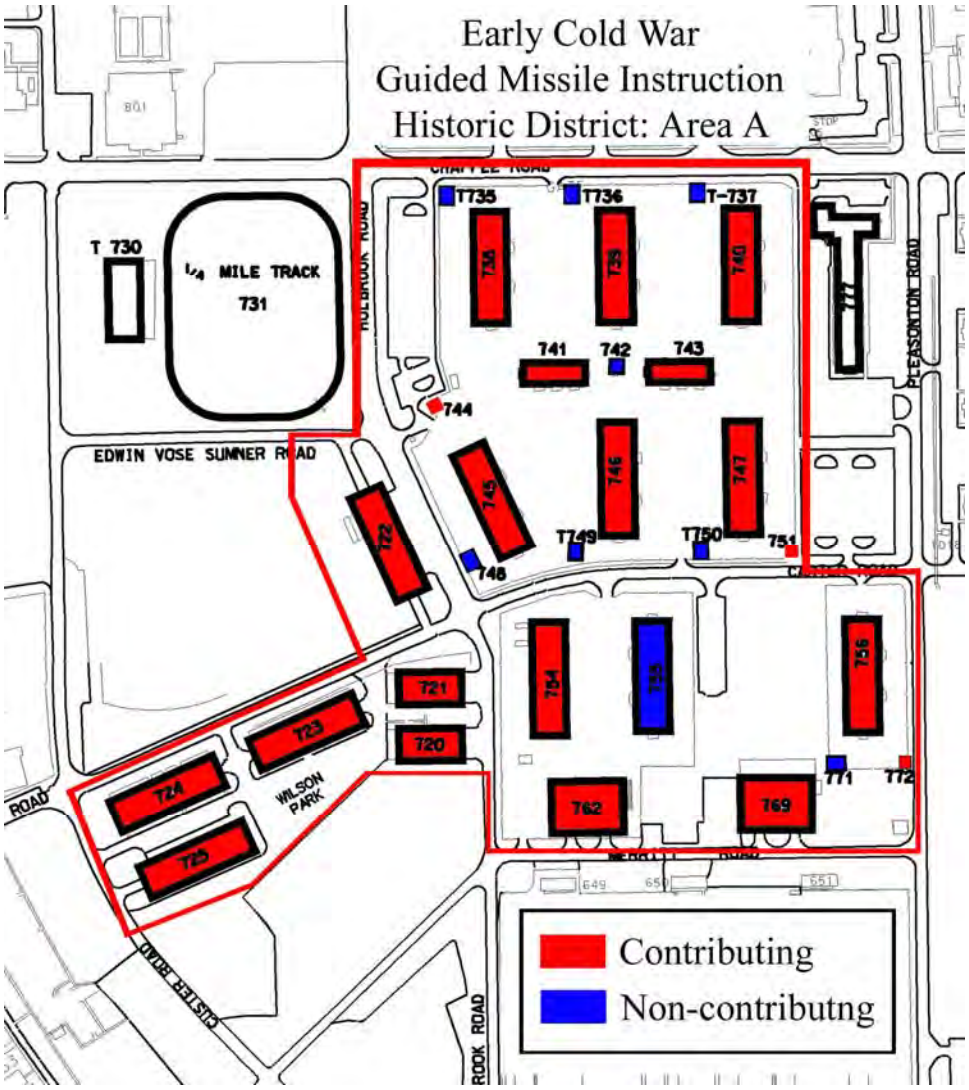

Figure 64. Map of Early Cold War Guided Missile Instruction Historic District: Area A.

