MISSILEER:

THE DAWN, DECLINE, AND REINVIGORATION OF AMERICA'S INTERCONTINENTAL BALLISTIC MISSILE OPERATORS

BY

LIEUTENANT COLONEL GEORGE L. CHAPMAN

A THESIS PRESENTED TO THE FACULTY OF

THE SCHOOL OF ADVANCED AIR AND SPACE STUDIES

FOR COMPLETION OF GRADUATION REQUIREMENTS

SCHOOL OF ADVANCED AIR AND SPACE STUDIES

AIR UNIVERSITY

MAXWELL AIR FORCE BASE, ALABAMA

JUNE 2017

APPROVAL

The undersigned certify that this thesis meets master's-level standards of research, argumentation, and expression.

_____

DR. JAMES M. TUCCI (DATE)

_____

COL MICHELE E. JOHNSON (DATE)

DISCLAIMER

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the U.S. Government, Department of Defense, the United States Air Force, or Air University.

ABOUT THE AUTHOR

Lieutenant Colonel George L. Chapman is a nuclear and missile operations officer currently attending the School of Advanced Air and Space Studies, Maxwell AFB, Alabama.

Lieutenant Colonel Chapman was commissioned through the ROTC program at Brigham Young University, Utah in 2003 with distinction as the Reed F. Hall Outstanding Missile Candidate. He has served in a variety of positions at the squadron, numbered air force, and center levels, as well as having accomplished 189 days of nuclear alert duty with the Minuteman III ICBM. The colonel is a graduate of the United States Air Force Weapons School's ICBM Weapons Instructor Course and the Air Command and Staff College. Lieutenant Colonel Chapman has been selected to command the 320th Missile Squadron at Francis E. Warren AFB, WY.

Lieutenant Colonel Chapman is married to his favorite running partner, and the couple has been blessed with wonderful children.

ACKNOWLEDGMENTS

I want to thank Dr. James Tucci, PhD, for his expert insight and efforts to focus this constantly transforming project. His patience and counsel helped refine my 'big ideas' into something more practical and digestible. Let it be known that Dr. Tucci was a missileer and the author of the acronym used to name the MM III console—REACT (Rapid Execution and Combat Targeting). I am proud to share a common ICBM and missileer heritage.

Thanks to the SAASS faculty for a wonderfully challenging year filled with countless hours of illuminating dialogue. Special thanks are owed to my thesis 'reader,' Colonel Michele Johnson, PhD, for your discerning eye and constructive feedback. To Dr. David Benson, PhD, thank you for introducing me to the concept of 'vacancy chains,' a concept that translated my understanding of an occurrence into words that were useful.

Behind every thesis citation is a source. Many thanks to the research teams and support staff that helped me to navigate the archives and tomes of history. Mr. Yancy Mailes and Mr. Donald Koser were invaluable resources in the Air Force Global Strike Command History & Museum Program—you vision of operationalizing history came to life for me and I am your advocate. Thanks to the staff of the Muir S. Fairchild Research Information Center for helping me find niche information to complete my story.

My penultimate thanks goes to all missileers that are serving, or have served. Yours can be a thankless mission and it has not always been easy. Thank you for finding purpose and committing yourselves to the pursuit of peace through nuclear deterrence. Keep fighting the good fight.

Of supreme importance, I would like to thank my wonderful family. Thank you for your patience, love, and encouragement all year long! Thanks to my wife for knowing when I needed to go on a run, or taking the kids to Florida so I could focus on writing—you taught me one of the most important things this year, "B is for balance." Thanks to my children, who always encouraged me with "Good luck on your thesis, dad." There were plenty of family moments that I missed because I was writing my thesis, but others I was happy to embrace as an escape.

ABSTRACT

This study examines the Air Force ICBM operators, missileers, and their evolution from the 1950s to 2017. The Air Force has long struggled to embrace and share the story of the missileer and the ballistic missile mission. Rather than provide yet another study on nuclear strategy, proliferation, and deterrence, this paper serves to show how technology, organizational structures, and personnel and mission challenges have influenced missileers as a corps of nuclear professionals for 60 years.

The story of missileers has been captured through the periodization of three epochs: The Rise of the ICBM Mission, 1959-1989; Post-Cold War ICBM Drawdown, 1989-2009; and, Reinvigorating the ICBM Mission, 2009-2017. The influences of technology, organizational structure, personnel and mission challenges, varied in relative influence in each of these periods. Chapter 4 provides analysis from the vantage point of how missileers were developed and promoted through the personnel system throughout the three epochs. The final chapter of this study provides several observations and implications drawn from an assessment of the influences on missileers and the ICBM mission.

Missileer heritage has largely been lost from contemporary discourse following two-decades of neglect. The recent creation of Air Force Global Strike Command, its elevation to a four-star command, and establishing an independent 13N Air Force Specialty Code for the Nuclear and Missile Operations officer is demonstrative of contemporary refocusing on the nuclear enterprise. While these actions hold the promise of institutional course-correction, it cannot be assumed a panacea to prevent future service parochialism and functional tribalism that has undermined missileers and the ICBM mission in the past. Primacy must be given, not just to nuclear weapon systems, but also to those who operate them as their solemn stewards—the missileer.

CONTENTS

Chapter		Page
	APPROVAL	ii
	DISCLAIMER	iii
	ABOUT THE AUTHOR	iv
	ACKNOWLEDGMENTS	v
	ABSTRACT	vi
	INTRODUCTION	1
1	RISE OF THE ICBM MISSION, 1959-1989	7
2	POST-COLD WAR ICBM DRAWDOWN, 1989-2009	41
3	REINVIGORATING THE ICBM MISSION, 2009-2017	76
4	MISSILEERS & GENERALS	98
5	CONCLUSIONS	107
	APPENDICES	122
	ABBREVIATIONS	162
	GLOSSARY	166
	BIBLIOGRAPHY	168

Illustrations

Table

1	Missile Squadron LCC and LF Composition	16
2	Significant Treaties, 1963-1989	22
3	ICBM Crew Size & LCC to LF Ratio	31
4	USSTRATCOM Task Force Structure, ca. 1992	50

5 Nuclear Experience of Key Military Leaders, 1989-1996 59

6 Independent Reviews After Nuclear Mishaps, 2007-2008 70

7 High-Visibility Missileer Discipline Actions, 2009-2014 90

8 13N Career Field Initiatives, 2014-2015 93

9 Command Experience of Missileers Who Became Senior Leaders 103

10 The Façade of the Missile Badge 104

11 New Nuclear-Related General Officer Positions, 2006-2017 105

12 Operational ICBM Basing History, 1959-2017 143

13 ICBM Squadron, LCC, and LF Totals, 1959-2016 144

14 USSTRATCOM Organizational Rank Structure, April 2017 145

15 Significant World Events, Treaties, and Initiatives, 1989-1996 ... 149

16 Studies and Papers Addressing Missileer Challenges 150

17 Purposes of SAC's Minuteman Working Group, 1976 151

18 MM III Sustainment and Upgrade Programs, 1990s – 2000s 152

19 Missileers Who Became Major General or Higher 153

20 SAC Leadership ICBM Experience and Missile Badge Wear 154

21 USSTRATCOM, AFSPC, AFGSC, and Twentieth Air Force Leadership ICBM Experience and Missile Badge Wear 155

22 CSAF, HAF/A10, and AFNWC Leadership ICBM Experience and Missile Badge Wear 156

23 Possibilities and Precedents for Future Missileer Development ... 160

Figure

1 U.S. Intercontinental Ballistic Missile Force Development 12

2 A Growing Missile Business 18

3	Pocket Rocket Cartoon - Palace Missile Program, 1981	37
4	USSTRATCOM Organization, 2006	51
5	Morale Patches Opposing Removal of Missile Badge	67
6	Cartoon Depicting Missileer Frustrations, NOV 2008	71
7	Multiple Command Roles of Eighth Air Force Commander	81
8	Patches of the ICBM Weapons Officer & 315 WPS	87
9	Traditional Nuclear Triad	122
10	Strategic Air Command's Twin Triad Concept	122
11	Evolution from the Cold War Triad to the New Triad	123
12	DOD's Planned New START Strategic Force Structure	124
13	Missile Operations Career Progression Guide, 1972	125
14	18XX Missile Family Assignment Opportunities	127
15	13S Space and Missile Operations Career Path Pyramid, ca. 2000	127
16	13S Space and Missile Operations Career Path Pyramid, ca. 2006	128
17	Officer Career Path Guide, 2008	128
18	13N Missile and Nuclear Operations Career Path Pyramid, 2012	129
19	13N Missile and Nuclear Operations Career Path Pyramid, 2014	129
20	13N Missile and Nuclear Operations Career Path Pyramid, 2016	130
21	Ballistic Missile Organization Structure, October 1955	131
22	SAC ICBM Wing & Squadron Assignments, 1958	132
23	SAC ICBM Wing & Squadron Assignments, 1960	133
24	SAC ICBM Wing & Squadron Assignments, 1965	134

25 SAC ICBM Wing & Squadron Assignments, 1970 135
26 SAC ICBM Wing & Squadron Assignments, 1973 136
27 SAC ICBM Wing & Squadron Assignments, 1975 137
28 SAC ICBM Wing & Squadron Assignments, 1987 138
29 SAC ICBM Wing & Squadron Assignments, 1992 139
30 ACC ICBM Wing & Squadron Assignments, 1992 140
31 AFSPC ICBM Wing & Squadron Assignments, 2000 141
32 AFGSC ICBM Wing & Squadron Assignments, 2009 142
33 USSTRATCOM Organizational Structure, 2011 145
34 Planned USSTRATCOM Organizational Changes, April 2017 146
35 Detailed USSTRATCOM Structure Change Plans, April 2017 147
36 AFGSC Assigned Units, 2016 148
37 315 WPS ICBM Weapons Officer Mural 161

Introduction

> *Identification is not merely a relation between people, but between participants, social configurations, categories, enterprises, actions, artifacts, and so forth. Identification is not merely a subjective experience; it is socially organized. It is not merely a static relation; it is dynamic, generative process. Because it represents an investment of the self, identification generates the social energy that sustains both our identities and our communities in their mutual constitution.*
>
> Etienne Wenger, PhD

Missileer: a U.S. military profession for Air Force officers charged with deterring potential aggressors with nuclear intercontinental ballistic missiles (ICBMs) and, when directed, eliminate aggressors through decisive strike.[1] Countless individuals have served honorable military careers as missileers, pursuing peace through strategic nuclear deterrence, ever since the first ICBM became operational in the autumn of 1959. However, in a tragic irony for the professionals who played a key role in U.S. success in the Cold War, standard word processing software does not even acknowledge missileer as a word. Why focus so much on a word? Because missileer is much more than a word--it is an identity.

As the opening quote indicates, identification has implications beyond oneself; it extends and influences communities, social organizations, enterprises, and more. Similarly, in true constructivist form, how one identifies oneself is equally susceptible to the mutual

[1] 1st Lt Veronica Perez, "Inspiring the Force: New 20th AF Vision and Mission Statements," 20th Air Force, 9 December 2016, http://www.20af.af.mil/News/Article-Display/Article/1025963/inspiring-the-force-new-20th-af-vision-and-mission-statements. Because no official definition for missileer exists, this definition borrows from the most current 20th Air Force mission statement.

influence by those things it can influence. Identity is, therefore, iterative as part of an on-going relationship of mutually influential and contextual variables. The question explored here is what contextual variables have shaped and influenced the demographic of missileers over time. Specifically, how have technology, force structure, and personnel and mission challenges influenced missileer force development over time and what are the implications for career progression.

This paper provides a contemporary look at the major influences that have affected the development of missileers since they first started pulling alert in 1959. An understanding of these influences will help explain how the career field developed missileers over time and shed light on why some contemporary problems faced by missileers should come as no surprise. By examining the influences on missileer force development in the past, one can make correlations about how decisions may affect the development of missileers in the future. The creation of an independent Air Force Specialty Code (AFSC) for missileers as 13N Nuclear and Missile Operations officers along with the creation of a nuclear-focused Air Force Global Strike Command (AFGSC) continue to shape the identity of missileers in today's Air Force. A look into the past may shed light on future implications for missileer force development.

Scope

The scope of this paper is twofold—time-based and demographic-based. Chapters 1-3 of this paper are broken into chronological epochs divided by logical events. Chapter 4, however, is dedicated to a demographic-based analysis of senior Air Force officers.

Epochs

The first epoch begins in 1959, which correlates with the year the first ICBM became operational and began performing nuclear alert duties. However, because the ICBM program predated 1959, references to earlier dates are made to help provide additional context. The second epoch begins in late 1989, which correlates with the year of the Malta

Summit. On 2 December 1989 president George H. W. Bush met in Malta with Soviet President, Mikhail Gorbachev. The outcome of the two-day Malta Summit was both parties declaring an end to the Cold War. The third epoch begins in 2009 with the stand-up of Air Force Global Strike Command, which took place in the wake of several embarrassing nuclear incidents. This third epoch addresses missileers in contemporary times and runs through the spring of 2017 during the writing of this paper.

Demographics

The demographic focus of this paper is narrowed to USAF ICBM missileers only and will not include other services or operators of other systems. Categorically, operators of Ground Launch Cruise Missiles (GLCM), intermediate range ballistic missiles (IRBM), strategic missiles (SM), or other guided missiles will not be addressed in this paper.

When analyzing the records of general officers in Chapter 4, the demographic will be limited to those officers who performed ICBM operations before they commanded as field grade officers. The intent is to focus on those who had operational ICBM experience before they commanded at the squadron level to then account for missileers who grew into senior officers, as opposed to senior officers who broadened into ICBMs from another career field. Additionally, only those officers who have been selected for, or attained the rank of Major General, or higher, are analyzed. Major General was selected as the minimum general officer threshold as it equates to traditional minimum rank of a Numbered Air Force (NAF) commander.

Squadrons

Analysis of missile squadrons will only include operational ICBM squadrons. This narrow scoping excludes other missile-related squadrons, such as operational test squadrons, training squadrons, evaluation squadrons, weapons squadrons, strategic squadrons, support squadrons, and so forth. The rationale for limiting analysis to operational

missile squadrons is because anything beyond this scope tends to serve as enabling, enhancing, redundant, or correlated squadrons and capabilities. The missileer's core mission is in operating ICBMs in operational missile squadrons.

Recurring Themes

There are three recurring themes used to frame the three epochs identified in this paper: technology, force structure, and personnel and mission challenges. However, in Chapter 4 these three themes are set aside to focus on the missileers who became general officers, the product of force development during the three epochs.

Technology

Technological developments have had having varying influence on missileer force development. During the first epoch, technology was a key driver early on, influencing basing strategies, integration, and the missileer force structure. With the advent of more robust, sustainable technologies, and the Minuteman infrastructure, technology influenced force structure less, but it did contribute to personnel and mission challenges. Technology became more pertinent again in contemporary times in the form of Life Extension Programs (LEP) and targeted modernizations efforts. Most recently, renewed efforts to recapitalize the ICBM fleet have renewed discussions on technology for the Minuteman III replacement.

Force Structure

ICBM force structure has been influenced by several factors. The rapid development and deployment of ICBM units influenced force structure early on based on capabilities and technological limitations. Later, key personalities such as the Secretary of Defense and President of the United States were pivotal in directing sweeping changes that would affect the entire ICBM force. At times these changes were calculated to increase efficiencies, while other times they were the result of arms control negotiations. Additionally, ongoing conventional conflicts would

shift not only focus, but also entire Numbered Air Forces (NAF), resulting in reorganizations of stateside forces to balance administrative responsibilities. In contemporary times, force structure was affected by the need to realign the ICBM mission in a post-Cold War environment and to refocus service attention.

Personnel & Mission Challenges

The challenges faced by missileers and the ICBM nuclear deterrence mission tell the story of nuclear weapons often left out of books on strategy. Unlike the pilot and the astronaut, figures that have been idolized as American heroes, missileers have never been awarded such stature despite their critical function. Whether as a result of Air Force culture, or the unwillingness of a nation and its elected officials to recognize the important role the ICBM serves in deterring potential foes from attacking the U.S. homeland, the missileer performs a largely unsung role in the military. The inaction and ever-ready state of the missileer has been a key capability and fundamental frustration since the 1950s. Additionally, lopsided personnel policies, skewed organizational emphasis, and limited wars have resulted in numerous challenges that only compounded those experienced by missileers.

The Generals

While the majority of this paper deals with the influence of technology, force structure, and personnel and mission challenges, it also looks at a select group of officers that experienced missile operations early in their careers and eventually rose to the rank of Major General, or above. This is a comprehensive look at high-profile officers to determine if there are trends in their development that should be considered in the force development strategy of today's missileer in the 13N Nuclear and Missile Operations career field.

Limitations

The analysis of this paper is limited by its scope, availability of information, and unfolding contemporary events. The Strategic Air Command (SAC) archives have been largely reestablished at Air Force Global Strike Command (AFGSC), but digitized information was limited. Additionally, although historical records have a strong focus on the flying missions SAC performed, there was much less focus on the ICBM mission. Research involving specific personnel information was limited to open-source information such as the Air Force biographies website.

Summary

The framework established in this paper provides a lens for studying the development of the Air Force missileer. Studying the past and analyzing decisions made in appropriate context will aid in identifying implications for missileers today and into the future. Changes in technology or force structure can influence the challenges to the personnel and ICBM mission, including the service's ability to grow future leaders in this critical nuclear mission.

In recent years the Air Force, along with several third-party entities, has explicitly stated its need to focus on the nuclear mission, prioritize it, and give it the leadership it demands. Among several other actions, the Air Force has created an independent career field for missileers as 13N Nuclear and Missile Operations officers, a Major Command to focus on the nuclear mission in Air Force Global Strike Command, and a Headquarters Air Force directorate dedicated to all-things Air Force nuclear in AF/A10 Strategic Deterrence and Nuclear Integration. The question remains as to whether the Air Force will be able to maintain its nuclear focus when money and attention are diverted by contemporary demands. The level of commitment the Air Force demonstrates to its nuclear stewardship might just be discerned by understanding how it cultivates its only nuclear-focused officer career field—13N Nuclear and Missile Operations officers…missileers.

Chapter 1

Rise of the ICBM Mission, 1959-1989

The capability of the Strategic Air Command to accomplish its assigned mission both in the current cold war and a potentially hot war is, essentially, the product of three factors – organization, men and weapon systems. The quality of the over-all product is contingent upon not only the individual quality of each of these factors but also the degree and congruity of their interrelationship.

General Thomas S. Power, CINCSAC

The ICBM mission rushed to the forefront of our nation's strategic capabilities in the late 1950s and continued to be the backbone of national deterrence for nearly three decades. Even in the final stages of the Cold War, the first pages of the 1988 National Security Strategy acknowledged nuclear weapons and intercontinental delivery systems as "the primary threat to our national survival."[1] Tomes of literature have been written on events that have occurred from 1959 to 1989 and this writing is not intended to synthesize all that occurred during this timeframe. Rather, all the events of the Cold War serve as the backdrop for the technological innovations, force structure changes, and personnel and mission challenges that influenced missileers.

Throughout this period the strategic environment was extremely dynamic. Soviet advances in missiles and atomic weapons in the 1940s and 1950s came to culmination with their shocking launch of Sputnik in 1957. The popular fear of a 'missile gap' between the U.S. and Soviet

[1] The White House, *National Security Strategy of the United States* (Washington, DC, January 1988), 1-2.

Union resulted in ballistic missile development being identified as "a research program of the highest national priority, second to no other."[2]

Advances in ICBM and nuclear technology came in leaps and bounds throughout the 1950s. The ICBM program is comparable to the WWII Manhattan Project in terms of scope and scientific challenges.[3] Advances took place in rocketry, nuclear technology, and automation. These factors influenced weapon systems and basing concepts for the ICBM force and the conditions missileers operated in.

Organizations seemed to spring to life to support the massive ICBM endeavor. These organizations seemingly had a life their own, expanding and contracting based on advancements in technology, world events, and fiscal constraints. The fundamental organizational unit influencing missileers was the operational missile squadron, the number of which peaked in 1963 with a total of 38 missile squadrons.[4]

The ICBM mission was fraught with personnel and mission challenges throughout this early period. Human performance factors were identified in reports as early as 1958 stating how the standardization demanded by nuclear duties would restrict ingenuity, breed boredom, and result in monotony for the missile combat crew member.[5] Furthermore, the nuclear deterrence mission fundamentally differed from the strategic bombing mission; the differences were not

---

[2] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 135. On 13 September 1955, President Eisenhower pledged to use all available resources "to the end that nothing surmountable shall stand in the way of the most rapid progress of this program…no other development program is the subject of so urgent and emphatic a directive."

[3] Jacob Neufeld, "Ace in the Hole: The Air Force Ballistic Missiles Program," in *Technology and the Air Force: A Retrospective Assessment*, ed. Jacob Neufeld, George M. Watson, Jr., and David Chenoweth (Washington, DC: Air Force History and Museums Program, 1997), 118.

[4] *From Snark to Peacekeeper: A Pictorial History of Strategic Air Command Missiles* (Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 1 May 1990), 79-93.

[5] Lt Col William L. Anderson, "Organizing and Manning Ballistic Missile Units," in *Air Force Report on the Ballistic Missile: Its Technology, Logistics, and Strategy*, ed. Lt Col Kenneth F. Gantz (Garden City, NY: Doubleday & Company, Inc., 1958), 84-88.

easily appreciated when overlaid atop the conflicts experienced in these three decades.

Technology

Many of the technological breakthroughs affecting the ICBM program occurred throughout 1950s and early 1960s. Platform-specific advances occurred simultaneously with the fielding of each new ICBM system; lessons were learned and nuclear doctrine evolved. The technological advances that ushered in the age of ICBMs date back to World War II with the German V-2 rocket program. At the close of WWII, Operation Paperclip resulted in the exfiltration of nearly 130 German rocket scientists, approximately 100 dismantled V-2 rockets, along with crucial V-2 technical data; these people, hardware, and knowledge underpinned future U.S. rocket programs.[6]

On the eve of the Air Force being established as a separate military branch, discussions ensued as to which service would have responsibility for the nascent U.S. missile program. As part of the 15 September 1947 Army-Air Force Implementation Agreements, an understanding was attained for the, "assignment of strategic missile responsibility to the Air Force…and Air Force responsibility for research and development of guided missiles."[7] Following the establishment of the Air Force, 40 transfer orders were issued to implement the Army-Air Force agreements, including the placement of both the surface-to-surface pilotless aircraft and strategic missile missions with the Air Force.[8] Nuances and details of the scope of the assigned missions continued to be debated well into the 1950s.

---

[6] David N. Spires, *On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011* (Colorado Springs, CO: Air Force Space Command), 8.
[7] Richard I. Wolf, ed., *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, 1987) 91.
[8] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 52.

Despite early assignment to the Air Force for stewardship over strategic and guided missiles, significant inter-service competition with both the Army and Navy ensued. Missiles became synonymous with resources in a post-war drawdown. Refinement of roles and missions, ranges and altitudes, defense and offense were all entering arguments for the continuing debate over missiles.

The guided missile program only advanced in fits and starts throughout the 1950s. The launch of Sputnik coupled with Soviet advancements in atomic and missile technology, alarmed several defense officials into the belief that there was a significant 'missile gap' between the U.S. and Soviet Union.[9] The 'missile gap' perception led to an effective lobbying campaign that resulted in President Eisenhower giving ICBM research and development the highest national priority.[10] Presidential prioritization of the missile program successfully reversed a trend of fiscal conservatism and sped up the development of operational missiles.[11]

Developments in nuclear technology overcame the technical challenges presented by atomic weapons. The weapons of WWII were atomic weapons that created explosions by splitting the atom in either a 'gunshot' or 'implosion' device. Unfortunately, the size of these weapons proved cumbersome and presented technical challenges when trying to mate these weapons atop an ICBM. Engineers were faced with the dilemma of either having weapons with smaller yield and better accuracy, or weapons with greater yield and less accuracy. The

---

[9] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 4, 132, 185. Even though President Eisenhower denied the possibility of a 'missile gap,' the Gaither Report (1957) and Killian Report (1958), both commissioned by the President, indicated otherwise--this only added to the controversy.

[10] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 135.

[11] Jacob Neufeld, "Ace in the Hole: The Air Force Ballistic Missiles Program," in *Technology and the Air Force: A Retrospective Assessment*, ed. Jacob Neufeld, George M. Watson, Jr., and David Chenoweth (Washington, DC: Air Force History and Museums Program, 1997), 119.

successful breakthrough in hydrogen fusion[12] meant the Air Force could plan on smaller weapons with greater yield; accuracy became less of an issue with megaton class warheads.[13]

ICBM weapons systems developed under the 'concurrency' model, also referred to as parallel development. The concurrency model meant, "the simultaneous development of the systems, manning requirements, and the organizational structure required to expeditiously produce an intercontinental ballistic capability."[14] Parallel development, which was also used during the Manhattan Project, "stimulated competition to turn out a weapon in the shortest time. There was a separate associate contractor for each major subsystem…a plan that provided insurance against failure of a single contractor."[15]

The early development of ICBM systems reflected new technology that was without precedent. The predicted size of the missile force fluctuated often, but it was clear there would be a demand for officers knowledgeable about this new weapon system as soon as it became operational. To meet this challenge, future missileers were embedded in laboratories and production facilities, ensuring first hand tutoring from

---

[12] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 98, 103, 117. Early prospects of fusion technology surfaced in May 1951 during the "Greenhouse" nuclear test series, shot "George." The concept was confirmed on 1 November 1952 during the "Ivy" nuclear test series, shot "Mike."

[13] Jacob Neufeld, "Ace in the Hole: The Air Force Ballistic Missiles Program," in *Technology and the Air Force: A Retrospective Assessment*, ed. Jacob Neufeld, George M. Watson, Jr., and David Chenoweth (Washington, DC: Air Force History and Museums Program, 1997), 117.

[14] Maj Thomas J. Gosling, Maj James W. Knapp, and Maj Kenneth R. Morrison, "Future Management Applications in the Minuteman Operations Career Area: A Call to Action," Research Report no. 3-9349-00219-4336 (Maxwell AFB, AL: Air Command and Staff College, 1975), 7.

[15] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 122.

the scientists and engineers building the systems they would soon operate.[16]

The confluence of nuclear breakthroughs, national concern of a missile gap, national prioritization of the ICBM program, and clever management of missile development programs resulted in rapid deployment of a family of ICBMs. Figure 1 shows the technological, engineering and testing, and deployment phases for all U.S. ICBMs.

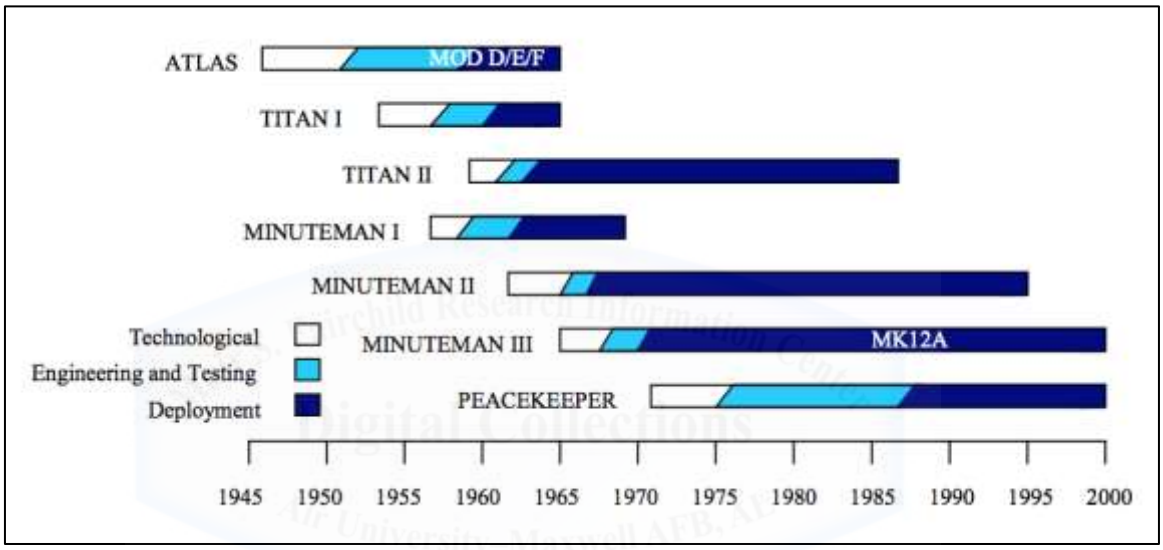


Figure 1: U.S. Intercontinental Ballistic Missile Force Development

Source: David M. Kunsman and Douglas B. Lawson, A Primer on U.S. Strategic Nuclear Policy, Sandia Report SAND2001-0053 (Albuquerque, NM: Sandia National Laboratories, January 2001), 43.

On 31 October 1959, a nuclear warhead was mated to an Atlas D ICBM, which enabled the Commander of Strategic Air Command, General Thomas S. Power, to declare the missile on alert.[17] ICBM alert operations have continued non-stop since 31 October 1959.

---

[16] David N. Spires, *On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011* (Colorado Springs, CO: Air Force Space Command), 49.

[17] *Alert Operations and the Strategic Air Command, 1957-1991* (Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 7 December 1991), 5. This date differs from David N. Spires' book, *On Alert*, which states on p. 50 of his history that, "on 1 September 1959 SAC Commander-in-Chief General Power announced that the first Atlas D missile at Vandenberg had achieved "operational" status. A week later,

Three generations of ICBMs were fielded between 1959 and 1989. The first generation of ICBMs included the Atlas D/E/F and Titan I. The second generation of ICBMs included the Titan II and Minuteman I/II/III. The final generation of ICBMs deployed was the Peacekeeper. Technical advances with each successive generation of ICBMs influenced the deployment configuration, associated manpower requirements, and missileer crew experience.

Early technological developments with ICBMs allowed for rapid replacement of costly and potentially obsolete systems. The first generation ICBMs, Atlas and Titan I, were liquid-fueled and required the use of a cryogenic oxidizer, liquid oxygen. Liquid oxygen required special storage outside the missile until the missiles were being prepared for launch.[18] Second and third generation Minuteman and Peacekeeper ICBMs advanced from liquid fuel to a solid propellant. This influenced the level of safety associated with the missile systems, as did the level of involvement by the missileer.

While both liquid-fueled systems, the transition from Titan I to Titan II resulted in a more efficient weapons system that reduced the number of active control components from 125 to 30, and valves and regulators from 91 to 16.[19] Liquid-fueled ICBMs were co-located with the owning launch control centers in a 'launch complex,' whereas solid-fueled missiles were dispersed out in a 'missile field.' The further away from the missile a missileer became, the less involved they became with

---

following a successful training flight performed by a SAC crew, the command placed one of the three Atlases in the 576th Strategic Missile Squadron on Emergency War Order alert." The citation used by Spires is Jacob Neufeld's book, *Ballistic Missiles*, which states the same thing, but in fewer words on pg. 208 without additional citations to support the date used. In deference to the SAC historian, the authority on the subject, the 31 October 1959 date is used.

[18] David N. Spires, *On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011* (Colorado Springs, CO: Air Force Space Command), 43.

[19] David N. Spires, *On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011* (Colorado Springs, CO: Air Force Space Command), 65.

overseeing maintenance and facilities personnel. Advances in guidance systems also decreased the level of involvement the missileer had in hands-on tasks.

Early ICBMs utilized radio-initial guidance, which was susceptible to jamming and required the missile to be tethered to the launch control center. However, advances in inertial guidance, gimbal suspension, and gyroscopic stabilization eliminated the requirement for expensive ground-based radio equipment, radars,[20] and centralized guidance control facilities.[21] Later, advances in technology allowed a transition from manual loading of targeting information directly onto ICBMs to a remote re-targeting capability, reducing workload for missileers and maintenance personnel previously charged with this task.

Developments in automation during this period later raised questions about the role of the missileer. Unlike the focus in the space shuttle program to find the right balance between abstraction and automation, there was no struggle to ensure the missileer would be given the same heroic status the astronaut received.[22] While humans were at the heart of the human-machine relationship for both the shuttle and missile programs, ballistic missiles were viewed as inflexible and incompatible with the heroic image of exploration—there was no emphasis on the human as the ultimate backup system.

Advances in technology resulted in several system upgrades in the latter part of this period. The Air Force viewed silo-based systems as too vulnerable to Soviet systems. As a result, the Air Force tested several ICBM deployment concepts, including road-mobile and air-mobile

---

[20] David N. Spires, *On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011* (Colorado Springs, CO: Air Force Space Command), 66.
[21] 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 (November1996; repr., Bodega Bay, Canada: Hole in the Head Press, 2014), 195-196.
[22] David A. Mindell, *Digital Apollo: Human and Machine in Spaceflight* (Cambridge, MA: Massachusetts Institute of Technology, 2008), 39.

systems. At one point, proof of concept was accomplished for an air-mobile system when the Air Force successfully launched a Minuteman I by deploying it out the back of a C-5A Galaxy transport aircraft in 1974.[23] Ultimately, it was the reliable and enduring Minuteman I infrastructure that provided the backbone for Minuteman II/III and Peacekeeper systems through the end of the Cold War.

Force Structure

There are a myriad of factors that influence force structure and subsequently impact the environment in which a missileer operates. ICBM weapon systems have inherent capabilities and limitations that shape how they are deployed. Key personalities have been decisive in influencing force structure. Finally, organizations have their own necessities and respond to the environment in an attempt to increase efficiency and organizational survivability. Each of these variables will be discussed in turn.

Systems

The structure a missile squadron took reflected the infrastructure and technology of the weapon system's design. Table 1 provides an overview of a missile squadron's composition for each ICBM system the U.S. has deployed along with the Launch Control Center (LCC) to Launch Facility (LF) ratio for each. Appendix F shows the progression of squadrons, LCCs, and LFs. The LCC is where missileers operate from to perform nuclear command and control (NC2) functions. The LF is where the ICBM resides. The ratio of LCC to LF is essential; the LCC is to the missileer what the cockpit of an airplane is to a pilot. Early ICBM systems were tethered individually to launch control centers and ground control equipment, limited by the technology supporting the system.

[23] David N. Spires, *On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011* (Colorado Springs, CO: Air Force Space Command), 137.

Table 1: Missile Squadron LCC and LF Composition

Weapon System	LCCs	LFs	LCC : LF Ratio
Atlas - D	1-3	3-9	1:3
Atlas - E	9	9	1:1
Atlas - F	12	12	1:1
Titan I	3	9	1:3
Titan II	9	9	1:1
Minuteman I/II/III	5	50	1:10
Peacekeeper	5	50	1:10

Source: Adapted from 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 (November1996; repr., Bodega Bay, Canada: Hole in the Head Press, 2014), 190, 209, 221. Information based on configuration models presented, augmented squadron information. Atlas D squadrons varied in number of launch complexes from 1-3.

The Atlas system had a variety of deployed configurations. Early Atlas D series were deployed in an aboveground vertical configuration with scaffolding. Later, Atlas D and early Atlas E weapons were deployed horizontally in a shelter until the missile was being prepared for launch. Upon direction the missile would be raised to a vertical position—this configuration was colloquially referred to as a coffin launcher.

The Atlas D and Titan I missiles were deployed in sets of three, meaning one LCC would control three LFs, or three missiles. The reason for this launch complex design with the Atlas D was due to the co-dependency on ground control equipment of the radio-inertial guidance. The Titan I, the first true multi-stage ICBM, also required a ground-based guidance system, tethering silos together in clusters to gain equipment-sharing efficiencies. Unlike the Atlas D, the Titan I launch complexes were completely underground. Each Titan I was silo-based, then raised on an elevator when ready for launch. All three Titan I silos

were accessible by underground tunnels that intersected at the underground launch control center.[24]

ICBM deployment configurations matured along with nuclear strike survivability considerations. Beginning with the Atlas F series, a silo-based deployment method was used. Vertical storage in a hardened silo helped protect the thin-skinned ICBM against the potential blast effects of a nuclear strike.[25] The missile would then be raised using elevators when the missile was to be launched. Additionally, the Atlas E and F had inertial-guidance upgrades that enabled the dispersion of launch sites.

The first generation of ICBMs was the result of a 'crash' program to deploy as many missiles as possible to face Soviet threats. As Appendix F shows, in 1963 the Air Force reached the largest number of ICBM squadrons that it would ever see, totaling 38 strategic missile squadrons. Within a year the missile force reached a peak in the total number of LCCs, totaling 251 in 1964. By the end of 1965 all first-generation ICBM missiles had been retired and their owning squadrons were disestablished or realigned.

The second generation of ICBMs brought additional deployment configurations as well as stability of weapon systems. In 1966, the ICBM force peaked the total number of operational LFs, totaling 1054. Culturally, ICBMs were viewed as a growth enterprise as reflected in Figure 2. The number of operational LFs remained constant for the next 18 years.

---

[24] 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 (November1996; repr., Bodega Bay, Canada: Hole in the Head Press, 2014), 210-211.
[25] 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 (November1996; repr., Bodega Bay, Canada: Hole in the Head Press, 2014), 194-198.

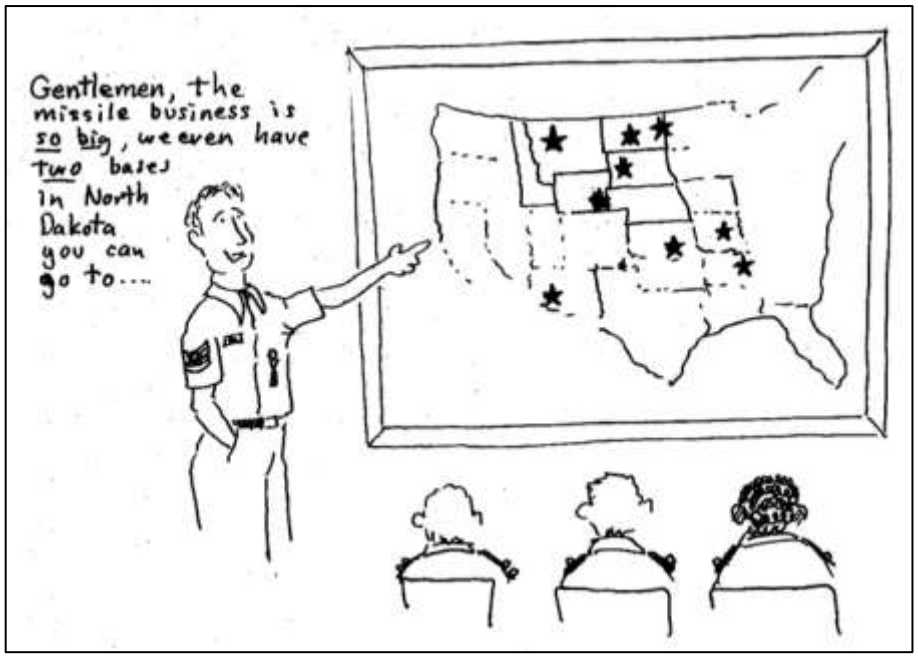


Figure 2: A Growing Missile Business

Source: Maj Roger Tollerud, Maj Steve Kucynda, and Maj Don Karcewski, Guide for Minuteman Missile Maintenance Managers, 1970 ca. Provided by Association of Air Force Missileers.

The Titan II was a significant improvement over Titan I. Titan II employed an all-inertial guidance system, which freed the missile from any tether to ground-based guidance equipment and allowed missiles to be dispersed at least seven nautical miles from each other. Additionally, the Titan II was the first missile that could be launched from within its silo, increasing its responsiveness to launch orders.[26]

The Minuteman ICBM incorporated the latest system developments and brought about a new and enduring deployment configuration. Minuteman I updates included: being the first solid-fuel ICBM; employed all inertial guidance, enabling dispersal; was a three-stage system; and allowed one LCC to control ten LFs in a flight, with up to 50 LFs in a

[26] 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 (November1996; repr., Bodega Bay, Canada: Hole in the Head Press, 2014), 210.

squadron. This squadron configuration would serve three generations of Minuteman ICBMs, as well as the Peacekeeper.

Peacekeeper represents the third generation of ICBMs. Although several deployment methods were explored during the development of Peacekeeper, the Air Force decided to utilize the infrastructure Minuteman had established just over a decade earlier. Only one Peacekeeper squadron ever deployed, achieving full operational capability in December 1988.[27]

Personalities

Key personalities also had a big impact on the force structure of the ICBM force. While countless individuals have influenced nuclear thinking and strategies, three of the most influential personalities included CINCSAC, SECDEF, and POTUS. General Thomas S. Power, Secretary Robert McNamara, and President Ronald Reagan were examples of persons who directly influenced ICBM force structure.

General Power was the first CINCSAC to command an operational ICBM force. Power had been prepared by General LeMay for the task of integrating ICBMs into SAC. Power served as LeMay's Deputy Commander, then Vice Commander in SAC from October 1948 to April 1954. Foreseeing the advent of ICBMs, LeMay sent Power to command Air Research and Development Command (ARDC) where he could get first-hand knowledge and experience with the upcoming missile systems.[28] Power commanded ARDC from April 1954 to June 1957 where he oversaw the efforts of General Bernard Schriever, the Western Development Division (WDD), and Ballistic Missile Programs.[29] Appendix C shows the organizational structure in 1955, which foreshadows future

---

[27] *From Snark to Peacekeeper: A Pictorial History of Strategic Air Command Missiles* (Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 1 May 1990), 47.
[28] Alwyn T. Lloyd, *A Cold War Legacy: A Tribute to Strategic Air Command – 1946-1992* (Missoula, MT: Pictorial Histories Publishing Company, Inc., 1999), 667, 672.
[29] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 140.

leaders in the ICBM mission area. Following his command in ARDC, General Power assumed command of SAC in July 1957. He oversaw the prolific introduction of ICBMs into the Air Force arsenal, including the peak number of ICBM squadrons and LCCs, until his retirement in November 1964.[30] General Power continues to be recognized for his outstanding advocacy for missileers and the ICBM program today with the Air Force Association's award for the best overall missile crew in the United States—the General Thomas S. Power Award.[31]

Secretary of Defense Robert McNamara was also influential to the force structure of the ICBM mission and the context it operated within from 1961 to 1968. McNamara was one of the newly emplaced Kennedy administration's 'whiz-kids' who came with a focus on addressing the nation's perceived 'missile gap' with a thorough review of the ICBM program to improve management and reduce waste.[32] By March 1961, McNamara had accomplished a review of strategic forces and decided to "defer plans for three mobile Minuteman squadrons and to cancel two of the eight Titan II squadrons that had been programmed."[33] Seeing the benefits of the solid-propellant Minuteman ICBM over the costly, cumbersome, and liquid-fueled Atlas and Titan, McNamara expedited the retirement of first generation ICBMs. McNamara gave full support to the Minuteman program, increasing the number of ICBMs to be fielded and turning it into a 'crash program', expediting production.[34]

A year later, Secretary McNamara and General Power accompanied President John F. Kennedy to view a test launch of an Atlas missile on

---

[30] Alwyn T. Lloyd, *A Cold War Legacy: A Tribute to Strategic Air Command – 1946-1992* (Missoula, MT: Pictorial Histories Publishing Company, Inc., 1999), 667.
[31] "Awards Presented at the Conference Opening and Awards Ceremony," Air Force Association, accessed 22 February 2017, https://www.afa.org/informationfor/military/nataerospaceawards/awardspresented.
[32] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 212.
[33] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 213.
[34] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 214-215.