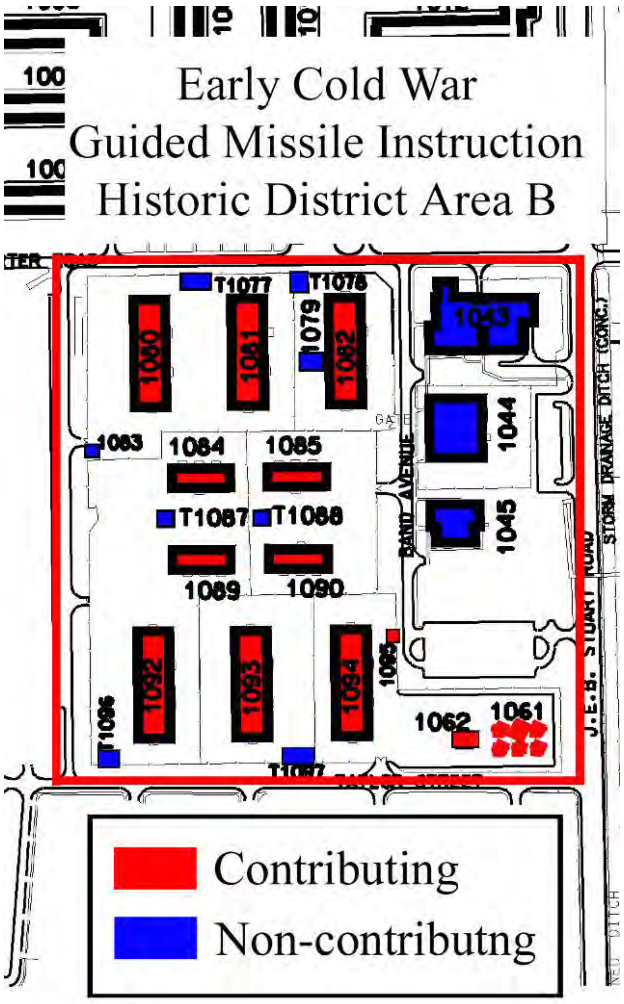

Figure 65. Map of Early Cold War Guided Missile Instruction Historic District: Area B.

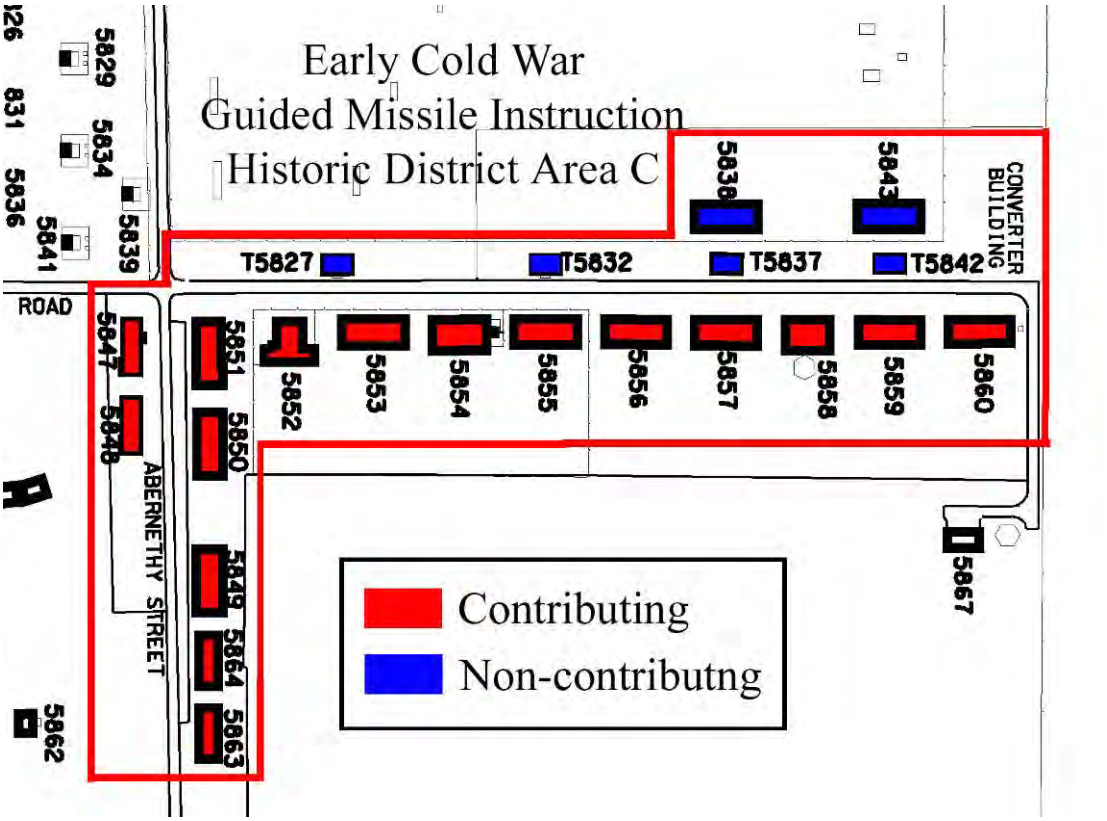

Figure 66. Map of Early Cold War Guided Missile Instruction Historic District: Area C.

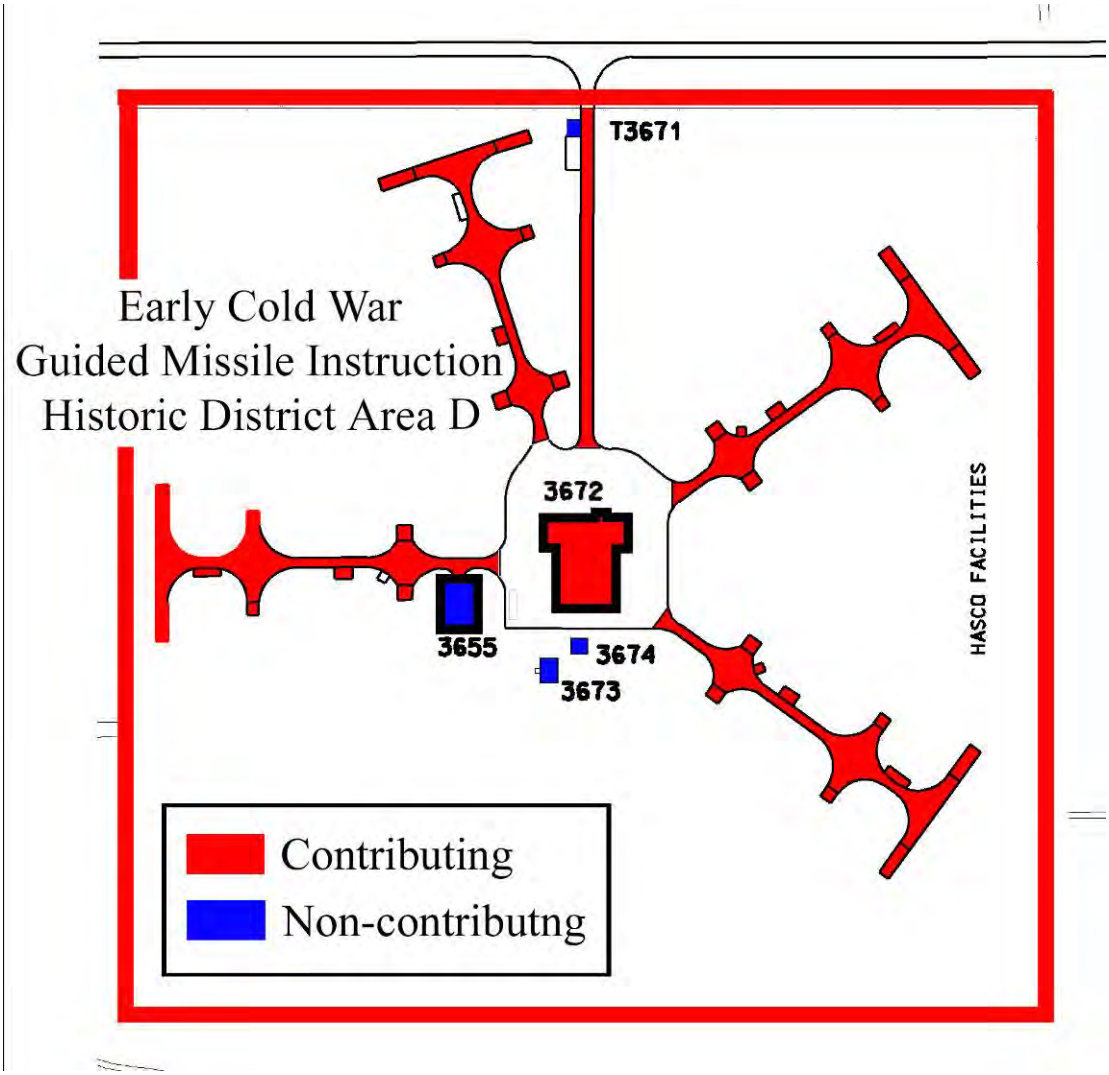

Figure 67. Map of Early Cold War Guided Missile Instruction Historic District: Area D.