23 March 1962 at Vandenberg AFB. At the conclusion of the launch, President Kennedy was presented with a missile badge.[35] While the first generation missiles had served their role in assuring the public there was no 'deterrent gap' with the Soviet Union, McNamara would take additional steps to advance their retirement.[36] In 1963, the Air Force proposed an orderly and phased retirement of the Atlas D/E/F and Titan I systems through 1969, beginning with Atlas D. McNamara directed an accelerated retirement of all first-generation ICBMs by the end of 1965 due to their obsolescence and the advent of the more reliable Minuteman ICBM.[37] McNamara also played a key role in leading the U.S. into conflict in Vietnam, which influenced a decade of nuclear relations with the Soviet Union following the Cuban Missile Crisis.

The tensions of the 1962 Cuban Missile Crisis brought the U.S. and Soviet Union to the brink of nuclear exchange. This event highlighted the need for a forum wherein nuclear states could engage in open dialogue geared toward greater stability. Subsequently, arms control negotiations became the staple of international relations during the Cold War, influenced by presidential administrations and world events.

The recurring rounds of debate in international fora to develop treaties and verification protocols became familiar steps in nuclear détente during the 1970s, at a time when the U.S. was in Vietnam. A closer look at the arms control agreements listed in Table 2 shows that early nuclear arms control initiatives were geared toward stemming nuclear weapons and technology proliferation. Later, arms control agreements became focused on limiting those systems and technologies

---

[35] *Alert Operations and the Strategic Air Command, 1957-1991* (Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 7 December 1991), 12.
[36] David N. Spires, *On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011* (Colorado Springs, CO: Air Force Space Command), 56.
[37] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 233, 237.

believed to be destabilizing. Despite a trend for restrictions and limitations in arms control, worldwide operational nuclear stockpiles continued to surge from 32,648 in 1963 up to 62,729 in 1987.[38]

Table 2 – Significant Treaties, 1963-1989

YEAR	TREATY	PREMISE
1963	Partial Nuclear Test-Ban Treaty	Prohibits testing nuclear weapons in atmosphere, outer space, or on ground – limited states to underground testing
1967	Outer Space Treaty	Prohibits deployment of nuclear weapons in outer space
1968	Non-Proliferation Treaty	Nuclear states would not promote the spread of nuclear weapons to non-nuclear states; non-nuclear states would not seek to develop nuclear capabilities
1971	Strategic Arms Limitation Talks (SALT)	Limited future deployment of antiballistic missiles; froze ICBM & SLBM numbers
1971	Seabed Treaty	Bans emplacement of nuclear weapons on ocean floor beyond 12-mile coastal zones
1974	Anti-Ballistic Missile Treaty	Initially limited a state to two ABM deployment sites; subsequent protocol limited ABM to one site
1974	Threshold Test Ban Treaty	Prohibited nuclear testing with yields greater than 150 kilotons
1979	SALT II	Set limits on the number of Multiple Independently Reentry Vehicles (MIRVs) missiles
1987	Intermediate-Range Nuclear Forces (INF) Treaty	Complete elimination of intermediate- and medium-range land-based missiles; first treaty reducing nuclear weapons

Source: Author's Original Work

U.S. involvement with arms control negotiations with the Soviet Union was regular and successful while engaged in Vietnam from 1963-1975; the early 1970s became known as a period of détente that tentatively began with President Richard M. Nixon's 1972 visit to

[38] Stephen L. Bonin, "Peace through Strength: The Relevance and Complementing Attributes of America's National Security Bedrock—Strategic Nuclear Deterrence," Paper presented as USAF Strategic Policy Fellow, 10 June 2015, 98.

Moscow. The final détente agreement struck was the Strategic Arms Limitation Talks (SALT) II, on 18 June 1979. However, the Soviet decision to invade Afghanistan on 24 December 1979, in response to a changing political situation, soured U.S.-Soviet relations as the U.S. and Soviet Union each sponsored opposing belligerents in an on-going conflict that lasted through 1992. During this period President Ronald Reagan entered office.

Newly elected President Reagan felt that the strategic balance had tipped in favor of the Soviet Union as a result of SALT II. As a result, prior to engaging in any additional arms control discussions with the Soviet Union, the U.S. completed modernization of its strategic nuclear forces. Modernization resulted in the end of Titan II systems and the advent of the Peacekeeper. By the end of 1987, all Titan II squadrons had been inactivated, and the first Peacekeeper squadron was operational by the end of 1988.[39] However, unfolding world events and additional arms-control initiatives determined the fate of future Peacekeeper units and other proposed new ICBM systems.

Arms control negotiations during the Reagan era were not as fruitful as they had been during détente in the 1970s. U.S. modernization, emerging U.S. Peacekeeper and Soviet SS-20 missiles, Reagan's anti-ballistic missile Strategic Defense Initiative (SDI), deployment of Pershing II medium-range missiles and Ground-Launched Cruise Missiles in Europe, all collectively complicated U.S.-Soviet negotiations.[40] The U.S. and Soviets disagreed on which missile systems would be included in the Strategic Arms Reduction Talks (START); this was complicated by Reagan's "zero-zero offer" plan requiring dismantling

[39] 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 (November1996; repr., Bodega Bay, Canada: Hole in the Head Press, 2014), 123.
[40] 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 (November1996; repr., Bodega Bay, Canada: Hole in the Head Press, 2014), 123.

of all SS-20 missiles. The SS-20 missiles were a mobile intermediate range ballistic missile (IRBM). However, on 8 December 1987, the U.S. and USSR signed the Intermediate-Range Nuclear Forces (INF) treaty, the first arms control treaty to reduce nuclear weapons and eliminate an entire class of nuclear weapons, intermediate- and short-range Pershing II and cruise missiles, from the nuclear forces.[41]

Organizations

Organizations have a vitality all their own and often take steps to perpetuate their own existence. SAC was no different in this regard. SAC was identified as a specified command under the Department of Defense Reorganization Act of 1958 and used a hierarchical structure of NAFs, divisions, wings, and squadrons.[42] The number and configuration of subordinate units over time can be seen in Appendix D. In 1960, SAC's NAFs, Second, Eighth, and Fifteenth Air Forces, were aligned on a north-south basis; Second Air Force was responsible for the Central U.S., Eighth Air Force for the Eastern U.S., and Fifteenth Air Force for the Western U.S.[43]

The organization of operational ICBM forces occurred at a breakneck pace to keep abreast of ARDC's Ballistic Missile Office (BMO) Site Activation Task Forces (SATAF) and as demanded by the concurrency concept.[44] Concurrency required rapid missile development and flight-testing, construction of facilities, manufacturing equipment, and training missile crews all at the same time. SAC created the 1st Missile Division to accommodate the operational testing occurring at

---

[41] "Treaty Between The United States of America And The Union of Soviet Socialist Republics On The Elimination Of Their Intermediate-Range And Shorter-Range Missiles (INF Treaty)," U.S. Department of State, accessed 22 February 2017, https://www.state.gov/t/avc/trty/102360.htm.

[42] Gen Thomas S. Power, "Strategic Air Command," *Air Force Magazine*, September 1959, 116.

[43] Alwyn T. Lloyd, *A Cold War Legacy: A Tribute to Strategic Air Command – 1946-1992* (Missoula, MT: Pictorial Histories Publishing Company, Inc., 1999), 301.

[44] David N. Spires, *On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011* (Colorado Springs, CO: Air Force Space Command), 44.

Cooke Air Force Base (later Vandenberg AFB), California. After General Power declared the Atlas ICBM operational and on Emergency War Order (EWO) alert, ICBM squadrons were established at a prolific rate.

Anticipating the rapid influx of ICBM units and their associated missileers crew force, SAC implemented a new organizational concept called a 'Strategic Wing' to integrate missile and bomber forces.[45] A strategic wing, later Strategic Aerospace Wing (SAW), was neither a strategic bomber wing, nor a strategic missile wing, because these units had at least one unit of bombers and one unit of missiles. By the end of 1958, SAC had activated 14 strategic wings in name, but due to placement of strategic assets only three were truly active.[46] The SAW concept was appropriate for Atlas squadrons, which were deployed in fewer numbers at diverse bases with flying missions. However, as second-generation ICBMs came on-line, missile squadrons were able to form independent Strategic Missile Wings (SMW) rather than a pilot-dominated SAW. In 1960, all operational missile squadrons were spread across nine wings, seven divisions, in two numbered air forces.

At the end of 1965, all first-generation Atlas and Titan I missiles had been retired and their owning squadrons inactivated. All second-generation Minuteman and Titan II missile squadrons were formed into nine SMWs, spread across eight air divisions, with all three CONUS-based NAFs having responsibility for a portion of the ICBM mission. Breaking with the north-south delineation of NAF responsibility, the SMWs at McConnell AFB, KS, and Whiteman AFB, MO, were assigned to Eighth Air Force rather than Second Air Force to ensure the ICBM mission was represented across all SAC CONUS-based NAFs.

The number of wings reporting to an air division oscillated between 2-3 during the 1960s, but this number increased to 3-4 in 1970. As a

---

[45] Gen Thomas S. Power, "Strategic Air Command," *Air Force Magazine*, September 1959, 115.
[46] Alwyn T. Lloyd, *A Cold War Legacy: A Tribute to Strategic Air Command – 1946-1992* (Missoula, MT: Pictorial Histories Publishing Company, Inc., 1999), 264.

result of the 1969 directed manpower reductions, SAC was required to reduce the number of CONUS-based air forces from three to two. As a result, SAC inactivated the 3rd Air Division in Guam, Sixteenth Air Force transferred to U.S. Air Forces in Europe, and Eighth Air Force was transferred from CONUS to Guam, enabling it to better support war efforts in Vietnam. Following Eighth Air Force's transfer to Guam, all remaining CONUS-based SAC personnel and assets were reassigned to Second Air Force and Fifteenth Air Force, SAC's CONUS-based NAFs.[47]

As part of the 1970 reorganization, all nine ICBM SMWs were reassigned within five air divisions, all belonging to Fifteenth Air Force, while Second Air Force became a flying-only NAF. Interestingly, even though Second Air Force became a flying only NAF, SMWs in Fifteenth Air Force were still organized into air divisions with flying wings, the 17th Strategic Air Division being the only exception.

By 1973, the ICBM mission was once again divided between SAC's CONUS-based NAFs. Fifteenth Air Force was divested of three of its SMWs that were transferred to Second Air Force. While the number of SMWs remained at nine, they were now dispersed among six air divisions in two NAFs.

The end of conflict in Vietnam in 1975 brought about additional organizational changes. In 1975, Second Air Force was inactivated as Eighth Air Force returned to CONUS and essentially assumed the staff functions and mission Second Air Force had, resulting in no changes in the subordinate SMWs. However, Fifteenth Air Force increased its number of air divisions from three to four. The result of the 1975 reorganization was nine SMWs spread across seven air divisions in two NAFs. This final reorganization would last for just over a decade.

The final organizational change in this period occurred as the last of the liquid-fueled Titan II ICBMs were being retired. In 1987, all but

[47] Alwyn T. Lloyd, *A Cold War Legacy: A Tribute to Strategic Air Command – 1946-1992* (Missoula, MT: Pictorial Histories Publishing Company, Inc., 1999), 426-427.

one Titan II squadron had been inactivated, leaving the 373rd SMS at Little-Rock AFB, AK, which would join the other Titan II squadrons by the year's end. By January 1988, there would be six SMWs, spread across three air divisions in Eighth Air Force and Fifteenth Air Force. The next series of organizational changes would not come until 1992 in preparation for the end of SAC.

Personnel & Mission Challenges

The advent of ICBMs brought with it several challenges, including those related to the missileers who made nuclear deterrence possible. Challenges ranged across several areas including: cultural baggage of senior leaders; accessions, training, and retention; personnel policy; senior leader advocacy; and, the combat crew experience.

The question of how the ICBM mission fit into the Air Force arsenal was a much-debated issue. General LeMay as CINCSAC showed little interest in the capability of the future ICBM program prior to breakthroughs in nuclear technology. Even still, LeMay viewed the primary military benefit of the ICBM in its ability to assist manned bombers to penetrate enemy airspace, stating that in no case would ICBMs alone "be capable of destroying the target system."[48]

Institutional resistance to the ICBM was so great, because it was seen as a radical innovation that threatened the status quo. The resistance from Air Force leaders may have delayed the initiation of a sustained long-range ballistic missile project by six years.[49] Integration of guided missiles and ICBMs proved a mental hurdle some were incapable of making. Jacob Neufeld notes that for several years "the Air Force referred to all missiles as pilotless aircraft and dubbed missile fins as wings. The USAF even went so far as to assign aircraft designations to

---

[48] Quoted in Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 142.
[49] Thomas P. Hughes, *Rescuing Prometheus* (New York: Vintage Books, a Division of Random House, Inc., 1998), 77.

missiles. Thus, for example, the Atlas ICBM became the XB-65, for experimental bomber 65!"[50]

In addition to challenges faced by the weapon system, there was significant resistance to the early establishment of an operational career field that featured advanced technology operated by non-rated officers. Early Air Force delineations between rated-pilot, rated-non-pilot, and support officers were significant. General Hap Arnold's early vision of an officer corps comprised primarily of technicians and scientists was consistent with his view that the service would be highly technical.[51] While some leaders like Arnold seemed ambivalent on whether an officer had a pilot rating or not, others such as General George Kenney and Major General Clements McMullen of SAC "made a determined effort to exclude all nonrated officers from their command."[52] General Carl Spaatz, Chief of Staff of the Air Force (CSAF), noted to major commanders how "unfortunate" the division between rated and non-rated officers was and that there should be no barriers to the career possibilities of non-rated officers, save command of flying units.[53]

In the late 1950s, as ICBMs were about to enter the operational arsenal, CSAF General Thomas D. White and CINCSAC Thomas S. Power fought against Air Force cultural resistance to ICBMs. In a meeting with all major commanders, White stated that, "As rapidly as missiles become operationally suitable, they will be phased into units either to completely or partially substitute for manned aircraft according to military

---

[50] Jacob Neufeld, "Ace in the Hole: The Air Force Ballistic Missiles Program," in *Technology and the Air Force: A Retrospective Assessment*, ed. Jacob Neufeld, George M. Watson, Jr., and David Chenoweth (Washington, DC: Air Force History and Museums Program, 1997), 117.
[51] Vance O. Mitchell, *Air Force Officers: Personnel Policy Development, 1944-1974* (Washington, DC: Air Force History and Museums Program), 340.
[52] Vance O. Mitchell, *Air Force Officers: Personnel Policy Development, 1944-1974* (Washington, DC: Air Force History and Museums Program), 340.
[53] Quoted in Vance O. Mitchell, *Air Force Officers: Personnel Policy Development, 1944-1974* (Washington, DC: Air Force History and Museums Program), 341.

requirements."[54] Additionally, in a bold move against trends to eliminate excessive accouterments from the service uniform, on 28 April 1958 General White directed that no later than 1 June 1958 "a distinctive badge for wear by missilemen will be designed and available for issue or purchase by those individuals authorized to wear the badge."[55] By 1963, as part of a missileer recognition initiative, the missile badge was authorized senior and master badges with star and wreath.[56]

The identity created by occupational badges, or absence thereof, was noted by a 1965 committee commissioned by the Air Force Recruiting Service to identify causes of retention issues among nonrated officers since the Korean War. One such issue was that non-rated officers had no occupational badge to denote their specialty, while rated pilots had their wings.[57] Despite the service push for the plain blue suit, the Guided Missile Insignia was created for those in the missile mission area by 1968.[58] Aside from pilot wings, the missile badge was one of the first operational service badges created and it distinguished missileers from other officers, setting a precedent for other non-rated occupations that later received occupational badges.[59]

---

[54] Quoted in Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907-1960*, vol. 1, (Maxwell AFB, AL: Air University Press, December 1989), 515.
[55] Maj Greg Ogletree, "The Missile Badge (a not-so-brief history)," (Monograph, Association of Air Force Missileers, 1 May 2002), 1.
[56] Maj Greg Ogletree, "The Missile Badge (a not-so-brief history)," (Monograph, Association of Air Force Missileers, 1 May 2002), 5.
[57] Vance O. Mitchell, *Air Force Officers: Personnel Policy Development, 1944-1974* (Washington, DC: Air Force History and Museums Program), 343. The Van Sickle Committee was led by Maj. Gen. Neil D. Van Sickle, Commander of the Air Force Recruiting Service.
[58] The Guided Missile Insignia name was updated to the Missileman Badge in December 1963 as the missile crew force was comprised solely of male missileers. In April 1979 the badge name was again updated to Missile Badge with the introduction of female missileers in the Titan missile force. Later, the Missile badge was augmented with a wreath as an operations designator to distinguish from those that performed maintenance or worked with other non-ICBM missiles.
[59] Bruce D. Callander, "Whatever Happened to the Plain Blue Suit?," *Air Force Magazine*, July 2006, 84-88.

While the creation of the Guided Missile Insignia was helpful in creating a common identity among those involved in missiles, the liberal requirements resulted in prolific awarding, diluting its significance. Being one of the very few occupational badges authorized to wear on the uniform, and its availability to non-rated personnel, made the missile badge a coveted piece of uniform hardware. The missile badge could be found on the uniforms of those involved with acquisitions, engineering, key staff positions, commanders, maintainers, and weapons loaders. Even the famed 'Candy Bomber,' Col Gail Halvorsen wore a missile badge for his staff time working on the Titan III space launch system. Several iterations of missile badge award criteria occurred to limit the award and recognize missileers. However, it was not until 1988, when the missile badge itself changed to include a wreath on both sides of the missile, that it was renamed the 'Missile Operator Badge'.[60] The badge was awarded in three levels, Basic, Senior, and Command—the latter being a nomenclature change matching that of the Command Pilot.[61]

Concurrency posed challenges to early missileers. The rapid development of several weapon systems for rapid deployment meant there were no experienced or trained missileers prevalent in the force in the late 1950s and early 1960s. The fundamental challenge was a trifecta of training new missileers while organizing operational units and deploying new weapon systems. A majority of officers selected as the first missileers for the Atlas system were hand-picked from SAC bombing crews.[62] As no previous operational missile squadrons existed, initial missileers were assigned to ICBM contractor plants where over-the-

[60] Maj Greg Ogletree, "The Missile Badge (a not-so-brief history)," (Monograph, Association of Air Force Missileers, 1 May 2002), 7.
[61] Maj Greg Ogletree, "The Missile Badge (a not-so-brief history)," (Monograph, Association of Air Force Missileers, 1 May 2002), 7.
[62] Jacob Neufeld, *Ballistic Missiles in the United States Air Force, 1945-1960* (Washington, DC: Office of Air Force History), 48-49.

shoulder training could occur in laboratories and on production lines.[63] As ICBM systems came on line, Air Training Command (ATC) and SAC established formalized training schools.

Missile crews varied in size depending on the weapon system they operated. Table 3 shows the ratio of crew operations for each of the ICBM systems. The core of each missile crew was two officers, a Missile Combat Crew Commander (MCCC) and a Deputy Missile Combat Crew Commander (DMCCC). First generation ICBMs had larger missile crews because technology was less efficient, or required additional ground facilities to assist in guidance control.[64]

Table 3 – ICBM Crew Size & LCC to LF Ratio

SYSTEM	CREW SIZE	LCC to LF RATIO
ATLAS – D	12-15	1:3
ATLAS – E	5	1:1
ATLAS – F	5	1:1
TITAN I	6	1:3
TITAN II	4	1:1
MINUTEMAN I/II/III	2	1:10
PEACEKEEPER	2	1:10

Source: Author's Original Work

By the mid-1960s, missileers were making their presence felt in the service, particularly in the area of strategic retaliation, as missile systems began to replace not only bombers, but draw on the rated community to feed the missileer force. According to personnel statistics, "the Operations (flying) career field, of which 97 percent were rated, would decrease by 15 percent (ten thousand billets) by 1965 and 25 percent (sixteen thousand billets) by the early 1970s, even without any

[63] David N. Spires, *On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011* (Colorado Springs, CO: Air Force Space Command), 49.
[64] Maj Thomas J. Gosling, Maj James W. Knapp, and Maj Kenneth R. Morrison, "Future Management Applications in the Minuteman Operations Career Area: A Call to Action," Research Report no. 3-9349-00219-4336 (Maxwell AFB, AL: Air Command and Staff College, 1975), 8.

further loss in overall service strength."[65] During the same period, the number of officers in SAC would decrease from 36,435 in 1959 to 21,788 in 1975, while the total number of missile crews formed increased from zero to 1,194 in 1975.[66] However, drawing on the rated community to support the formation of missile crews was not without drawbacks.

The Air Force struggled with how to manage its rated personnel, and it was estimated that, in 1960, the number of rated officers exceeded authorized billets by over 9,000.[67] Rated officers were afforded career-broadening assignments out of the cockpit into fields such as missiles, an experience not offered to non-rated officers. In the 1960s-1970s, the ratio of rated to non-rated officers was approximately a 70-30 split among the Regular officer corps to allow for surging pilot capacity from within the force during times of conflict. In peacetime, however, surplus rated officers were permitted to pursue career-broadening assignments. Rated officers who broadened into non-rated assignments were referred to as the rated supplement. In missiles, the rated supplement program had a "demoralizing effect on missile crews since it detracts from the growth visibility of the non-rated officers."[68] Additionally, early Strategic Air Wings with flying assets where first-generation ICBM squadrons had been emplaced were commanded only by pilots, creating a vision of limited upward mobility for career missileers.

The number of rated supplement officers involved in missiles seemed to shift as organizations realigned and the service surged pilot capacity in times of conflict. As Strategic Missile Wings became more

---

[65] Vance O. Mitchell, *Air Force Officers: Personnel Policy Development, 1944-1974* (Washington, DC: Air Force History and Museums Program), 210.
[66] *Alert Operations and the Strategic Air Command, 1957-1991* (Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 7 December 1991), 67-71.
[67] Vance O. Mitchell, *Air Force Officers: Personnel Policy Development, 1944-1974* (Washington, DC: Air Force History and Museums Program), 210.
[68] Capt Robert Cancellieri and Maj David J. Willoughby, "A Study of the Relationships Between Demographic Factors and SAC Missile Combat Crew Members' Attitudes," Research Report no. LSSR 34-77B (Wright-Patterson AFB, OH: School of Systems and Logistics, Air Force Institute of Technology, 1977), 27.

prominent, it was possible to envision missileer command opportunities at the squadron, group, and wing levels. In 1968, 56 percent of the officer corps was non-rated, but 1965 figures show that non-rated personnel constituted only 23 percent of colonel billets and 12 percent of all general officers.[69] Initiatives such as the Air Force TOPLINE program mandated the missile force have a 20 percent rated supplement.[70] Organizations aligned under Air Divisions and Numbered Air Forces with flying missions often resulted in command being limited to rated-pilots.[71] Command at the Division, NAF, and MAJCOM levels practically necessitated command at lower echelons first. Thus, as command opportunities became restricted to rated personnel, non-rated personnel became excluded from command at higher echelons, limiting upward mobility.[72]

Another challenge facing missileers was the transient nature of the career field. From the beginning, manpower for missile crew forces drew from the broader Air Force to meet requirements. Early statistics reveal that upward of 40 percent of missileers came from the surplus of rated personnel, of which 35 percent were rated as navigators.[73] Additionally, there was a large appeal for non-rated support personnel to volunteer for missileer duty as well, because it promised more command opportunities than their core occupations did.[74] Later, the buildup for Vietnam changed the composition of the crew force, resulting in fewer rated

---

[69] Vance O. Mitchell, *Air Force Officers: Personnel Policy Development, 1944-1974* (Washington, DC: Air Force History and Museums Program), 342.
[70] Career Counseling Booklet for Commanders of Missile Organizations, 1970 ca., 5, Provided by Association of Air Force Missileers.
[71] Maj Thomas J. Gosling, Maj James W. Knapp, and Maj Kenneth R. Morrison, "Future Management Applications in the Minuteman Operations Career Area: A Call to Action," Research Report no. 3-9349-00219-4336 (Maxwell AFB, AL: Air Command and Staff College, 1975), 9.
[72] Vance O. Mitchell, *Air Force Officers: Personnel Policy Development, 1944-1974* (Washington, DC: Air Force History and Museums Program), 353-356.
[73] Capt Clark L. Wingate, "Man and the Missile: Factors Affecting Human Efficiency and Morale," (Maxwell AFB, AL: Air Command and Staff College, 1964), 6.
[74] Capt Clark L. Wingate, "Man and the Missile: Factors Affecting Human Efficiency and Morale," (Maxwell AFB, AL: Air Command and Staff College, 1964), 6-7.

personnel in key leadership positions and an increase in non-volunteers for missile duty.[75] General Dougherty, CINCSAC, viewed the decrease of rated personnel in the missile community as a positive thing and commented in the early 1970s that "this was a major turning point for the command in the fact that there was a new generation of misileers who were not retread pilots and navigators, but those who grew up in the career field."[76]

Despite the turning point seen by General Dougherty in the early 1970s, the transient nature of the missile business did not change and the conclusion of Vietnam saw the return of rated personnel to the missile career field. As early as 1964, missileer crew commanders served an average of 18 months on alert, with three years of duty in the missile field.[77] Even with the establishment of a four-year missile crew commitment to mitigate attrition of trained missileers, the average Minuteman missile tour from 1969-1970 was only 33 months. In 1973-1974 crew tours shrank to an average of only 22 months, partly impacted by Early-Out Programs, a Reduction-in-Force (RIF), and other personnel policies.[78] Rated officer requirements contrasted starkly to those of the missileer by demanding a minimum of 14 of their first 22 years of service in the cockpit, or in duties requiring maintenance of flying qualifications.[79] Even though missile duty was seen as cutting edge

---

[75] Maj Thomas J. Gosling, Maj James W. Knapp, and Maj Kenneth R. Morrison, "Future Management Applications in the Minuteman Operations Career Area: A Call to Action," Research Report no. 3-9349-00219-4336 (Maxwell AFB, AL: Air Command and Staff College, 1975), 17-18.
[76] Quoted in Alwyn T. Lloyd, *A Cold War Legacy: A Tribute to Strategic Air Command – 1946-1992* (Missoula, MT: Pictorial Histories Publishing Company, Inc., 1999), 438.
[77] Capt Clark L. Wingate, "Man and the Missile: Factors Affecting Human Efficiency and Morale," (Maxwell AFB, AL: Air Command and Staff College, 1964), 3-4.
[78] Maj Thomas J. Gosling, Maj James W. Knapp, and Maj Kenneth R. Morrison, "Future Management Applications in the Minuteman Operations Career Area: A Call to Action," Research Report no. 3-9349-00219-4336 (Maxwell AFB, AL: Air Command and Staff College, 1975), 17.
[79] Vance O. Mitchell, *Air Force Officers: Personnel Policy Development, 1944-1974* (Washington, DC: Air Force History and Museums Program), 213.

technology of 'push-button' warfare, efforts and enforcement of missileer requirements fell woefully short in retaining trained personnel.

A consequence of how missile manning was accomplished over time was the casual treatment of missile duty as a special duty where people could flow into and out of the career field from other specialties. Career counselors considered a "career" in missiles if an officer stayed in the missile business for eight years before "moving on." It was this concept of moving on that remained a part of the missile corporate consciousness throughout its existence—the idea that pulling combat crew duty was a stepping-stone for career broadening, or command opportunities. Rated personnel in key missile staff or command positions were not required to maintain currency, which resulted in a disassociation from the operations and training environment and led to an administrative approach to leadership.[80] A 1975 study identified that "the lack of current viable career progression, coupled with the lack of career broadening options, detract from the missile operations officer's perspectives and intentions concerning the attractiveness of a full missile career."[81]

The Ground-Launched Cruise Missile (GLCM) program offered missileers relevant broadening and command opportunities. GLCM assignments provided missileers a chance to be stationed outside the continental U.S. in locations throughout Europe. In addition to the allure of being stationed in Europe, GLCM units operated with U.S. ground forces and provided missileers with unique and rewarding leadership opportunities not available in ICBM squadrons. However, with the

[80] Maj Thomas J. Gosling, Maj James W. Knapp, and Maj Kenneth R. Morrison, "Future Management Applications in the Minuteman Operations Career Area: A Call to Action," Research Report no. 3-9349-00219-4336 (Maxwell AFB, AL: Air Command and Staff College, 1975), 15.
[81] Maj Thomas J. Gosling, Maj James W. Knapp, and Maj Kenneth R. Morrison, "Future Management Applications in the Minuteman Operations Career Area: A Call to Action," Research Report no. 3-9349-00219-4336 (Maxwell AFB, AL: Air Command and Staff College, 1975), 22.

signing of the INF treaty and the elimination of GLCM mission, these unique and rewarding opportunities for missileers were eliminated too.

A perennial challenge area for missileers was the ability to find expression, fulfillment, and meaning in the performance of duties that were highly standardized, automated, and centralized. While first-generation and liquid-fueled ICBMs may have been less efficient, they provided a crew construct and launch complex that allowed for more on-site, face-to-face leadership and supervision by the missileer with enlisted troops and maintenance personnel on the complex.[82] However, advances in technology with the Minuteman infrastructure led to a dispersion of the ICBMs in their LFs from the LCC, reducing missileer actions to "routine daily tests and infrequent security and malfunction procedures."[83] More so than the Atlas and Titan missileers, the operators of the Minuteman and Peacekeeper ICBMs have described their duty as: rigid, monotonous, routine, boring, frustrating, impersonal, and technically complex.[84] The political and cultural goals that shaped the development of the military's ICBM program placed greater emphasis on system efficiency and survivability than the role of the missileer—something that the service has tried to compensate for over decades.

Countless studies and reports have been conducted to address issues faced by missileers (see Appendix J). Programs such as the Minuteman Education Program (MMEP) in 1962 had as its objectives: "motivating officers to enter the missile operations career area; relieving

---

[82] Maj Thomas J. Gosling, Maj James W. Knapp, and Maj Kenneth R. Morrison, "Future Management Applications in the Minuteman Operations Career Area: A Call to Action," Research Report no. 3-9349-00219-4336 (Maxwell AFB, AL: Air Command and Staff College, 1975), 23.

[83] Maj Thomas J. Gosling, Maj James W. Knapp, and Maj Kenneth R. Morrison, "Future Management Applications in the Minuteman Operations Career Area: A Call to Action," Research Report no. 3-9349-00219-4336 (Maxwell AFB, AL: Air Command and Staff College, 1975), 23.

[84] Capt Robert Cancellieri and Maj David J. Willoughby, "A Study of the Relationships Between Demographic Factors and SAC Missile Combat Crew Members' Attitudes," Research Report no. LSSR 34-77B (Wright-Patterson AFB, OH: School of Systems and Logistics, Air Force Institute of Technology, 1977), 25-26.

the boredom of the alert tour by offering the crew member an opportunity to partially fulfill his drive for self-actualization; and providing a personnel resources of officers with advanced degrees which the Air Force could use after the crew members' tours in missiles had ended."[85] Additionally, several alert and crew composition concepts were tested to attempt savings in manpower and logistics. Alert shifts ranged from 24- to 40-hour alert tours, sometimes posting two missileer crews at a time. These efforts were largely an attempt to address symptoms of the root cause—missileers continued to struggle to find purpose and expression in their duty, especially as their peers in the rest of the Air Force were going off to fight in Vietnam or staring down the Soviets in Europe. However, toward the end of the 1970s and into the early 1980s, missileers found a new outlet in the rising 20XX space career field.

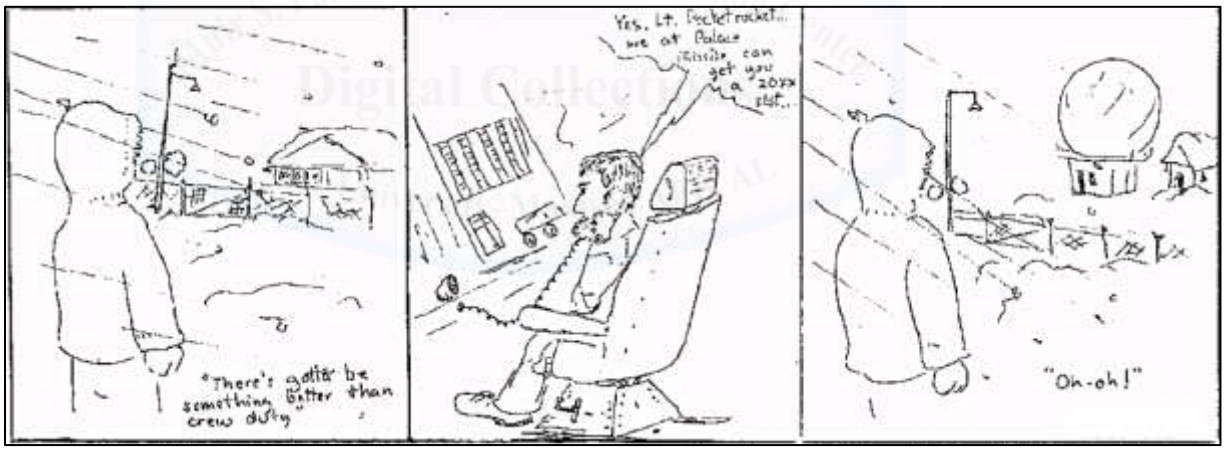


Figure 3: Pocket Rocket Cartoon - Palace Missile Program, 1981

Source: HQ SAC/DPXPM, "Pocket Rocket," Missile and Space Memos, VOL VII, July 1981, 1.

[85] Captain Michael R. Engel and Captain Patrick H. O'Neill, "The Impact of the Minuteman Education Program on Acquisition and Retention of Missile Launch Control Officers," Research Report no. LSSR 28-78B (Wright-Patterson AFB, OH: School of Systems and Logistics, Air Force Institute of Technology, September 1978), 3.

In 1979 the disestablishment of Air Defense Command resulted in the transfer of 85 percent of space jobs to SAC.[86] An increasing demand for manpower in the growing 20XX space operations career field was met through personnel programs such as PALACE MISSILE that helped match 18XX missileers into meaningful broadening and cross-training opportunities in space assignments as is depicted in Figure 3.[87] These personnel opportunities came at a time when SAC was also beginning to shift its focus from a purely strategic nuclear retaliation role in the mid 1980s. Applying lessons learned from operations in Vietnam, CINCSACs General John T. Chain and General Lee Butler began to advocate for SAC assets to be made available for more conventional roles. This advocacy resulted in a shift in the traditional Cold War triad to a "Twin Triad" model where nuclear deterrence existed alongside conventional war as depicted in Appendix A.[88]

The organizational environment missileers faced in SAC through the 1980s was a mixture of ups and downs. The end of détente with the Soviet Union and Reagan's push to modernize the nuclear arsenal breathed fresh life into the nuclear enterprise. Prospects of the third generation Peacekeeper ICBM, a rail-mobile ICBM system, and a new miniature ICBM, the Midgetman, made missiles feel like a growth area once again. Cross-training opportunities into the growing 20XX space career field, the Strategic Defense Initiative, and creation of Air Force Space Command created opportunities to satisfy personal development desires of missileers looking to broaden. However, progress can be a double-edged sword. SAC's Twin Triad movement to make strategic assets relevant in conventional conflict along with a growing space cadre

[86] HQ SAC/DPXPM, "New Opportunities in the Missile Family," *Missile Memos*, VOL II, 19 September 1979, 4-6.
[87] HQ SAC/DPXPM, "New Opportunities in the Missile Family," *Missile Memos*, VOL I, July 1981, 1-2.
[88] *Alert Operations and the Strategic Air Command, 1957-1991* (Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 7 December 1991), 52.

and mission area also meant less time and attention on the steady-state mission of nuclear deterrence. While still viewed as an important mission set, it appeared that all the innovation and strategic thinking on nuclear deterrence had been accomplished. Commanders at all levels could earn their missile badge to gain nuclear credibility without growing up in the missile business—it had become more of a participation badge than a badge of honor.

Summary

There was no 'Golden Age' of missiles for missileers. Even though missile systems were given the highest national priority for research and development, cultural baggage among Air Force senior leaders made it an uphill battle to invest in ballistic missile development. The fear of Soviet developments in missiles and the launch of Sputnik that drove a perceived missile gap finally gave impetus for prioritizing missiles. First-generation ICBMs played a key role in addressing the would-be missile gap, but the service life of these systems was short lived, and they were retired from the inventory by 1965. Second-generation ICBMs provided a more stable framework for the Air Force to conduct land-based nuclear deterrence and develop 'career' missileers.

Operational ICBM units were rapidly built and established as a combined effort from ARDC and SAC, maximizing General Schriever's concurrency model. Strategic Air Wings, Strategic Missile Wings, Air Divisions, and NAFs provided the organizational framework for ICBMs. While the organization of ICBM units provided the prospect for non-rated missileers to command at all levels, situations where ICBM units were aggregated with flying missions limited command opportunities that were reserved for rated-pilots. ICBM units were shuffled from one division, or NAF, to another as a means to share in the missile business, or to distribute staff oversight. Not until the late days of SAC were responsibilities for ICBMs consolidated in Twentieth Air Force.

While some early leaders, such as CSAF General White and CINCSAC General Power, helped create an identity for missileers with the missile badge and establishment of missile squadrons, groups, and wings, the mission area was still plagued by other factors. The woes of missile duty had been predicted before the first ICBM entered into service. Problems with self-expression, self-fulfillment, creativity, problem solving, and leadership affected morale among missileers. The highly standardized and centralized control of ICBM operations resulted in boredom, monotony, and frustration. These problems were only exacerbated with the Minuteman infrastructure that emphasized system hardness and survivability over the missileer-machine relationship.

Historian Vance O. Mitchell summarized many of the issues of this period in the following:

> …the Air Force remained very much wedded to the airplane as the chief *raison d'etre* of the service and the institution remained overwhelmingly masculine in its character. Yet everyone needed training, opportunities for advancement, support, and, within the broadest possible parameters, an unimpeded chance to excel if they were to truly contribute to the service and its mission. If individuals contributed to the mission of the service, they expected compensation, not only in their pay but also in terms of promotion, assignment opportunities, professional education, and job security. They did not wish to be placed in increasingly artificial categories, such as rating, gender, and race, that placed them at a disadvantage and resulted in morale problems, lower retention (particularly for the more ambitious and capable officers), and inefficient use of personnel.[89]

Changing mission focus in SAC and broadening opportunities into space assignments were setting the stage for changes in the military resulting from the end of the Cold War and dissolution of the Soviet Union.

[89] Vance O. Mitchell, *Air Force Officers: Personnel Policy Development, 1944-1974* (Washington, DC: Air Force History and Museums Program), 363.

Chapter 2

Post-Cold War ICBM Draw Down, 1989-2009

The rationale for the transfer [of ICBMs from Air Combat Command to Air Force Space Command] was to "more closely align the organization, training and equipping of 20AF and its ICBM mission with the major command whose core business is space launch and control." In the context of continuing USAF force reductions, it seemed only logical to group those 'essentially identical' functions of space launch vehicles and ICBMs.

General Merrill McPeak, CSAF

Missileers were catching a second-wind in the latter part of the 1980s, riding a wave of nuclear refresh that President Reagan had put in motion along with significant investments in the military. However, world events removed the wind from the sails of the nuclear enterprise, in particular the ICBM business. Just as world events effected the rapid rise of the ICBM business, so too would they influence its rapid decline. With the events that unfolded in the 1980s-1990s, missileers gained an appreciation for just how closely their weapon system was tied to national strategy, not just military strategy. Not unlike the early days of ICBMs when the national strategy demanded technological breakthroughs that shaped force structure, the national strategy during this period demanded arms control and sustainment, which also shaped force structure.

The fall of the Berlin Wall on 9 November 1989 signaled the beginning of the end for the Soviet Union. More importantly, it represented both unprecedented nuclear security concerns and arms control opportunities. Less than a month following the fall of the Berlin Wall, the U.S. and Soviet Union declared an end to the Cold War during the 2-3 December Malta Summit. However, the Soviet Union did not

simply decide overnight to start being a benevolent international actor--not all was well in the Soviet Union and the time available to make the most of favorable circumstances was limited.

In quick succession, several engagements led to the large-scale contraction of conventional and nuclear forces in Europe for both the U.S. and Soviet Union. The Treaty on Conventional Armed Forces in Europe along with the Strategic Arms Reductions Talks I (START I), drove meaningful reductions of forces in Europe, which also meant significant military drawdown. A rapidly closing window of opportunity led President Bush to pursue what is referred to as the Presidential Nuclear Initiatives (PNI), reciprocal unilateral actions, which resulted in sweeping changes in U.S. and Soviet nuclear postures. While not legally binding, the PNI bypassed the lengthy negotiations process to enact changes much faster than previous treaties and resulted in positive reciprocation in the Soviet Union. During this period of opportunity and international permissiveness, successful arms control negotiations in rapid succession seemed to create a momentum all their own. By all appearances, the changes in nuclear posture had such momentum that not even the end of the Soviet Union, and its associated change in political leadership, were able to stop changes to nuclear force structures, nor could the U.S. afford to let that happen.

Much to the surprise of the international community, and a mere two years following the fall of the Berlin Wall, the Soviet Union dissolved. After a series of Soviet internal events, including an attempted coup against Soviet President Mikhail Gorbachev and his subsequent resignation as head of the Communist party, it was clear that there would be a period of significant political upheaval.[1] Concerns of nuclear proliferation and the security of nuclear weapons in Soviet bloc states drove the arms control agenda. The dissolution of the Soviet Union on

[1] U.S. State Department, "The Collapse of the Soviet Union," Office of the Historian, https://history.state.gov/milestones/1989-1992/collapse-soviet-union.

25 December 1991 created three new nuclear states overnight: Ukraine, Belarus, and Kazakhstan. The relatively peaceful transition of the Soviet Union into multiple separate nations represented not just the end of an ideological era, but also an end to the constant fear of nuclear war. Efforts seemingly doubled to undo the nuclear mainstays of four decades of Cold War deterrence.

The international excitement of change in Europe and success in arms control painted the world with rose-colored lenses. Arms control negotiations prior to 1987 had focused primarily on restrictions and limits. However, from 1987 to 1996 arms control succeeded in a multitude of arenas (see Appendix I): sweeping nuclear stockpile reductions, platform limitations, establishment of nuclear weapons free zones, reciprocal unilateral nuclear reduction initiatives, dismantling of nuclear weapons programs in four countries, dissuading yet other countries from pursuing nuclear programs, nuclear testing limitation and moratoria, and the cessation of actively targeting former nuclear adversaries.