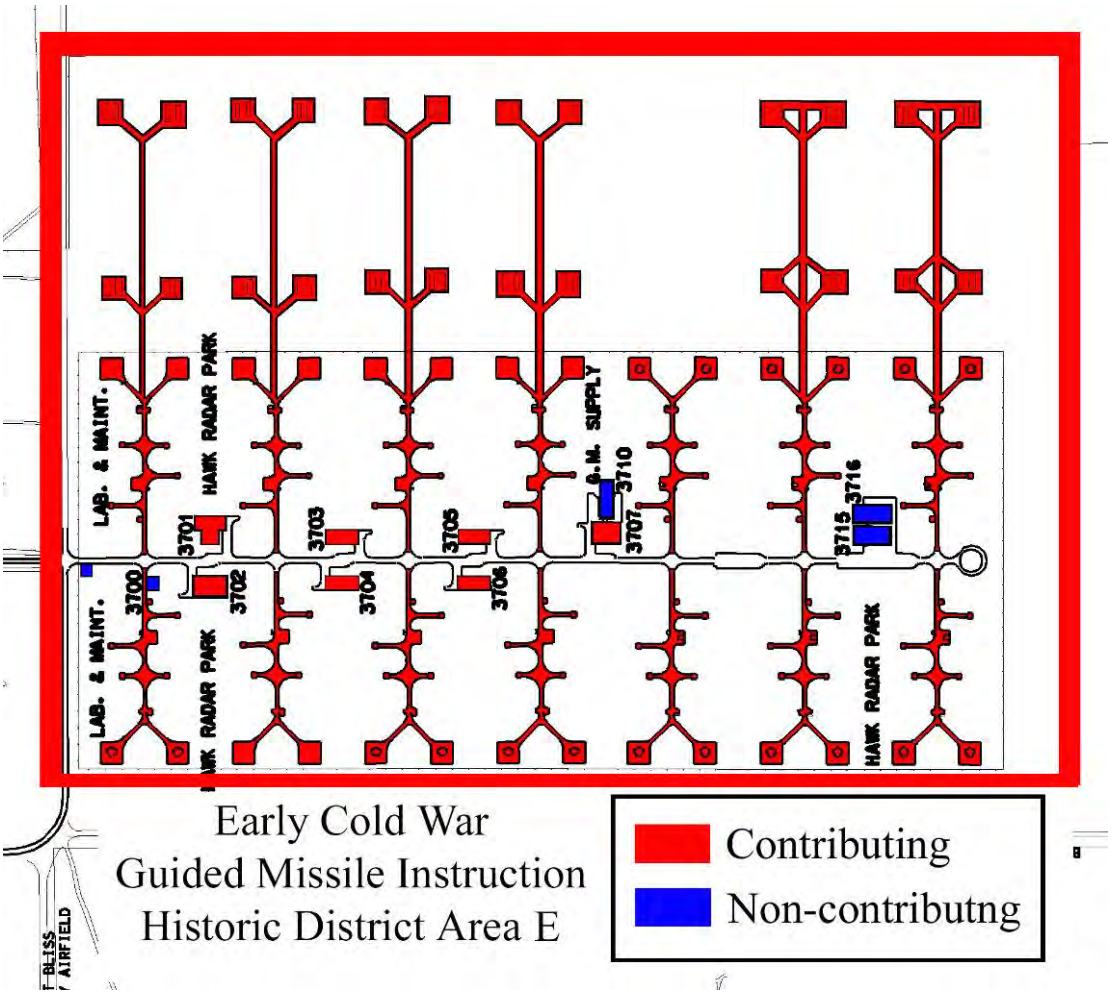

Figure 68. Map of Early Cold War Guided Missile Instruction Historic District: Area E.

The Early Cold War Guided Missile Instruction Historic District contains 87 buildings and structures (Table 3 through Table 7). There are 31 contributing resources that were found eligible to the National Register prior to this report. These 31 contributing resources are noted by an asterisk in the tables. In addition, there are concrete hardstands located in Area D and Area E. These concrete hardstands were an integral part of training and check out for the completely mobile Hawk missile system and retain their integrity since no permanent equipment was ever installed. They are included as contributing sites as seen in Figure 67 and Figure 68.

There are 29 non-contributing resources. The non-contributing resources are those that are temporary in nature such as pre-fabricated, metal buildings that serve as temporary storage facilities around the five areas of the historic district. Other non-contributing resources are those that have not reached 50-years of age and are not exceptionally important under Criterion G.

Please refer to historic property forms for specific information regarding the buildings in this historic district.

Table 3. Area A Contributing and Non-Contributing Resources

BLDG #	YEAR BUILT	HISTORIC FUNCTION	ELIGIBILITY STATUS
720*	1953	GEN REP INST	contributing
721*	1953	ORG STORAGE	contributing
722*	1954	VEH MAINT INST	contributing
723*	1954	GEN INST BLDG	contributing
724*	1954	TNG AIDS CENTER	contributing
725*	1954	GEN REP INST	contributing
735	1960	STORAGE	non-contributing
736	1960	SUB/SWIT STA	non-contributing
737	1960	SUB/SWIT STA	non-contributing
738	1960	GEN REP INST	contributing
739	1960	VEH MAINT INST	contributing
740	1960	VEH MAINT INST	contributing
741	1960	VEH MAINT INST	contributing
742	1960	SUB/SWIT STA	non-contributing
743	1960	VEH MAINT INST	contributing
744	1960	ACCESS CNT FAC	contributing
745	1960	VEH MAINT INST	contributing
746	1960	GEN REP INST	contributing
747	1960	GEN REP INST	contributing
748	1960	SUB/SWIT STA	non-contributing
749	1960	ORG STORAGE	non-contributing
750	1960	ORG STORAGE	non-contributing

BLDG #	YEAR BUILT	HISTORIC FUNCTION	ELIGIBILITY STATUS
751	1960	ACCESS CNT FAC	contributing
754*	1958	GEN REP INST	contributing
755	1971	GEN REP INST	non-contributing
756	1960	VEH MAINT INST	contributing
762*	1939	ORGANIZATION GARAGE	contributing
769*	1939	ORGANIZATION GARAGE	contributing
771	1960	STORAGE	non-contributing
772	1960	STORAGE	contributing

* Found eligible to the National Register prior to this report

Table 4. Area B Contributing and Non-Contributing Resources

BLDG #	YEAR BUILT	HISTORIC FUNCTION	ELIGIBILITY STATUS
1043	1972	BATTLE LAB	non-contributing
1044	1972	BATTLE LAB	non-contributing
1045	1972	BAND TRAINING BLDG	non-contributing
1061*	1973	SAFEGUARD TEST FACILITY	contributing
1062*	1973	SAFEGUARD TEST FACILITY	contributing
1077	1959	STORAGE	non-contributing
1078	1959	STORAGE	non-contributing
1079	1988	STORAGE	non-contributing
1080*	1959	GEN REP INST	contributing
1081*	1959	GEN REP INST	contributing
1082*	1959	GEN REP INST	contributing
1083	1988	ACCESS CNT FAC	non-contributing
1084	1959	VEH MAINT SHP	contributing
1085	1959	VEH MAINT SHP	contributing
1087	1959	STORAGE	non-contributing
1088	1959	STORAGE	non-contributing
1089	1959	VEH MAINT SHP	contributing
1090	1959	VEH MAINT SHP	contributing
1092*	1959	VEH MAINT INST	contributing
1093*	1959	COMP REP INST	contributing
1094*	1959	GEN REP INST	contributing
1095	1959	ACCESS CNT FAC	contributing
1096	1959	STORAGE	non-contributing
1097	1959	STORAGE	non-contributing

* Found eligible to the National Register prior to this report

Table 5. Area C Contributing and Non-Contributing Resources

BLDG #	YEAR BUILT	HISTORIC FUNCTION	ELIGIBILITY STATUS
5827	1959	STORAGE	non-contributing
5832	1959	STORAGE	non-contributing

BLDG #	YEAR BUILT	HISTORIC FUNCTION	ELIGIBILITY STATUS
5837	1959	STORAGE	non-contributing
5838	1970	AUTO AID INS	contributing
5842	1959	STORAGE	non-contributing
5943	1970	AUTO AID INS	contributing
5847*	1959	MUSEUM	contributing
5848*	1959	GEN INST BLDG	contributing
5849*	1959	GEN INST BLDG	contributing
5850*	1959	GEN INST BLDG	contributing
5851*	1959	GEN REP INST	contributing
5852*	1959	GEN REP INST	contributing
5853*	1959	SIM BLDG NONMOT	contributing
5854*	1959	GEN INST BLDG	contributing
5855*	1959	SIM BLDG NONMOT	contributing
5856*	1959	GEN REP INST	contributing
5857*	1959	GEN REP INST	contributing
5858*	1959	GEN INST BLDG	contributing
5859*	1959	GEN INST BLDG	contributing
5860*	1959	GEN REP INST	contributing

* Found eligible to the National Register prior to this report

Table 6. Area D Contributing and Non-Contributing Resources

BLDG #	YEAR BUILT	HISTORIC FUNCTION	ELIGIBILITY STATUS
3655	1974	COMP ITEM REP	non-contributing
3671	1960	ACCESS CNT FAC	non-contributing
3672	1960	WPN QA/CAL DEP	contributing
3673	1960	FLAM MAT STOR	non-contributing
3674	1960	STORAGE	non-contributing
n/a	1960	4 HARDSTANDS	contributing

Table 7. Area E Contributing and Non-Contributing Resources

BLDG #	YEAR BUILT	HISTORIC FUNCTION	ELIGIBILITY STATUS
3700	1961	FLT/UTL BLDG	non-contributing
3701	1961	ORG STORAGE	contributing
3702	1961	ORG STORAGE	contributing
3703	1961	ORG STORAGE	contributing
3704	1961	ORG STORAGE	contributing
3705	1961	ORG STORAGE	contributing
3706	1961	ORG STORAGE	contributing
3707	1961	ORG STORAGE	contributing
n/a	1961	14 HARDSTANDS	contributing

Hammerhead Barracks Historic District

The Hammerhead Barracks Historic District is eligible for the National Register under Criterion A: Event.