Eight months after the declared end of the Cold War, tensions in the Middle East came to a point when Iraq invaded Kuwait that demanded the attention of the U.S. The U.S. began a buildup of troops in the Middle East during Operation Desert Shield in August 1990, which later transitioned into Operation Desert Storm in January 1991 to liberate Kuwait from the Iraqis. The conflict was so brief and successful that President Bush declared liberation of Kuwait on 27 February 1991. For the first time in a long time, the U.S. was able to claim a successful military campaign against a foe with conventional weaponry. The Air Force had many 'coming of age' events during Desert Storm, such as the integration of space-based capabilities and precision munitions in conventional conflict, which fed the overall perception of what kinds of capabilities and conflicts the U.S. needed to prepare for.

After a couple of short years following Desert Storm, the attention of the U.S. military was once again drawn to another part of the world. This time military operations would be conducted as the North Atlantic Treaty Organization (NATO), in concert with the United Nations (UN), addressed tensions in Bosnia. U.S. participation in the conflict was limited to NATO sorties enforcing no-fly zones as early as 1993, and then NATO airstrikes later in 1994-1995. While overall military operations for the U.S. were limited to U.S. Air Force flying NATO sorties in support of the UN, this conflict continued to highlight the advantages of recent technological advances enhancing conventional air warfare.

Collectively, the military operations in Kuwait and Iraq, followed by U.S. support for NATO air operations in Bosnia, began to sharpen the vision for senior U.S. military leaders of future conventional warfare. Nuclear concerns from the Cold War seemed to be a thing of the past, particularly as political leaders continued to press forward with arms control agreements. By the time operations in Bosnia were coming to an end, President Clinton had already announced that the U.S. and Russia would no longer actively target each other's strategic assets and there would be no more nuclear yield testing in the U.S. Additionally, two strategic missile wings were deactivated and the ICBM depot at Kelly AFB was closed as part of the BRAC. It was clear that senior military leadership was pressing full-speed ahead to reduce the role of nuclear weapons and strategic nuclear deterrence as part of military strategy.

The impact that the shifting national strategy had on missileers and the ICBM forces was so significant that the resultant impacts were felt beyond the turn of the century. The national posture took another turn with the attacks of 11 September 2001, further isolating the nuclear enterprise and the role ICBMs played from service efforts in low-intensity irregular warfare against terrorism. For missileers, the period from 1989-2009 was hallmarked by a dwindling force structure being held together through sustainment and life extension programs. Recoiling from

significant arms control initiatives, missileers tried to find their way in a post-Cold War environment where nuclear weapons were deemphasized by the Air Force, the joint community, and the nation.

Force Structure

> *A curious irony of victory is that it eliminates the need for the people and organizations that forged it. Strategic Air Command was established to deter communist aggression, prevent nuclear warfare, and wage the Cold War. The successful conclusion of that campaign and changing concepts in the employment of air power have eliminated the requirement for a command exclusively dedicated to strategic air power. SAC has accomplished its mission and will be retired.*
>
> *General George L. Butler, Last CINCSAC*

SAC & USSTRATCOM

The Unified Command Plan (UCP) is what the Department of Defense uses to organize its military forces into Combatant Commands (COCOM). In 1990, there were ten Unified Commands and members of the Joint Staff, foreseeing a military draw down with the end of the Cold War, started working groups to develop plans addressing the changing security environment with a smaller force.[2] Lieutenant General George Lee Butler, the Joint Staff Director for Strategic Plans and Policy, J-5, believed that "a radical approach should at least be presented to the JCS." Amidst the increasing military operations in the Middle East, Butler convened several working group meetings to develop a future concept that weighed "shrinking budgets and switching from a global to a regionally based strategy, a smaller conventional capability, and a rationalization of strategic nuclear forces."[3] By January 1991, Butler had become the Commander-in-Chief of Strategic Air Command (CINCSAC)

---

[2] Drea, Edward. J. et al, *History of the Unified Command Plan, 1946-2012*, (Washington, DC: Joint History Office, Office of the Joint Chiefs of Staff, 2013), 63.
[3] Drea, Edward. J. et al, *History of the Unified Command Plan, 1946-2012*, (Washington, DC: Joint History Office, Office of the Joint Chiefs of Staff, 2013), 63.

and continued to pursue changes to SAC's mission from a direct position of influence.

Within six months of taking on the role of CINCSAC, Butler was further convinced that SAC's mission had become outdated and required new focus. Butler believed that SAC reconnaissance, tanker, and conventional bomber assets should be divested and merged into Tactical Air Command (TAC) and Mobility Air Command (MAC), creating new commands in their places. At the same time, Butler sought to build off General Jack Chain's vision, Butler's predecessor as CINCSAC, by consolidating nuclear functions into a single command structure.

Prior to 1992, unified commands had their own nuclear forces, which were deconflicted in planning by the Joint Strategic Target Planning Staff (JSTPS)—the JSTPS Director was dual-hatted as CINSAC. The 1987 Goldwater-Nichols Act required reconsideration of the UCP, suggesting the possibility of a unified strategic command, but no changes were made in 1987 because nothing was 'broke' with the existing order of things.[4] However, the changed security environment and current conflicts from 1989-1991 seemingly changed the entire strategic outlook. As force structures grew smaller and nuclear forces contracted, CINCSAC sought to consolidate the JSTPS and Navy nuclear assets under a singular umbrella with Air Force nuclear assets. This move also promised a joint unified command that the Goldwater-Nichols Act had sought a few years earlier.

Butler, along with the CSAF, made the proposal to the Chairman of the Joint Chiefs of Staff (CJCS) of changes that would have SAC, TAC, and MAC replaced by U.S. Strategic Command (USSTRATCOM), Air Combat Command (ACC), and Air Mobility Command (AMC) respectively. Changes to Air Force organizations would also clearly distinguish the roles of Air Force Major Commands (MAJCOM) as being responsible for

[4] Drea, Edward. J. et al, *History of the Unified Command Plan, 1946-2012*, (Washington, DC: Joint History Office, Office of the Joint Chiefs of Staff, 2013), 63.

organize, train, and equip functions; warfighting would be the sole responsibility of unified COCOMs. After reaching consensus from the other service Chiefs, the CJCS presented the reorganization plan to the President for approval. During President Bush's 27 September 1991 PNI address, the creation of a new unified strategic command was announced along with significant nuclear force structure reductions and de-alerting of U.S. nuclear capable bombers.[5] All organizational changes were complete by 1 June 1992.[6]

Sweeping organizational changes resulted in the end of two bastions of the Cold War—the JSTPS and SAC. As command structures and nuclear forces contracted, theater nuclear planning functions ended across unified commands and were consolidated in the new unified strategic command; the JSTPS ceased to exist at the JCS because it no longer had a role to deconflict nuclear war plans across unified commands. SAC divested itself of conventional capabilities and became a nuclear unified command charged with select warfighting and nuclear responsibilities. According to USSTRATCOM history, the command's new responsibilities also included "strategic nuclear advocacy, arms control planning, force structure issues, and nuclear policy concerns, as well as the responsibility to wage nuclear war if deterrence failed."[7] However, there were early ideations within the new command of having a geographic AOR or incorporating conventional assets into nuclear war plans. These ideas were met with great resistance from service chiefs, and ultimately rejected "on grounds that USSTRATCOM's mission had been conceived by the CINCs as a strategic nuclear one and was so

[5] Drea, Edward. J. et al, *History of the Unified Command Plan, 1946-2012*, (Washington, DC: Joint History Office, Office of the Joint Chiefs of Staff, 2013), 65.
[6] Rita Clark, Vincent A. Giroux, Jr., and Todd White, *History of the United States Strategic Command, June 1, 1992-October 1, 2002*, (Offutt AFB, NE: Command Historian's Office, United States Strategic Command, 15 January 2004), 20.
[7] Rita Clark, Vincent A. Giroux, Jr., and Todd White, *History of the United States Strategic Command, June 1, 1992-October 1, 2002*, (Offutt AFB, NE: Command Historian's Office, United States Strategic Command, 15 January 2004), 34.

approved by the President."[8] USSTRATCOM was destined to be the Department of Defense (DOD) organization where nuclear weapons were managed.

Additional changes at the COCOM-level occurred as additional cuts to the nuclear bomber force were made and continued emphasis was placed on the space mission. The START II Treaty required additional bombers be reconfigured to operate solely in a conventional capacity. With USSTRATCOM being a nuclear-only COCOM, these additional air assets, along with strategic reconnaissance aircraft, were transferred out of SAC to the Atlantic Command. Transfer of conventional assets was completed on 23 December 1993. By the end of 1993, USSTRATCOM's forces only consisted of "ICBMs, ballistic missile submarines and battle management aircraft, which had no role except in a strategic nuclear war."[9] Foreshadowing the expansion of USSTRATCOM's missions, a review was directed to assess a possible merger between U.S. Space Command and USSTRATCOM; no actions were taken based on this review until after the millennium.

During the 1991-1992 period in which these organizational changes were taking place, lower-order changes took place in the Air Force that affected the ICBM mission as well. Migrating organize, train, and equip functions drove additional organizational changes with nuclear oversight functions. Additionally, reduction of forces across the DOD brought with it Base Realignment and Closure (BRAC) initiatives that had additional impact on the Air Force's nuclear enterprise.

The creation of USSTRATCOM in 1992 as a unified command with sole responsibility for nuclear forces meant that former SAC organizations were discontinued and their missions realigned under new

---

[8] Rita Clark, Vincent A. Giroux, Jr., and Todd White, *History of the United States Strategic Command, June 1, 1992-October 1, 2002*, (Offutt AFB, NE: Command Historian's Office, United States Strategic Command, 15 January 2004), 65.
[9] Rita Clark, Vincent A. Giroux, Jr., and Todd White, *History of the United States Strategic Command, June 1, 1992-October 1, 2002*, (Offutt AFB, NE: Command Historian's Office, United States Strategic Command, 15 January 2004), 65-66.

organizational structures. SAC's divestiture of bomber and ICBM organize, train, and equip missions to Air Force MAJCOMs obviated the need to retain redundant nuclear organizations and divided these forces among ACC and AMC. The 1st Strategic Aerospace Division (1st SAD) contained organize, train, and equip elements and was deactivated and/or realigned, along with its subordinate units. The 1st SAD was the parent organization to the 4315th Combat Crew Training Squadron (CCTS) and 3901st Strategic Missile Evaluation Squadron (SMES), which were responsible for all ICBM combat crew training and standardization/evaluation functions respectively. The 4315 CCTS and 3901st SMES reorganized under the 392d Training Group as part of Air Education and Training Command (AETC). For the first time in decades, core missile accessions training was accomplished outside of the COCOM's purview.

USSTRATCOM went through two significant reorganizations that influenced how the ICBM mission was accomplished. The first change came in 1992 with the creation of USSTRATCOM. This first iteration of USSTRATCOM grouped Air Force ICBM forces, nuclear-capable bombers, and support aircraft with Navy Fleet Ballistic missiles. These forces were further grouped into Task Forces to enable operationalization of the forces (See Table 4).

The second major organizational change USSTRATCOM faced came between 2002 and 2005 with the merger of USSPACECOM and USSTRATCOM. With the rechristening of USSTRATCOM on 1 October 2002, it gained several new mission sets, adding to the overall scope of the COCOM's portfolio. To help organize these mission sets, the nuclear Task Force concept became insufficient to operationalize newly attained mission sets. The COCOM implemented a Joint Functional Component Commander (JFCC) Concept to operationalize the missions of: Space and Global Strike; Integrated Missile Defense; Intelligence, Surveillance, and Reconnaissance; Network Warfare; Combating WMD, and; coordination

of the Joint Information Operations Center and JTF for Global Network Operations (see Figure 4).

Table 4 – USSTRATCOM Task Forces, ca. 1992

Task Force	Role / Assets	Mission
TF-124	Airborne Communications / Navy E-6B Mercury	Provide a survivable communications link between national decision-makers and the nation's strategic forces. Based at Tinker AFB, OK.
TF-134	COMSUBPAC / Navy Ohio Class SSBNs with Trident missiles	Provide survivable leg of U.S. strategic forces from the Pacific Fleet. Based at Naval Base Kitsap, WA.
TF-144	COMSUBLANT / Navy Ohio Class SSBNs with Trident missiles	Provide survivable leg of U.S. strategic forces from the Atlantic Fleet. Based at Naval Submarine Base Kings Bay, GA.
TF-204	Strategic Bomber & Reconnaissance Aircraft / B-52, B-2, RC-135, E-4B, U-2	Provides flexible, combat-ready nuclear forces that can deploy anywhere in the world, along with ISR capabilities.
TF-214	Land-based ICBMs / Minuteman III ICBM	Provides responsive and highly reliable strategic missile forces.
TF-294	Aerial Refueling / Tankers	Works with Air Mobility Command to generate tankers to enhance global combat and reconnaissance operations.

Source: Author's Original Work

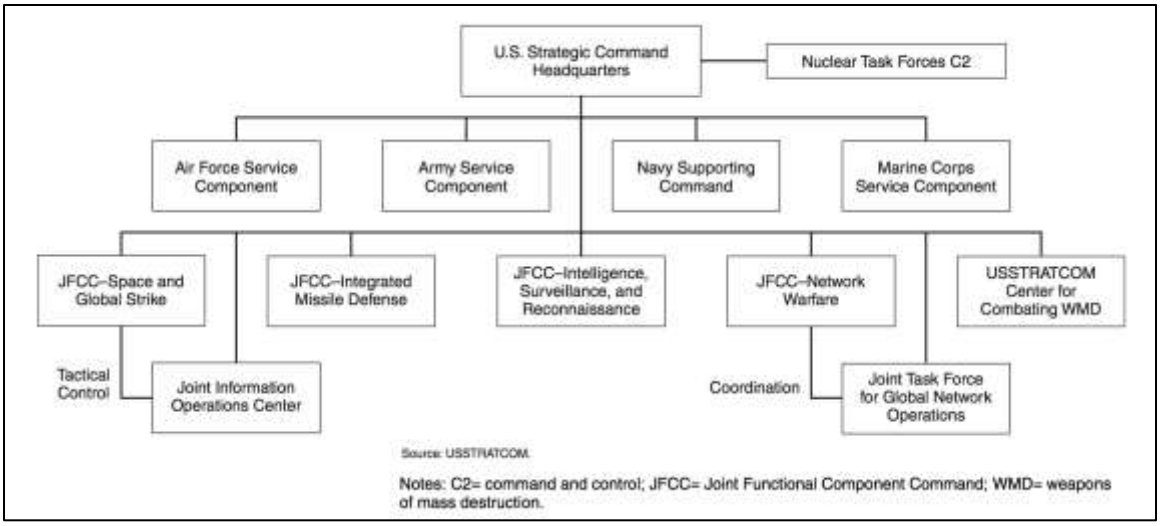


Figure 4 – USSTRATCOM Organization, 2006

Source: United States Government Accountability Office, Military Transformation: Additional Actions Needed by U.S. Strategic Command to Strengthen Implementation of Its Many Missions and New Organization, GAO-06-847 (Washington, DC: Government Accountability Office, September 2006), 8.

USSTRATCOM continued to evolve its organization as space and cyber became more relevant. JFCC-Space and Global Strike, which was commanded by the Eighth Air Force Commander, was split into JFCC-Global Strike, still commanded by the Eighth Air force Commander, and JFCC-Space, which was led by the Fourteenth Air Force Commander. JFCC-Global Strike was commanded by a Lieutenant General, which prompted AFSPC to increase the rank of the Fourteenth Air Force Commander to a three-star billet in 2008.[10] Ironically, a year later the Air Force would downgrade the rank of the Eighth Air Force/JFCC-Global Strike Commander from a three-star position to a two-star position.[11] Additionally, in 2009 the Secretary of Defense directed USSTRATCOM to

[10] Sr Amn Stephen Cadette, "14th AF Commander Receives 3rd Star," *30th Space Wing Public Affairs*, 10 January 2008, http://www.schriever.af.mil/News/Article-Display/Article/278611/14th-af-commander-receives-3rd-star/.
[11] Carla Pampe, "Maj. Gen. Carpenter Takes the Reins of the Mighty Eighth," 8th Air Force Public Affairs, 10 June 2009, http://www.barksdale.af.mil/News/ArticleDisplay/tabid/2668/Article/321744/maj-gen-carpenter-takes-the-reins-of-the-mighty-eighth.aspx.

organize a sub-unified command, U.S. Cyber Command, led by a four-star general to pursue efforts in a growing cyber mission area.

Ultimately, by 2009 the ICBM mission had lost relative importance in both the MAJCOM organize, train, and equip functions, as well as in the COCOM war fighting functions. Missileers were faced with existential quandaries, having a mission focus that was at odds with the Air Force's expeditionary focus. Confusing concepts such as 'The New Triad' sought to modernize strategic focus, reducing the nuclear triad to one leg of the new triad (see Appendix A).

Arms Control & Twentieth Air Force

Arms control negotiations gained renewed life as the political environment became more permissive following Mikhail Gorbachev's 1985 election to lead the Soviet Union. For the first time in U.S.-Soviet arms control talks, the two countries were able to move beyond prohibitive discussions and move toward a reductionist agenda beginning with the INF Treaty in 1987. A rapidly changing political landscape led to the disintegration of cohesion among member states across the Soviet Union.

The U.S. sought to address nuclear proliferation and security concerns with a flurry of arms control agreements, treaties, and initiatives before and after the dissolution of the Soviet Union on 25 December 1989. The success of arms control reduced the worldwide operational nuclear stockpile from 62,729 in 1987 to 27,904 in 1996.[12] While some arms control efforts were borne out of necessity to ensure nonproliferation and security of nuclear weapons in a turbulent state, other non-legally-binding unilateral actions were taken without fully considering long-term implications. Not only was this period highly

[12] Stephen L. Bonin, "Peace through Strength: The Relevance and Complementing Attributes of America's National Security Bedrock—Strategic Nuclear Deterrence," Paper presented as USAF Strategic Policy Fellow, 10 June 2015, 98.

turbulent with arms control agreements, but significant changes were occurring within the Air Force and other high-level institutions.

With the impending deactivation of SAC and the 1st SAD looming, the Air Force organized its ICBM forces under a reconstituted Twentieth Air Force. Twentieth Air Force was reactivated on 1 September 1991 as a numbered air force (NAF) under SAC. However, following the deactivation of SAC, ownership of Twentieth Air Force, and the ICBM mission, transferred to ACC. Twentieth Air Force became the Air Force's ICBM force provider to USSTRATCOM through Task Force-214. However, MAJCOM ownership of the ICBM mission changed again in less than a year, moving from ACC to Air Force Space Command (AFSPC) on 1 July 1993.[13]

From the beginning of its reactivation, Twentieth Air Force was in a constant state of change as it was reactivated at the same time President Bush had announced his PNIs on 1 September 1991—"For the men and women of America's ICBM Team, it proved to be a period of sustained, dramatic change."[14] Over a few short years, Twentieth Air Force downsized from six missile wings to three, and from 1,000 ICBMs on alert status to almost half that at 550.[15] Organizationally, Twentieth Air Force under AFSPC and Task Force-214 under USSTRATCOM became the Air Force's sole mission dedicated to the nuclear mission, and it continued to decrease in size while changing hands from SAC to ACC to AFSPC. In 2002, USSTRATCOM increased its mission portfolio beyond its nuclear focused mission when USSPACECOM was merged into USSTRATCOM.

---

[13] "Twentieth Air Force," F. E. Warren Air Force Base, 12 April 2016, http://www.warren.af.mil/AboutUs/FactSheets/Display/tabid/3813/Article/719524/twentieth-air-force.aspx.
[14] "Twentieth Air Force," F. E. Warren Air Force Base, 12 April 2016, http://www.warren.af.mil/AboutUs/FactSheets/Display/tabid/3813/Article/719524/twentieth-air-force.aspx.
[15] "Twentieth Air Force," F. E. Warren Air Force Base, 12 April 2016, http://www.warren.af.mil/AboutUs/FactSheets/Display/tabid/3813/Article/719524/twentieth-air-force.aspx.

Organizational upheavals of the 1990s and early 2000s kept missileers and their organizations questioning their place in the new MAJCOM. When Twentieth Air Force transferred to AFSPC in 1993 there were a total of six missile wings and 19 missile squadrons. Over the next decade all missile wings were re-designated from Missile Wings to Space Wings and back to Missile Wings again, three missile wings were deactivated, and the total number of missile squadrons were reduced down to 11. These organizational challenges were compounded with a round of BRAC efforts.

In concert with a shrinking defense budget, reduced nuclear stockpiles, and fewer personnel, a round of BRAC efforts was deemed appropriate. In 1995, BRAC claimed Kelly AFB, Texas for closure. Kelly AFB and the San Antonio Air Materiel Center had responsibility to "manage all United States Air Force nuclear weapon equipment such as missile re-entry systems, warheads, bomb arming and fusing devices, tools, and tests handling and training equipment."[16] Entering into the 1990s, with several decades of expertise, "nuclear weapons systems acquisition and modification capabilities in the Air Force was well structured and understood by all participants, with the majority of nuclear operations centered at Kelly AFB."[17] However, this would shift as radical changes in the U.S. nuclear posture were implemented.

As nuclear forces began to contract, it was noted as early as 1992 that the "Nuclear Weapons/System Acquisition and Modification capability atrophied as its structure weakened and became increasingly diluted."[18] When Kelly AFB closed, the nuclear sector of the Air Force

---

[16] San Antonio Air Logistics Center, "A Brief History of Kelly AFB," Office of History, http://proft.50megs.com/kelly.html.
[17] Roxanne Christian and Nicole Padilla, "Air Force Nuclear Weapons Center to Grow," Air Force Nuclear Weapons Center, 30 January 2009, https://www.stratcom.mil/news/2009/58/Air_Force_Nuclear_Weapons_Center_to_Grow/.
[18] Roxanne Christian and Nicole Padilla, "Air Force Nuclear Weapons Center to Grow," Air Force Nuclear Weapons Center, 30 January 2009,

Weapons Laboratory was completely disbanded and "[t]hat which had been consolidated at Kelly AFB was dispersed and Air Force nuclear weapons systems became fragmented."[19] Just as operational responsibility for nuclear operations were shuffled, the processes that supported nuclear operations were also fragmented and dispersed.

Technology

Unlike the first epoch for missileers, the period from 1989-2009 was not synonymous with technological breakthroughs and rapid development and deployment of new and improved ICBM systems. The reality of these two decades included steps to reduce overall force strength, cancelling ICBM programs, and pursuing life-extension and weapon system sustainment programs. The rapid progression of arms control agreements geared toward force reductions made any effort to increase or improve ICBM developments inconsistent with strategic messaging.

The cancellation of additional third-generation ICBMs, such as the Peacekeeper program, rail-mobile, or miniature ICBMs, meant a concerted effort was needed to extend Minuteman III operational capability initially to 2010, and later to 2020. Appendix L shows a series of Minuteman III Life Extension Programs (LEP) that were conducted to give the longevity the ICBM system needed to meet service requirements. LEPs addressed issues including: operational ground equipment, propulsion replacement, guidance replacement, safety enhanced reentry vehicles, environmental equipment, communications equipment, security modernization, and cryptology. However, several of these programs were met with funding and prioritization challenges on the military side and

---

https://www.stratcom.mil/news/2009/58/Air_Force_Nuclear_Weapons_Center_to_Grow/.

[19] Roxanne Christian and Nicole Padilla, "Air Force Nuclear Weapons Center to Grow," Air Force Nuclear Weapons Center, 30 January 2009, https://www.stratcom.mil/news/2009/58/Air_Force_Nuclear_Weapons_Center_to_Grow/.

technical competency issues from the contractor side. These challenges resulted in several program delays.[20]

The successful implementation of several LEPs eventually resulted in system upgrades that modernized the MM III from nozzle to nosecone, and several aspects of the operational ground equipment in both the LF and LCC. The outcome was not a Minuteman IV ICBM, but several upgrade programs resulted in a missile much more advanced than what was first fielded in the early 1970s, or even mid-1980s.

Personnel & Mission Challenges

> *The Cold War, the nuclear weapons worked....In terms of real war they're not going to deter a rationale enemy....One of the major lessons of Desert Storm is the fact that it's about the new world, it's not about the Cold War world, it's about how useless nuclear weapons are except to people who have no conscience.*
>
> *General Charles Horner*

From 1989 to 2009 missileers were stressed to a breaking point. Senior leader advocacy for the missile community waned, arms control initiatives followed by life extension and modernization programs spotlighted the ICBM mission as a sunset mission, and a growing space operations mission area created the appeal for missileers in search of an alternative military career.

Waning Senior Leader Advocacy

During the early 1990s a rising group of military senior leaders who had cut their military teeth in Vietnam had risen to positions of power and influence. The military was being led by Generals from the 'Vietnam Generation' who had seen first-hand, as described by WM Bruce Danskine in his paper *Fall of the Fighter Generals*, "the chaos of a limited, unconventional war and the realization that strategic bombing

[20] David N. Spires, *On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011* (Colorado Springs, CO: Air Force Space Command), 172-182.

had little impact against an agrarian, non-industrial adversary….[and] saw the futility of massive bomber attacks through a strong IADS [Integrated Air Defense Systems] against non-strategic targets, and felt the frustration of not being able to gain lasting air superiority over the battlefield."[21] These lessons learned from Vietnam were guiding principles in an age when the SAC 'Bomber Barons' that had dominated the Air Force throughout the Cold War were replaced by TAC's fighter pilots. This same generation of Vietnam veterans as senior Air Force leaders were also represented in the sister-services.

The 'Fighter Generals' embraced new technologies developed to increase the combat effectiveness of air warfare. Technological innovations, such as precision guided munitions and stealth technologies, directly correlated to the challenges faced in Vietnam and were readily embraced to enhance the effectiveness of air forces in the Middle East and over Bosnia. It was not difficult for tactically focused combat veteran generals to view nuclear weapons as pointless in limited warfare against non-traditional adversaries. Not a single CSAF from 1990-1996 had any nuclear experience—all had come from a tactical fighter background. Furthermore, the premier warfighting leadership in the Air Force was now that of the Joint Force Air Component Commander (JFACC) or the Combined Force Air Component Commander (CFACC). Both the JFACC and CFACC positions were being tested and proven in Iraq and Bosnia, which would later infuse bias for these wartime artifacts into Air Force organizations.

During a period of vast changes in the fabric of U.S. military nuclear infrastructure, from weapon system acquisition and modernization to combatant command control, those who had nuclear stewardship had their own biases that came to bear during the process

[21] Maj WM Bruce Danskine, "Fall of the Fighter Generals: The Future of USAF Leadership," (Maxwell AFB, AL: The School of Advanced Airpower Studies), 33, June 2001.

of change. Leaders at every level played a part in shaping the U.S. nuclear posture at the bidding of their political masters. Change was met with little resistance, perhaps because of the combined experiential makeup of senior military members during a period of radical change.

At a time when the U.S. was entering into conflict in the Middle East and significant arms control and political initiatives were underway, there was an overall absence of nuclear expertise in the circles where changes were discussed. In reference to Table 5, a review of key leadership above the NAF level shows that during the timeframe when the disestablishment of SAC and formation of USSTRATCOM were discussed in 1989-1992, nobody in leadership positions had any nuclear experience.

The JCS office of the director for strategic plans and policy (J-5) played a key role in the development of changes to the UCP and disestablishment of SAC. As the J-5, General Butler was a key player during working groups that addressed changes to the nuclear force structure and posture and was one of the only key players with nuclear experience as a B-52 bomber pilot. During his military career, Butler served honorably in a variety of capacities, including time as an F-4 pilot, an Olmstead Scholar in Paris, France, and as part of the Strategic Arms Limitations Talks (SALT). Following his military career, Butler came forward as a staunch advocate for the abolishment of all nuclear weapons. Butler's convictions are evidenced in his 1999 statement below:

> It is my profound conviction that nuclear weapons did not, and will not, of themselves prevent major war. To the contrary, I am persuaded that the presence of these hideous devices unnecessarily prolonged and intensified the Cold War. In today's security environment, threats of their employment have been fully exposed as neither credible nor of any military utility.[22]

[22] "General Lee Butler," Heroes for a Better World, http://www.betterworld.net/heroes/pages-b/butler-lee-quotes.htm.

The context of Butler's personal beliefs demonstrates how much of an advocate for the nuclear enterprise he may, or may not have been when his input was steering the future of U.S. nuclear capabilities.

Table 5 – Nuclear Experience of Key Military Leaders, 1989-1996

YEAR	COCOM	CSAF	MAJCOM	NAF - 20 AF
1989		Gen Welch * FP	Gen Chain, SAC * FP, NN	
1990		Gen Dugan (F) * FP, NN	Gen Chain, SAC * FP, NN	
1991		Gen Loh (Act) * FP, NN	Gen Butler, SAC * FP, BP	Brig Gen Kuenning, * IC
1992	Gen Butler, STRAT * FP, BP	Gen McPeak * FP, NN	Gen Loh, ACC * FP, NN	Lt Gen Jameson, * IC
1993	Gen Butler, STRAT * FP, BP	Gen McPeak * FP, NN	Gen Horner, AFSPC * FP, NN	Lt Gen Jameson, * IC
1994	ADM Chiles, STRAT * SN	Gen Fogleman * FP, NN	Gen Ashy, AFSPC * FP, NN	Maj Gen Parker, * IC
1995	ADM Chiles, STRAT * SN	Gen Fogleman * FP, NN	Gen Ashy, AFSPC * FP, NN	Maj Gen Parker, * IC
1996	Gen Habiger, STRAT * BP, MP	Gen Fogleman * FP, NN	Gen Estes, AFSPC * FP, NN	Maj Gen Cook, * BP, SP

Legend:
FP = Fighter Pilot | IC = ICBM Experience | MP = Mobility Pilot
BP = Bomber Pilot | SN = Nuclear Sub Experience | (F) = Fired CSAF
NN = No Nuclear Experience | SP = Space Experience | (Act) = Acting CSAF

Source: Author's Original Work

As previously discussed, the ICBM mission was shuffled from one MAJCOM to another over a short period following Twentieth Air Force's reactivation in 1991. Twentieth Air Force was initially assigned to SAC, a specified command/MAJCOM, but quickly transition from SAC to ACC with the disestablishment of SAC in 1992. Then acting CSAF, General Loh, oversaw the reactivation of Twentieth Air Force and would later own the nuclear NAF when he took the helm of ACC in 1992. However, it was General Loh, a traditional TAC fighter pilot, who oversaw the transition of Twentieth Air Force to AFSPC in 1993, perhaps coinciding with the CJCS direction to review the feasibility of USSPACECOM merging with USSTRATCOM. However, Twentieth Air Force was reassigned to AFSPC under the tenure of General Horner, the former Desert Storm JFACC who

viewed nuclear weapons as a thing of the past and not relevant to 'real wars.' Neither the MAJCOM nor CSAF commanders through 1996 had any nuclear experience; rather, they came from the Vietnam generation of fighter pilots that were prominent across Air Force leadership. The one place where the nuclear expertise persisted was in Twentieth Air Force.

In 2006, space and missile operations officer positions at USSTRATCOM totaled 140 positions, a skill set representing the largest military specialty at the command.[23] However, in 2006 this skill set was organized under JFCC-Space and Global Strike, a position tied to the Eighth Air Force Commander, an individual typically with a bomber background.[24] In other words, the largest military skill set of space and missile operations in the COCOM was led by a bomber pilot who was dual-hatted as the Eighth Air Force Commander and fell under ACC's stewardship for the organize, train, and equip functions.

Assessment of leadership in Twentieth Air Force showed that every commander since its reactivation had some sort of nuclear experience, and only one commander was without ICBM experience (see Table 5). However, the organizational bandwidth was challenged with its ability to keep pace with arms control agreements, political initiatives, current DOD military engagements, and the lack of mission advocacy among the fighter dominant leadership chain and nuclear indifferent/apathetic tenor of leadership all the way to the President. With three missile wings closing their doors, changes in the ICBM supply/sustainment chains, and the shuffling of the NAF from one COCOM and MAJCOM to the next, Twentieth Air Force became the last bastion of core nuclear competency

[23] United States Government Accountability Office, *Military Transformation: Additional Actions Needed by U.S. Strategic Command to Strengthen Implementation of Its Many Missions and New Organization*, GAO-06-847 (Washington, DC: Government Accountability Office, September 2006), 49.
[24] United States Government Accountability Office, *Military Transformation: Additional Actions Needed by U.S. Strategic Command to Strengthen Implementation of Its Many Missions and New Organization*, GAO-06-847 (Washington, DC: Government Accountability Office, September 2006), 63.

within the U.S. Air Force. However, Twentieth Air Force would face internal ICBM-community struggles in the years ahead, as a result of organizational realignments.

The Air Force continued to focus on emerging mission sets, such as cyber, rather than ICBMs, a perceived sunset mission. In November 2006, the creation of a new MAJCOM, Air Force Cyber Command (AFCYBER), was announced.[25] This new provisional command was to grow from Eighth Air Force, the NAF assigned responsibility for the B-52 nuclear mission. Air Force Space Command would play an instrumental role in developing this new command, diverting its attention from the atrophy in the ICBM mission.

Impact of Arms Control, LEP, and Modernization

By 1998, all the heavy lifting from arms control agreements impacting ICBM force structure had been accomplished and there were only three missile wings remaining. However, there was no rest for the weary. The break-neck pace of deactivation continued, compounded by the flurry of modernization and LEPs AFSPC initiated. An unfortunate aspect of fielding several ICBM life extension and modernization programs simultaneously, however, was an almost insupportable workload for missileers, maintainers, and defenders. Referring to Appendix L, missileers were coordinating upwards of six to nine LEP or modernization programs simultaneously. Nowhere to be found were the days plagued by boredom and monotony that early analysts had predicted for missileers.

The struggle of maintaining steady-state deterrence operations amidst a rapidly shrinking force structure and the implementation of several LEP and modernization programs was further complicated by contemporary conflicts. The advent of the fighter generals and several

[25] SSgt C. Todd Lopez, "8th Air Force to become new cyber command," *U.S. Air Force News*, 3 November 2006, http://www.af.mil/News/Article-Display/Article/129190/8th-air-force-to-become-new-cyber-command/.

conventional operations in a post-Cold War environment, particularly once the Global War on Terror began following 9/11 terrorist attacks, culturally distanced ICBM forces further from the rest of the Air Force—deploying in place did not hold the same meaning to those who deployed to the Middle-East and Central Asia. Additionally, the blunt instruments of nuclear war were inconsistent with the increased value placed on precision-guided munitions that reduced collateral damage in conflict. Furthermore, the value of space-based capabilities to the modern warfighter became more valued as it integrated with conventional forces. Too common among missileers was the saying, 'If you're not in space, you're not in the race,' referring to perceptions of career possibilities.

Appeal of Space

The combined 13S Space and Missile Operations career field manpower requirements were perceived as a balanced, mutually beneficial pairing. The 18XX missile operations career field had a large need for first-assignment company grade officers to accomplish nuclear alert duties, with far fewer requirements for senior captains and field grade officers. However, the 20XX space operations career field had a large and growing demand for senior captains and field grade officers to operate and manage space systems.

Over a two-decade period, it became the norm for approximately 80 percent of all 13S accessions to be assigned missile duty for their first active duty assignment.[26] Upon completion of the required four-year tour as a missileer, about 70 percent of all missileers would proceed to core space operations assignments (see Appendix B). Those missileers who remained on the ICBM track were often perceived as being less likely to promote or command at senior levels. A combined 13S Space and Missile career field meant that to be effective at more senior levels, one required experience in both space and missiles. It was expected that officers who

[26] Briefing by Maj David Kaya and Richard Harrop, Air Force Personnel Center Road-Show, subject: 13S Assignments and Force Development, 2011.

had upward mobility would have operational experience with multiple weapon systems, giving them more credibility in future staff and command assignments.

The 13S career field was structured in such a way that the majority of 13S officers spent the bulk of their career in space operations; it also gave an edge to officers with experience in multiple weapon systems. Officers who remained in missile operations could only boast a single weapons system, whereas missileers that gained experience in a space system were perhaps more competitive for command assignments, being eligible to command either missile or space squadrons. The dual-weapon system approach resulted in a lack of depth in any weapon system, but was touted as the appropriate career development path for 13S officers.[27]

Another natural draw to space assignments included locations. When comparing the locations of space assignments to missile assignments, there were far more favorable locations for a space officer. ICBM bases were intentionally located in northern-tier states because it meant a shorter flight path for missiles when traveling over the North Pole to targets in the Soviet Union. The three remaining missile wings were located in North Dakota, Montana, and Wyoming. Space bases included several warmer climate and exotic locations, such as Florida, California, Hawaii, and Diego Garcia—these assignment locations were perceived to be more desirable. Ultimately, when compared to missile assignments, there was a greater variety and availability of bases with space missions.

Another appeal for assignments in space operations dealt with the potential to capitalize on career expertise in a post-military job market. AFSPC space professionals included masses of contractor and civilian employees with special technical knowledge or prior active duty

[27] Lt Col J. Kevin McLaughlin, "Military Space Culture," Federation of American Scientists, January 2001, https://fas.org/spp/eprint/article02.html.

expertise. Unlike the apparent sunset nature of the ICBM mission, space assignments promised not only active duty assignments in a growth area, but also opportunities to leverage active duty experience and clearances when competing in a retirement job market. The transferability of nuclear missile operations to the civilian sector was more limited. The prospects of job security cannot be overlooked when considering the appeal of space assignments in the 13S Space and Missile career field.

The cross-flow between missile and space operations tended to be a one-way flowing of missileers into space operations, unless the prospect of command provided opportunities not available in space operations. As missileers progressed beyond their initial missile assignment and gained experience in their second weapon system in space operations, they tended to remain in space-related staff assignments. There was, however, a cross-flow point when a missileer could return to the missile community, which typically occurred at the time they would compete for command at the squadron, group, or wing level. The result was commanders returning to the ICBM mission with little more to lean on than their initial assignment in missiles. It was common for missile squadron commanders to have nothing more than a "slick missile badge" with no star or wreath designator on top, indicating several years of missile operations experience. In sum, several compounding personnel factors, over the course of two decades, diluted the experience among missileers and created the perception that only in space operations could one hope to achieve fulfilling professional goals. This set the stage for a series of events that again changed the focus in nuclear operations.

Breaking Point

"The world has changed, but the current arsenal carries the baggage of the Cold War.…What is it that we're really trying to deter? Our current arsenal does not address the threats of the 21st century."[28]
~ General James E. Cartwright (Ret)

The changing ICBM environment from the end of the Cold War, through the 1990s, and into the new millennium demonstrated a waning emphasis on nuclear deterrence and dilution of nuclear experience. As early as 1996, with the premature passing away of Major General Robert E. Linhard, a career missileer who was serving as the director of plans, deputy chief of staff, plans and operations, an absence of nuclear expertise was observed. Then CSAF, General Ronald R. Fogleman noted that with General Linhard's passing there was nobody left on the Air Staff with nuclear experience.[29] A culmination of organizational changes, diluted nuclear expertise, lack of senior leaders with nuclear expertise, and organizational desires to become more relevant by moving beyond the limits of a 'Cold War arsenal' led to a series of events in 2008-2009 that indicated that the Air Force had broken its nuclear forces.

The creation of USSTRATCOM from the ashes of SAC in 1992 was intended to liberate certain capabilities and platforms to other MAJCOMs while leaving SAC with a sole nuclear mission focus. To accomplish its mission, Task Forces were created (see Appendix G) to operationalize these forces. Each Task Force Commander was on a relatively equal footing in terms of senior leader advocacy. However, the second iteration of USSTRATCOM in 2002 saw several mission sets added to the USSTRATCOM portfolio. General Cartwright, a Marine fighter pilot, used the Joint Functional Component Commander (JFCC) concept to

---

[28] Thom Shanker, "Former Commander of U.S. Nuclear Forces Calls for Large Cut in Warheads," *New York Times*, 15 May 2012, http://www.nytimes.com/2012/05/16/world/cartwright-key-retired-general-backs-large-us-nuclear-reduction.html.
[29] Interview with colonel from Air Staff, 18 April 2017. General Fogleman's comments are corroborated by a colonel who was serving on the Air Staff at that time.

operationalize new mission sets, which simultaneously marginalized the role of nuclear Task Force Commanders. The power and influence of the ICBM Task Force Commander on the USSTRATCOM staff was diminished relative to other JFCCs and other Task Force Commanders (see Appendix G).

In addition to the mass organizational changes occurring under McPeak's tenure as CSAF, including the ICBM mission transfers to ACC, then AFSPC in 1993, missileers experienced a career field merger with space operators. When the missile and space career fields merged in 1994 a new occupational badge was released, the Space & Missile Operations badge. The new occupational badge was initially intended to replace the missile badge for new accessions, while allowing those who had been awarded the missile badge continued wear until it naturally phased out. McPeak's successor as CSAF, General Fogleman, reversed this policy fully by 1995, allowing continued awarding and wear of the missile operations badge.[30] However, the issue of a unifying occupational badge would surface again in 2004.

The Space and Missile Operations career field struggled in adopting a common identity. While there were mutually beneficial gains to be had by combining the two career fields, such as increased discipline and warfighter mentality in space operations and increased opportunities for missileers, there were several challenges such a merger brought about as well. Deliberate actions were taken to create unity in the career field; however, many of these actions only weakened cultural identity and mission focus for both space and missile communities. In 1997, following re-organization under AFSPC, all ICBM Missile Wings were re-designated as Space Wings to match MAJCOM nomenclature for all assigned bases.

[30] Maj Greg Ogletree, "The Missile Badge (a not-so-brief history)," (Monograph, Association of Air Force Missileers, 1 May 2002), 8.

General Lance W. Lord was the first missileer to rise to the rank of four-star General, serving as the Commander of Air Force Space Command from 2002 to 2006. General Lord was also the very first non-rated officer to command AFSPC since ICBMs had been realigned under the command in 1993. Having commanded an ICBM squadron, two ICBM wings, and a NAF that oversaw ICBM testing, Lord was by all indications a missileer's missileer. However, Lord was intent on driving the space and missile communities together, and adopted the motto "if you're not in space, you're not in the race," which proliferated across the command.[31] In 2004, Lord announced the advent of the new Air Force Space and Missile Badge (AFSMB), also known as Space Wings. The contentious point with the release of the AFSMB was that the wear of the missile badge was no longer authorized. Figure 5 illustrates cultural artifacts opposing General Lord's move to eliminate the missile badge.

Figure 5: Morale Patches Opposing Removal of Missile Badge

Source: Author's Personal Collection

All active duty officers were required to update their uniforms with the new space wings and discontinue wear of the missile operations badge. These moves came as a shock to missileers who were being directed by their missileer MAJCOM commander to abandon the one thing that distinguished their service in deterrence operations.