After World War II, the military discharged most of its active duty Soldiers, and as a result, had to scramble to increase troop levels when the Korean War broke out. As the Cold War progressed, it became military policy to maintain a large standing force to insure a high level of readiness. Housing these troops presented problems that were addressed by massive barracks and support buildings construction programs beginning in the 1950s. The need for a very large number of barracks and other support buildings in a short amount of time led to the use of standardized plans across the Army. A typical brigade area would contain 15 barracks, 1 regiment headquarters, 4 battalion headquarters, 1 branch exchange, and 4 motor pools.

For the first of these plans, an effort was made to incorporate all company functions in one building. Commonly known as hammerhead barracks due to their unique footprint, the overall layout of the building is a rectangular three-story barracks and a one-story, L-shaped addition appended to an end elevation, which housed the company's mess facility, company administrative space, and storage area. A large number of hammerhead barracks were built between 1951 and 1957. Three different sizes of single-company hammerhead barracks were developed to house 105 (six-bay), 165 (nine-bay), and 225 (eleven-bay) men. Hammerhead barracks were most commonly clustered in groups of four or ten and laid out as a regimental-size troop housing complex. Each four building group represents a battalion and each four battalion group represents a regiment.

Cold War UPH buildings can be contributing elements of a historic district if the majority of the barracks and associated buildings in a group maintain integrity to their period of significance. This is accomplished by retaining their distinctive physical features as defined in the UPH context. At Fort Bliss, the 1000 area Hammerhead barracks area retains sufficient integrity to qualify as a NRHP eligible historic district.

This is an eligible historic district since it is an excellent example of an intact regiment area with barracks, administration buildings, motor pools, classrooms, and a branch post exchange. The district has a high level of architectural integrity except for five barracks that have been heavily modified.