[31] Maj Niki J. Kissiar, "Reinvigorating the Nuclear Enterprise: Is it Time For a Separate ICBM Career Field?" (Maxwell AFB, AL: Air Command and Staff College, April 2009), 10.

During the 1990s and early 2000s the missileer force was under a constant state of change that begged the question of what was actually needed to accomplish the mission. A constantly diminishing ICBM force structure, the merger of the 18XX and 20XX career fields into a consolidated 13S Space and Missile career field, and force shaping initiatives in the early 2000s made steady-state missileer manpower requirements nebulous at best. In an attempt to achieve manpower efficiencies during a time when manpower requirements were uncertain, Major General Deppe, Commander of Twentieth Air Force implemented the 72-hour alert construct in 2006 and 2007.[32] The 72-hour alert construct called for three-person missile crews consisting of an L1, L2, and L3 missileer, which roughly equated to experience and skill levels.[33] Ultimately, 72-hour alerts were found to be inefficient and produced unnecessary risk. Missileers returned to normal alert operations upon direction from the new Twentieth Air Force Commander, Major General Roger Burg, on 1 May 2008. The initial search for increased manpower efficiencies were due to significant pressures placed on the career field by corporate Air Force.

The Global War on Terror (GWOT), aging weapon systems, and increasing personnel costs forced leadership in the Air Force to make hard choices to transform the Air Force to meet the needs of the day. Secretary of the Air Force Michael W. Wynne stated: "We will fund transformation through…organizational efficiencies, process efficiencies, reduction of legacy systems and manpower while sustaining GWOT and

---

[32] "Missile Squadron Poised for 72-Hour Alerts," Defense-Aerospace.com, 3 October 2006, http://www.defense-aerospace.com/articles-view/release/3/73891/usaf-tests-new-duty-schedules-for-icbm-crews.html.

[33] The L2 and L3 missileers were both considered Crew Commanders. Missileers were upgraded from the deputy to commander position with as few as 10 months of alert experience. This accepted additional risk in operations by requiring missileers to upgrade much earlier in their four-year crew tour than the previously accepted construct of upgrading after roughly two years of experience.

ongoing operations supporting the Joint Fight."[34] 72-hour alerts only constituted one-half of the manpower efficiency solution within Twentieth Air Force, the other half came in the form of Air Force force shaping programs.

In 2006, the Air Force sought to trim its ranks by 6,800 Airmen, and by another 8,000 officers in 2007 with Force Shaping Boards.[35] The 13S career field was overmanned by 487 personnel and became a likely target to reduce overages and find efficiencies. One of the vehicles to assist officers in separating from the service was Voluntary Separation Pay (VSP), which allowed officers with 6-12 years of service to opt out early with some monetary incentives. The unhappy coincidence created a four-fold equation where missile culture was being erased with the elimination of the missile badge, the COCOM was operationalizing new mission sets perceived as more important than nuclear missions, Twentieth Air Force was being led by a career maintenance officer trying to gain manpower efficiencies from the crew force, and officers were either voluntarily separating the service or being force shaped all at the same time. It was at this time when, for better or worse, the nuclear enterprise would be brought back to the spotlight.

On 29 August 2007, six nuclear cruise missiles were unknowingly loaded onto a B-52H and mistakenly transported from Minot AFB, ND, to Barksdale AFB, LA. Within seven months of this first incident, the Air Force reported in late March 2008 that it had mistakenly labeled and shipped four classified nuclear warhead fuse assemblies to Taiwan in

---

[34] Quoted in Andrew S. Billman, historian, Office of the Historian, 341 Missile Wing, Malmstrom AFB, MT, to Jerome E. Schroeder, the AFSPC Office of History, Museum & Field History Program Manager, Air Force Space Command, Peterson AFB, CO, e-mail, subject: RE: 72 Hour Alert Study, 4 August 2008. The material provided to the AFSPC Historian in this email was an attachment titled: "02 A Brief History of Alert Transformation," which appeared to be a chapter belonging to a larger work. Similar information is cited in David N. Spires work, "On Alert" on pages 189-192.

[35] Laura M. Colaruso and Rob Hafemeister, "Forced Cuts: Air Force leaders plan to drop 40,000 airmen and civilians over 6 years starting in 2006," *Air Force News*, 26 December 2005; Rob Hafemeister, "Air Force to cut at least 8,000 officers, 11,000 enlisted," *Air Force News*, 26 July 2006.

2006. These two events drove multiple independent reviews of the nuclear enterprise (see Table 6). While the initial concern for the health and wellness of nuclear policies and procedures stemmed from the B-52 incident, a thorough review of the entire DoD nuclear enterprise revealed that there was substantiated reason for concern for the entire Air Force nuclear enterprise.

TABLE 6: Independent Reviews After Nuclear Mishaps, 2007-2008

YEAR / MO	STUDY / REVIEW
2007 / AUG	Commander Directed Investigation Concerning an Unauthorized Transfer of Nuclear Warheads
2008 / FEB	Air Force Blue Ribbon Review of Nuclear Weapons Policies and Procedures (Blue Ribbon Review)
2008 / APR	Defense Science Board Permanent Task Force on Nuclear Weapons Surety – Report on Unauthorized Movement of Nuclear Weapons
2008 / MAY	Air Force Inventory and Assessment: Nuclear Weapons and Nuclear Weapons-Related Materiel
2008 / MAY	Admiral Donald Investigation into the Shipment of Sensitive Missile Components to Taiwan (Donald Report)
2008 / JUL	Air Force Comprehensive Assessment of Nuclear Sustainment Report (AFCANS Report)
2008 / SEP	Report of the Secretary of Defense Task Force on DoD Nuclear Weapons Management, Phase I: the Air Force's Nuclear Mission (Schlesinger Report, Part I)
2008 / OCT	Reinvigorating the Nuclear Enterprise (AF Nuclear Roadmap)
2008 / DEC	Report of the Secretary of Defense Task Force on DoD Nuclear Weapons Management, Phase II: Review of the DoD Nuclear Mission (Schlesinger Report, Part II)

Source: Adapted from Air Force Nuclear Task Force, Reinvigorating the Air Force Nuclear Enterprise, (Washington, DC: Headquarters, United States Air Force, 24 October 2008), 13. Table adapted from this report and includes the self-same report in the adapted table.

As multiple nuclear reviews were underway, rumblings of eroded nuclear expertise, culture, and esprit de corps began to surface. The effects from multiple independent reviews and inspections designed to increase discipline and rigor had an additional impact on missileers. Frustration and helplessness among missileers, predominantly first-assignment officers doing what they had been trained to do, was at an all-time low as is depicted in two drawings that circulated on one missile base during November 2008 (see Figure 6). Efforts were made by senior leaders to address these issues. General C. Robert Kehler, Commander of

Figure 6: Cartoon Depicting Missileer Frustrations, NOV 2008

Source: Lt Emma Poon, Malmstrom AFB, MT, November 2008.[36]

AFSPC and the second missileer to make four-star General, oversaw growing ICBM heritage displays at Peterson AFB, CO, including a Missile Procedures Trainer (MPT) in the museum and a full-scale Minuteman III static display painted in operational colors.[37] Additionally, it was

[36] This cartoon was circulated among missileers at Malmstrom AFB, MT in November 2008 following a period of intense scrutiny from several local and off-base agencies commissioned to conduct inspections and nuclear enterprise reviews. This cultural artifact represents the frustrations and helplessness felt by the common missileer.
[37] Ed White, "Celebration of ICBM history kicks off museum exhibit," *Air Force Space Command Public Affairs*, 20 May 2008, http://www.afspc.af.mil/News/Article-Display/Article/251085/celebration-of-icbm-history-kicks-off-museum-exhibit/; Thea

announced that in June 2008 a special ceremony would be held at Wright-Patterson AFB, OH, during the annual CORONA meeting of Air Force General Officers to reinstate a portion of lost missileer heritage.

On 6 June 2008, in a ceremony presided by SecAF Michael Wynne, CSAF General T. Michael Moseley re-established the missile operations badge and announced the renaming of ICBM bases from Space Wings to Missile Wings. Mosely stated: "The re-establishment of the operations badge to missile professionals speaks to the absolute importance of the strategic nuclear mission."[38] Fourteen missile badges were ceremoniously presented to missileers at the foot of a new ICBM exhibit in the National Museum of the USAF.[39] Moseley went on to state the importance of the missile badge as it "recognizes the career path for our officers in the missile community."[40] Even though these events were a great morale boost for missileers, it came too late for Air Force senior leaders who were held accountable for not giving proper emphasis to the nuclear mission.

The same day Secretary Wynne and General Moseley restored missile badges and paid homage to the strategic nuclear mission, they were both asked to tender their resignations by Secretary of Defense Robert Gates. In a rather unceremonious fashion, Wynne and Moseley

---

Skinner, "ICBM 'aims high' at dedication," *21st Space Wing Public Affairs*, 11 August 2009, http://www.afspc.af.mil/News/Article-Display/Article/250755/icbm-aims-high-at-dedication/.

[38] Ed White, "Air Force brings back Missile Operations badges, Missile Wings," *Air Force Space Command Public Affairs*, 12 June 2008, http://www.patrick.af.mil/News/Article-Display/Article/330377/air-force-brings-back-missile-operations-badges-missile-wings/. This article also provides requirements for the different missile badge levels: basic – CMR as a missile crew member at an operational unit, senior – six years of nuclear experience, master – nine years of nuclear experience.

[39] Airman 1st Class Dillon White, "Malmstrom Airmen attend Peacekeeper dedication," *341st Space Wing Public Affairs Office*, 11 June 2008, http://www.malmstrom.af.mil/News/Article-Display/Article/348741/malmstrom-airmen-attend-peacekeeper-dedication/.

[40] Ed White, "Air Force brings back Missile Operations Badges, Missile Wings during museum ceremony," *Air Force Space Command Public Affairs*, 6 June 2008, http://www.nationalmuseum.af.mil/Upcoming/Press-Room/News/Article-Display/Article/198894/air-force-brings-back-missile-operations-badges-missile-wings-during-museum-cer/.

were asked to excuse themselves from CORONA and return to Washington, DC, and be held accountable for missteps in overseeing the Air Force nuclear enterprise. While there was other contributing incidents associated with the dismissal of these two senior leaders, the unflattering reports and investigations surrounding the B-52 incident and Taiwan fuse embarrassment finalized the issue.[41] The groundwork for reinvigorating the nuclear enterprise would fall on the shoulders of new Air Force leadership.

Following the dismissal of Wynne and Moseley, newly appointed SecAF Michael Donley and CSAF General Norton Schwartz set out to show that institutionally the Air Force was prioritizing the nuclear mission. By fall 2008, Major General C. Donald Alston, Director of the Air Force Nuclear Task Force, synthesized the findings from the nuclear review reports conducted during the previous year and created a nuclear roadmap for the service to use in correcting its nuclear shortcomings.[42] On 24 October 2008, Donley announced the creation of a new major command specifically to manage its nuclear assets, Air Force Global Strike Command (AFGSC).[43] General Schwartz cited the shortcomings of AFSPC oversight of the nuclear mission: "It was our conclusion that a major command that did space, cyber and nuclear perhaps was too much for a single organization to address with the necessary focus."[44] Eight days later, the Air Force stood up a new headquarters office to manage the overall nuclear enterprise, The Strategic Deterrence and

---

[41] Lisa Burgess, "Gates asks Air Force secretary, chief of staff to resign," Stars and Stripes, 6 June 2008, https://www.stripes.com/news/gates-asks-air-force-secretary-chief-of-staff-to-resign-1.79752#.WPZGIlLMyDV.
[42] Air Force Nuclear Task Force, *Reinvigorating the Air Force Nuclear Enterprise*, (Washington, DC: Headquarters, United States Air Force, 24 October 2008), 1.
[43] Fred W. Baker III, "Air Force to Establish New Nuclear Major Command," *American Forces Press Service*, 24 October 2008, http://archive.defense.gov/news/newsarticle.aspx?id=51660.
[44] Quoted in Fred W. Baker III, "Air Force to Establish New Nuclear Major Command," *American Forces Press Service*, 24 October 2008, http://archive.defense.gov/news/newsarticle.aspx?id=51660.

Nuclear Integration Office, known as A10, led by a two-star Major General and missileer—Major General C. Donald Alston.[45]

Concurrent with the announcement to stand up AFGSC, Donley and Schwartz announced the decision to consolidate all nuclear sustainment activities in the Air Force Nuclear Weapons Center (AFNWC) at Kirtland AFB, NM, growing its command position over time to a two-star position.[46] Additionally, the decision was made to hold off on standing up AFCYBER. Rather, a new NAF, Twenty-fourth Air Force, was to be created in AFSPC, effectively filling the void that Twentieth Air Force would leave.[47] While this was a temporary action, bureaucratic inertia could not contain cyber from growing. By 2009 the Secretary of Defense directed the establishment of U.S. Cyber Command as a sub-unified command within USSTRATCOM, led by its own four-star general. For a brief moment in time, the missileers of Twentieth Air Force would be in the same MAJCOM as the space operators of Fourteenth Air Force and cyber operators of Twenty-Fourth Air Force. Despite macro-level organizational changes on the horizon, 13S Space and Missile Operations officers still retained the same AFSC and career field Functional Manager on the Air Staff.

Summary

Following the end of the Cold War, and at the same time that political leaders and treaty negotiators were capitalizing on a changed security environment with the former Soviet nuclear-adversary, radical changes were being worked in the U.S. military architecture. The JCS

---

[45] Katherine McIntire Peters, "Air Force opens office to manage nuclear mission," *Government Executive*, 3 November 2008, http://www.govexec.com/defense/2008/11/air-force-opens-office-to-manage-nuclear-mission/27978/.

[46] Michael B. Donley, Secretary of the Air Force "Reinvigorating the Air Force Nuclear Enterprise" (address, Center for Strategic and International Studies, Washington, DC, 12 November 2008).

[47] 24 AF Office of History, "*History of Twenty-Fourth Air Force and 624th Operations Center*," Twenty-Fourth Air Force, 17 January 2014, http://www.24af.af.mil/Portals/11/documents/About_Us/AFD-140429-035.pdf?ver=2016-04-26-113101-810.

leaned forward with proposals of changing the UCP and the constitution of standing commands in anticipation of reduced budgets, manpower, capabilities and basing. General Butler led working groups that deliberated upon plans resulting in a consensus that had timely relevance to Bush's PNIs and ultimately resulted in the end to SAC, TAC, and MAC, along with an overhaul of the Unified Command Plan.

Even though several significant macro-level decisions and actions took place during the end of this period, there were still problems at the tactical level. Organizational changes could not reverse an experience-well overnight. Missileers would still experience more thrash before change would occur where it would be most visible.

Chapter 3

Reinvigorating the ICBM Mission, 2009-2017

Following the Cold War, our national focus was on the start of what has become more than 25 years of continuous combat operations….Many viewed the nuclear force as having done its job and not as relevant to strategic stability. But since the turn of the century, the strategic landscape has again shifted to re-emphasize the importance of a nuclear deterrent.…Of course, deterrence rings hollow without skilled and dedicated Airmen.…the time is right, for our mission and our Airmen, to enact meaningful and enduring change.

Major General Anthony Cotton, 20 AF/CC

2009 heralded the beginning of a new era for missileers, armed with the promises of a MAJCOM endowed with the lineage of Strategic Air Command, its raison d'être was to give focus to its nuclear mission, and its first commander would be a three-star missileer—Lieutenant General Frank G. Klotz. By all accounts, things were looking brighter for the future of missileers—organizational change was occurring, people were saying the 'right' things to prioritize the nuclear mission, and the Air Force had set a precedence for MAJCOM-level command opportunities for future generations of missileers. These macro-level efforts were designed to address strategic issues, however, there were still items requiring serious attention at operational and tactical levels. Reestablishing a national focus requires sustained effort by leadership at all levels over time.

Technology

Technological initiatives directed at modernization and life extension commenced under AFSPC would continue through completion into the early years of AFGSC. However, other innovative pursuits had

also begun to gain traction as the DoD sought to diminish its reliance on nuclear weapons. In addition to innovative weaponeering solutions, AFGSC also began to focus on the aging Minuteman III along with its aging infrastructure. This focus would eventually be the acquisition process for the Minuteman III follow-on system and the consolidation of the Nuclear Command, Control, and Communications (NC3) architecture as a named weapon system. Many initiatives have yet to come to fruition as of this writing, but the mere effort demonstrates a coordinated effort to invest in the nuclear enterprise.

Ground Based Strategic Deterrent (GBSD) & NC3

In 23 October 2010, a complete communications outage with 50 Minuteman III ICBMs occurred in the 90th Operations Group, resulting in all missiles entering 'radio mode' and making them air-launch accessible.[1] This loss of communications was an anomaly caused by an innocuous component in one of the missile communication racks, but resulted in the complete loss of command and control (C2) capability of missileers to one-third of all ICBMs in the 90th Missile Wing. The Operations Group Commander, Colonel Rob Vercher, led missile crews through trouble-shooting procedures that resumed C2 capability. Subsequent analysis revealed that the weapon systems were under no threat of malicious activity at any time during this event.

The results of the communications outage at F.E. Warren highlighted several concerns. Some concerns arose as to why an O-6 Colonel was needed to trouble-shoot tactical weapon systems issues rather than the on-alert missileers. Others feared that the communications outage had been the result of a crippling cyber attack on ICBM forces. The concern of cyber attack led to a comprehensive year-long cyber-vulnerabilities assessment of the ICBM communications

[1] Terri Moon Cronk, "No Significant Threat From Missile Glitch, Officials Say," *DoD News*, 27 October 2010, http://archive.defense.gov/news/newsarticle.aspx?id=61450.

architecture.[2] An unclassified outcome of the study highlighted the need to address the aging communications architecture that had been emplaced to support the Minuteman weapon system in the early 1960s. The complicated relationship between the weapon system and its supporting communications architecture led to piecemeal funding and modernization.

The drive to pursue a suitable replacement for the Minuteman III weapon system dated back to an Analysis of Alternatives (AOA) AFSPC conducted in 2002. However, AFPSC opted for an evolutionary approach to updating the missile through substantial modernization and LEPs. There was no denying that a replacement weapon system was long overdue. In 2011, AFGSC began a capabilities-based assessment of its land-based deterrent and in 2012 initiated a new AOA.[3]

Since completion of the AOA in 2014, the Air Force indicated that the GBSD program "will replace the entire flight system, retaining the silo basing mode while recapitalizing the ground facilities" indicating a greater level of effort in modernizing silos and launch control facilities than previously thought.[4] As of 29 July 2016, the Air Force released its Requests for Proposals (RFP) for the GBSD program, expecting to award up to two contracts in the fourth quarter of fiscal year 2017.[5] Long-range budget documents indicate that the Air Force is seeking to deliver an

---

[2] "Air Force Nuclear Command Pushes to Guard Against Electronic Strikes," Nuclear Threat Initiative, 27 September 2012, http://www.nti.org/gsn/article/air-force-nuclear-command-pushes-guard-against-computer-strikes/. In addition to the cyber vulnerabilities assessment conducted with ICBMs, this event drove cyber vulnerabilities assessments for all aircraft in Air Combat Command in 2013-2014 under the direction of the United States Warfare Center.

[3] Amy F. Woolf, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, CRS Report RL33640 (Washington, DC: Congressional Research Service, 10 February 2017), 17.

[4] Amy F. Woolf, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, CRS Report RL33640 (Washington, DC: Congressional Research Service, 10 February 2017), 18.

[5] "AF releases new ICBM solicitation," *Air Force Nuclear Weapons Center Public Affairs*, 29 July 2016, http://www.af.mil/News/Article-Display/Article/881075/af-releases-new-icbm-solicitation/.

integrated flight system beginning in FY2028, with nine missiles on alert by 2029, and complete deployment of 400 on alert missiles by 2036.[6]

GBSD appears that it will utilize the existing infrastructure and architecture of Minuteman III. Barring any exciting developments in how LCCs are dispersed from LFs or the isolated conditions missileers operate in, then it is likely that GBSD will continue to present the same personnel challenges that have existed since the early 1960s. The operational norms established by Minuteman would have to be challenged in order to change the human-machine interface and human factors that stifle the self-expression and job fulfillment missileers desire.

As the GBSD program moves forward, concerted effort has been made to improve stewardship over the communications architecture supporting missile operations and NC3. The NC3 architecture had been handled as a system of systems, but not as a single entity that could be managed and funded appropriately. A 2013 RAND study recommended the consolidation of the NC3 architecture and a single command oversight for its sustainment.[7]

In 2015, the SecAF and CSAF decided through the Air Force's Nuclear Oversight Board that it would be best to consolidate the 62 systems making up the NC3 architecture under AFGSC. The 62 systems of the NC3 architecture is found on 12 configuration elements: launch control centers, bombers, tankers, Air Force One and the executive aircraft fleet, wing command posts, unified command centers, mobile support teams, satellites, radios, and antennas.[8] To further management and sustainment efforts, the NC3 architecture was given a weapon

---

[6] Amy F. Woolf, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, CRS Report RL33640 (Washington, DC: Congressional Research Service, 10 February 2017), 18.
[7] Don Snyder et al., *Sustaining the U.S. Air Force Nuclear Mission*, RAND Report TR-1240-AF (Washington, DC: RAND Project Air Force, 2013), 11-13.
[8] Carla Pampe, "AFGSC stands up Air Force NC3 Center," *Air Force Global Strike Command Public Affairs*, 3 April 2017, http://www.afgsc.af.mil/News/Article-Display/Article/1139359/afgsc-stands-up-air-force-nc3-center/.

system designation in February 2017, followed by the establishment of a NC3 Center on 3 April 2017. The center was organized as a direct reporting unit to AFGSC.[9]

Force Structure

On 7 August 2009 the Air Force stood up Air Force Global Strike Command, commanded by Lieutenant General Frank G. Klotz. The standup of the command was merely the MAJCOM staff, followed by a phased reception of its two NAFs.[10] Twentieth Air Force and its ICBM mission transferred from AFSPC to AFGSC in December 2009, followed by the transfer of Eighth Air Force and its nuclear-capable bomber force from ACC to AFGSC in February 2010. The motto of the newly minted nuke-focused MAJCOM highlighted its top priorities: "To Deter and Assure."[11] The MAJCOM appeared to be balanced and focused on the nuclear mission, however, the organization of Eighth Air Force yielded greater relative bureaucratic influence than Twentieth Air Force.

When the Air Force decided to forego growing Eighth Air Force into AFCYBER and realign the NAF under AFGSC, the Eighth Air Force commander billet was downgraded from a three-star to a two-star position. Additionally, the NAF was divested of its Information Operations Wing and Intelligence Wing, effectively losing the cyber and reconnaissance assets that were instrumental for the creation of AFCYBER. For some in the B-52 community, the creation of AFGSC and nuclear focus felt more like two steps back after their successful

---

[9] Sarah Crawford, "Air Force Nuclear Command Center at BAFB will employ 236," Shreveport Times, 3 April 2017, http://www.shreveporttimes.com/story/news/2017/04/03/air-force-nuclear-command-center-activated-barksdale-employ-236/99996698/.
[10] TSgt Amaani Lyle, "Air Force stands up Global Strike Command," *Secretary of the Air Force Public Affairs*, 7 August 2009, http://www.afgsc.af.mil/News/Article-Display/Article/455475/air-force-stands-up-global-strike-command/.
[11] Yancy Mailes, "Air Force Global Strike Command: Five Years in the Making," *Office of the Director, AFGSC History and Museums Program*, 7 August 2014, http://www.afgsc.af.mil/News/Commentaries/Display/Article/629822/air-force-global-strike-command-five-years-in-the-making/.

integration into ACC, conventional role in contemporary conflicts, and growth in emerging mission areas. The downgrade of the Eighth Air Force commander's rank also resulted in interesting dynamics in the COCOM.

The commander of Eighth Air Force wears four proverbial hats: Eighth Air Force Commander, JFCC Global Strike, TF 204 Commander, and JFACC via the 608 AOC. These four roles, as shown in Figure 7, have certain efficiencies by having the same individual leading all efforts, with COCOM responsibilities being directed by the commander of USSTRATCOM. With Eighth Air Force moving from ACC to AFGSC, the JFCC-GS position overseeing deliberate planning of nuclear and ICBM missions no longer resided in a separate MAJCOM. Additionally, with the downgrade of the Eighth Air Force commander position, JFCC-GS

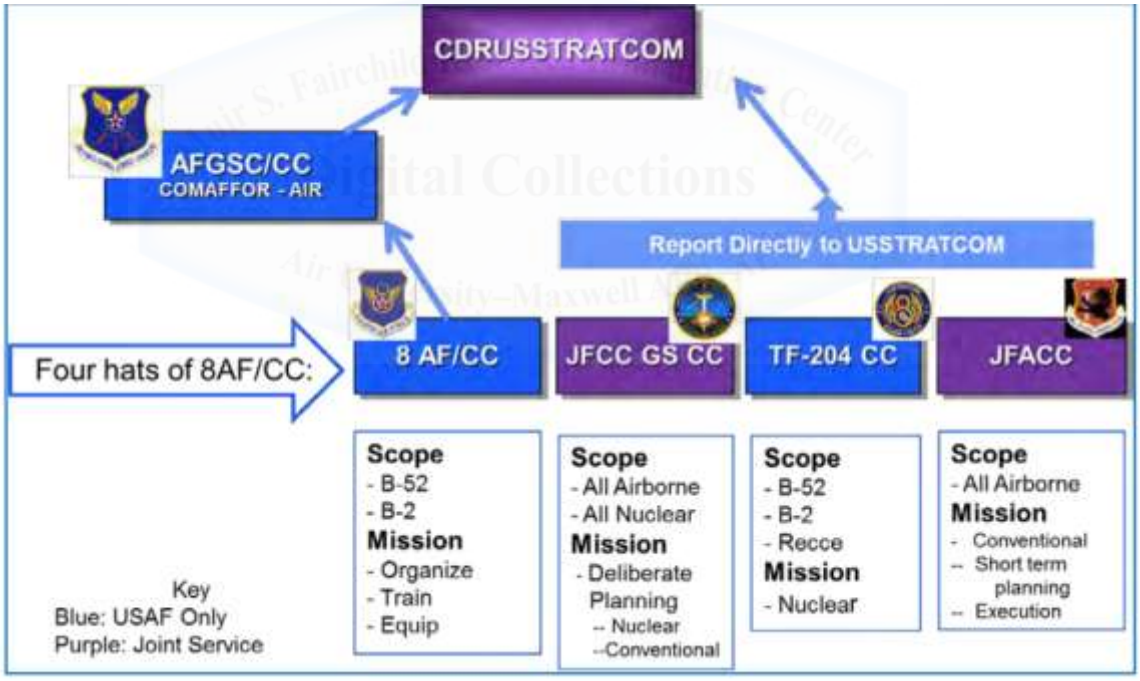


Figure 7: Multiple Command Roles of Eighth Air Force Commander

Source: Inspector General, United States Department of Defense, Assessment of Air Force Global Strike Command Organizational Structures, Roles and Responsibilities, DODIG-2012-113 (Arlington, VA, Department of Defense Inspector General, 20 July 2012), 2-5.

decreased in relative influence to the other COCOM component commanders, who all wore three-stars. Additionally, the commander of USSTRATCOM designated the deputy position for JFCC-GS as a one-star Navy flag officer billet.

Organizationally, the COCOM structure holds many implications for senior missileers. The two-star Twentieth Air Force / TF-214 commander was lower ranking than all COCOM JFCCs. A missileer could not be appointed as JFCC-GS, because it was tied to the Eighth Air Force position, or the deputy JFCC-GS as it is a designated Navy billet. Lastly, deliberate planning of ICBMs was managed by a 'peer' TF-204 commander. Organizationally, command possibilities for missileers were limited to the outmoded TF-214 position.

The recent creation of the 595th Command and Control Group (CACG) on 6 October 2016 reassigned the 625th Strategic Operations Squadron (STOS) from Twentieth Air Force to Eighth Air Force.[12] The 625th STOS is provides ICBM targeting validation for USSTRATCOM. This move placed all ICBM targeting under the leadership of JFCC-GS, and validation under the leadership of Eighth Air Force Commander—two hats, same general, no senior missileer. In essence, the Twentieth Air Force and TF-214 commander has no voice in the planning, validation, and execution of the ICBM forces he has stewardship over.

Combined oversight of missile and bomber forces by HAF and MAJCOM staffs created the bureaucratic necessity for senior staff officers to become versant across ICBM and bomber platforms and capabilities. While missileers have been successful in serving in various leadership capacities at both HAF and MAJCOM levels as part of institutional refocus on the nuclear mission, the same effort was not made in the COCOM. The JFCC positions created by General Cartwright have

[12] Senior Airman Rachel Hammes, "595th CACG activates at Offutt," 55th Wing Public Affairs, 4 October 2016, http://www.offutt.af.mil/News/Article/963039/595th-cacg-activates-at-offutt/.

superseded, in at least relevance, the outmoded Task Force construct established when USSTRATCOM was a nuclear-focused COCOM.

Rather than divest the Eighth Air Force commander of one of his four hats, institutional inertia has maintained the status quo. USSTRATCOM has been incrementally moving away from the nuclear task force construct since JFCCs were instituted in 2005. Ironically, a 2012 Inspector General report assessing AFGSC organizational structures, roles, and responsibilities stated: "In order to achieve success in the nuclear arena, USSTRATCOM must rely upon informed experts to provide critical guidance. Currently, NAF commanders (via their role as task force commanders) effectively fill that role."[13] Creating artificial hurdles that prevent missileers from leading missileers at any level suggests that their experience and contributions are inconsequential.

On 28 July 2015, another significant milestone in the evolution of AFGSC was elevating the MAJCOM from a three- to a four-star commander. General Robin Rand was the first four-star to command AFGSC, an experienced commander with a fighter pilot background. While Rand was not cut from the same nuclear cloth one might have expected, his bold leadership and fresh perspective came at a critical time as the command was suffering from significant personnel turmoil in 2014. Air Force Secretary Deborah James explained "having a four-star general responsible for the world's most powerful weapons is critically important."[14]

With the growth of AFGSC to a four-star MAJCOM came the growth of the MAJCOM portfolio. On 1 October 2015, the Air Force realigned both the B-1 bomber mission and the Long Range Strike

---

[13] Inspector General, United States Department of Defense, Assessment of Air Force Global Strike Command Organizational Structures, Roles and Responsibilities, DODIG-2012-113 (Arlington, VA, Department of Defense Inspector General, 20 July 2012), 7.
[14] Carla Pampe, "Rand takes command of AF Global Strike Command," *AFGSC Public Affairs*, 28 July 2015, http://www.af.mil/News/ArticleDisplay/tabid/223/Article/611280/rand-takes-command-of-af-global-strike-command.aspx.

Bomber (LRS-B) program from ACC to AFGSC.[15] A purely conventional platform, the transfer of the B-1 fleet to AFGSC meant the MAJCOM would have stewardship over all bomber aircraft and an increased obligation as a force provider to conventional fights. This evolution also resulted in an evolution of the MAJCOM motto, "Deter…Assure…Strike," which speaks to a growing conventional mission set.[16]

Discussions at USSTRATCOM in spring 2017 began the process of the COCOM moving away from the Task Force construct altogether. Frustrations by MAJCOM commanders of Component-NAFs (C-NAF) engaging directly with COCOM commanders have given impetus to organizational change. Several organizational changes are planned to take place by June 2017 that will include transitioning Eighth Air Force & Twentieth Air Force into traditional NAFs and have AFGSC become a Component-MAJCOM (C-MAJCOM) (see Appendix G). As a C-MAJCOM, AFGSC would be the nuclear force provider to USSTRATCOM.

C-MAJCOM changes would limit the Eighth Air Force commander as the CFACC through the 608th AOC for conventional missions only. USSTRATCOM JFACC authorities will be established with the C-MAJCOM commander.[17] By vesting JFACC authorities with the AFGSC commander, however, it adds a layer of political complexity when considering a missileer as a future commander of AFGSC. If deliberate development of a missileer to serve in JFACC roles and responsibilities is not pursued, these new organizational changes effectively discriminate and inhibit a missileer from being able to command at the MAJCOM or COCOM levels.

---

[15] "AF realigns B-1, LRS-B under Air Force Global Strike Command," *Secretary of the Air Force Public Affairs*, 20 Apr 2015, http://www.af.mil/News/Article-Display/Article/585547/af-realigns-b-1-lrs-b-under-air-force-global-strike-command/.
[16] "Air Force Global Strike Command Strategic Plan, 2016," Air Force Global Strike Command, 2016, 2, http://www.afgsc.af.mil/Portals/51/Docs/AFGSC%20Strategic%20Plan_2016_CC%20Signed.pdf?ver=2016-05-06-144801-403.
[17] Interview with officer from USSTRATCOM, 19 April 2017.

Personnel & Mission Challenges

The contemporary period has been marked with many successes and challenges. Organizational changes and macro-level initiatives began to pay off in terms of advocacy and unity of effort. However, policy-makers set a reductionist tenor regarding the nuclear mission area. Despite the uncertain political commons, efforts were underway to address nuclear expertise at the tactical-level. Additionally, missileer cross-pollination and cross-flow were implemented to address career-field needs. Despite these efforts, the ICBM mission area once again came under intense scrutiny as several senior leaders were relieved of command. A massive cheating scandal sent shockwaves throughout Twentieth Air Force and resulted in an ICBM Force Improvement Program (FIP). By the end of this period, missileers had a self-sustaining career-field with several new initiatives designed to address shortcomings identified in the FIP.

In 2009, President Barack Obama established the temperament of the nuclear mission for eight years. On 5 April 2009, President Obama gave his famous 'Prague Speech' in which he addressed the issue of nuclear weapons and foretold of a future without them.[18] Also in 2009, Obama began a new round of arms control negotiations with Russian counterparts under New Strategic Arms Reductions Treaty (New START).[19] Lastly, the president directed a full review of the nation's nuclear forces resulting in the 2010 Nuclear Posture Review that prioritized reducing the number and role of nuclear weapons.[20]
The national strategic de-emphasis on nuclear weapons came in the wake of significant turmoil in the nuclear enterprise from the nuclear

---

[18] Barack Obama, "Obama Prague Speech On Nuclear Weapons: Full Text," The Huffington Post, 5 April 2009, http://www.huffingtonpost.com/2009/04/05/obama-prague-speech-on-nu_n_183219.html.
[19] Amy F. Woolf, *The New START Treaty: Central Limits and Key Provisions*, CRS Report R41219 (Washington, DC: Congressional Research Service, 1 February 2017), 1-2.
[20] Department of Defense, *Nuclear Posture Review Report* (Washington, DC: Office of the Secretary of Defense, April 2010), iii.

mishaps in 2007 and 2008. Missileers were left wondering just how important they and their nuclear deterrence mission truly was. Undeterred by policy-makers, defense officials continued to pursue its Nuclear Roadmap to regain its nuclear focus. Ironically, 2009 also marked the 50th anniversary of ICBMs being on alert, which was commemorated with a symposium attended by SecAF, AFSPC, and AFGSC commanders in October 2009.[21] On 8 April 2014 the Pentagon released its plans for its New START force structure (see Appendix A), which called for a reduction in ICBMs from 450 silos to 400 silos while retaining 50 empty silos and all 45 launch control centers.[22]

Another initiative pursued to reinvigorate nuclear expertise was the establishment of an ICBM Weapons Instructor Course (WIC) as part of the USAF Weapons School (USAFWS). The goal of this initiative was to develop ICBM weapons officers who would "use their expertise in critical thinking, instructor skills, and understanding of the USAF flying culture of open, honest, and direct feedback in crew training to facilitate the education of the ICBM force."[23] The ICBM WIC syllabus was developed in 2009 in the 328th Weapons Squadron, validated in the first half of 2010, and the first student class of ICBM WIC students began in July 2010. On average, the WIC has produced four weapons officers per class, and two classes per year since course validation.

On 2 March 2012, the ICBM WIC received special authorization to form underneath the 315th Weapons Squadron (WPS) at Nellis AFB, NV. The 315 WPS was constituted from the inactive 4315 Combat Crew Training Squadron (CCTS) that had been charged with training all SAC

---

[21] SrA Daryl Knee, "Airmen commemorate 50 years of nation's preeminent ICBM fleet," *90th Missile Wing Public Affairs, 8 October 2009*, http://www.afgsc.af.mil/News/Article-Display/Article/455458/airmen-commemorate-50-years-of-nations-preeminent-icbm-fleet/.

[22] Amy F. Woolf, *The New START Treaty: Central Limits and Key Provisions*, CRS Report R41219 (Washington, DC: Congressional Research Service, 1 February 2017), 18-19.

[23] Lt Col Andrew S. Kovich, "Safeguarding the Nuclear Enterprise: Building and Maintaining Expertise in AFGSC," *High Frontier, The Journal for Space & Missile Professionals* 5, no. 2 (February 2009): 23-24.

missile combat crews as part of the 1st Strategic Air Division. Seen as agents for change, leadership at all levels have leaned heavily on weapons officers to accomplish special taskings. The 'Patch' of the Weapons Officer has proliferated to all ICBM squadrons adding a new artifact of Air Force culture (see Figure 8). However, the relationship

Figure 8: Patches of the ICBM Weapons Officer & 315 WPS

Source: Author's Personal Collection

between leadership and weapons officers has to an extent, stretched weapons officers' ability to focus on their top priority of increasing squadron combat capability. From call signs to improved unit combat capability, ICBM Weapons Officers began to have a pronounced impact on operations and culture in the ICBM mission that had not previously existed (see Appendix O). In 2017, the positive impact made by ICBM Weapons Officers led AFGSC to call for increased throughput of students at the ICBM WIC to meet the demands from missile units.

As the division of AFSPC and AFGSC became a reality, the 13S career field that straddled two MAJCOMs became more difficult to manage. Senior leaders began identifying 13S positions across the Air Force that required specialized nuclear experience and labeled these billets as Key Nuclear Billets (KNB). Over two decades nuclear experience had dissipated and no special tracking of nuclear expertise existed. In an attempt to work with the constraints of the personnel system, Special

Experience Identifiers (SEI) were created and utilized in officer personnel records to assist in matching the right people with the right experience sets to the right jobs.[24]

Missileer manpower requirements have often been compared to a 'witches hat' with large manpower requirements at the bottom and disproportionately fewer requirements in the senior CGO and FGO ranks. Leaders such as Major General Alston, however, were skeptical of the 'witches hat' analogy, believing that several legacy nuclear positions existed throughout the Air Force, sister-services, and interagency, but that these positions were not being actively tracked or appropriately manned. For these reasons, the Air Force nuclear roadmap identified the need to identify KNBs across the nuclear enterprise and then coordinate with MAJCOM and COCOM staffs to define the training, education, and experience requirements.[25]

Just as AFGSC was establishing more stringent nuclear expertise requirements, AFSPC was beginning to institute some of their own by implementing science, technology, engineering and mathematics (STEM) degree requirements for space operations. What was once an open gate to space operations for missileers was now quickly closing. Missileers who did not meet AFSPC STEM degree requirements were subject to meeting a cross-flow board that would determine if they would be retained in the missileer career-field, or cross-flowed to another appropriate career-field, such as intelligence, services, and public affairs. Personnel managers developed a coding process to identify 13S officers as either 'space coded' or 'nuke coded.' This resulted in two factions of 13S officers, furthering the divide between the space and missile communities.

In addition to addressing nuclear expertise required for KNBs, personnel-centric initiatives were aimed at solving an unhealthy cultural

[24] Air Force Nuclear Task Force, *Reinvigorating the Air Force Nuclear Enterprise*, (Washington, DC: Headquarters, United States Air Force, 24 October 2008), 14-15.
[25] Air Force Nuclear Task Force, *Reinvigorating the Air Force Nuclear Enterprise*, (Washington, DC: Headquarters, United States Air Force, 24 October 2008), 33-34.

perspective that missile assignments were merely a stepping-stone to space assignments. This cultural perspective was actually an accurate assessment of what had been expected of 13S officers based on career path tools (see Appendix B). However, this perspective led to lackluster commitment by officers unable or unwilling to embrace the nuclear deterrence mission. In February 2013, the growing divide between space and missile officers led to the division of the career field; missileers would once again have their own AFSC as 13N Nuclear and Missile Operations officers.[26] This division allowed each career field to develop the technical expertise required to satisfy increasingly complex weapon system requirements.

Personnel actions taken to influence the depth of expertise found in the missileer community were productive, but failed to address underlying issues still plaguing the crew force. Table 7 shows a series of high visibility discipline actions taken from 2009 to 2014 affecting the ICBM community. One senior leader cited 'rot' in the crew force and an on-going crisis with missileers, comments that even captured the attention of then Defense Secretary Chuck Hagel.[27]

Concerns over the well-being of nuclear forces were echoed by Twentieth Air Force Commander, Major General Michael Carey before his untimely removal as ICBM NAF commander. Carey indicated in an interview that his troops had the worst morale and that senior leaders did not support the ICBM forces, treating it like a second-class mission.[28] Wanting to eliminate disparity between his command and the rest of the

---

[26] "AF splits space, missile career field for officers," *Air Force Space Command*, 15 February 2013, http://www.afspc.af.mil/News/Article-Display/Article/249198/af-splits-space-missile-career-field-for-officers/.
[27] "Hagel demands answers on 'rot' at Air Force nuclear missile base," Fox News Politics, 9 May 2013, http://www.foxnews.com/politics/2013/05/09/hagel-demands-answers-on-rot-at-nuke-missile-base.html.
[28] Joe Pappalardo, "A Disgraced Air Force General's Last Interview: What a fired commander's last words say about the state of America's nuclear missiles," *Popular Mechanic*, 6 Jan 2014, http://www.popularmechanics.com/military/a9924/a-disgraced-air-force-generals-last-interview-16341301/.

Air Force, Carey was concerned with the high rates of administrative punishment at ICBM wings, being 29 percent above Air Force averages in 2011 and 23 percent above in 2012.[29]

TABLE 7: High-Visibility Missileer Discipline Actions, 2009-2014

Date	Event	Consequence
2009, OCT	- Transfer of 20 AF to AFGSC	- Increased nuclear focus
2009, OCT	- 91 MW failed inspection - Two ICBM transport vehicle incidents	- 91 MW/CC relieved - 91 MNX Group CC relieved - 91 MNX Squadron CC relieved
2013, MAR	- 91 MW Marginal inspection rating	- 17 missileers decertified
2013, MAR	- Malmstrom cheating scandal / drug investigation	- 341 MW/CC resigned - 341 OG/CC & CD relieved - 10, 12, 490 MS/CCs relieved - 10 MS/DO relieved - 341 OSS/DO relieved - 341 OG Stan/Eval officer relieved - 92 missileers disciplined
2013, MAR	- Impact to health, welfare, and organizational climate	- 90 OG/CC relieved
2013, JUN	- Loss of confidence	- 91 OSS/CC relieved
2013, AUG	- Failed nuclear inspection	- 341 SFG/CC relieved
2013, OCT	- Inappropriate behavior while in Russia on official duty; drinking related	- 20 AF/CC relieved
2014, NOV	- Abrasive conduct to subordinates - Conduct unbecoming an officer	- 90 Missile Wing Vice relieved
2014, NOV	- Failed to safeguard morale & well-being of subordinates	- 91 OG/CC reprimanded
2014, NOV	- Discrimination / harassment - Missileers exposed to hazardous fumes left on alert	- 741 MS/CC relieved

Source: Author's Original Work

Lamenting the lack of positive attention and appreciation received by missileers and maintainers, Carey stated: "We use our missiles every

[29] Joe Pappalardo, "A Disgraced Air Force General's Last Interview: What a fired commander's last words say about the state of America's nuclear missiles," *Popular Mechanic*, 6 Jan 2014, http://www.popularmechanics.com/military/a9924/a-disgraced-air-force-generals-last-interview-16341301/.

day, but we don't launch them….The people who know this are our possible adversaries. The people who don't happen to be the same people who benefit most from our existence."[30] While Carey's personal behavior (see Table 7) was unfortunate, his observations of the missile crew force were prescient as would be revealed shortly after he was relieved of command.

On 15 January 2014, AFGSC commander, Lieutenant General Stephen Wilson publicly announced that agents from the Office of Special Investigations investigating a drug case had discovered evidence of missileers sharing answers to their monthly proficiency tests.[31] As the wider implications of this event began to unfold, Wilson would come to refer to this experience at Malmstrom as an 'unignorable moment,' an event that is public, irreversible, systemic and would challenge identity.[32] A total of 100 officers assigned to the 341st Missile Wing were implicated in the cheating scandal at Malmstrom, with several senior leaders being relieved of command (see Table 7).[33] What may have had more impact on missileers than anything else was the corrective action senior leaders decided to pursue.

Unlike previous nuclear incidents that drove several high-level independent reviews of the nuclear enterprise by outside entities, the Malmstrom cheating scandal resulted in an innovative approach through the ICBM Force Improvement Program (FIP). Under General Wilson's leadership, the ICBM FIP incorporated Dr. John Kotter's model for

---

[30] Quoted in Joe Pappalardo, "A Disgraced Air Force General's Last Interview: What a fired commander's last words say about the state of America's nuclear missiles," *Popular Mechanic*, 6 Jan 2014, http://www.popularmechanics.com/military/a9924/a-disgraced-air-force-generals-last-interview-16341301/.

[31] Yancy Mailes in Donald L. Koser, *Morale and the Fore Improvement Program, Part I – ICBM,* Air Force Global Strike Command Historical Study #5 (Barksdale AFB, LA: AFGSC History and Museums Program, AFGSC), ii.

[32] Lt Gen Stephen Wilson in Donald L. Koser, *Morale and the Fore Improvement Program, Part I – ICBM,* Air Force Global Strike Command Historical Study #5 (Barksdale AFB, LA: AFGSC History and Museums Program, AFGSC), iv.

[33] Amy McCollough, "Nuclear Force Improvements: The Force Improvement Program promises grassroots fixes for USAF's nuclear forces," Air Force Magazine, April 2015, 43.

organizational change, resulting in an "action-oriented, field-influenced program intended to make rapid and enduring changes."[34] According to AFGSC command historian Yancy D. Mailes, FIP was "unlike studies of the past, where outsiders or management studied the problem, the FIP process charged northern tier Airmen to identify problems and recommend solutions [themselves]. It was ground breaking and the FIP process moved fast to close the 'say do' gap."[35] In a way, the command was seeking to accomplish at a macro-level what ICBM weapons officers were doing in their squadrons, teaching people to be critical thinkers and not just identify problems, but identify solutions. This innovative approach engaged Airmen across the ICBM mission to lead the change they needed and wanted.

Secretary Deborah James and AFGSC commander, Lieutenant General Wilson aggressively worked in lockstep to enact several proposed solutions from FIP. Each FIP recommendation submitted from the field was reviewed at the general officer level.[36] Several initiatives in response to the FIP were enacted the same year FIP commenced as represented in Table 8. Some initiatives, such as the NDOSM and incentive pay, were not novel ideas and had actually been attempted in 2009/2010 by Major General Alston and the Twentieth Air Force staff, but were ultimately unsuccessful. Many issues that had plagued missileers were finally being addressed through meaningful change and plans were set in motion to increase nuclear expertise throughout AFGSC. One loose end remained that the 3 + 3 Missile Tour construct did not address, the standing missile cross-flow board.

---

[34] Lt Gen Stephen Wilson in Donald L. Koser, *Morale and the Fore Improvement Program, Part I – ICBM,* Air Force Global Strike Command Historical Study #5 (Barksdale AFB, LA: AFGSC History and Museums Program, AFGSC), iv.
[35] Yancy Mailes in Donald L. Koser, *Morale and the Fore Improvement Program, Part I – ICBM,* Air Force Global Strike Command Historical Study #5 (Barksdale AFB, LA: AFGSC History and Museums Program, AFGSC), ii.
[36] Carla Pampe, "Force Improvement Program team moving forward," *Air Force Global Strike Command Public Affairs*, 8 April 2014, http://www.af.mil/News/Article-Display/Article/478226/force-improvement-program-team-moving-forward/.

Table 8: 13N Career Field Initiatives, 2014-2015

Initiative	Intent
Nuclear Deterrence Operations Service Medal (NDOSM)	To recognize direct support to nuclear deterrence operations. Authorized for Airmen who directly impacted the Nuclear Enterprise.(A)
Nuclear Incentive Pay	Incentivize Airmen to volunteer for and perform duties in nuclear career fields, the Air Force's number one mission.(B)
3 + 3 Missile Tour Construct	First 3-year missileer assignment focused on developing expertise. Second 3-year missileer assignment focused on applying expertise as instructor, evaluator, or flight commander.(C)
AFGSC Pathfinder Internship Program	3-year professional development program providing accelerated service on HQ AFGSC staff in three consecutive 1-year assignments in various directorates.(D)
Striker Trident Program	Air Force-Navy exchange officer program; officers serve with Pacific or Atlantic nuclear submarine forces in VA or HI becoming trained management of SSBN forces.(D)
13N / 21M / 31P Exchange Program	Create and sustain cadre of ICBM professionals with greater breadth in the nuclear enterprise by exchanging area functional expertise as CGO in security forces or maintenance assignments.(D)
School of Advanced Nuclear Deterrence Studies (SANDS)	One-year Professional Military Education (PME) program designed to create experts in the breadth of nuclear deterrence and what it means in the 21st century.(E)

Source: Various[37]

[37] (A) "Nuclear Deterrence Operations Service Medal," Air Force Personnel Center, 29 June 2016, http://www.afpc.af.mil/About-Us/Fact-Sheets/Display/Article/856019/nuclear-deterrence-operations-service-medal/.
(B) "AF approves special pay for nuclear career fields," U.S. Air Force, 2 October 2014, http://www.af.mil/News/Article-Display/Article/503220/af-approves-special-pay-for-nuclear-career-fields/.
(C) Amn 1st Class Joseph Raatz, "New ICBM career model instituted across 20th AF," *Air Force Global Strike Command Public Affairs*, 12 November 2014, http://www.afgsc.af.mil/News/Article-Display/Article/629422/new-icbm-career-model-instituted-across-20th-af/.
(D) Debbie Gildea, "Nuclear, missile officer development team convenes in December," *Air Force Personnel Center Public Affairs*, 18 November 2014, http://www.afpc.af.mil/News/Article-Display/Article/856322/nuclear-missile-officer-development-team-convenes-in-december/.

Several iterations of the missileer career path had come about since 2008, but none adequately took steps to create a self-sustaining career field. The missile cross-flow boards still enabled a cultural mindset that one might be forced out of their career field, or have a way out, through a mandatory missile cross-flow board at a missileer's four-year point. In 2016, AFGSC commander General Rand set out to abolish the practice of a missile cross-flow board and create a self-sustaining career field. Rand stated, "We employed young officers for four years and then forced many of them out of the career field to meet manpower needs across the Air Force. No other career field does this, and it has created a number of challenges for the ICBM community."[38] The elimination of the cross-flow is planned to result in a new rank distribution through the 13N career field.

Changes in 13N career field composition began with creating more positions for seasoned officers within missile squadrons. Missile squadrons have added two Assistant Directors of Operations (ADO) billets for a senior company grade officer (CGO) /junior field grade officer (FGO), along with a Weapons Officer billet. Once 3 + 3 began, other positions began to be manned by more seasoned officers. According to the 13N Career Field Manager (CFM) Zannis Pappas, the 2016 restructuring plans of the career path would change annual accessions into the career field from 160 officers to only 120 in FY2017, and plans to drop to 102 accessions by FY2021. However, the total number of 13N billets for the career field would remain constant at 705, with around

---

(E) Brian W. Everstine, "Masters of Nuclear Deterrence," *Air Force Magazine*, October 2016, 40-44, http://www.airforcemag.com/MagazineArchive/Magazine%20Documents/2016/October%202016/1016nukes.pdf.

[38] Gen Robin Rand in "AF to restructure nuclear, missile operations (13N) career field," *Air Force Global Strike Command Public Affairs*, 7 April 2016, http://www.af.mil/News/Article-Display/Article/715304/af-to-restructure-nuclear-missile-operations-13n-career-field/.

235 at each missile wing.[39] Additionally, Rand seeks to provide additional broadening opportunities for missileers.

Twentieth Air Force Commander General Cotton shared that he is "more worried about the sustainment of the career field down the road….Professional development will be the crux of keeping ICBM officers of all grades, showing how viable 13N [A]irmen are and will be to the overall mission of the Air Force."[40] Simultaneously with the career field restructure, nuclear-related billets across the Air Force have been undergoing review to determine if they are appropriate for inclusion in the 13N career field.[41] Continued concern about lack of assignment opportunities for missileers beyond those at a missile wing have caused senior leaders to once again cast a net for relevant nuclear-related opportunities.

General Rand shared his vision for 13Ns by stating: "I see the Air Force relying heavily on the 13N career field as the backbone of nuclear expertise….In the future, just about every organization with a nuclear mission should have a 13N officer assigned to provide expertise in nuclear policy, command and control, and weapons effects."[42] Rand even indicated that he could see missileers going to work in command posts for other MAJCOMs, or teach as a professional military education instructor, as examples of career broadening. The key in addressing the

---

[39] Zannis Pappas in Stephen Losey, "Air Force outlines plans for a more senior nuke force," *Air Force Times*, 20 July 2016, https://www.airforcetimes.com/story/military/2016/07/20/air-force-outlines-plans-more-senior-nuke-force/87338836/.

[40] Maj Gen Anthony Cotton in Oriana Pawlyk, "Air Force nuclear officers need earlier education, mentorship, commander says," Air Force Times, 30 July 2016, https://www.airforcetimes.com/story/military/2016/07/30/air-force-nuclear-officers-need-earlier-education-mentorship-commander-says/87632546/.

[41] "AF to restructure nuclear, missile operations (13N) career field," *Air Force Global Strike Command Public Affairs*, 7 April 2016, http://www.af.mil/News/Article-Display/Article/715304/af-to-restructure-nuclear-missile-operations-13n-career-field/.

[42] Gen Robin Rand in "AF to restructure nuclear, missile operations (13N) career field," *Air Force Global Strike Command Public Affairs*, 7 April 2016, http://www.af.mil/News/Article-Display/Article/715304/af-to-restructure-nuclear-missile-operations-13n-career-field/.

many personnel initiatives is to find the right balance of nuclear expertise, career broadening, and professional development without reducing a missileer's opportunity to command at all levels.

Suspiciously absent from contemporary dialogue, given USSTRATCOM and AFGSC organizational changes regarding C-MAJCOM and JFACC functions, is how missileers can be developed as part of the CSAF's focus area of strengthening joint leaders and teams. Rather than establish a standing Joint Task Force at USSTRATCOM for ICBMs and SSBNs, who present nuclear forces in a similar fashion, ICBM forces are being presented to the COCOM in the same fashion as bomber and reconnaissance capabilities (see Appendix G). While it has been acceptable for USSTRATCOM to be led by non-rated and non-pilot generals in the past, it remains to be seen whether Air Force culture will permit a non-rated, non-pilot missileer to serve as a MAJCOM commander that is dual-hatted as the JFACC for USSTRATCOM.

A lingering question among missileers regarding command is the actual future potential of a missileer to command in an evolving MAJCOM and career field. For the first time in the existence of AFGSC, the MAJCOM commander does not have a missile badge on his uniform. For better or worse, General Rand is authorized the wear of a missile badge by merit of being the AFGSC commander, just as his two bomber predecessors had done before him, despite having zero ICBM operations experience. The rationale for awarding the missile badge to commanders with no actual missile operations experience dates back to the earliest days of missiles—the badge represented something of a participation ribbon to anyone involved or associated with the missile program. To his credit, when General Rand was offered a missile badge he respectfully declined, realizing that the missile badge represented something much more than what he felt he merited.

Summary

Since 2009 the Air Force has attempted to refocus on the mission of nuclear deterrence. The 1988 NSS indicates that the effectiveness of our strategic nuclear forces and our will to use them should never be in doubt to potential aggressors.[43] To help restore the credibility of our strategic forces, many initiatives have addressed the aging technology, weapon systems, and infrastructure that make up the nuclear enterprise. Similarly, the organization of nuclear forces in the Air Force under AFGSC has enabled greater focus. Several personnel and manpower issues have arisen, some highlighting significant cultural issues, which drove significant attention through the ICBM FIP.

Several initiatives resulted from the ICBM FIP throughout 2014-2015, resulting in sweeping career path changes, broadening opportunities, incentives, and personnel actions.[44] The initiatives from FIP have been foundational in course correcting the culture within the ICBM community. The future that lays ahead for missileers is bright, but one question remains…just how bright is the future for missileers if they are no longer able to grow their own MAJCOM or COCOM commander?

[43] The White House, *National Security Strategy of the United States* (Washington, DC, January 1988), 2.
[44] Wilson Brissett, "Rebuilding the Missile Force," *Air Force Magazine*, February 2017, 22.

Chapter 4

Missileers and Generals

Elevating the commander of Air Force Global Strike Command to 4-stars places the right level of emphasis on this priority mission; and as I've said before, we will continue to provide persistent leadership and persistent focus on our nuclear force.…[it] deserves the highest level of leadership and oversight similar to our other operational core mission areas.

Deborah Lee James, Secretary of the Air Force, 2015

The appointment of a four-star sends a powerful message to our Airmen, allies and any would-be enemy.…In a complex global environment, having a four-star general responsible for the world's most powerful weapons is critically important.

Deborah Lee James, Secretary of the Air Force, 2015

Strategic nuclear deterrence is the number one priority for the United States and steps taken in recent years to create commensurate organizational emphasis have reinforced this prioritization. Referring to the elevation of Air Force Global Strike Command's (AFGSC) commander from a three-star to a four-star command position, then Secretary of the Air Force, Deborah Lee James, indicated the critical importance of having a four-star general responsible for the world's most powerful weapons. General Robin Rand is the first four-star commander of AFGSC with a background very different from that of the operational ICBM and bomber forces he commands. This change also means there are now two four-star commands that oversee ICBM forces--AFGSC and U.S. Strategic Command. AFGSC is the Major Command (MAJCOM) responsible for

the organize, train, and equip functions and is the ICBM force provider to U.S. Strategic Command (USSTRATCOM).

USSTRATCOM is the global Combatant Command (COCOM) responsible for the ICBM war-fighting mission. USSTRATCOM has been a four-star command since it was created in the 1990s from the ashes of Strategic Air Command (SAC), which also was a four-star command. USSTRATCOM command responsibilities rotate between the Air Force and the Department of the Navy. While Rand has paved the way for a four-star command opportunity in AFGSC, it remains to be seen if the ICBM and bomber communities will be able to develop officers qualified to fill that position from their own tribes in the future. Furthermore, it remains to be seen whether an individual with experience limited to ICBM nuclear deterrence can be developed sufficiently to be capable of commanding in either of these four-star commands, each with diverse mission sets ranging from nuclear, to kinetic global strike, to space and cyber operations.

During the past eight years the Air Force has created AFGSC and an independent 13N Nuclear and Missile Operations career field in the wake of multiple incidents in the nuclear enterprise and ICBM community. With emphasis placed on reinvigorating the nuclear enterprise and ensuring organizational prioritization, the Air Force made significant modifications to the bureaucratic structure and personnel system. Changes in the personnel system affected missileers, who under their previous MAJCOM, had the opportunity to broaden and acquire experience in multiple weapon systems, but now focus solely on their nuclear deterrence operations mission with ICBMs. Bureaucratic changes affected both non-rated missileers and rated bomber forces, both communities anecdotally referred to as the 'red-headed step children' of their former four-star MAJCOMs, combining them into a single MAJCOM--AFGSC.

Since AFGSC's inception, there have only been four commanders. The first commander of AFGSC was a missileer, the following two commanders had bomber backgrounds, and the current commander, General Rand, has a fighter pilot background. These personnel and organizational changes have influenced the traditional paths to four-star MAJCOM command for the operators in AFGSC. Since 1959, only three officers that began their careers as missileers have risen to the rank of four-star General, and these occurred during the period when missileers were part of a combined 13S Space and Missile Operations career field. Prior to the combined 13S period, the highest rank a missileer had been promoted to was the rank of Lieutenant General, which was often the result of considerable cross-training and/or career broadening (see Appendix M).

The social environment of the Air Force consists of formal rank and structure resulting in a hierarchical organization where four-star generals typically preside atop their designated hierarchies. When the position of a four-star general is projected to become vacant, the position is filled from a lower-tier position. The process of filling a four-star general position may be viewed as a singular, virtually independent event occurring in a market environment. However, some argue that mobility in a hierarchy is not a zero-sum game, where one individual simply gets the position, while others do not.[1] Rather, the linkages and patterns of individual moves among a system of occupational statuses creates vacancy chains and may provide clues as to the structure of the process that generates them.[2] In other words, there may be patterns and relationships that support the progression and development of officers as they move up a hierarchy until they are logically the best suited to fill the vacancy at the top of a given hierarchy. The changes to the 13N career

[1] Chase, Ivan D., "Vacancy Chains," *Annual Review of Sociology* 17, (1991): 133, http://www.jstor.org/stable/2083338?seq=1#page_scan_tab_contents.
[2] Harrison C. White, *Chains of Opportunity: Mobility in Organizations* (Cambridge, MA: Harvard University Press, 1970), 89.

field and creation of AFGSC have broken new ground for new precedents to be established. With each senior officer appointment that occurs within the nuclear enterprise, an unofficial vacancy chain is being developed and/or reinforced.

According to Harrison C. White, the major distinctive feature of a formal analyses and models for vacancy chains is that:

> …they are analyses of the internal logical relationships among a series of elements of components which are taken as 'given' for the analysis. Such analyses involve two basic steps: (1) the specification of the elements of the corpus (in this case jobs and vacancies), and (2) the formulation of a series of rules or logical operations which "generate" the elements of the corpus.[3]

It is noteworthy that such a model looks at logical mobility relationships within an organization and does not attempt to establish empirical relationships.

The U.S. nuclear enterprise is a no-fail mission and the Air Force is responsible for two of the three legs of our nation's nuclear triad. Over the past eight years, scores of individuals operating in the ICBM mission area have been restricted from conducting nuclear operations as the result of cheating scandals, for loss of confidence in the ability to lead nuclear organizations at the squadron, group, wing, and numbered air force levels. Even the Secretary of the Air Force and Chief of Staff of the Air Force were relieved of their responsibilities in connection to poor oversight of the nuclear enterprise. Nukes continue to be in the spotlight.

Institutionally, the Air Force has taken steps to remedy macro- and micro-level issues afflicting the ICBM mission area, to include the creation of AFGSC and an independent 13N Nuclear and Missile Operations career field. These initiatives have had the express purpose

---

[3] Harrison C. White, *Chains of Opportunity: Mobility in Organizations* (Cambridge, MA: Harvard University Press, 1970), 89.

of reinvigorating the nuclear enterprise. However, 13N officers exist within AFGSC, a bureaucratic hierarchical organization shared with bomber pilots who have the dual-mission of conventional and nuclear global strike. The ICBM combat mission reports to USSTRATCOM, a COCOM responsible for other global capabilities such as space, cyber, and global strike. It is imperative that the Air Force take deliberate steps to ensure that the force development construct and opportunities existing under these recently evolved parameters are sufficient to develop tomorrow's nuclear leaders from the only Air Force career field that focuses 100 percent of their time and attention on this no-fail mission set.

While broadening a 13N is important to understand the larger Air Force they operate in, care must be taken to not dilute expertise upon the altar of breadth. Broadening may lead to an unhealthy operational culture as occurred for over two decades when missileers were combined with the 13S Space and Missile Operations career field under the stewardship of Space Command. Research to reveal patterns and correlations may validate current force development and opportunity construct. Conversely, the revelations may indicate disparity in what is observed, or not observed in the data, which would drive a discussion on changes to improve the development of tomorrow's 13N leaders and future MAJCOM/COCOM/Joint Task Force commanders.

To better assess current trends in growing missileers into senior leaders, a historical perspective is helpful. An analysis of all general officers biographies at the rank of Major General and above that had ICBM operations experience before commanding as a Field Grade Officer resulted in a total of 43 general officers (see Appendix M). The premise of these parameters is to identify officers who served as missileers while still early in their careers and were able to promote to a rank sufficient to command at the Numbered Air Force level, or higher.

Research has shown that the missileer career field has not been a stand-alone career field over time, siphoning or feeding other career fields since 1959. Applying the concept of vacancy chains to an officer's typical career path, Table 9 shows several command milestones typically seen in the progression of senior leaders. Command at each

Table 9: Command Experience of Missileers Who Became Senior Leaders

COMMANDS	MAJ GEN (31)	LT GEN (9)	GENERAL (3)
ICBM SQ/CC	10	1	2
ICBM GP/CC (equiv)	11	3	1
ICBM WG/CC	15	3	1
ICBM DIV/CC	2	1	0
ICBM NAF/CC (equiv)	9	4	0
ICBM MAJCOM/CC	0	1	2
ICBM COCOM/CC	0	0	1

Source: Author's Original Work (see Appendix M for additional data)

level can ostensibly prepare an officer for command at the next higher level. However, research revealed that command of ICBM units at lower levels has not been a significant pre-requisite to command them at higher levels. Officers may have commanded an ICBM unit at one level and not at others, or commanded in another functional area earlier and an ICBM unit later on. Additionally, nostalgic notions of missileer command opportunities during SAC are woefully misplaced.

During SAC's stewardship of the ICBM mission, missileers' command opportunities were limited. No missileer commanded above the division level until ICBMs were organized under Twentieth Air Force just prior to SAC's disestablishment. It was not until there was a combined 13S Space and Missile career field operating under AFSPC that missileers were able to find a path to four-star general. There have only been three missileers that have promoted to four-star general. Of the

three missileers to become four-star generals, none had served as the commander of Twentieth Air Force.

Twentieth Air Force has been the NAF where missileers have had the greatest opportunity to command as a general officer since its reactivation in 1991. However, command of Twentieth Air Force has not typically produced three-star generals. Of the nine missileers to promote to Lieutenant General, only three had commanded Twentieth Air Force; the others found success through other functional areas. The only graduated Twentieth Air Force commander to command at the MAJCOM level was Lt Gen Klotz, the first commander of AFGSC.

While there has been limited success of missileers being promoted to senior ranks, that is not to say that the missile badge has not been seen on senior leaders. There has been a tendency from the earliest days

Table 10: The Façade of the Missile Badge

POSITION	YEARS	# of CCs	WORE MISSILE BADGE	HAD ICBM OPS EXPERIENCE
CSAF	1957 - 2017	18	6	0
CINCSAC	1957 - 1992	11	8	0
USSTRATCOM/CC	1992 - 2017	10	3	1
AFSPC/CC	1992 - 2011	9	6	2
AFGSC/CC	2009 - 2017	4	3	1
TOTAL	1957 - 2017	52	26	4

Source: Author's Original Work (see Appendix M for additional data)

of the ICBM program to award the missile badge to those who had merely been associated with the ICBM program, but never having actually performed nuclear operations as part of a combat ready missile crew. Table 10 shows just how prolific the missile badge has been among Air Force senior leaders over time. This was particularly true during the days of SAC. A review of SAC's top-three leadership positions, CINCSAC, the Vice, and Chief of Staff, from 1957 to 1992 revealed that of the 51

general officers that cycled through, 26 of them wore the missile badge on their uniform. Of the 26 SAC leaders, only two generals had operational experience as a missileer, and those two were on the lowest leadership rung as the SAC Chief of Staff.

The practice of wearing the missile badge by senior officers associated with missiles has a dual-effect. First, having the missile badge on the uniform of senior leaders advocating on behalf of the ICBM mission set is a positive thing as it visibly adds to their credibility. The other effect, however, represents an institutional façade hiding the fact that the Air Force is not organizationally structured in a way that prioritizes the growth of missileers into senior leaders capable of doing their own advocating. Additionally, the pride and value of the missile badge is diminished when it is so easily obtained without ever having performed nuclear alert at the console of an operational ICBM.

In recent years additional senior missileer positions have been established with the reinvigoration of the nuclear enterprise, as shown in Table 11. Missileers have served as the Deputy Chief of Staff for Strategic

Table 11: New Nuclear-Related General Officer Positions, 2006-2017

PERIOD	RANK	POSITION	TOTAL OF MISSILEERS HAVING HELD POSITION
2008 – 2017	Lt Gen	HAF/A10	2
2009 - 2017	Maj Gen	AFGSC/CV	3
2006 - 2017	Maj Gen	AFNWC/CC	2

Source: Author's Original Work (see Appendix M for additional data)

Deterrence and Nuclear Integration (HAF/A10), the Commander of the Nuclear Weapons Center at Kirtland AFB, NM, and the Vice Commander of AFGSC. There remains a handful of one-star positions within USSTRATCOM, DTRA, and HQ AFGSC that feed the two-star nuclear billets available completing the missileer vacancy chain. Both HAF/A10 and the USSTRATCOM Vice Commander positions are three-star

positions that could enable a missileer to be developed into a four-star MAJCOM or COCOM commander from a rank perspective.

It requires much more than the appropriate rank to lead at the most senior levels. As precedents are established in AFGSC and 13N missileers grow up, providing the appropriate broadening experiences will be essential. Lieutenant General Wilson stated: "We have really good people. If we give them the right education, training, and experience, if we make sure they are confident and proud, [and] if we make sure they are personally and professionally fulfilled, we [get] mission success."[4] Mission success comes in many forms, and one of these forms of success to a missileer is knowing that the first missileer AFGSC commander was not its last.

[4] Lt Gen Stephen Wilson in Amy McCollough, "Nuclear Force Improvements: The Force Improvement Program promises grassroots fixes for USAF's nuclear forces," Air Force Magazine, April 2015, 40.

Chapter 5

Conclusions

> *We have Airmen right now as we speak defending the homeland and that nuclear deterrent underwrites every military operation on the globe.*
>
> General David L. Goldfein, CSAF, 2017

> *For the vigilant missileers each hour of deterrence is their personal victory, every moment of freedom their personal conquest, and every day that passes their personal prize. What they fight is a war of wills….They have fought and won the cold war, but having won they must fight on. Yesterday's deterrence is gone, today's is being won right now, and tomorrow's must forever be earned.*
>
> Greg Ogletree, Missileer, 1998

The story of missileers and the nuclear ballistic missile program are part of the foundation of the U.S. Air Force ranging back to the Army-Air Force Transfer Agreements. Missileers are the living component of the ICBM weapon system, and together have enabled great power stability and continues to underwrite every military operation on the globe. Missileers, along with the weapon systems they have operated, are a national asset under the stewardship of the U.S. Air Force. While the Cold War is in the past, the necessity for nuclear deterrence remains. Decisions made on technology, force structure, and how to handle personnel and mission challenges will continue to shape the most critical aspect of the Air Force ICBM nuclear deterrent—the identity of the nuclear-minded missileer. Collectively, this research paper has provided several observations that provide implications for the future of ICBMs.

Technology

1) Observation/Implication: A nationally prioritized, funded, and dedicated missile acquisition program enables strategic agility and unity of effort.

The establishment of the Western Development Division (WDD) in Air Research and Development Command (ARDC) under the leadership of General Power and General Schriever, provided a dedicated acquisitions process tailored to meet the needs of the missile program, being significantly different than aircraft projects. Additionally, national prioritization resulted in the appropriate funding needed to meet the demands for rapid development, acquisition, and fielding of first-generation missiles, which utilized the concurrency concept of multiple subcontractors tackling technological requirements resulting in redundant lines of effort and interchangeable subcomponents.

Over time the WDD has evolved into the Space and Missile Systems Center (SMC), which is aligned under Air Force Space Command (AFSPC). AFSPC is the only MAJCOM to have its own acquisitions authority through SMC. Other research and developmental missile programs, such as prompt global strike, are handled through Army programs. As the Minuteman III follow-on system is developed, and the NC3 weapon system is modernized and sustained, having a nationally prioritized, funded, and dedicated acquisition program that is not bogged down in parochialism will be essential.

2) Observation/Implication: Developments in nuclear-related technology are influenced by arms control initiatives.

Early arms control initiatives were largely focused on limiting behavior of nuclear states. Such arms control initiatives involved limiting where nuclear tests were conducted, what type of tests were conducted, and served as a forum for productive dialogue among nuclear states, namely the United States and USSR/Russia. During the 1980s, arms control initiatives began to be more reductionist, focusing on the

elimination or decreases in nuclear weapons. The Nuclear Non-Proliferation Treaty (NPT) requires the eventual dismantling of all nuclear weapons. The U.S. has allowed other nuclear states to modernize their nuclear weapons capabilities while pursing life extension programs at home. Arms control initiatives have stagnated the U.S. national nuclear industrial complex, resulting in more costly sustainment efforts. Arms control initiatives that constrain developments in nuclear-related technologies may hamper opportunities for innovation and efficiency, while maintaining a national position of advantage in relation to potential nuclear adversaries.

3) Observation/Implication: Development, acquisition, and deployment of new ICBMs require human capital investments in acquisitions and operations.

All three generations of ICBMs deployed required a collaborative effort in research, development, test, and deployment of the weapon systems. These processes benefit from acquisition personnel that have operational experience, as well as operators that have acquisitions experience. As new systems are deployed beginning in FY2028, site activation teams will be needed that understand the intricacies of the new weapon system as well as contract obligations. Preparations for the Minuteman III follow-on may well benefit from deliberate human capital investment over the next decade to prepare those officers who will lead the transition to the fourth generation of ICBMs. Human capital preparation is needed now to coincide with initial GBSD system delivery in FY2028, nine missiles on alert in 2029, and the complete deployment of 400 on alert missiles by 2036.

4) Observation/Implication: Missileers have had more opportunities to lead at the NAF, MAJCOM, and COCOM levels when not organized with flying missions.

During early years of the ICBM mission when strategic missile squadrons were organized in wings that included operational flying missions, opportunities to command were restricted to rated personnel. Legal requirements stipulating rated personnel commanding flying missions precluded a missileer from commanding a wing with a flying mission. Once missile wings were organized and sufficient personnel were developed to be competitive for wing command, missileers were more likely to command at that level. However, where air divisions and numbered air forces were organized with a combination of missile units and flying units, missileers were also precluded from commanding flying organizations. At no point during SAC did a missileer hold operational command above the wing level, with two exceptions—when a division contained only missile units and just before SAC ended and Twentieth Air Force was reestablished as an ICBM-only NAF. Missileers were not able to command at the four-star MAJCOM level until they were organized in a command where the preponderance of missions were considered non-rated operations. This structure also enabled MAJCOM commanders to be eligible for COCOM command.

The preponderance of USSTRATCOM missions are conducted by non-flying/non-rated personnel from the Air Force, Navy, and Army. USSTRATCOM has been commanded by four-star generals from the Air Force and admirals from the Navy that have not had any rated, flying, or nuclear experience. The only observable trend noted for COCOM command is serving at the four-star level in a service capacity prior tp commanding in a joint COCOM. If a missileer is to command at the four-star COCOM level in the future, organization and culture must enable a missileer to serve as a four-star in the Air Force first.

5) Observation/Implication: The ICBM infrastructure does not require a specific Launch Control Center to Launch Facility ratio, but the missileer career field does.

There is no weapon system requirement to maintain a particular launch control center (LCC) to launch facility (LF) ratio. Largely shaped by technological limitations and solutions, the ratio of LFs to LCCs has varied from Atlas missiles to Titan, and finally to Minuteman. The robust and enduring Minuteman infrastructure has served as the backbone for all three Minuteman ICBMs, as well as the Peacekeeper ICBM. If the U.S. elects to remain committed to obligations of nuclear disarmament described in the nuclear nonproliferation treaty, however, the nuclear force structure will continue to get smaller. Under circumstances of a shrinking force structure, technological solutions should allow for a diminishing number of LFs to LCCs without experiencing weapon system degradation.

While LCCs do not require a certain number of LFs to be an effective ICBM architecture, missileers requires a certain number of LCCs to sustain their career field. As the number of LFs continue to decline, there is no requirement to eliminate LCCs. Earlier weapon systems such as Atlas and Titan demonstrated the willingness to have LCCs control anywhere from one to three ICBMs. Furthermore, the number of LCCs to be considered a squadron has varied over time. The Air Force should be cognizant of the ratios needed to sustain a cadre of motivated and skilled missileers when presenting ICBM force structure solutions to political leaders in response to potential future arms control initiatives.

6) Observation/Implication: ICBMs have been organized under both Specified and Unified command structures, and marginalized in both.

ICBMs have been performing their unique mission since 1959, but have continuously been in competition for attention and funding with non-deterrence missions under the same command structures. SAC was

a ‘specified’ command under the Unified Command Plan. A specified command is a combatant command comprised of forces from only one service that reports directly to the Joint Chiefs of Staff (JCS), rather than their service Chiefs. USSTRATCOM in its first iteration was a ‘unified’ command that consisted only of nuclear forces from the Air Force and Navy that also reported directly to the JCS. With its second and current iteration, USSTRATCOM increased its mission portfolio to include several non-nuclear focused missions, still remaining a unified command. Under all iterations of specified and unified COCOMs that ICBMs have been organized under, increasing mission requirements extending beyond a nuclear deterrence role to meet the needs of contemporary conflicts, has resulted in the marginalization of the ICBM nuclear deterrence mission.

As the services consider the appropriateness of how forces are organized, care should be given to ensure a nuclear focus is maintained by organizational alignment. Whether through a specified Air Force nuclear COCOM, or through a unified nuclear COCOM, a decreasing nuclear force has the potential to be marginalized if sustained valuation is not given to the mission of nuclear deterrence. If prioritization of Air Force nuclear missions in the joint community cannot be obtained, perhaps a return to an Air Force specified command construct would allow the service to ensure the nuclear deterrence mission receives the attention it demands.

7) Observation/Implication: When ICBMs are organized in a MAJCOM with non-nuclear missions, the nuclear focus is lessened.

With the restructuring of nuclear forces and equipment into multiple organizations, combined with the demands of conventional conflicts, the Air Force became distracted from the task of advocating for investment in the nuclear enterprise. When multiple MAJCOMs became stewards for nuclear investment, it became more challenging to advocate with one voice. Without strong investment advocacy, the Air Force budget

for nuclear-related equipment, facilities, and personnel eroded.[1] In other words, when the nuclear enterprise was everyone's responsibility, it was no one's responsibility. Near the end of SAC's tenure, the twin triad concept began to detract from the command's nuclear focus. Under AFSPC the shrinking ICBM mission competed with the growing space mission for scarce resources. In an attempt to create unity of command, a combined career field was created and broadening into multiple weapon systems expected, resulting in the dilution of nuclear expertise.

AFGSC's growing weapon system portfolio, including conventional bombers, dual-use bombers, and NC3 responsibilities, create fiefdoms that compete for limited MAJCOM resources and attention. The urgency created by demands in current conventional conflicts creates a tension when pitted against the investment in nuclear deterrence against a possible future aggressor. Care should be taken to ensure that course corrections in prioritization are made before they result in unignorable moments that undermine U.S. nuclear credibility.

8) Observation/ Implication: The current USSTRATCOM organizational model does not prioritize the ICBM mission compared to its other missions.

The U.S. Air Force has been able to take steps to prioritize its nuclear stewardships, however, these actions are limited to service valuation and do not automatically translate to the COCOM. The current USSTRATCOM organizational model that utilizes a confusing series of J-staff, JFCCs, and Task Force commanders has complicated the command structure and marginalized the role of the ICBM mission and the Task Force 214 commander.

The JFCC construct has created an imbalance between the TF-214 and TF-204 commanders as one's forces are subject to the other's oversight in the TF-204 commander's role as JFCC-Global Strike. The

[1] Air Force Nuclear Task Force, *Reinvigorating the Air Force Nuclear Enterprise*, (Washington, DC: Headquarters, United States Air Force, 24 October 2008), 55.

planning and validation of ICBM targeting is overseen by JFCC-Global Strike/TF-204 commander, not the TF-214 commander. The TF-214 commander is the lowest ranking and least empowered general officer of all USSTRATCOM's JFCC and Task Force commanders. If USSTRATCOM does not value the nuclear mission, then the service force providers charged with to organize, train, and equip may follow. MAJCOMs may incrementally synchronize prioritization schemas to match that of the war-fighting COCOM requirements resulting in a gradual de-emphasis.

Personnel & Mission

9) Observation/Implication: The Minuteman infrastructure has produced additional personnel challenges in the human and machine interface.

The combat crew experience of missileers in the Atlas and Titan ICBMs was different than that of the Minuteman missileer due to weapon system infrastructure and crew dynamics. Atlas and Titan crews were larger, consisted of officer and enlisted personnel, and were co-located with the missiles they controlled. Additionally, by being co-located with the missiles they operated, missileers had more ownership of the complete ICBM weapon system, had direct oversight of maintenance and security activities, and had more leadership of on-site support personnel. The Minuteman infrastructure changed the combat crew experience by removing the combat crew from the missiles they operated, increasing the number of missiles being controlled, isolated missileers from maintenance, security, and support personnel. Minuteman crews operated from a distance, not having the human interaction or leadership experiences had by Atlas and Titan crews.

The implications of continuing to utilize the Minuteman infrastructure as the backbone for GBSD means missileers will continue to operate in isolation, from a distance. The role of the missileer in peacetime will potentially continue to be that of a communications node

between maintenance and security forces personnel at LFs, or above ground in the flight area. This being the case, missileers may continue to feel frustrations by not having enough of a role to perform in ICBM operations during peacetime as the Minuteman infrastructure has created a human and machine interface that has marginalized the role of the missileer.

10) Observation/Implication: The majority of senior leaders who had formative operational experience as missileers broadened into acquisitions or space.

Of the 43 missileers who have attained the rank of Major General or higher that were analyzed in this paper, seven cross-trained or broadened into acquisitions, and 21 cross-trained or broadened into space operations. Of those that broadened with space experience, 18 officers did so and retired after the ICBM mission had transferred to AFSPC in 1993. Prior to the ICBM mission being in AFSPC, 11 of the officers assessed cross-trained rather than continue with ICBM operations.

When the 18XX missile operations career field merged with the 20XX space operations career field, broadening opportunities were created that allowed officers to broaden without having to cross-train into another career field. During periods when ICBM systems were being developed and deployed, there were more senior officers that had cross-trained into acquisitions. Of the 43 officers assessed, only six had nuclear missile focused careers. Broadening of missileers can be expected with the acquisition of GBSD and AFGSC stewardship over the NC3 weapon system. Furthermore, general officers in the space and missile communities over the next 10-15 years can expect to have had a mixture of space and missile experience due to the once combined career field.

11) Observation/Implication: Missileers have only become four-star generals when there have been opportunities to serve at the one-, two-, and three-star levels first.

At first glance this observation appears obvious. The nuance is in whether general officer billets are made accessible to missileers through appropriate experience and training. The vacancy chain concept has been applicable to missileer force development at the senior officer levels. Only when there have been opportunities for missileers to serve at successive levels of rank and responsibility have missileers been able to promote to the rank of four-star general. It was not until divisions were disestablished throughout the Air Force and ICBMs realigned that missileers were eligible for operational command at senior levels with commensurate rank. Fourteenth Air Force, Twentieth Air Force, and AFSPC became organizations that could be commanded by non-rated personnel at all levels, an opportunity not previously available to missileers under SAC.

As of April 2017, it has yet to be demonstrated whether or not a 13N Nuclear and Missile Operations officer, missileer, can be grown to serve as a four-star general. Notionally, there is a path for a missileer to serve in nuclear-related billets at all general officer levels, but none have commanded a MAJCOM at the rank of four-star general. Furthermore, the creation of AFGSC as a four-star command has created an environment where a missileer must be able to command at the four-star MAJCOM level in a command that contains both the ICBM mission and flying missions—something a non-rated missileer has never done at the four-star rank.

12) Observation/Implication: Non-rated officers can command rated officers in USSTRATCOM only if they have commanded a MAJCOM first.

Since its creation in 1992 through 2017 there have been ten commanders of USSTRATCOM, five of which have had no flying experience. Of the five commanders with no flying experience, three came from Navy nuclear submarine backgrounds; the other two had Air Force space and missile backgrounds. General C. Robert Kehler and General John E. Hyten are the two Air Force Generals with no flying experience to command USSTRATCOM. Of the two commanders, Kehler began as a missileer and broadened with space, while Hyten had a pure space background. Collectively, the two have established a precedent for non-rated Air Force generals to command USSTRATCOM. However, both Kehler and Hyten also established a precedent by having commanded AFSPC, a four-star MAJCOM, before being selected to command USSTRATCOM.

While the trend of commanding a four-star MAJCOM before a four-star COCOM is not novel, the MAJCOM missileers are now organized in contains both rated and non-rated career fields. While there is a precedent for non-rated personnel commanding rated missions in the COCOM setting, the same precedent has not been made in the Air Force. It was not until a missileer had the opportunity to command at the four-star MAJCOM level that they were able to later command at the four-star COCOM level. Therefore, if a missileer is prevented from serving as the four-star AFGSC commander for any reason, whether due to experience, training, or cultural discrimination as a non-rated officer, then it is unlikely a missileer will ever be enabled to serve as the four-star commander of USSTRATCOM or any other COCOM in the future.

13) Observation/Implication: Having a four-star MAJCOM or COCOM to advocate for the ICBM nuclear deterrence mission does not mean it will provide advocacy.