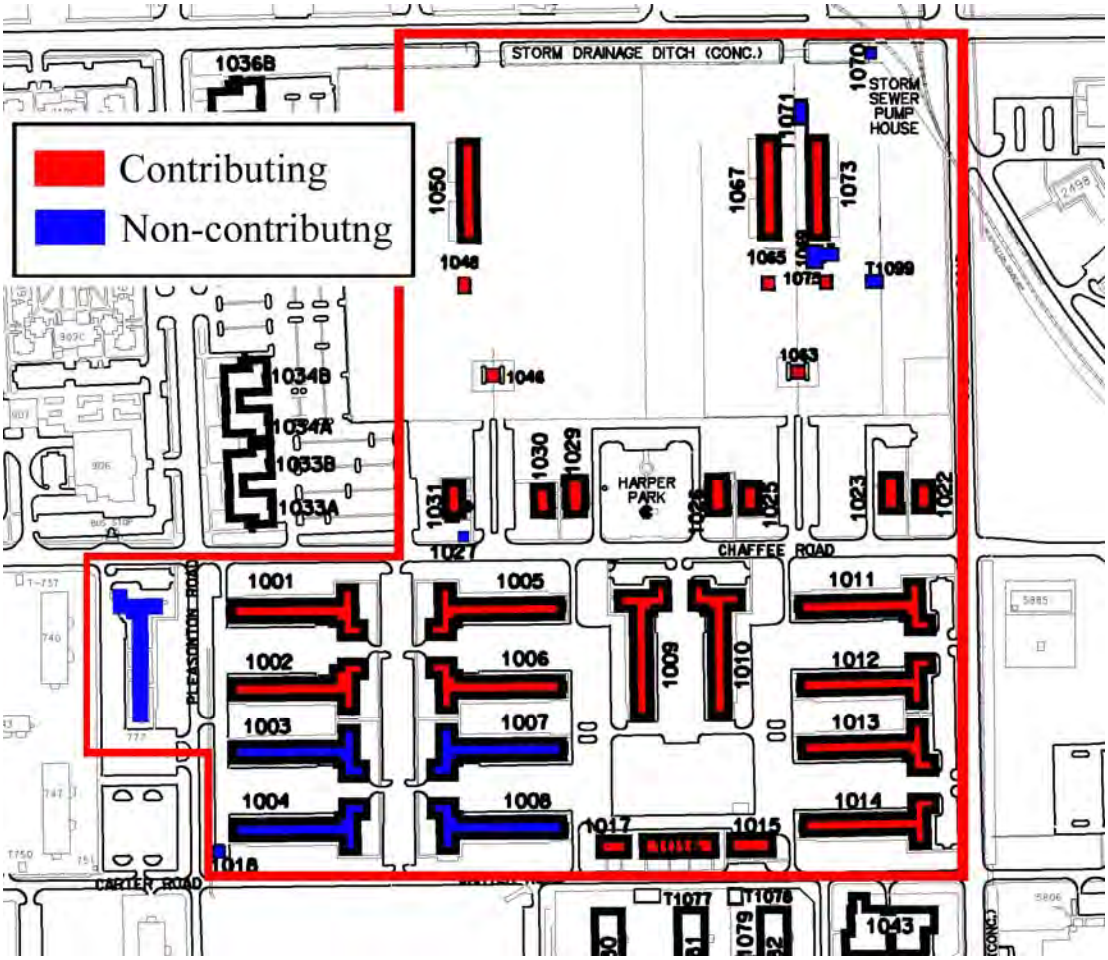

Figure 69. Map of Hammerhead Barracks Historic District.

The Hammerhead Barracks Historic District contains 39 buildings and structures. There are 28 contributing resources. These include hammerhead barracks, administration buildings, branch post exchange, vehicle maintenance facilities, and other miscellaneous buildings.

There are 11 non-contributing resources. The primary reason for non-contributing status in this historic district is a lack of architectural integrity such as Building 777 or Building 1004 (see Figure 70 and Figure 71). The other non-contributing resources are those that are temporary in nature such as pre-fabricated, metal buildings, and those that have not reached 50-years of age and are not exceptionally important under Criterion G. Building 1018 was previously evaluated for eligibility and found not eligible.

Please refer to historic property forms for specific information regarding the buildings in this historic district.

Table 8. Hammerhead Barracks Contributing and Non-Contributing Resources

BLDG #	YEAR BUILT	HISTORIC FUNCTION	ELIGIBILITY STATUS
777	1959	ADMINISTRATION	non-contributing
1001	1956	CO HQ BLDG/ENL UPH	contributing
1002	1956	CO HQ BLDG/ENL UPH	contributing
1003	1956	CO HQ BLDG/ENL UPH	non-contributing
1004	1956	CO HQ BLDG/ENL UPH	non-contributing
1005	1956	CO HQ BLDG/ENL UPH	contributing
1006	1956	CO HQ BLDG/ENL UPH	contributing
1007	1956	CO HQ BLDG/ENL UPH	non-contributing
1008	1956	CO HQ BLDG/ENL UPH	non-contributing
1009	1956	CO HQ BLDG/ENL UPH	contributing
1010	1956	BN HQ BLDG	contributing
1011	1956	CO HQ BLDG/ENL UPH	contributing
1012	1956	CO HQ BLDG/ENL UPH	contributing
1013	1956	CO HQ BLDG/ENL UPH	contributing
1014	1956	CO HQ BLDG/ENL UPH	contributing
1015	1956	EXCHANGE BRANCH	contributing
1016	1957	ORG CLASSROOM	contributing
1017	1958	BN HQ BLDG	contributing
1018*	1955	WTR SUP/TRT BLDG	non-contributing
1022	1956	BN HQ BLDG	contributing
1023	1957	ORG CLASSROOM	contributing
1025	1956	BN HQ BLDG	contributing
1026	1957	ORG CLASSROOM	contributing
1027	1989	MONUMENT	non-contributing
1029	1957	ORG CLASSROOM	contributing
1030	1957	BN HQ BLDG	contributing
1031	1963	BN HQ BLDG	contributing
1046	1957	FUEL/POL BUILDING	contributing
1048	1957	OIL STORAGE FAC	contributing
1050	1957	VEH MAINT INST	contributing
1063	1957	FUEL/POL BUILDING	contributing
1065	1957	OIL STORAGE FAC	contributing
1067	1957	VEH MAINT INST	contributing
1069	1959	ENG/HOUSING MNT	non-contributing
1070	1956	SEW/WTR TRT BLDG	non-contributing
1071	1957	ENG/HOUSING MNT	non-contributing
1073	1957	MNT GEN PURP	contributing
1075	1957	OIL STORAGE FAC	contributing
1099	1960	STORAGE	non-contributing

* Found ineligible to the National Register prior to this report

Figure 70. North elevation of Building 777 with addition of office space.

Hammerhead barracks, Building 1002, with original staircase windows and entry bay

Renovated Hammerhead barracks, Building 1007, with exterior metal staircase addition clad with a stucco-like material

Figure 71. Comparison of integrity changes between original hammerhead barracks and renovated barracks.