The nuclear mission has always held a place of national priority and reverence. As such, the ICBM mission has always had a four-star MAJCOM or COCOM to available to oversee and advocate for ICBM requirements. However, having four-star level advocacy does not always translate to support or prioritization. Under SAC no career path led to the four-star level that would enable missileers to advocate from a position of knowledge and experience. ICBMs were organized under ACC for such a brief period that the biggest decision made regarding the mission was probably to transfer it out of ACC. Under AFSPC, the ICBM mission was in caretaker status, receiving the necessary attention to sustain the force in a reductionist political environment. USSTRATCOM was nuclear-focused until it more than doubled its portfolio with other global mission sets.

Some of the biggest upheavals in the ICBM mission set occurred under the watch of a four-star MAJCOM and COCOM indicating that merely having four-star general oversight is not guarantor that the mission will be appropriately overseen. With AFGSC and USSTRATCOM four-star general leadership, it is possible that nuclear focus could still be lost. Sustained nuclear prioritization across MAJCOM and COCOM is the likely combination to avoid future missteps in nuclear governance.

14) Observation/Implication: Awarding the missile badge with operations designator to senior leaders who have not been a combat mission ready crewmember hides the fact that missileers are not developed into senior leaders.

The creation of the missile badge was an early Air Force endeavor to recognize the special importance of the guided missile program, which became more representative of a participation badge than an

occupational badge. The immense scope of the ICBM program resulted in scores of individuals being awarded the missile badge to recognize their contributions to the missile program, but distribution spiraled out of control over time. The creation of the missile badge with operations designator was a definitive step to separate ICBM combat crewmembers from those that performed maintenance, acquisitions, or were associated with smaller missile programs such as cruise missiles. Senior leaders commanding operational missile units were authorized the wear of the missile badge even if they had never been certified as a combat mission ready missileer that performed alert duties for an ICBM weapons system. This practice continues today.

The practice of awarding missile badges with operational designators to senior leaders that have no operational background as an ICBM operator hides the fact that there are no actual missileers that have been grown into senior leaders. Whenever this occurs, it creates the façade of expertise among senior leaders and demoralizes the missileers who would otherwise wear the missile badge as a badge of honor. The continued practice of awarding the missile badge to those who have not earned it in the same fashion as new accessions to the career field will perpetuate false pretenses and create cultural rifts between rated and non-rated personnel. There is no practice for non-rated operations personnel who command rated flyers to wear aviation badges, by allowing the reverse to occur is to perpetuate a double standard.

A Non-Linear Future – Past as a Prelude

On 6 August 1945 the crew of the Enola Gay B-29 bomber employed the Little Boy, an atomic weapon, on the city of Hiroshima, Japan. For the first time in history a nuclear weapon was used in anger by one state against another in war. Days later, on 9 August 1945, the crew of the Bockscar B-29 employed the Fat Man atomic weapon on the city of Nagasaki, Japan, marking the second and final time a nuclear

weapon was detonated in war. Air Force history would go on to immortalize Col Paul Tibbets, the aircraft commander of the Enola Gay, and Maj Charles Sweeney, the aircraft commander of the Bockscar, both rising to general officer ranks. However, neither Tibbets nor Sweeney were in charge of the nuclear missions over Japan.

Captain William S. Parsons and Commander Frederick Ashworth were the two naval officers appointed as senior technical advisors and mission commanders aboard the Enola Gay and Bockscar, respectively. These naval officers had intimate familiarity with the workings of the nuclear weapons being employed, their fusing, and effects—they were Weaponeers. General Leslie Groves of the Manhattan Project directed Parsons and Ashworth be the mission commanders of the two atomic missions. As mission commanders, Parsons and Ashworth were the approval authority for the release of Little Boy and Fat Man, not the aircraft commanders. It was Ashworth who directed the crew of Bockscar to forgo their primary target of Kokura, Japan after three failed bomb runs and proceed to the secondary target of Nagasaki. Parsons and Ashworth were Weaponeers, a core group of military officers involved with the Manhattan Project, and would rise to the flag officer rank in the Navy.

The Air Force has long heroized the pilot and their important role in the service. History likes heroes. Tibbets and Sweeney were the heroes of LeMay's Twentieth Air Force, even though their role, while critically important, was essentially to fly the plane to a designated location and back. Once Tibbets and Sweeney safely delivered their precious crew and cargo above Hiroshima and Nagasaki, the weaponeer prepared the nuclear weapon for execution, the bombardier assumed control of the aircraft, and upon direction from the mission commander, the bombardier released the weapon. Only once all critical nuclear actions were complete did the aircraft commander resume control of the aircraft for the return trip to base.

When CSAF General Welsh discussed General Rand's appointment as the first four-star commander of AFGSC, he told Rand to "go become the next Curtis LeMay. Bring this nuclear mission, no kidding, back to the front edge of Air Force attention every single day."[2] However, Welsh's guidance should be taken with caution, as there were plenty of service struggles caused by the manner LeMay controlled strategic assets. Missileers would not do well with another LeMay who favored manned bombers and rated personnel over all others. What missileers and the ICBM mission needs is another General White or General Power who understood that while ICBMs may present challenges for the service, they were critical for the nation and deserved to be recognized and emphasized alongside other core Air Force missions. The nuclear enterprise benefits from leaders who are forward thinking and can envision a future that is not merely a continuation of the past—leaders who can envision a future evolved from the past that has adapted from lessons learned along the way (see Appendix N).

The Air Force missileer has a long and storied past replete with innovations, growing pains, traditions, culture, success stories, and failures. Just as in the bygone days, strategic context will continue to influence technological developments, force structure, and personnel challenges, which will influence the force development of tomorrow's missileers. Deliberate effort is necessary to ensure that the choices of today enable the development of tomorrow's highly skilled and focused nuclear leaders—missileers.

[2] Aaron Mehta, "USAF Eyes Larger Say in Nuclear Enterprise," Defense News, 2 April 2015, http://www.defensenews.com/story/defense/air-space/strike/2015/04/02/usaf-eyes-larger-say-in-nuclear-enterprise/70827882/.

Appendix A

EVOLUTION OF TRIAD CONCEPTS

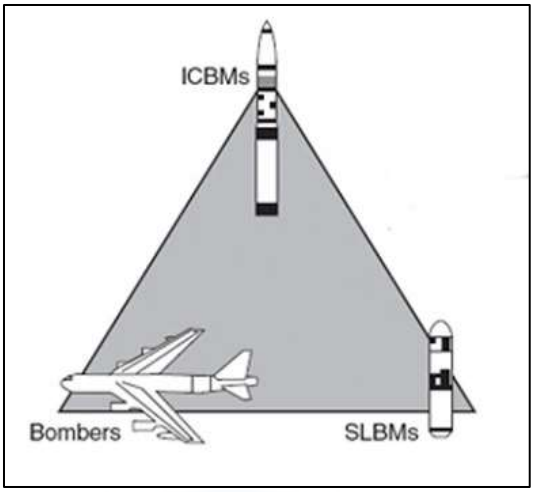


Figure 9: Traditional Nuclear Triad

Source: Michael Frankel, James Scouras, and George Ullrich, The New Triad: Diffusion, Illusion, and Confusion in the Nuclear Mission (Laurel, MD: Johns Hopkins Applied Physics Laboratory, 2009), 3.

Figure 10: Strategic Air Command's Twin Triad Concept

Source: Alert Operations and the Strategic Air Command, 1957-1991 (Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 7 December 1991), 52. This concept was used by General Lee Butler to gradually shift thinking on bomber and tanker missions to balance conventional and nuclear requirements.

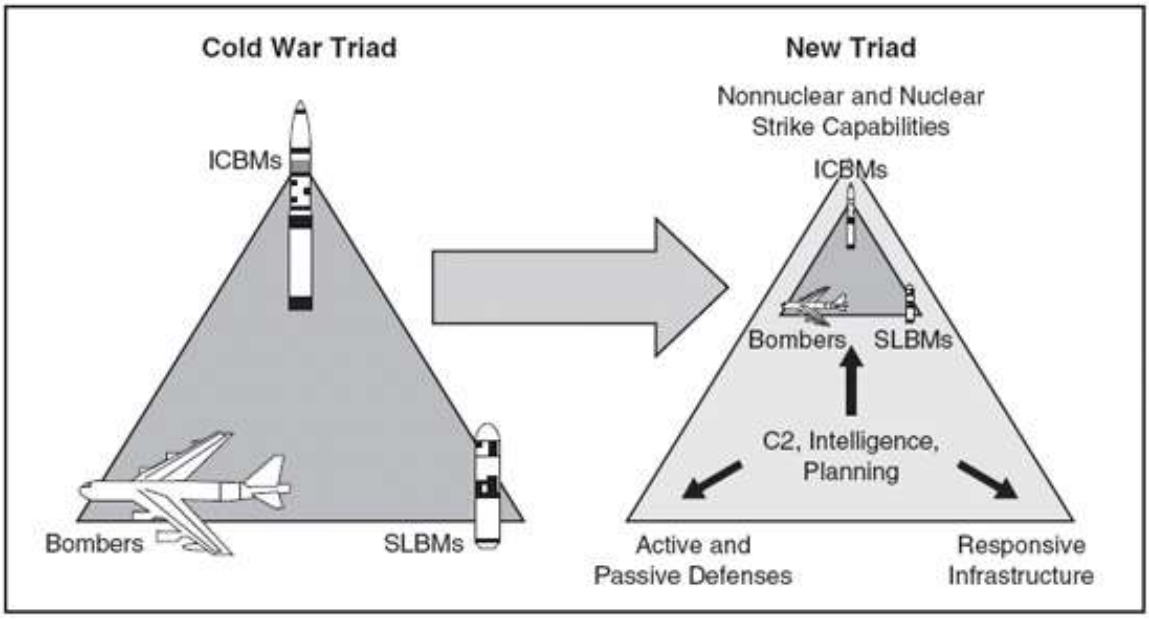


Figure 11: Evolution from the Cold War Triad to the New Triad

Source: Air Force Doctrine Document (AFDD) 2-12, Nuclear Operations, 7 May 2009, 6. The new triad reflected contemporary shift in doctrine in attempt to reflect changes in the security environment in a post-Cold War and post-9/11 world. However, the new triad effectively 'died on the vine' as it created more confusion than it did help. In large, there has been a reversal to the traditional Cold War triad with an understanding that bombers have a conventional mission and that other mission sets exist to support the contemporary military force in the missions they are involved in, particularly with C2, ISR, and planning functions.

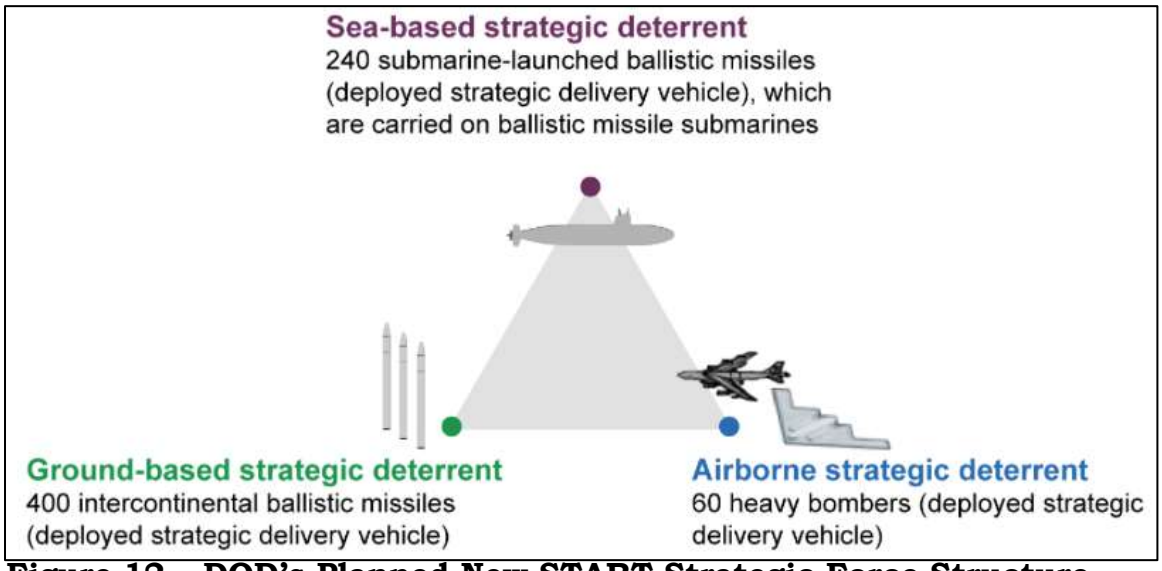
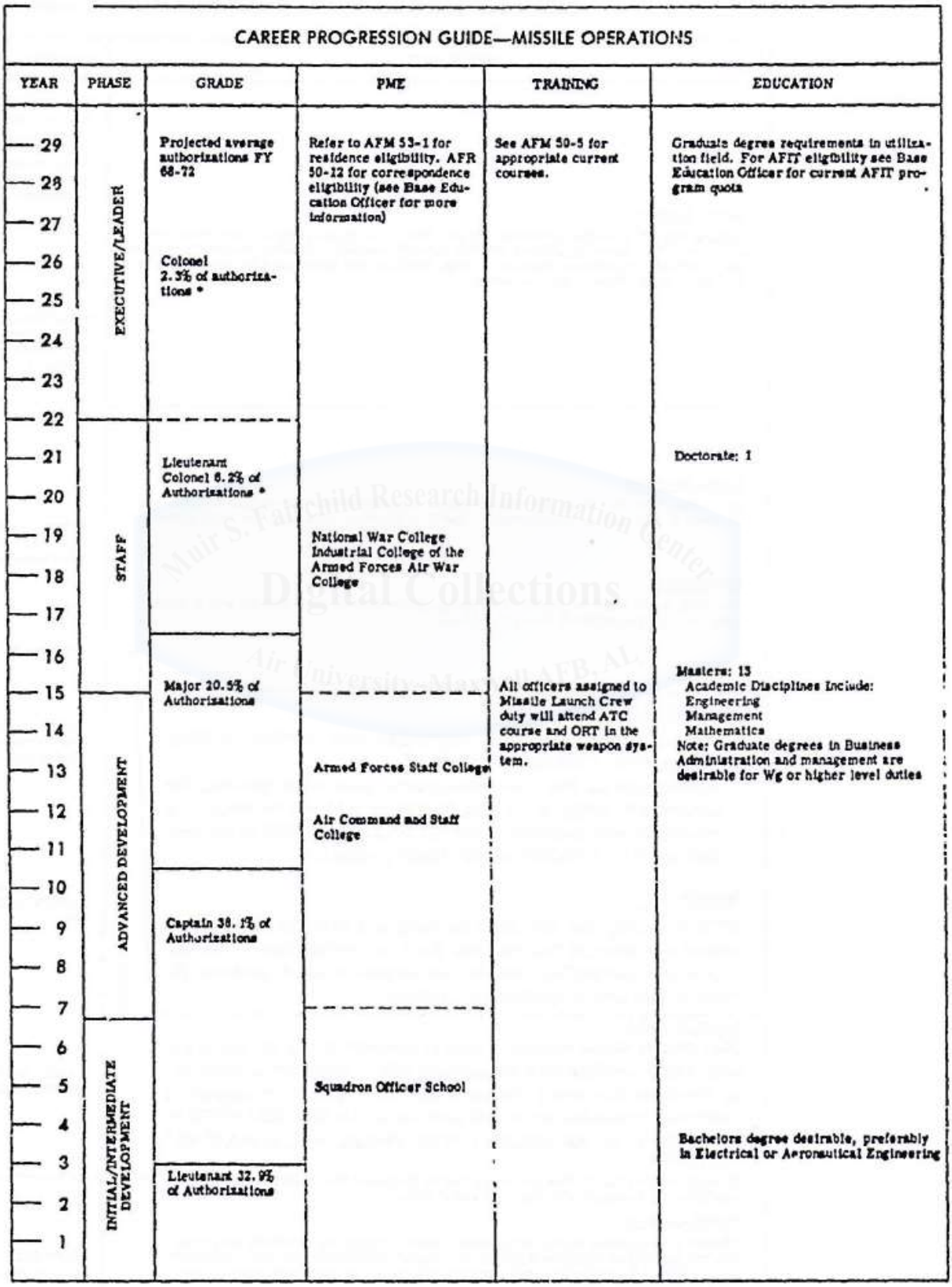


Figure 12 – DOD's Planned New START Strategic Force Structure

Source: United States Government Accountability Office, Nuclear Weapons: DOD Assessed the Need for Each Leg of the Strategic Triad and Considered Other Reductions to Nuclear Forces, GAO-16-740 (Washington, DC: Government Accountability Office, September 2016), 6.

Appendix B

EVOLUTION OF MISSILEER CAREER MODELS



CAREER PROGRESSION GUIDE—MISSILE OPERATIONS

YEAR	PHASE	GRADE	PME	TRAINING	EDUCATION
29	EXECUTIVE/LEADER	Projected average authorizations FY 68-72	Refer to AFM 53-1 for residence eligibility. AFR 50-12 for correspondence eligibility (see Base Education Officer for more information)	See AFM 50-5 for appropriate current courses.	Graduate degree requirements in utilization field. For AFIT eligibility see Base Education Officer for current AFIT program quota
28					
27					
26		Colonel 2.3% of authorizations *			
25					
24					
23					
22	STAFF				
21		Lieutenant Colonel 8.2% of Authorizations *			Doctorate: 1
20					
19			National War College Industrial College of the Armed Forces Air War College		
18					
17					
16					Masters: 13 Academic Disciplines Include: Engineering Management Mathematics Note: Graduate degrees in Business Administration and management are desirable for Wg or higher level duties
15	ADVANCED DEVELOPMENT	Major 20.5% of Authorizations		All officers assigned to Missile Launch Crew duty will attend ATC course and ORT in the appropriate weapon system.	
14					
13			Armed Forces Staff College		
12			Air Command and Staff College		
11					
10					
9		Captain 38.1% of Authorizations			
8					
7					
6	INITIAL/INTERMEDIATE DEVELOPMENT				
5			Squadron Officer School		
4					
3					Bachelors degree desirable, preferably in Electrical or Aeronautical Engineering
2		Lieutenant 32.9% of Authorizations			
1					

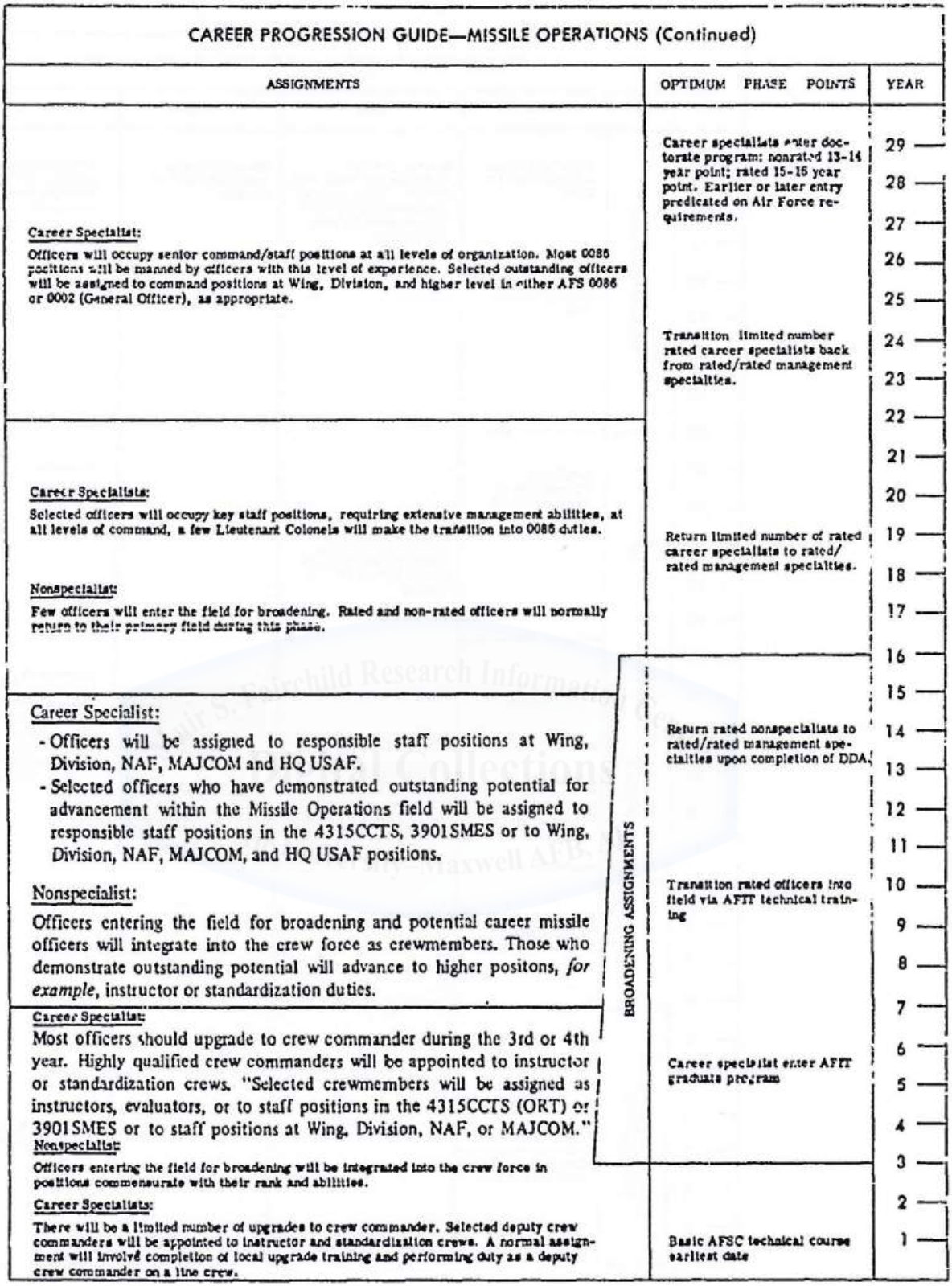


Figure 13: Missile Operations Career Progression Guide, 1972

Source: Michael P. Weitzel and John A. Belt, Career Development: Missile Officers' Perceptions and Opportunities, Technical Report no. 114 (Wichita, KS: Center for Human Appraisal and Communication Research, Wichita State University, 1975), 5-6.

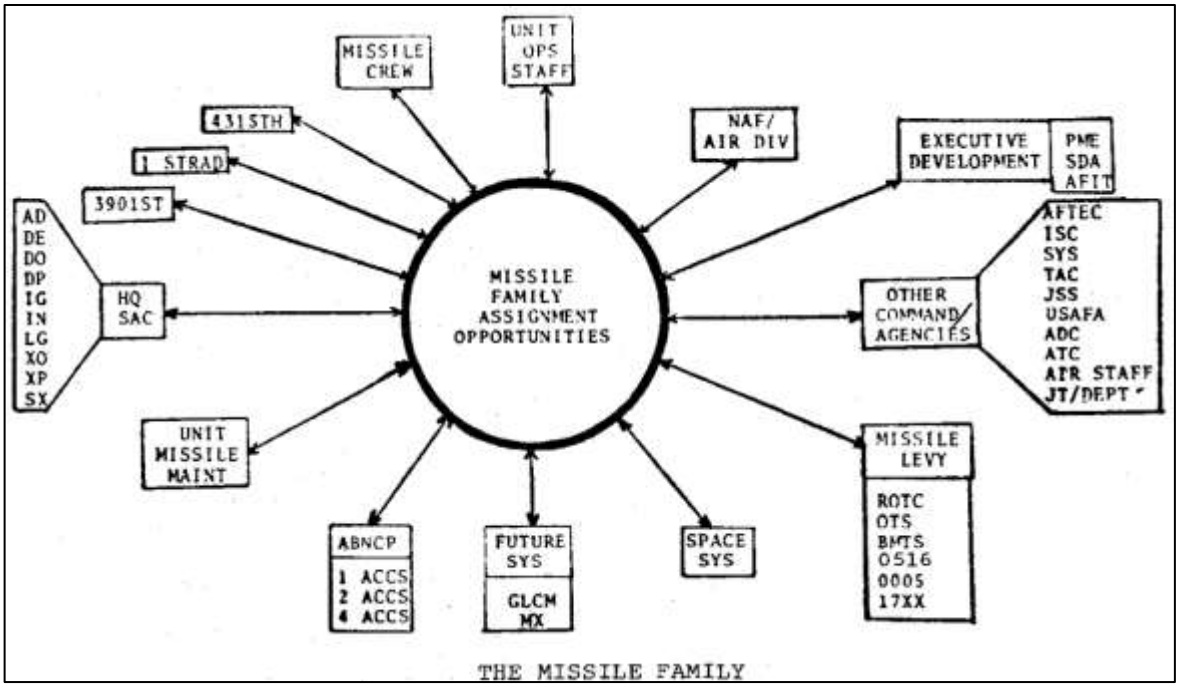


Figure 14: 18XX Missile Family Assignment Opportunities, 1979

Source: HQ SAC/DPXPM, "New Opportunities in the Missile Family," Missile Memos, VOL II, 19 September 1979, 10.

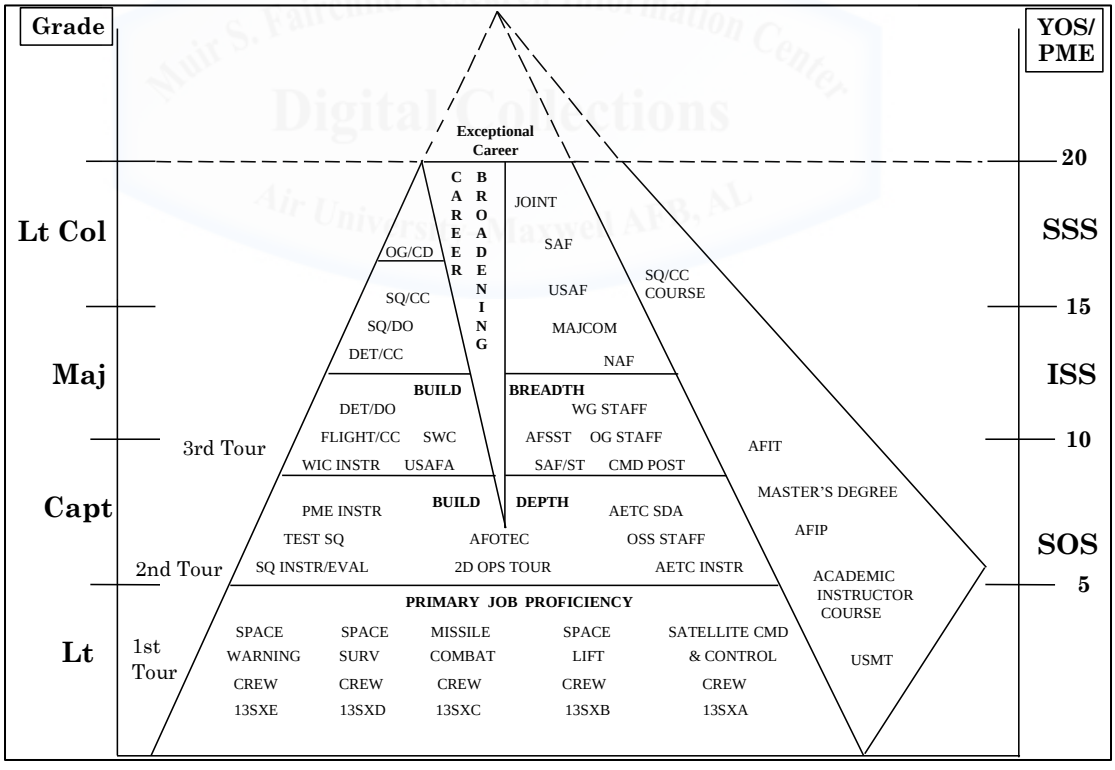


Figure 15: 13S Space and Missile Operations Career Path Pyramid, ca. 2000

Source: Department of the Air Force, Air Force Career Path Guide, (San Antonio, TX: Headquarters Air Force Personnel Center, 2000 ca.).

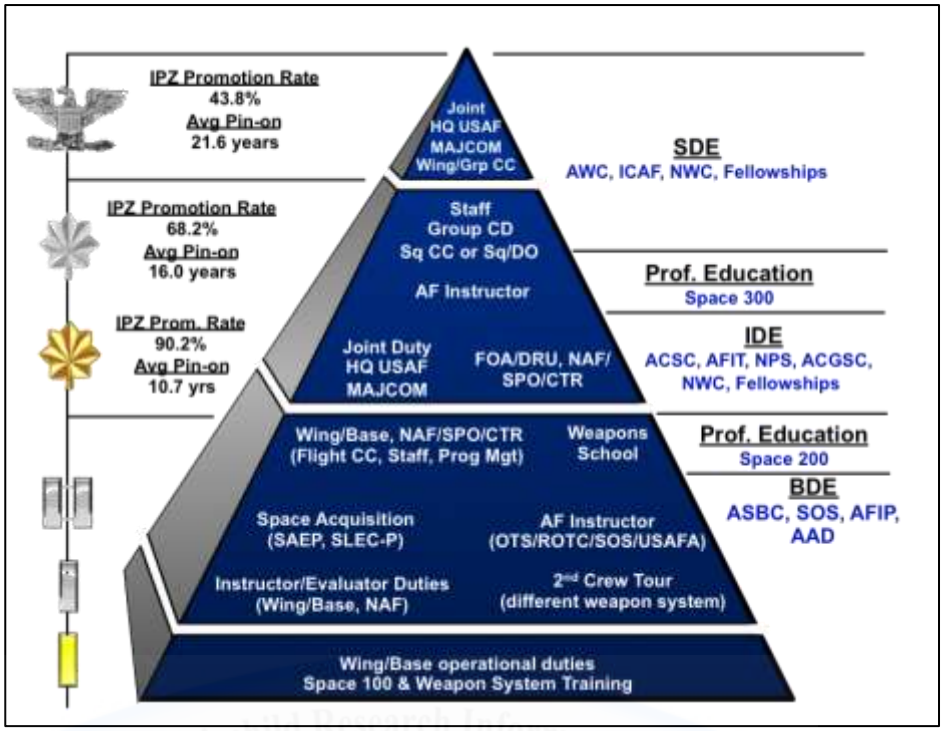


Figure 16: 13S Space and Missile Operations Career Path Pyramid, ca. 2006

Source: Department of the Air Force, Air Force Career Path Guide, (San Antonio, TX: Headquarters Air Force Personnel Center, 2006 ca.).

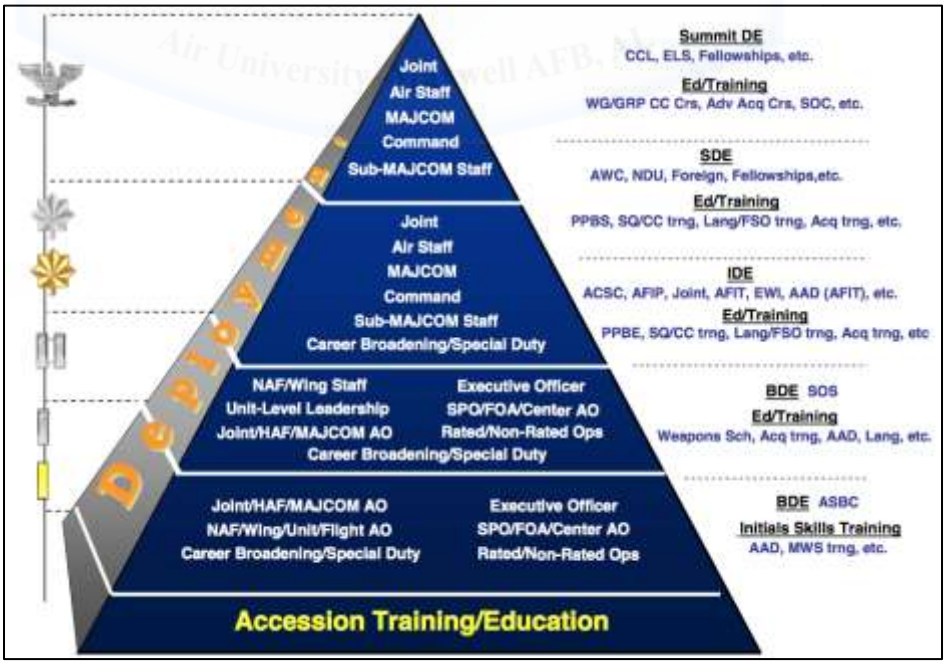


Figure 17: Officer Career Path Guide, 2008

Source: Air Force Instruction (AFI) 36-2640, Executing Total Force Development, 16 December 2008, 33.

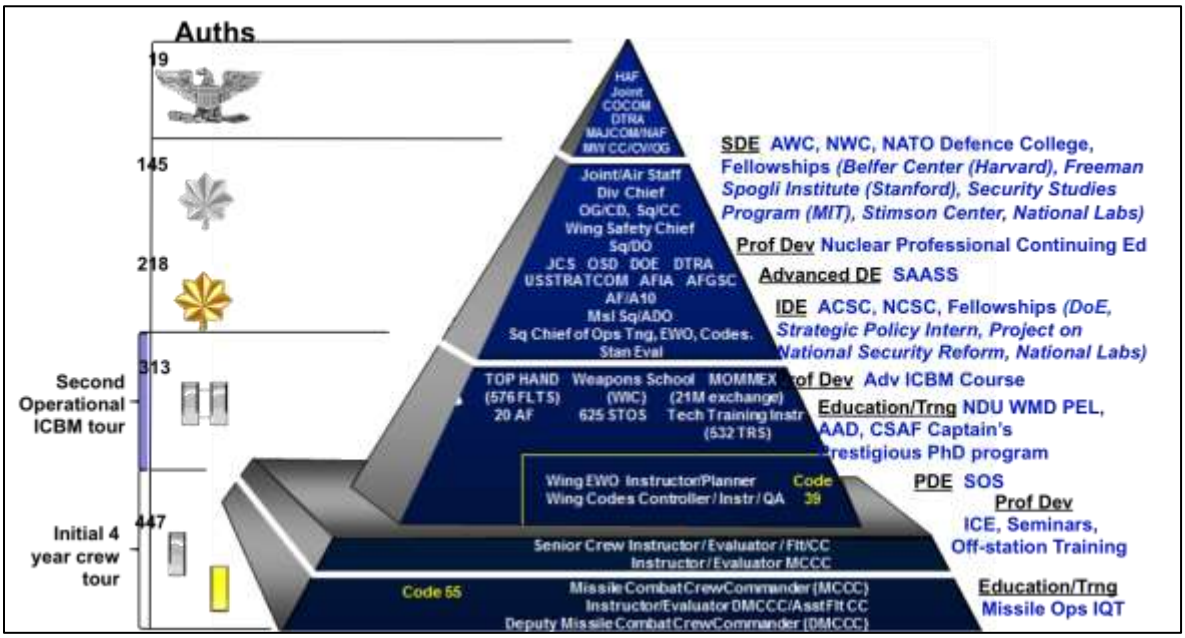


Figure 18: 13N Missile and Nuclear Operations Career Path Pyramid, 2012

Source: Briefing, Lt Gen Jones, AF/A1, subject 13S Split Implementation Plan at Fall 2012 CORONA, 7 December 2012.

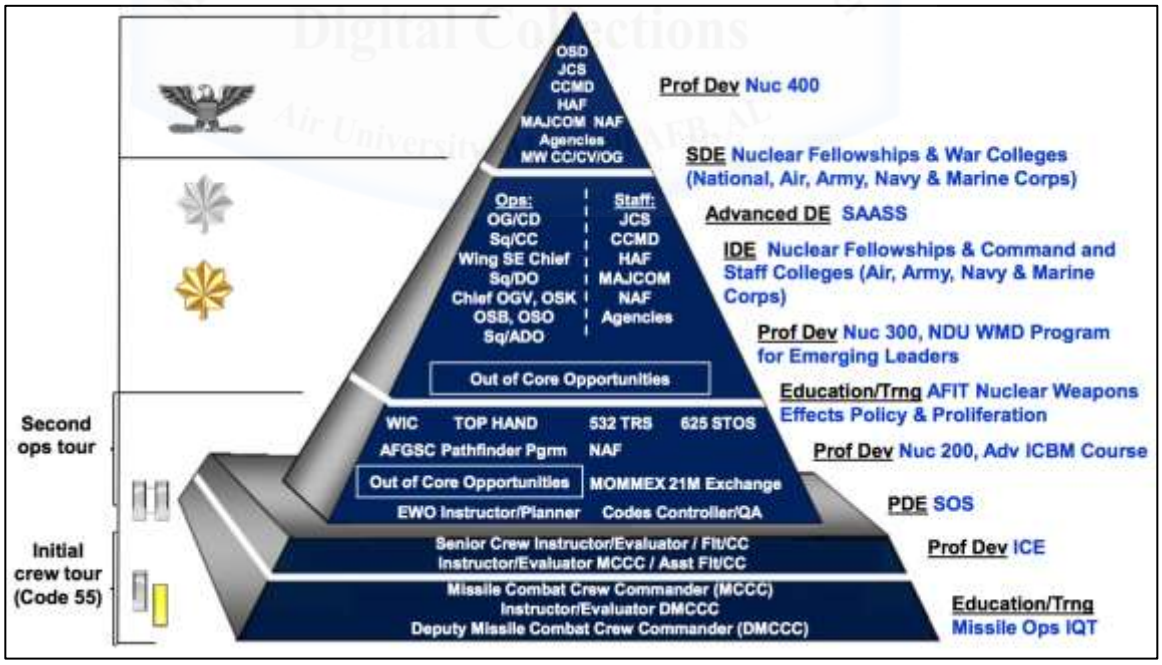


Figure 19: 13N Missile and Nuclear Operations Career Path Pyramid, 2014

Source: Maj Chad Dieterle, AFPC 13N Assignment Team, to the author, e-mail, subject: Missileer Force Development, 2 November 2016.

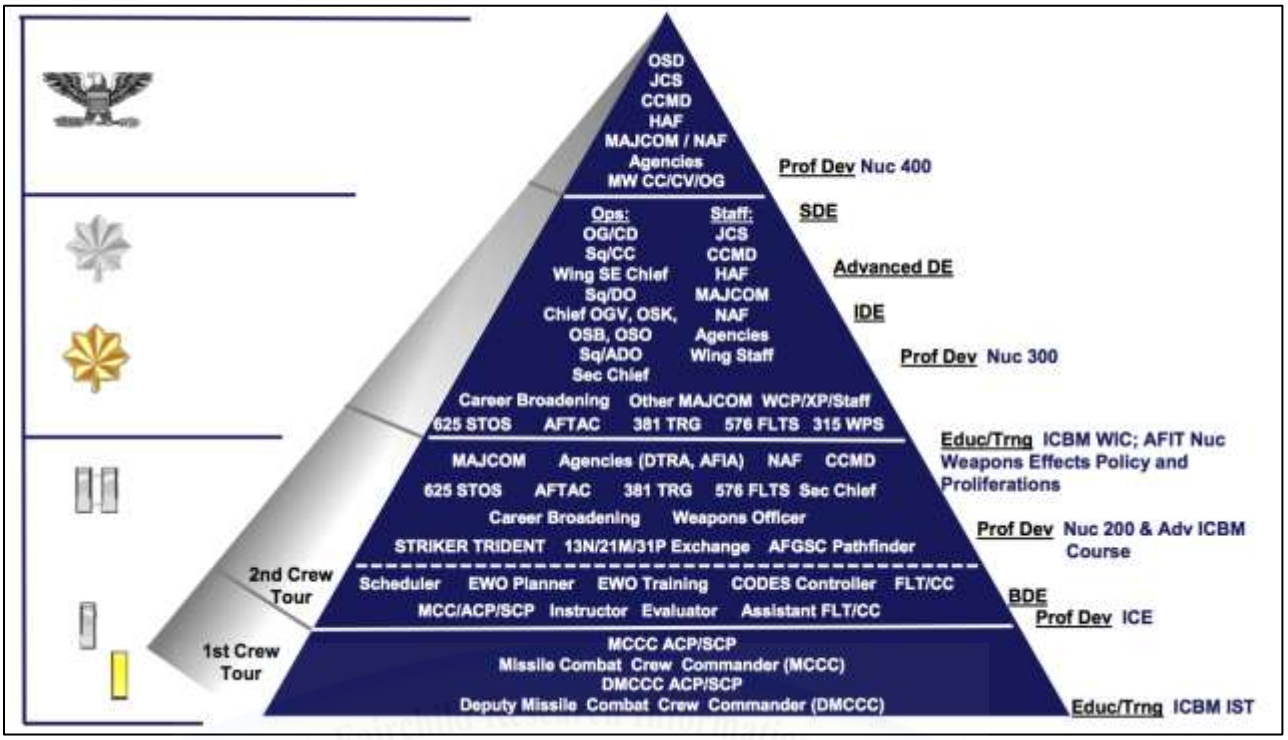


Figure 20: 13N Missile and Nuclear Operations Career Path Pyramid, 2016

Source: Maj Chad Dieterle, AFPC 13N Assignment Team, to the author, e-mail, subject: Missileer Force Development, 2 November 2016.

Appendix C

BALLISTIC MISSILE ORGANIZATIONAL STRUCTURE

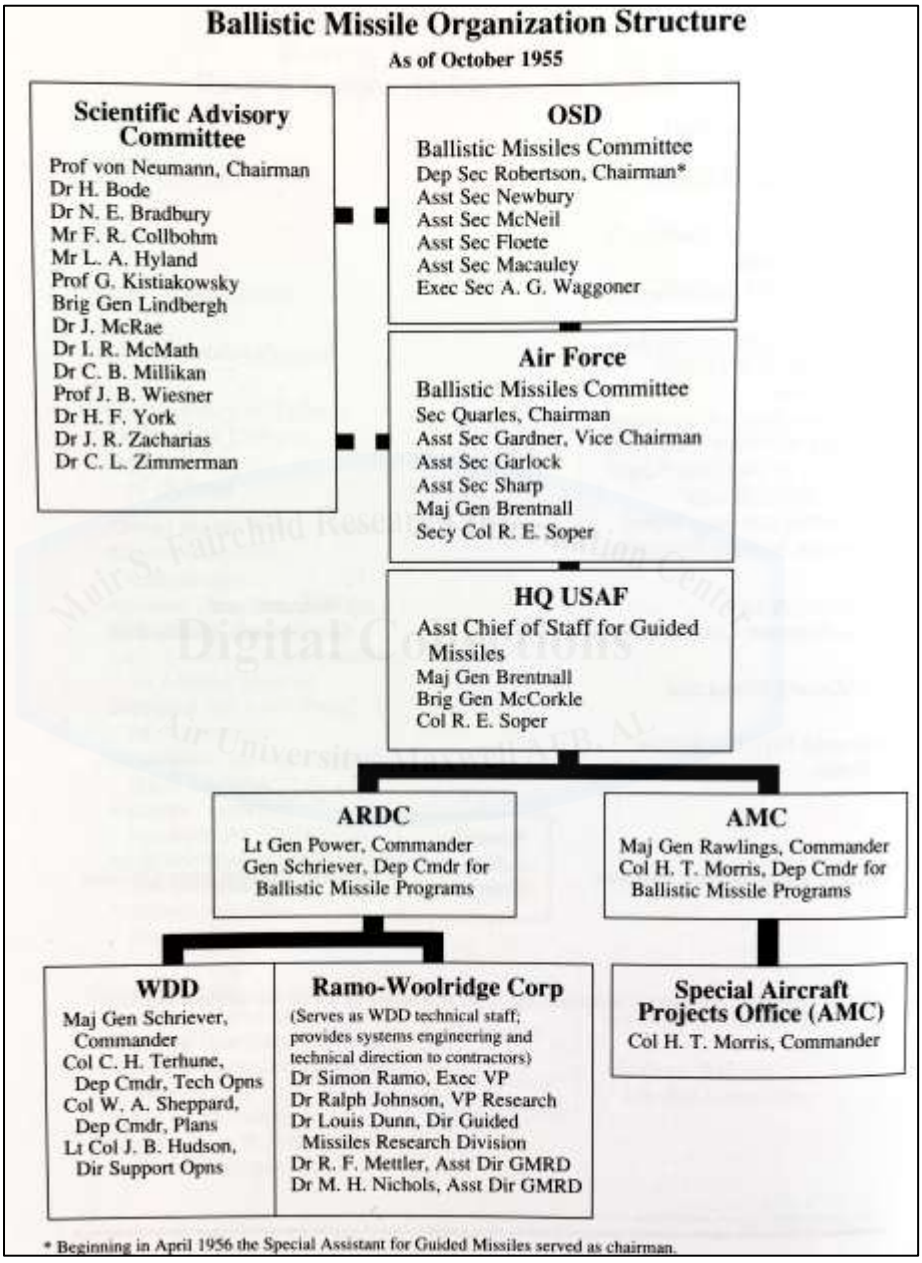


Figure 21: Ballistic Missile Organization Structure, October 1955

Source: Jacob Neufeld, Ballistic Missiles in the United States Air Force, 1945-1960 (Washington, DC: Office of Air Force History), 140.