In the summer 0f 2006, the Advisory Council on Historic Preservation gave its comments on management actions for unaccompanied personnel housing (UPH or barracks) by the Department of Defense. This Program Comment for Cold War Era Unaccompanied Personnel Housing (1946 - 1974) is to be

utilized by the Department of Defense in lieu of the National Historic Preservation Act's Section 106 process. Fort Bliss has sent to the Texas SHPO a list of the barracks covered by this Program Comment, which includes the fifteen hammerhead barracks in this historic district. The researchers suggest that this historic district be reevaluated whenever enough changes to the architectural fabric of the hammerhead barracks allowed by the Program Comment has resulted in a significant loss of integrity.

4 Building Inventory Forms

Part 1

Part 2

Part 3

Part 4

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Abbreviations and Acronyms

AAA	Antiaircraft Artillery
AAA & GM	Antiaircraft Artillery and Guided Missile
AAA RTC	Antiaircraft Artillery Replacement Training Center
AADS	Army Air Defense System
ABM	Anti-Ballistic Missile
ACHP	Advisory Council on Historic Preservation
ACR	Armored Cavalry Regiment
ADA	Air Defense Artillery
AEC	Army Environmental Center
ARAACOM	Army Antiaircraft Command
ARADCOM	Army Air Defense Command
ATACMS	Army Tactical Missile System
ATC	Antiaircraft Training Center
ASP	Annual Service Practice
BASOPS	Base Operations
BCC	Battery Control Central
BIRDIE	Battery Integration and Radar Display Equipment
BOQ	Bachelor Officers' Quarters
BMDO	Ballistic Missile Defense Organization
CERL	Construction Engineering Research Laboratory
COE	Corps of Engineers
CW	Continuous Wave
DIVAD	Division Air Defense
DLISW	Defense Language Institute Southwest Branch
DoD	Department of Defense
DOE	Determinations of Eligibility
ERDC	Engineer Research and Development Center
FAAR	Forward Area Alerting Radar
FORSCOM	United States Army Forces Command
HASCO	Hawk Assembly and System Check-Out
ICBM	Intercontinental Ballistic Missiles
IFC	Integrated Fire Control
JPL	Jet Propulsion Laboratory
HIPAR	High Powered Acquisition Radar
IFS	Integrated Facilities System

IRBM	Intermediate Range Ballistic Missile
MCA	Military Construction Appropriation
MIRV	Multiple Independently targetable Reentry Vehicles
MSR	Missile Site Radar
NATO	North Atlantic Treaty Organization
NCO	Non-Commissioned Officer
NCSHPO	National Council of State Historic Preservation Officers
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NORAD	North American Air Defense Command
NSC	National Security Council
OCE	Office of the Chief of Engineers
ORDCIT	Ordnance and California Institute of Technology
PAR	Perimeter Acquisition Radar
RCAT	Radio Controlled Aerial Targets
REFORGER	Redeployment of Forces to Germany
ROTC	Reserve Officers Training Corps
SAC	Strategic Air Command
SAGE	Semi-Automatic Ground Environment
SALT	Strategic Arms Limitation Treaty
SAM-D	Surface-to-Air Missile, Development
SAFCTF	Safeguard Central Training Facility
SCTF	Sentinel Central Training Facility
SDI	Strategic Defense Initiative
SRMSC	Stanley R. Mickelsen Safeguard Complex
THAADS	Theater High Altitude Area Defense System
TRADOC	Training and Doctrine Command
TX SHPO	Texas State Historic Preservation Officer
UPH	Unaccompanied Personnel Housing
USAADS	U.S. Army Air Defense School
USACDCADA	U.S. Army Combat Developments Command Air Defense Agency
UTM	Universal Transverse Mercator
WAC	Without Attitude Control

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14. ABSTRACT

This report inventories all of the Base Operations (BASOPS) buildings constructed at Fort Bliss Main Post between the years of 1951 and 1963. Determinations of Eligibility (DOE) to the National Register of Historic Places (NRHP) are then made based on the significance of the buildings and the degree to which they retain their integrity for conveying that significance. The authors inventoried and evaluated 160 properties on the installation constructed during these years. As previous studies had established the Fort Bliss properties that are directly related to exceptionally important Army Cold War activities, this research effort will contribute to the future determinations of standard eligibility to the NRHP for properties at Fort Bliss. The currently existing Program Comments for Unaccompanied Personnel Housing was taken into consideration when making DOEs for relevant buildings.

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