Appendix D

ICBM WING & SQUADRON ASSIGNMENTS, 1958-2017

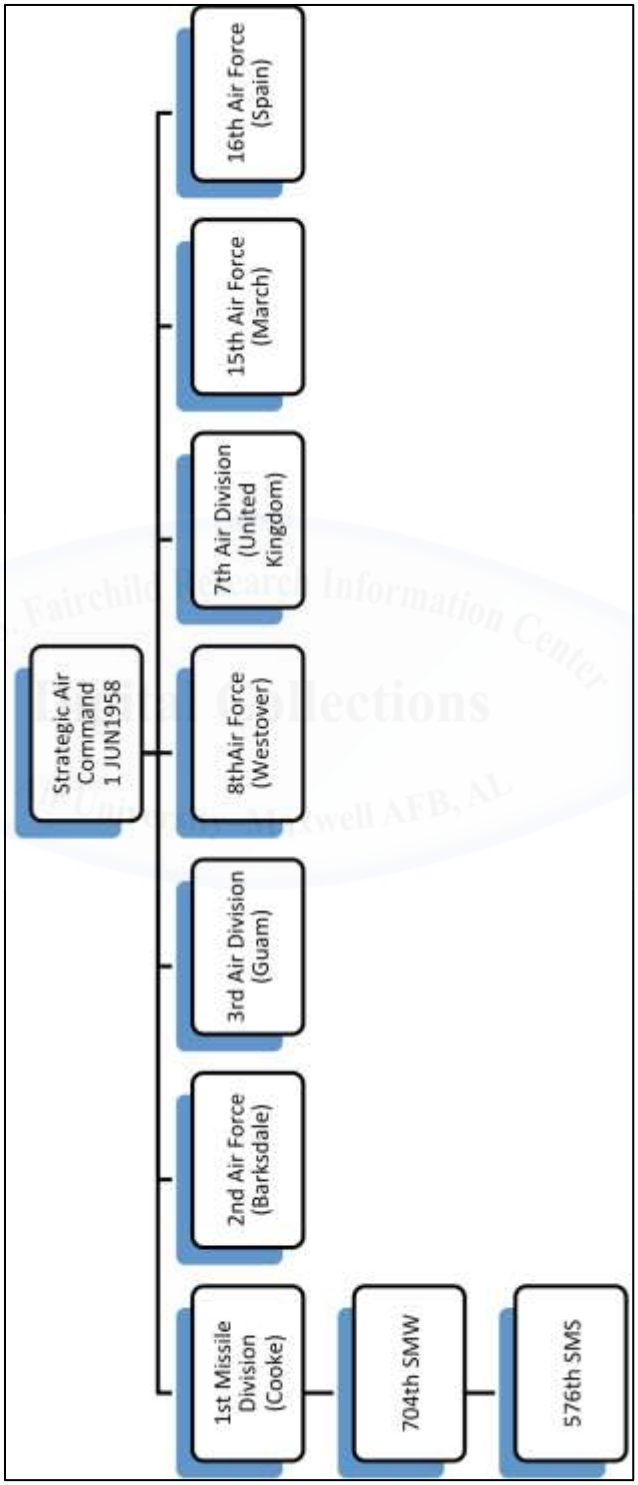


Figure 22: SAC ICBM Wing & Squadron Assignments, 1958

Source: Author's Original Work

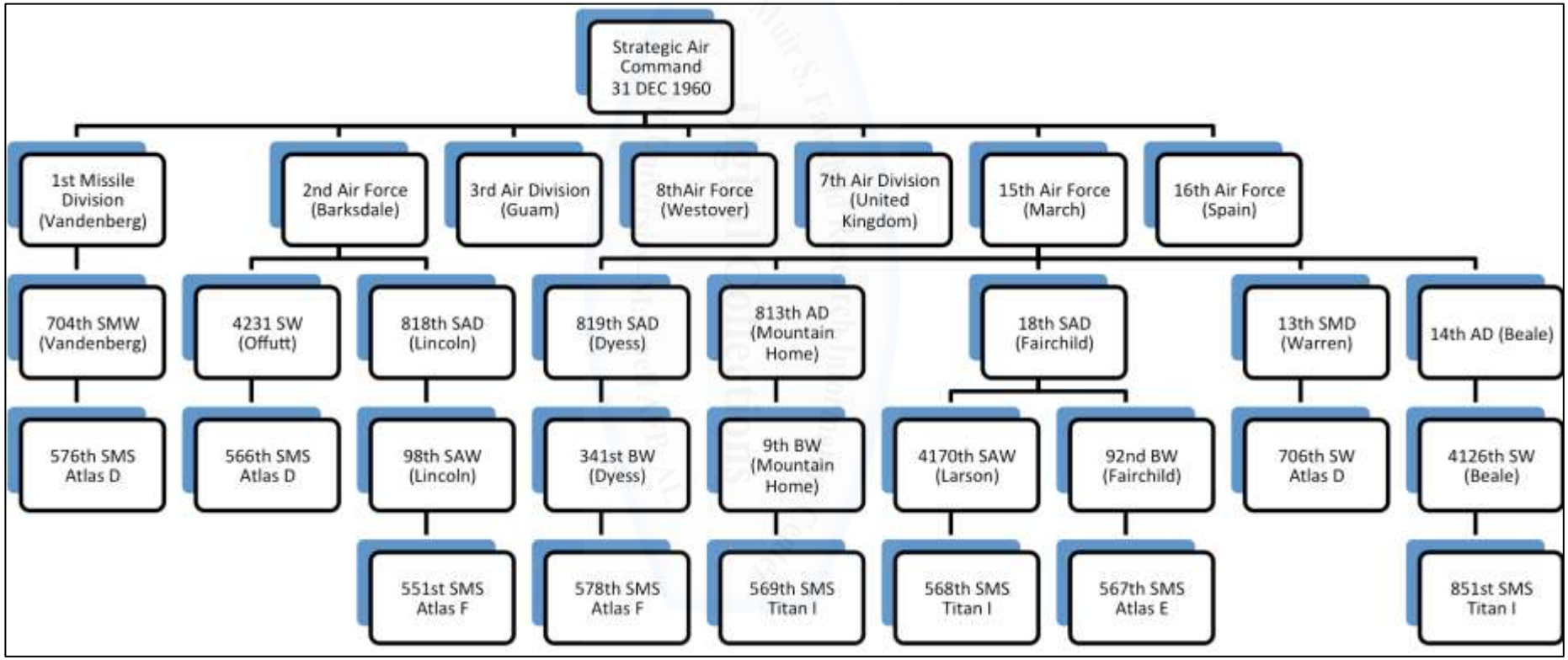


Figure 23: SAC ICBM Wing & Squadron Assignments, 1960

Source: Author's Original Work

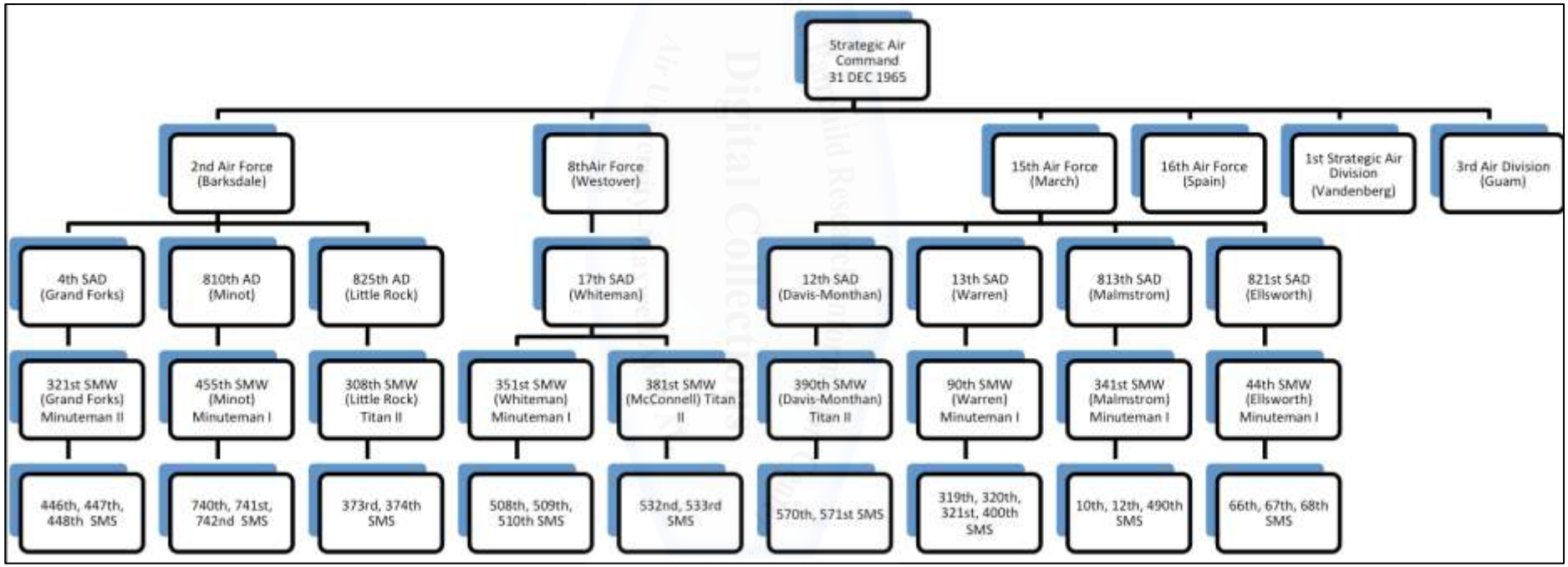


Figure 24: SAC ICBM Wing & Squadron Assignments, 1965

Source: Author's Original Work

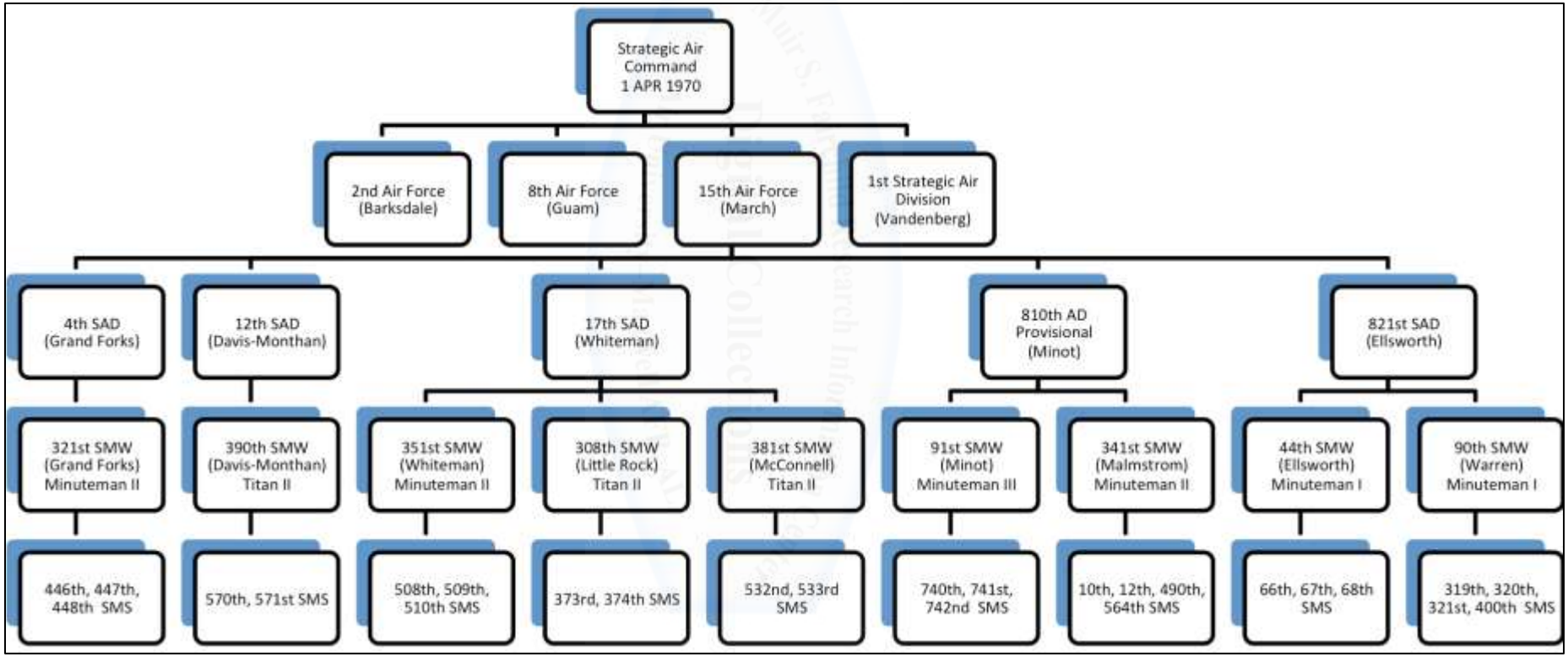


Figure 25: SAC ICBM Wing & Squadron Assignments, 1970

Source: Author's Original Work

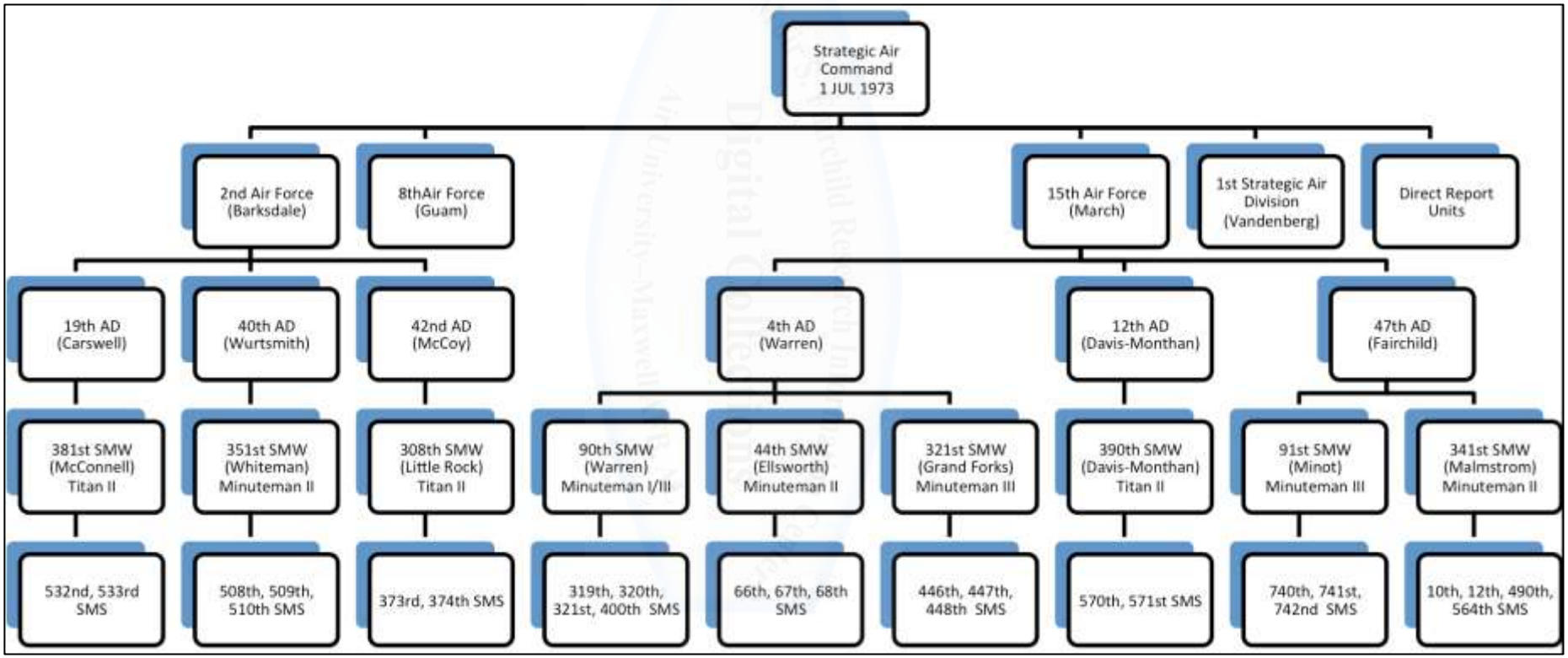


Figure 26: SAC ICBM Wing & Squadron Assignments, 1973

Source: Author's Original Work

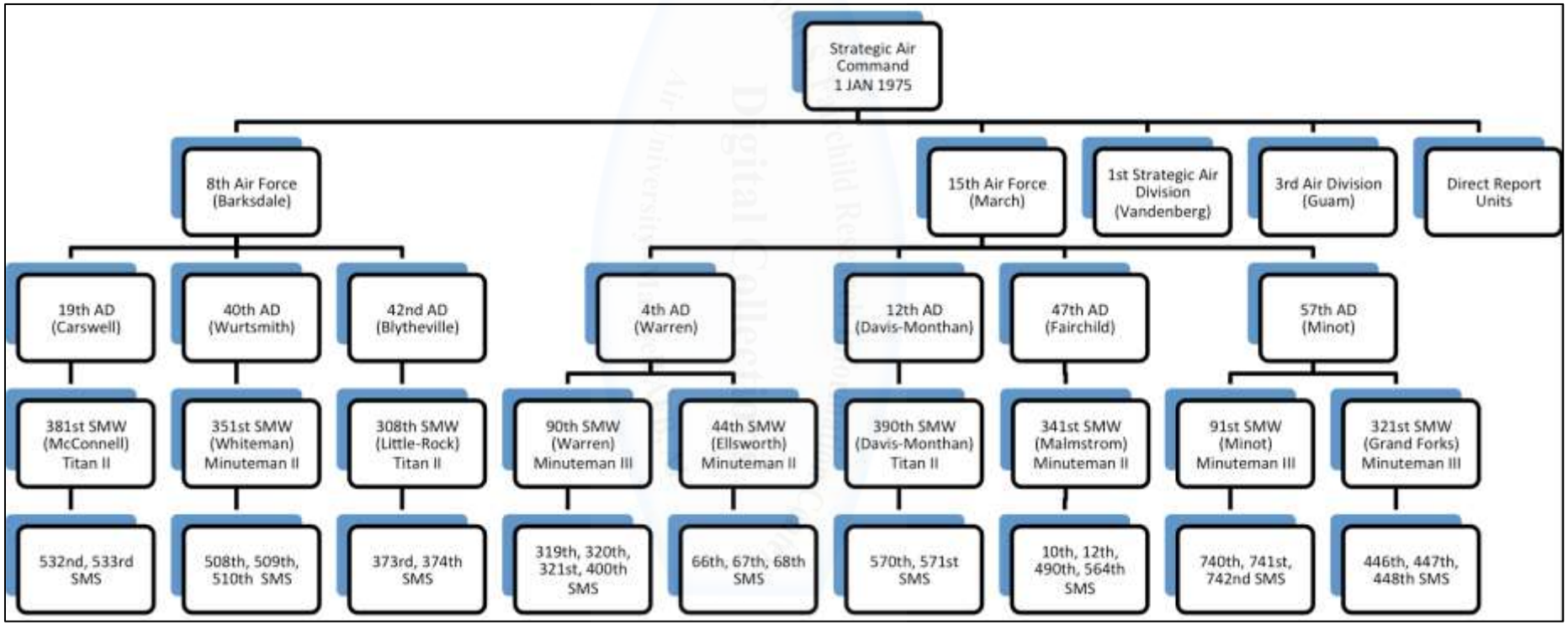


Figure 27: SAC ICBM Wing & Squadron Assignments, 1975

Source: Author's Original Work

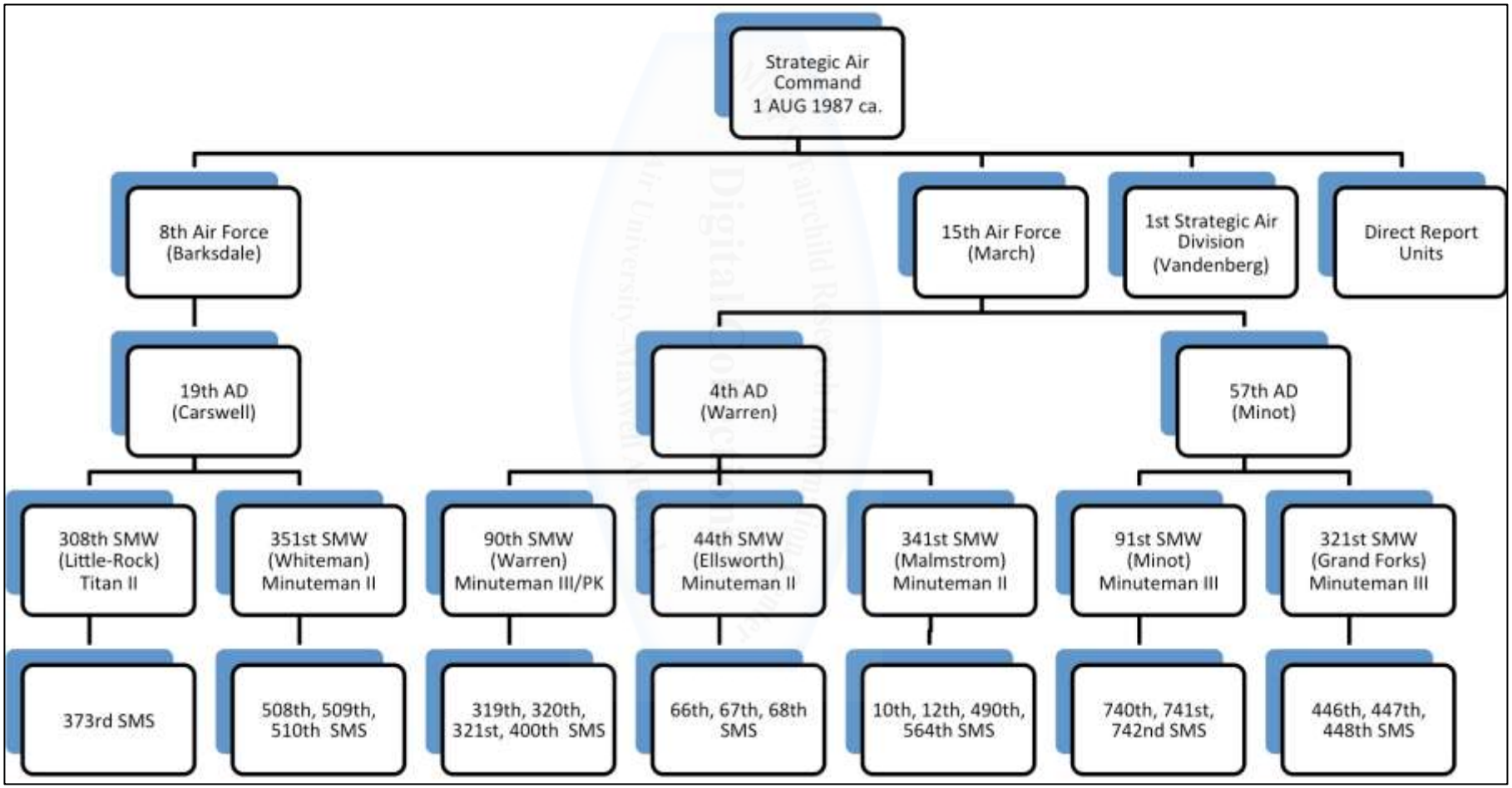


Figure 28: SAC ICBM Wing & Squadron Assignments, 1987

Source: Author's Original Work

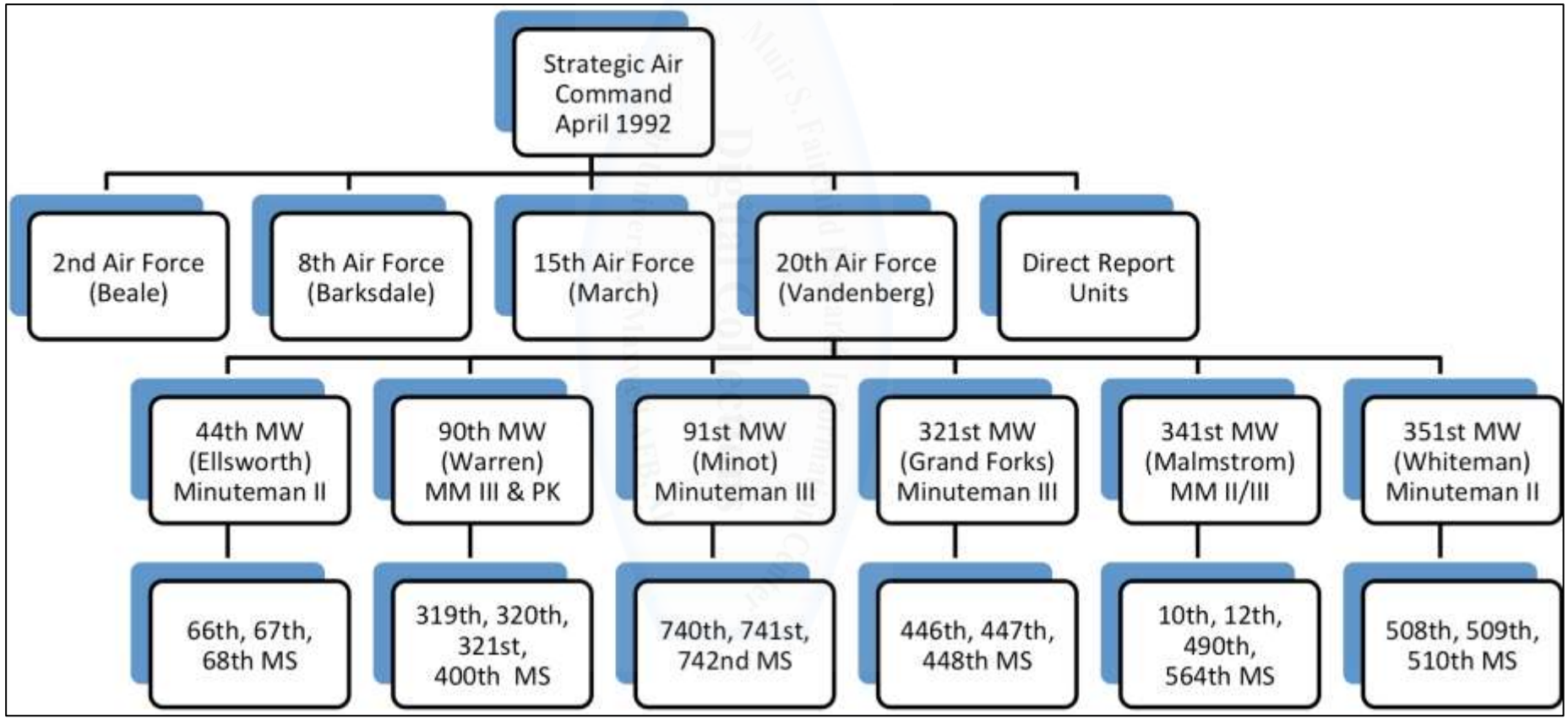


Figure 29: SAC ICBM Wing & Squadron Assignments, 1992

Source: Author's Original Work

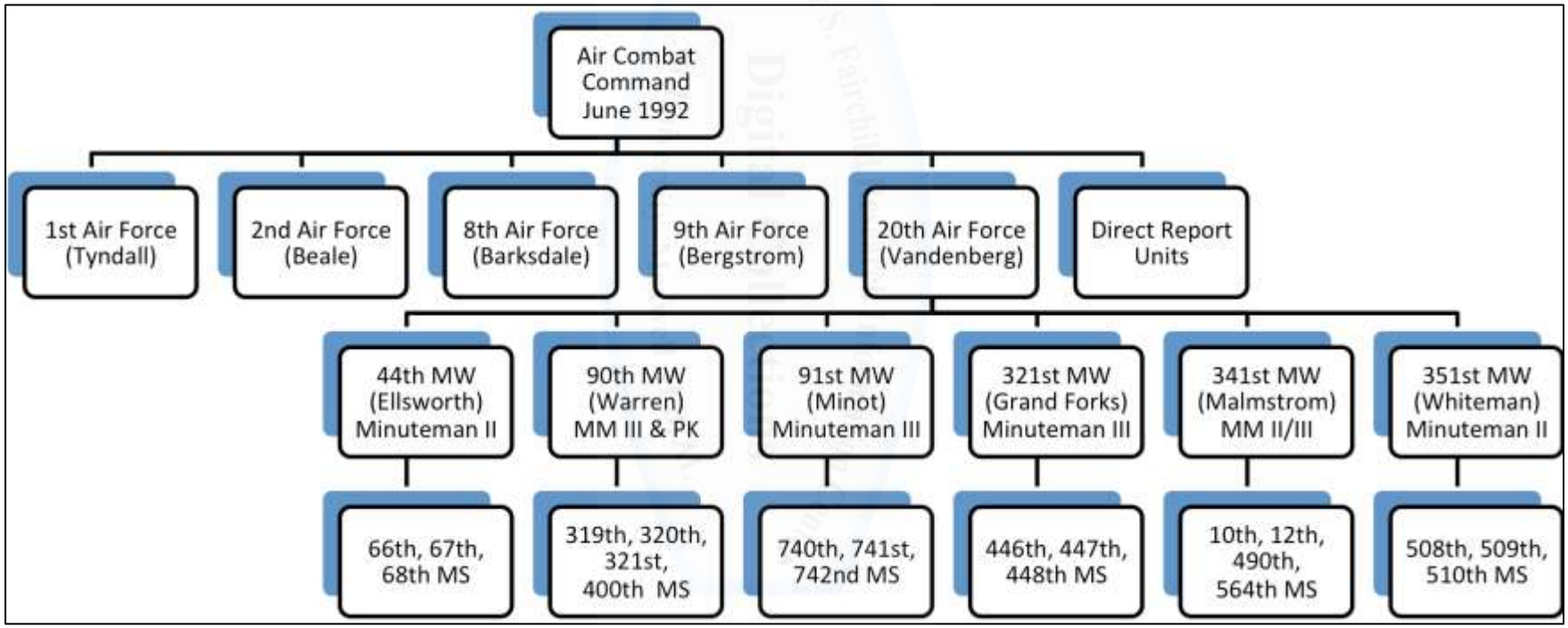


Figure 30: ACC ICBM Wing & Squadron Assignments, 1992

Source: Author's Original Work

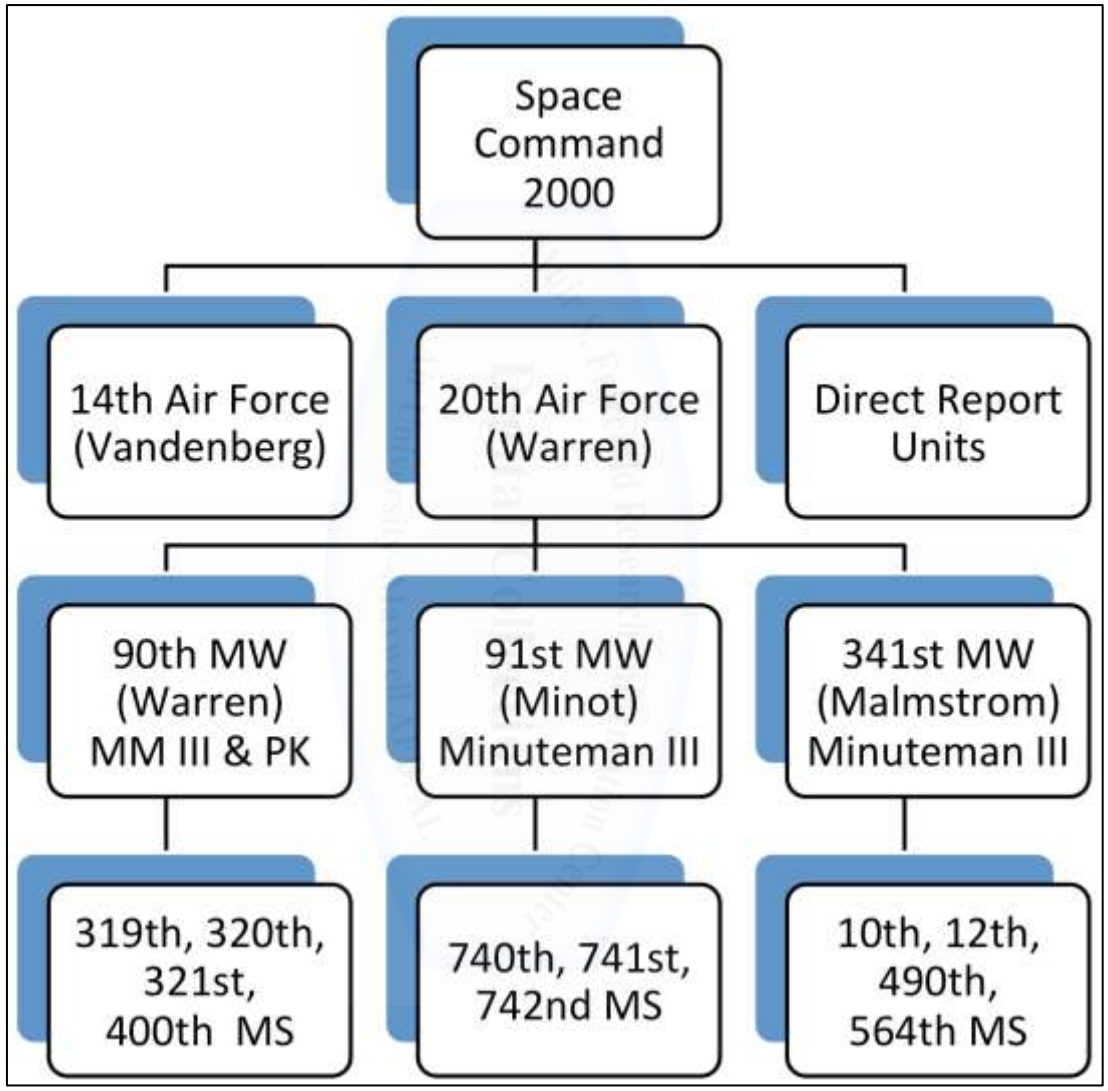


Figure 31: AFSPC ICBM Wing & Squadron Assignments, 2000

Source: Author's Original Work

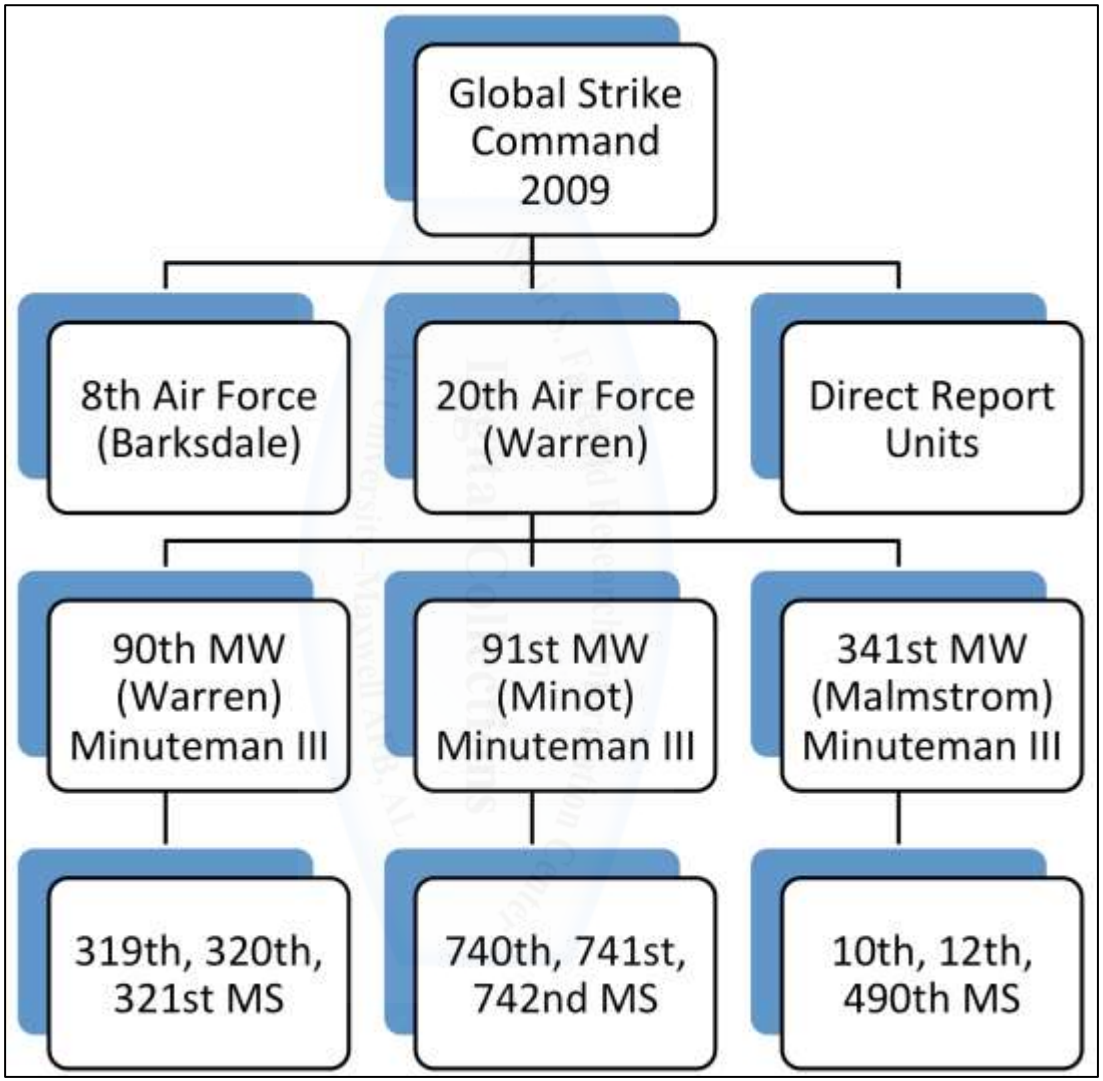


Figure 32: AFGSC ICBM Wing & Squadron Assignments, 2009

Source: Author's Original Work

Appendix E

OPERATIONAL ICBM BASING HISTORY

Table 12: Operational ICBM Basing History, 1959-2017

Atlas	
Base	**Weapon System Series**
F. E. Warren AFB, Wyoming	Atlas D/E
Offutt AFB, NE	Atlas D
Vandenberg AFB, California	Atlas D
Fairchild AFB, Washington	Atlas E
Forbes AFB, Kansas	Atlas E
Altus AFB, Oklahoma	Atlas F
Dyess AFB, Texas	Atlas F
Lincoln AFB, Nebraska	Atlas F
Plattsburgh AFB, New York	Atlas F
Schilling AFB, Kansas	Atlas F
Walker AFB, New Mexico	Atlas F
Titan	
Beale AFB, California	Titan I
Ellsworth AFB, South Dakota	Titan I
Larson AFB, Washington	Titan I
Lowry AFB, Colorado	Titan I
Mountain Home AFB, Idaho	Titan I
Davis-Monthan AFB, Arizona	Titan II
Little Rock AFB, Arkansas	Titan II
McConnell AFB, Kansas	Titan II
Minuteman	
Malmstrom AFB, Montana	Minuteman I/II/III
Ellsworth AFB, South Dakota	Minuteman I/II
Minot AFB, North Dakota	Minuteman I/III
Whiteman AFB, Missouri	Minuteman I/II
F. E. Warren AFB, Wyoming	Minuteman I/III
Grand Forks AFB, North Dakota	Minuteman II/III
Peacekeeper	
F. E. Warren AFB, WY	Peacekeeper

Source: Adapted from: From Snark to Peacekeeper: A Pictorial History of Strategic Air Command Missiles (Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 1 May 1990), 93-123.

Appendix F

ICBM SQUADRON, LCC, AND LF TOTALS, 1959-2016

Table 13: ICBM Squadron, LCC, and LF Totals, 1959-2016

TOTAL OPERATIONAL SQUADRONS (SQ), LAUNCH CONTROL CENTERS (LCC), AND LAUNCH FACILITIES (LF)
* NUMBERS BASED ON STATUS AT END OF EACH CALENDAR YEAR

YEAR	Atlas - D			Atlas - E			Atlas - F			Titan I			Titan II			Minuteman I/II/III			Peacekeeper			TOTALS		
	SQ	LCC	LF	SQ	LCC	LF	SQ	LCC	LF	SQ	LCC	LF	SQ	LCC	LF	SQ	LCC	LF	SQ	LCC	LF	SQ	LCC	LF
1959	1	1	3																			1	1	3
1960	2	3	9							2	6	18										4	9	27
1961	4	9	27	3	27	27				6	18	54										13	54	108
1962	4	9	27	3	27	27	6	72	72	6	18	54	6	54	54	9	45	450				34	225	684
1963	4	9	27	3	27	27	6	72	72	6	18	54	6	54	54	13	65	650				38	245	884
1964				3	27	27	6	72	72	6	18	54	6	54	54	16	80	800				37	251	1007
1965													6	54	54	19	95	950				25	149	1004
1966													6	54	54	20	100	1000				26	154	1054
1967													6	54	54	20	100	1000				26	154	1054
1968													6	54	54	20	100	1000				26	154	1054
1969													6	54	54	20	100	1000				26	154	1054
1970													6	54	54	20	100	1000				26	154	1054
1971													6	54	54	20	100	1000				26	154	1054
1972													6	54	54	20	100	1000				26	154	1054
1973													6	54	54	20	100	1000				26	154	1054
1974													6	54	54	19	95	950	1	5	50	26	154	1054
1975													6	54	54	19	95	950	1	5	50	26	154	1054
1976													6	54	54	19	95	950	1	5	50	26	154	1054
1977													6	54	54	19	95	950	1	5	50	26	154	1054
1978													6	54	54	19	95	950	1	5	50	26	154	1054
1979													6	54	54	19	95	950	1	5	50	26	154	1054
1980													6	54	54	19	95	950	1	5	50	26	154	1054
1981													6	54	54	19	95	950	1	5	50	26	154	1054
1982													6	54	54	19	95	950	1	5	50	26	154	1054
1983													5	45	45	19	95	950	1	5	50	25	145	1045
1984													4	36	36	19	95	950	1	5	50	24	136	1036
1985													4	36	36	19	95	950	1	5	50	24	136	1036
1986													1	9	9	19	95	950	1	5	50	21	109	1009
1987																19	95	950	1	5	50	20	100	1000
1988																19	95	950	1	5	50	20	100	1000
1989																19	95	950	1	5	50	20	100	1000
1990																19	95	950	1	5	50	20	100	1000
1991																19	95	950	1	5	50	20	100	1000
1992																18	90	900	1	5	50	19	95	950
1993																17	85	850	1	5	50	18	90	900
1994																16	80	800	1	5	50	17	85	850
1995																13	65	650	1	5	50	14	70	700
1996																13	65	650	1	5	50	14	70	700
1997																13	65	650	1	5	50	14	70	700
1998																10	50	500	1	5	50	11	55	550
1999																10	50	500	1	5	50	11	55	550
2000																10	50	500	1	5	50	11	55	550
2001																10	50	500	1	5	50	11	55	550
2002																10	50	500	1	5	50	11	55	550
2003																10	50	500	1	5	50	11	55	550
2004																10	50	500	1	5	50	11	55	550
2005																10	50	500				10	50	500
2006																10	50	500				10	50	500
2007																10	50	500				10	50	500
2008																9	45	450				9	45	450
2009																9	45	450				9	45	450
2010																9	45	450				9	45	450
2011																9	45	450				9	45	450
2012																9	45	450				9	45	450
2013																9	45	450				9	45	450
2014																9	45	450				9	45	450
2015																9	45	450				9	45	450
2016																9	45	450				9	45	450

Source: Author's Original Work[1]

[1] *Adapted From Snark to Peacekeeper: A Pictorial History of Strategic Air Command Missiles (Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 1 May 1990), 13-15, 23, 25, 31, 47 79-93. Information from 1959-1990 was extracted from this source and only includes operational ICBM squadrons, no training or support squadrons.*

Appendix G

USSTRATCOM ORGANIZATIONAL STRUCTURES, 2011-2017

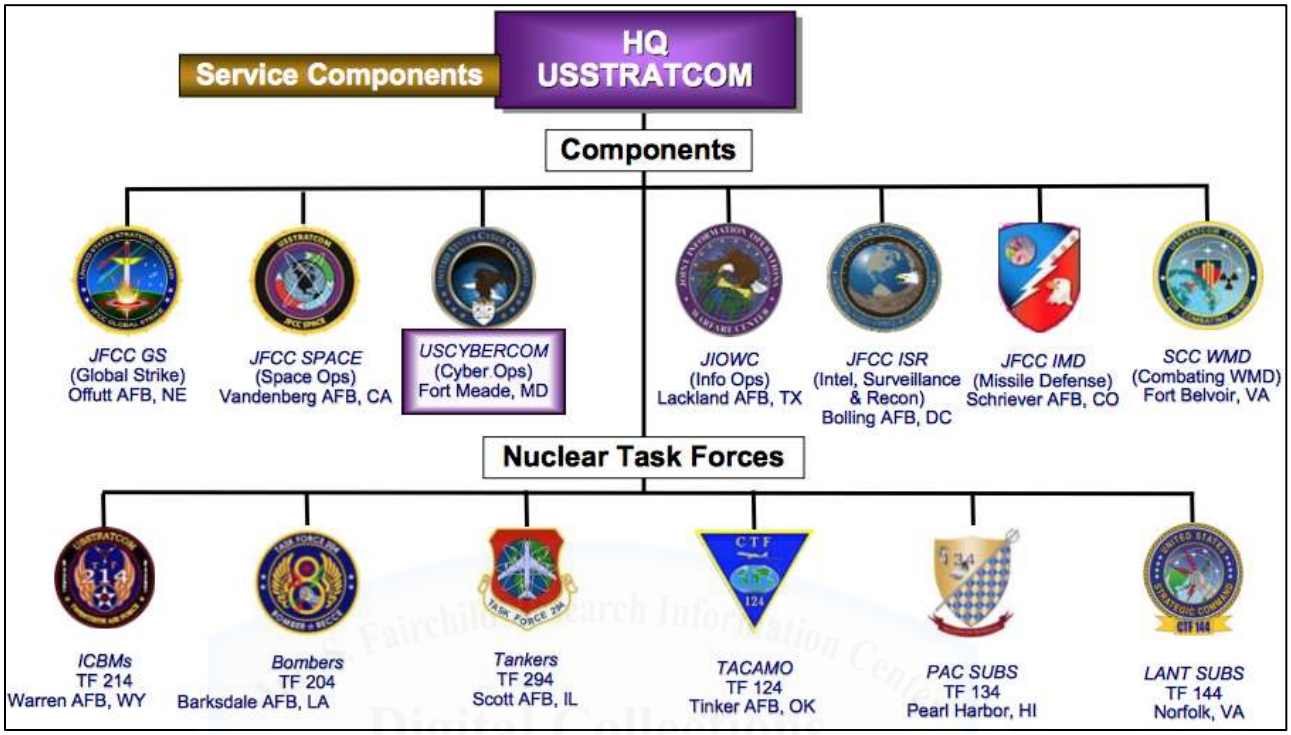


Figure 33: USSTRATCOM Organizational Structure, 2011

Source: Briefing, David W. Tyner, Capability and Resource Integration Directorate - J8, subject: Directorate Briefing, 23 June 2011, http://www.dtic.mil/ndia/2011/SET/TYNER.pdf.

Table 14: USSTRATCOM Organizational Rank Structure, April 2017

USSTRATCOM/CC	★★★★
USCYBERCOM/CC	★★★★
JFCC-IMD	★★★
JFCC-Space	★★★
JFCC-ISR	★★★
JFCC-GS	★★
SCC WMD	SES
JWAC	O-6
TF 214 (20 AF/CC)	★★
TF 204 (8 AF/CC)	★★
TF 294 (18 AF/CC)	★★★
TF 124	O-6
TF 134 (COMSUBPAC/CC)	★★
TF 144 (COMSUBLANT/CC)	★★★

Source: "Functional Components," U.S. Strategic Command, http://www.stratcom.mil/components/.

Figure 34: Planned USSTRATCOM Organizational Changes, April 2017

Source: Gen John E. Hyten, commander, USSTRATCOM, Commander's Conference Briefing, subject: USSTRATCOM Organization, 28 April 2017.

Figure 35: Detailed USSTRATCOM Structure Change Plans, April 2017

Source: Gen John E. Hyten, commander, USSTRATCOM, Commander's Conference Briefing, subject: USSTRATCOM Organization, 28 April 2017.

Appendix H

AFGSC ASSIGNED UNITS, 2016

Figure 36: AFGSC Assigned Units, 2016

Source: "Air Force Global Strike Command Strategic Plan, 2016," Air Force Global Strike Command, 2016, 8, http://www.afgsc.af.mil/Portals/51/Docs/AFGSC%20Strategic%20Plan_2016_CC%20Signed.pdf?ver=2016-05-06-144801-403.

Appendix I

SIGNIFICANT WORLD EVENTS, TREATIES, AND INITIATIVES, 1989-1996

Table 15: Significant World Events, Treaties, and Initiatives, 1989-1996

YEAR	TREATY / EVENT / INITIATIVE	SIGNIFICANCE
1989	9 Nov - Fall of Berlin Wall	Opening of East/West Berlin & Germany
	2-3 Dec - Malta Summit	U.S. & Soviet Union announce an end to the Cold War
	Dismantling of South African Nuclear Program	First country to have a nuclear program and then abandon it
1990	19 Nov - Treaty on Conventional Armed Forces in Europe	Limited NATO & Warsaw Pact total number of tanks, combat aircraft, attack helicopters, and armored vehicles
1991	31 Jul - Strategic Arms Reductions Talks I (START I)	Reduce nuclear stockpiles by 25-30%
	27 Sep - Bush Presidential Nuclear Initiative I (PNI I)	Reciprocal unilateral actions to eliminate tactical nuclear weapons & implement sweeping changes in U.S. nuclear posture
	Nov - Nunn-Lugar Act	Made provisions to address nuclear stockpiles of Ukraine, Belarus, and Kazakhstan through Cooperative Threat Reduction (CTR) program
	25 Dec - Dissolution of Soviet Union	Heralded new international dynamic
1992	28 Jan - Bush PNI II	Limitations on strategic forces: ended PK production, capped B-2 numbers, cancelled small-ICBM program, ended W-88 warhead production
	24 Mar - Open Skies Treaty	Allows for reciprocal unarmed aerial observation flights
	2 Oct – U.S. Unilateral Testing Moratorium	Adopted in reciprocation to Soviet moratorium of 1 Oct 1991
1993	Oct-Nov - Presidential Decision Directive 15 (PDD-15)	Established Dept of Energy Stockpile Stewardship Program to preserve nuclear intellectual and technical competence
1994	15 Jan - Moscow Summit	U.S. & Russia to cease to targeting each other with nuclear weapons; convert highly-enriched uranium to low-enriched
	5 Dec - Budapest Memorandum	Ukraine, Belarus, and Kazakhstan commitment to eliminate nuclear weapons & given security assurances from others
1995	15 Dec - Treaty of Bangkok	Bans nuclear weapons in southeast Asia
	11 Aug – U.S.-Zero Yield Nuclear Testing	Clinton announces desire for zero-yield nuclear testing
1996	1 Jan - Pelindaba Treaty	Bans nuclear weapons in Africa
	10 Sep - Comprehensive Test Ban Treaty (CTBT)	First security related treaty senate has not ratified in 80 years

Source: Author's Original Work

Appendix J

STUDIES AND PAPERS ADDRESSING MISSILEER CHALLENGES

Table 16: Studies and Papers Addressing Missileer Challenges

- Air Force Report on the Ballistic Missile: Its Technology, Logistics and Strategy (1958)*
- Man and the Missile: Human Efficiency and Morale (1964)*
- Motivation of Minuteman Missile Crews (1965)*
- A Study of the Motivational Behavior of Missile Combat Crews (1966)*
- Retention of Junior Officers in the Minuteman Missile Crew Force (1969)*
- Missile Management Working Group (1971): Improve the effectiveness, welfare, and morale of SAC missile crews
- Missile Career Development Handbook (1972): Career guide for Missileers
- Operation Top Hand (1972): Career-broadening for Missileers
- Minuteman Combat Crew Integrity Study (1972)
- Minuteman Personnel Selection Study (1972)
- Future Management Applications in the Minuteman Operations Career Area: A Call to Action (1975)*
- Missile Officer Career Development Study (1975)
- Missile Officers' Perceptions and Opportunities (1975)*
- Personnel Motivation--The Key to Minuteman System Effectiveness (1976)*
- The Impact of the SAC Missile Management Working Group on Missile Combat Crew Member Attitudes (1976)*
- Missile Crew Morale and Demographic Impacts Study (1977)
- A Study of the Relationships Between Demographic Factors and SAC Missile Combat Crew Members' Attitudes (1977)*
- Minuteman Crew Fatigue Study (1978)
- Project Teamwork (1985): Combat crew minor maintenance measure
- Squadron Commander Combat Ready Policy (1986)
- Missile Operations Personnel Job Attitude Survey (1987)
- SAC Airmanship Seminars (1987): Improve crew proficiency-morale, foster pride
- Missileer Off-Station Training Program (1988): Include visits to various bases
- Officer Adjunct/Administrative Positions (1988): Relieve administrative burden from missile crews
- Proud Visitor Program (1988): HQ orientations for select missile crew members
- SAC ICBM Executive Review Group (1988): Addressed critical ICBM issues
- 48-Hour Missile Crew Alert Test (1988)
- Distinctive Blue Missile Crew Uniform and Jacket (1989)
- Palace Boost Program (1993): ACC missile crew development program
- 72-Hour Missile Crew Alert Test (2006)
- Reinvigorating the Nuclear Enterprise: Is it Time For a Separate ICBM Career Field? (2009)*
- ICBM Cultural Review Study (2010)
- Morale and the Force Improvement Program: Part I – ICBM (2014)

Source: Adapted and Augmented by Author from Donald L. Koser, Morale and the Fore Improvement Program, Part I – ICBM, Air Force Global Strike Command Historical Study #5 (Barksdale AFB, LA: AFGSC History and Museums Program, AFGSC), 3. Items with an asterisk represent additional content added by author.

Appendix K

PURPOSES OF SAC'S MINUTEMAN WORKING GROUP

Table 17: Purposes of SAC's Minuteman Working Group, 1976

Goal and objectives. The goal of the MMWG is to "develop a better qualified, more experienced, and professional missile force." To accomplish this goal, the group formulated the following objectives:
1. Open the lines of communication between the headquarters and the missileman in the field.
2. Increase the volunteer rate into the missile career field.
3. Increase the retention of the most qualified missile personnel.
4. Improve the working environment.
5. Enhance the image of missile duty.

MMWG interest items. In response to its stated objectives, the MMWG has investigated numerous subjects. The following list identifies four general areas of interest and some of the specific items addressed:

Organization/Management Communications:
1. Unit reorganization oriented to the missile environment.
2. Formulation of a SAC Missile Directorate.
3. Unit and individual inspection/evaluation.
4. Unit manning.
5. Crew member scheduling.
6. Rated supplement in the missile career field.
7. Upward communication from units to SAC.
8. Briefing for wives of missilemen.
9. General Holloway video tape to crew members.

Education/Training:
1. Increased opportunities for participation in the Minuteman Education Program.
2. Realism in Emergency War Order Training.
3. Additional training for crews in the Missile Procedures Trainer.
4. Seminars for Professional Military Education.

Headquarters Policy Changes:
1. Reduction in four-year tour.
2. Requirements for Missile Badge.
3. Redesign of Missile Badge.
4. Requirements for Combat Readiness Medal.
5. Authorizations from SAC to man the Air Force Military Personnel Center (AFMPC) Palace Missile Program.

Incentive/Prestige:
1. Special Pay/Bonus.
2. Missile combat crew competition.
3. Working/living conditions in launch control centers.
4. Food service at launch control facilities.
5. Crew Member Excellence Award for outstanding achievement.

Source: Captain Dennis M. Ashbaugh and Captain Larry J. Godfrey, The Impact of the SAC Missile Management Working Group on Missile Combat Crew Member Attitudes, Research Report no. SLSR 14-76B (Wright-Patterson AFB, OH: School of Systems and Logistics, Air Force Institute of Technology, September 1976), 17-18.

Appendix L

MM III SUSTAINMENT AND UPGRADE PROGRAMS, 1990s – 2000s

Table 18: MM III Sustainment and Upgrade Programs, 1990s – 2000s

Minuteman III SRV	Reduce number of re-entry vehicles (RV) from three to one. Also known as de-MIRVing (MIRV = multiple independent re-entry vehicle)
Mk-12 Removal	Mk-12 Warheads removed and replaced with the Mk-12A and Mk-21 warheads.
Rivet Minuteman III Life Extension (Rivet MILE)	Two cycles of depot-level maintenance and modification of operational ground equipment.
Rivet MILE 2010	Small teams of 20-24 people accomplishing necessary recurring depot presence and ensuring modifications complete by 2010.
Rapid Execution and Combat Targeting (REACT) upgrade	Modification to command and control system that had been underway since 1980s replacing the Command Data Buffer (CDB) system.
Guidance Replacement Program (GRP)	Two phase effort to avoid degradation in MMIII guidance equipment. Phase I – replace NS-20 guidance set with improved NS-50 guidance set; replacement began in 1999 and finished in 2008. Phase II – inertial measurement unit (IMU) replacement remained unfunded.
Propulsion Replacement Program (PRP)	Replace solid-propellant on all three stages of all MM III missiles. Began in 2001 and finished in 2009.
Propulsion System Rocket Engine (PSRE) Life Extension Program (LEP)	Upgraded the single-axial, liquid-propellant, fourth-stage engine, and replace several component pieces. Began in 2004 and continued beyond 2012.
Safety Enhanced Reentry Vehicle (SERV) Program	Conversion of MM III Mk-12 / Mk-12A reentry systems (RS) to the Mk-21 reentry systems not used, or off-loaded from PK missiles. Mk-21 had additional safety features not available in earlier RS. Began in 2006.
REACT SLEP	Software fixes and system memory upgrades from four to sixteen megabytes. Began in 2002 and finished in 2006.
Environmental Control System (ECS) SLEP	Installation of modern air conditioning and digital controls in LCCs. Began in 2006 and continued into 2012.
Minuteman Minimum Essential Emergency Communications Network (MEECN) Program (MMP)	Part of MEECN program that replaced legacy Survivable Low Frequency Communications System (SLFCS) with integrated extremely high/very low/low frequency (EHF/VLF/LF) communications capability. Began in 2003 and finished in 2005.
Security Modernization (Three phases: Fast-Rising B-Plug, LF Concrete Headworks, and Remote Visual Assessment (RVA))	Fast-rising, secondary, launch site door to prevent or delay access to intruders; began in 2006 continued to 2013. Concrete headwork was installed around LF personnel access hatches to hinder unauthorized access. Began in 2004 and ended in 2007. RVA gave real-time LF security video to MAF security forces. Began in 2005, continued into 2013.
Cryptology Upgrade	On-going effort to upgrade existing ICBM coding equipment and provide capability for remote code changes.

Source: Adapted from David N. Spires, On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011 (Colorado Springs, CO: Air Force Space Command), 172-182.

Appendix M

MISSILEERS AND SENIOR LEADERSHIP

Table 19: Missileers Who Became Major General or Higher

Commissioning Date	Source	Rank	Name (Last, First)	ICBM System	Broadening / Cross-Training Focus Areas
1952	ROTC	MG	Adams, Christopher	MM I	Rated Sup (pilot)
1956	ROTC	MG	Spraker, Ralph	MM I/II	Rated Sup (nav)
1958	OCS	MG	Smith, Monroe	Atlas-F	CT - MNX, Logistics
1959	Mil Acad	LTG	Cromer, Donald	Atlas-D	CT - Acquisitions
1961	Mil Acad	LTG	Barry, Edward	Atlas-F	CT - Acquisitions
1962	ROTC	LTG	Jameson, Arlen	MM I	Manpower
1962	OTS	MG	Meyer, Kenneth	MM I	CT - EWI, Acquisitions
1962	OTS	MG	McElroy, Stephen	MM I	CT - Acquisitions/Space
1963	ROTC	MG	Parker, Robert	MM I	ALCS, Pol-Mil
1964	Mil Acad	LTG	Kelley, Jay	Titan II	Space, Pol-Mil, Air Univ
1964	ROTC	LTG	Lezy, Normand	MM I	CT - Personnel
1965	ROTC	LTG	Tattini, Eugene	MM II	CT - Acquisitions
1965	ROTC	MG	Curtin, Gary	MM I	ALCS, Air Intel, Pol-Mil
1968	ROTC	GEN	Lord, Lance	MM II/III/PK	GLCM, Space, Air Univ
1968	ROTC	MG	Linhard, Robert	Titan II	ALCS
1969	ROTC	MG	Morrell, Jimmey	MM II	Space
1969	ROTC	MG	Neary, Thomas	MM II/III/PK	GLCM
1970	ROTC	MG	Perryman, Gerald	MM III	Space
1970	OTS	MG	McMahon	MM III	Space, Pol-Mil
1971	ROTC	MG	Blaisdell, Franklin	MM II/III	Space
1972	ROTC	MG	Wiedemer, Michael	Titan II	CT - Sys Eng/Prgm Mgt
1973	Mil Acad	LTG	Klotz, Frank	MM III	Academics
1973	Mil Acad	MG	Mitchell, Howard	MM III	CT - Acquisitions
1973	ROTC	MG	Armor, James	Titan II	CT - Acquisitions
1974	ROTC	MG	Smolen, Robert	MM III	Pol-Mil / Legis. Liaison
1975	ROTC	GEN	Kehler, Robert	MM II/III	Space
1975	ROTC	MG	Mercer, Roosevelt	Titan II	Space
1975	Mil Acad	MG	Webber, Richard	MM II/III	Space / Cyber
1976	ROTC	MG	Griffin, Wendell	MM III	CT - B-52 / B-1
1978	Mil Acad	MG	Burg, Roger	MM II	Space
1978	Mil Acad	MG	Alston, C. Donald	Titan II	Space
1980	ROTC	MG	Thomas, Everett	MM II	Space
1982	ROTC	LTG	Weinstein, Jack	MM III	Space
1984	ROTC	GEN	Raymond, John	MM III	Space
1985	OTS	MG	Finan, Sandra	MM II/III	Space / C4
1985	ROTC	MG	Rego, Robert	MM III	Space / AFRC
1986	OTS	LTG	Buck, David	MM II	Space
1986	ROTC	MG	Cotton, Anthony	MM III	Space
1986	OTS	MG	Fortney, Michael	MM III	PK MNX, Cruise Missile
1987	ROTC	MG	Crosier, Clinton	MM III	Space
1988	ROTC	MG	Geary, Thomas	MM III	CT - Intel
1988	ROTC	MG	Stoss, Ferdinand	MM II/III	Pol-Mil / Looking Glass
1989	OTS	MG	Davis, Stephen L.	MM III	Space

Source: "Biographies," United States Air Force, http://www.af.mil/About-Us/Biographies/. CT = Cross-Trained for individuals known to have cross-trained out of missiles. Only lists those who did missile ops prior to squadron command.

Table 20: SAC Leadership ICBM Experience and Missile Badge Wear

SAC - CC			
Wore MB?	YEARS	RANK/NAME	ICBM OPS EXP?
Y	1957 - 1964	GEN Thomas S. Power	N
Y	1964 - 1967	GEN John Dale Ryan*	N
Y	1967 - 1968	GEN Joseph J. Nazzaro	N
?	1968 - 1972	GEN Bruce K. Holloway	N
Y	1972 - 1974	GEN John C. Meyer	N
?	1974 - 1977	GEN Russell E. Dougherty	N
Y	1977 - 1981	GEN Richard H. Ellis	N
?	1981 - 1985	GEN Bennie L. Davis	N
Y	1985 - 1986	GEN Larry D. Welch*	N
Y	1986 - 1991	GEN John T. Chain, Jr.	N
Y	1991 - 1992	GEN George Lee Butler	N
8	**TOTALS**		**0**

SAC - Vice			
Wore MB?	YEARS	RANK/NAME	ICBM OPS EXP?
?	1954 - 1961	Lt Gen Francis H. Griswold	N
Y	1961 - 1962	Lt Gen John P. McConnell*	N
Y	1962 - 1964	Lt Gen Hunter Harris, Jr.	N
Y	1964 - 1964	Lt Gen John Dale Ryan	N
Y	1964 - 1967	Lt Gen Joseph J. Nazzaro	N
?	1967 - 1969	Lt Gen Keith K. Compton	N
?	1969 - 1973	Lt Gen Glen W. Martin	N
?	1974 - 1977	Lt Gen James M. Keck	N
Y	1977 - 1977	Lt Gen James E. Hill	N
Y	1977 - 1978	Lt Gen Edgar S. Harris, Jr.	N
Y	1978 - 1981	Lt Gen Lloyd R. Leavitt, Jr.	N
Y	1981 - 1984	Lt Gen George D. Miller	N
Y	1984 - 1985	Lt Gen William J. Campbell	N
Y	1985 - 1987	Lt Gen Monroe W. Hatch, Jr.	N
?	1987 - 1988	Lt Gen Kenneth L. Peek, Jr.	N
Y	1988 - 1991	Lt Gen Donald O. Aldridge	N
?	1991 - 1992	Lt Gen Leo W. Smith II	N
11	**TOTALS**		**0**

SAC - CoS			
Wore MB?	YEARS	RANK/NAME	ICBM OPS EXP?
?	1957 - 1961	Maj Gen Edwin B. Broadhurst	N
?	1961 - 1962	Maj Gen James H. Walsh	N
?	1962 - 1963	Maj Gen Hewitt T. Wheless	N
?	1963 - 1964	Maj Gen Keith K. Compton	N
?	1964 - 1966	Maj Gen Charles M. Eisenhart	N
?	1966 - 1969	Maj Gen James B. Knapp	N
?	1969 - 1972	Maj Gen Timothy J. Dacey, Jr.	N
?	1972 - 1973	Maj Gen Warren D. Johnson	N
N	1973 - 1973	Maj Gen George H. McKee	N
N	1973 - 1974	Maj Gen James R. Allen	N
Y	1974 - 1975	Maj Gen Martin G. Colladay	N
Y	1975 - 1976	Maj Gen Andrew B. Anderson, Jr.	N
Y	1976 - 1977	Maj Gen Edgar S. Harris, Jr.	N
Y	1978 - 1978	Maj Gen Lloyd R. Leavitt, Jr.	N
?	1978 - 1980	Maj Gen Earl G. Peck	N
?	1980 - 1982	Maj Gen Andrew Pringle, Jr.	N
Y	1982 - 1983	Maj Gen Christopher S. Adams, Jr.	Y
Y	1983 - 1984	Maj Gen Monroe W. Hatch, Jr.	N
?	1984 - 1985	Maj Gen John A. Brashear	N
?	1985 - 1987	Maj Gen Robert D. Beckel	N
?	1987 - 1989	Maj Gen Randall D. Peat	N
?	1989 - 1991	Maj Gen Donald L. Marks	N
Y	1991 - 1992	Maj Gen Arlen D. Jameson	Y
7	**TOTALS**		**2**

* Indicates individual went on to become CSAF or CJCS

MB = Missile Badge OPS EXP = Operational Experience

Source: Author's Original Work

Table 21: USSTRATCOM, AFSPC, AFGSC, and Twentieth Air Force Leadership ICBM Experience and Missile Badge Wear

USSTRATCOM - CC			
Wore MB?	YEARS	RANK/NAME/SERVICE	ICBM OPS EXP?
Y	1992 - 1994	GEN George L. Butler, USAF	N
N	1994 - 1996	ADM Henry G. Chiles, Jr., USN	N
Y	1996 - 1998	GEN Euguene E. Habiger, USAF	N
N	1998 - 2002	ADM Richard W. Mies, USN	N
N	2002 - 2004	ADM James O. Ellis, Jr., USN	N
N	2004 - 2007	GEN James E. Cartwright, USMC	N
N	2007 - 2011	GEN Kevin P. Chilton, USAF	N
Y	2011 - 2013	GEN C. Robert Kehler, USAF	Y
N	2013 - 2016	ADM Cecil D. Haney, USN	N
N	2016 -	GEN John E. Hyten, USAF	N
3	**TOTALS**		**1**

AFSPC - CC			
Wore MB?	YEARS	RANK/NAME	ICBM OPS EXP?
Y	1992 - 1992	GEN Donlad J. Kutyna	N
N	1992 - 1994	GEN Charles A. Horner	N
N	1994 - 1996	GEN Joseph W. Ashy	N
Y	1996 - 1998	GEN Howell M. Estes III	N
Y	1998 - 2000	GEN Richard B. Myers*	N
Y	2000 - 2002	GEN Ralph E. Eberhart	N
Y	2002 - 2006	GEN Lance W. Lord	Y
N	2006 - 2007	GEN Kevin P. Chilton	N
Y	2007 - 2011	GEN C. Robert Kehler	Y
6	**TOTALS**		**2**

AFGSC - CC			
Wore MB?	YEARS	RANK/NAME	ICBM OPS EXP?
Y	2009 - 2011	Lt Gen Frank G. Klotz	Y
Y	2011 - 2013	Lt Gen James M. Kowalski	N
Y	2013 - 2015	Lt Gen Stephen W. Wilson	N
N	2015 -	GEN Robin Rand	N
3	**TOTALS**		**1**

AFGSC - Vice			
Wore MB?	YEARS	RANK/NAME	ICBM OPS EXP?
Y	2009 - 2011	Maj Gen James M. Kowalski	N
Y	2011 - 2013	Maj Gen Everett H. Thomas	Y
Y	2013 -2013	Maj Gen Jack Weinstein	Y
N	2014 - 2015	Maj Gen Richard Clark	N
Y	2015 - 2017	Maj Gen Michael E. Fortney	Y
?	2017 -	Brig Gen Paul W. Tibbets IV	N
4	**TOTALS**		**3**

Twentieth Air Force - CC			
Wore MB?	YEARS	RANK/NAME	ICBM OPS EXP?
Y	1991 - 1992	Maj Gen Thomas E. Kuenning, Jr.	Y
Y	1992 - 1994	Maj Gen Arlen D. Jameson	Y
Y	1994 - 1996	Maj Gen Robert W. Parker	Y
N	1996 - 1998	Maj Gen Donald G. Cook	N - Pilot
Y	1998 - 2000	Maj Gen Thomas H. Neary	Y
Y	2000 - 2003	Maj Gen Timothy J. McMahon	Y
Y	2003 - 2005	Maj Gen Frank G. Klotz	Y
Y (MNX)	2005 - 2007	Maj Gen Thomas F. Deppe	N - ICBM MNX
Y	2007 - 2010	Maj Gen Roger Burg	Y
Y	2010 - 2012	Maj Gen C. Donald Alston	Y
Y	2012 - 2013	Maj Gen Michael J. Carey	Y - As SQ/CC
Y	2013 - 2015	Maj Gen Jack Weinstein	Y
Y	2015 - 2017	Maj Gen Anthony Cotton	Y
12	**TOTALS**		**11**

* Indicates individual went on to become CSAF or CJCS

MB = Missile Badge OPS EXP = Operational Experience

Source: Author's Original Work

Table 22: CSAF, HAF/A10, and AFNWC Leadership ICBM Experience and Missile Badge Wear

Chief of Staff of the Air Force			
Wore MB?	YEARS	RANK/NAME	ICBM OPS EXP?
N	1957 - 1961	GEN Thomas D. White	N
N	1961 - 1965	GEN Curtis E. LeMay	N
Y	1965 - 1969	GEN John P. McConnell	N
Y	1969 - 1973	GEN John D. Ryan	N
N	1973 - 1974	GEN George S. Brown*	N
N	1974 - 1978	GEN David C. Jones*	N
Y	1978 - 1982	GEN Lew Allen, Jr.	N
N	1982 - 1986	GEN Charles A. Gabriel	N
Y	1986 - 1990	GEN Larry D. Welch	N
Y	1990 - 1990	GEN Michael J. Dugan	N
N	1990 - 1994	GEN Merrill A. McPeak	N
Y	1994 - 1997	GEN Ronald R. Fogleman	N
N	1997 - 2001	GEN Michael E. Ryan	N
N	2001 - 2005	GEN John P. Jumper	N
N	2005 - 2008	GEN T. Michael Moseley	N
N	2008 - 2012	GEN Norton A. Schwartz	N
N	2012 - 2016	GEN Mark A. Welsh III	N
N	2016 - Pres	Gen David L. Goldfein	N
6	**TOTALS**		**0**

HAF/A10			
Wore MB?	YEARS	RANK/NAME	ICBM OPS EXP?
Y	2008 - 2010	Maj Gen C. Donald Alston	Y
N	2010 - 2013	Maj Gen William A. Chambers	N - Navigator
N	2013 - 2015	Maj Gen Garrett Harencak	N - B-52/B-1
Y	2015 - Pres	Lt Gen Jack Weinstein	Y
2	**TOTALS**		**2**

AFNWC - CC			
Wore MB?	YEARS	RANK/NAME	ICBM OPS EXP?
Y	2006 - 2008	Col Terrence Feehan	N - ACQ/ENG
Y	2008 - 2011	Maj Gen Everett H. Thomas	Y
N	2011 - 2013	Maj Gen Garrett Harencak	N - Bomber
Y	2013 - 2015	Maj Gen Sandra E. Finan	Y
N	2015 -	Maj Gen Scott W. Jansson	N - ACQ
3	**TOTALS**		**2**

* Indicates individual went on to become CSAF or CJCS

MB = Missile Badge OPS EXP = Operational Experience

Source: Author's Original Work

Appendix N

PROSPECTS FOR AN INNOVATIVE FUTURE

In 2013 RAND predicted that future challenges of maintaining requisite levels of nuclear expertise would continue to grow. RAND indicated that the challenge would take two forms: "The overall size of the force is likely to be smaller in the future, and as the role of the nuclear mission is perceived to be less important to the country, it may be more difficult to attract and retain the high-quality workforce needed."[1] If these predictions hold to be true, what future solutions can Air Force leaders envision to address these critical issues?

Fast-forward 100 years from the nuclear missions of 1945 to consider a future that has evolved to embrace lessons learned from the past and grows from precedents already established. Imagine a missileer career field where officers bring a potpourri of nuclear expertise from all three legs of the nuclear triad. The uniforms of these officers would be decorated with a combination of missile badges, nuclear submarine deterrent patrol insignia, and aircrew member badges. These officers would belong to a truly joint, four-star led nuclear COCOM that would enable joint service across all legs of the triad. The broadening of missileers would focus on nuclear deterrence operations across all legs of the nuclear triad to hone a missileer's nuclear deterrence and warfighting expertise, not limited to broadening in nuclear support functions. The organization of all three legs of the nuclear triad would be in a unified command under a standing Joint Task Force (JTF) commander. Such a COCOM would further strengthen joint operations and an Airman's ability to serve as a JTF commander. These missileers versed in joint nuclear deterrence operations would not only be capable of commanding at the MAJCOM level, but the COCOM level as well.

[1] Don Snyder et al., Sustaining the U.S. Air Force Nuclear Mission, RAND Report TR-1240-AF (Washington, DC: RAND Project Air Force, 2013), 18.

Imagine a future where the NC3 architecture was modular with similarities across all three legs of the nuclear triad to enable missileers to broaden into multiple nuclear weapon systems without significant weapon system qualification delays. In this manner, nuclear operations would maintain certain universal qualities facilitating broadening—similar to the basics of aviation and qualifying in new aircraft. Dual-use conventional/nuclear aircraft would have the ability to be configured for a nuclear profile mission simply by inserting NC3 equipment enabling a missileer to become the nuclear mission commander for a nuclear profile mission. By having plug-and-play NC3 consoles for aircraft and allowing missileers to be nuclear mission commanders, pilots can focus their training efforts on conventional profile missions. Furthermore, the ability to reconfigure an aircraft could be used as signaling to potential adversaries. Similarly, the missileer would be able to broaden in nuclear SSBN assignments as a 'Weapons Officer' aboard a boomer.

Imagine an ICBM force structure that allows for the LCCs to be modular and mobile while allowing the ICBMs to remain fixed. The ICBM is designed to be responsive, not necessarily survivable. By focusing on the responsive nature of ICBMs rather than their survivability, new deployment concepts are possible. Previous programs that focused on mobile ICBM systems were costly, and not politically palatable at the prospect of continuously moving nuclear missiles over road and railways. However, the prospect of mobile LCCs creates the opportunity for additional surging and signaling with ICBM systems beyond their already ever-ready status. Furthermore, a land-based mobile LCC concept would further complicate an adversaries targeting dilemma without increasing risk to transiting ICBMs. Mobile LCCs would change the composition of the teams they lead and provide for additional leadership opportunities and challenges that would provide opportunity for self-expression.

Imagine a future where nuclear acquisitions occurred at a level above the parochial service level. Funding to a nationally prioritized

nuclear deterrence enterprise would not impact service budgets for conventional capabilities. Congressionally established deterrence funds would ensure national nuclear capabilities match strategic national priorities to avoid inter- and intra-service budget wars. By managing acquisitions through a Joint Program Office for strategic capabilities, efficiencies and commonalities across nuclear platforms could be achieved rather than maintaining costly independent contracts from different contractors in industry.

Returning to the now, many of these visions of the future appear radical, but they each are rooted in precedent. Table 23 lists each of the major ideas offered in these final paragraphs, not as solutions, but as possibilities. Dwindling resources and an uncertain future will drive difficult decisions on how to manage human capital, materiel, and the nation's nuclear enterprise. Tomorrow will not be the same as yesterday, or today. Our vision for how to handle the challenges tomorrow's nuclear enterprise should not mimic Curtis E. LeMay's past, but be forged with the vision of Thomas S. Power.

Table 23: Possibilities and Precedents for Future Missileer Development

Possibility	Precedent
- Missileers become airborne nuclear mission commanders aboard manned aircraft. - Aircraft pilot is the aircraft commander, but not the mission commander.	- Weaponeers were the mission commanders during the Japan atomic missions while pilots were the aircraft commanders. - Bombardiers controlled the aircraft and weapons release in early bombers. - General officer missileers currently serve as Airborne Emergency Action Officers (AEAO) aboard the ABNCP to exercise capability to assume command of U.S. strategic assets. - Several Air Force platforms already distinguish between aircraft commander and mission commander.
- Missileers assume responsibility for nuclear LRSO mission.	- The 532 Training Squadron is already a consolidated ICBM and ALCM squadron led by a missileer. - LRSO-like weapons such as the Snark and BOMARC missiles were operated by 'missilemen'. - Missileers already have familiarity and proficiency to teach Emergency War Order processes to bomber crews.
- Missileers become part of aircrew and become responsible for strike advising and nuclear weapons release.	- Weaponeers performed these functions in Japan. - Bombardiers performed a similar function in early bomber platforms. - Missileers already perform launch of ICBMs with the Airborne Launch Control System (ALCS). - Bomber Combat Systems Operators perform a similar function today for conventional and nuclear airborne platforms.
- Missileers with experience in all three legs of nuclear triad.	- Missileers operate ICBMs. - Striker Trident program gives missileers opportunity to serve aboard SSBNs and earn deterrent patrol insignia. - ALCS gives missileers opportunity to perform airborne nuclear alert duty. - Missileers may already serve on SSBN planning teams at USSTRATCOM.
- All three legs of nuclear triad are organized in a unified command under a standing Joint Task Force Commander.	- All three legs are already organized as Task Forces in USSTRATCOM, but additional alignment under a JTF Commander would update this construct to match contemporary command relationships.
- Make NC3 consoles modular for plug-and-play capability.	- ALCS is a modular system aboard aircraft providing missileers air-launch capability. - ABNCP and mobile command systems already represent survivable and mobile.
- Make the LCC NC3 consoles mobile with multiple connect points throughout a missile complex.	- Air Force drones function in a modular concept where Ground Control Stations can be deployed and tie into the C2 architecture for operations globally.
- Fund nuclear deterrence programs above the service level. - Establish a Joint Program Office (JPO) for nuclear deterrence program acquisitions.	- The Navy has already pursued funding for the Ohio-class SSBN follow-on beyond service-limited budgets through the 2015 congressionally established 'National Sea-Based Deterrence Fund.' - The F-35 Joint Strike Fighter utilized a JPO construct that delivered three variants of the F-35 to different U.S. military branches.

Appendix O

ICBM WEAPONS OFFICER CULTURAL ARTIFACT

Figure 37: 315 WPS ICBM Weapons Officer Mural

Source: 315 WPS, Nellis AFB, NV

Abbreviations

13N	Nuclear and Missile Operations Officer
13S	Space and Missile Operations (just Space after 2013)
18XX	Missile Officer (prior to merger with 20XX career field)
20XX	Space Officer (prior to merger with 18XX career field)
21M	Missile Maintenance Officer
31P	Security Forces Officer
ACP	Alternate Command Post
ADCOM	Air Defense Command
ADO	Assistant Director of Operations
AEAO	Airborne Emergency Action Officer
AETC	Air Education and Training Command
AFGSC	Air Force Global Strike Command
AFIP	Air Force Intern Program
AFIT	Air Force Institute of Technology
AFMPC	Air Force Military Personnel Center
AFPC	Air Force Personnel Center
AFSC	Air Force Specialty Code
AFSC	Air Force Systems Command
AFPSC	Air Force Space Command
AOA	Analysis of Alternatives
ARDC	Air Research and Development Command
ASTRA	Air Staff Training
BDE	Basic Developmental Education
BMO	Ballistic Missile Office
BRAC	Base Realignment and Closure
C2	Command and Control
CACG	Command and Control Group
CCTS	Combat Crew Training Squadron

CDB	Command Data Buffer
C-NAF	Component Numbered Air Force
C-MAJCOM	Component Major Command
COCOM	Combatant Command (also CCMD)
CRM	Combat Readiness Medal
CSM	Conventional Strike Missile
DMCCC	Deputy Missile Combat Crew Commander
DO	Deputy Commander for Operations (later OG/CC)
DO	Director of Operations
DTRA	Defense Threat Reduction Agency
EWI	Education With Industry
EWO	Emergency War Order
FIP	Force Improvement Program
GRP	Guidance Replacement Program
HAF	Headquarters Air Force
HGV	Hypersonic Glide Vehicle
HTV	Hypersonic Test Vehicle
ICBM	Intercontinental Ballistic Missile
IDE	Intermediate Developmental Education
IMU	Inertial Measurement Unit
JCS	Joint Chiefs of Staff
LCC	Launch Control Center
LCF	Launch Control Facility
LEP	Life Extension Program
LF	Launch Facility
JPO	Joint Program Office
JSTPS	Joint Strategic Target Planning Staff
MAC	Military Airlift Command
MAF	Missile Alert Facility
MAJCOM	Major Command
MCCC	Missile Combat Crew Commander

MPT	Missile Procedures Trainer
MW	Missile Wing
NAF	Numbered Air Force
NC3	Nuclear Command, Control, and Communications
NDOSM	Nuclear Deterrence Operations Service Medal
NPR	Nuclear Posture Review
NSS	National Security Strategy
OGV	Standardization and Evaluations
OSD	Office of the Secretary of Defense
OSB	Cryptographic Codes Flight
OSK	Weapons and Tactics Flight
OSO	Current Operations Flight
PGS	Prompt Global Strike
PME	Professional Military Education
PNI	Presidential Nuclear Initiative
PRP	Propulsion Replacement Program
PSRE	Propulsion System Rocket Engine
REACT	Rapid Execution and Combat Targeting
RFP	Request for Proposals
RS	Reentry System
RV	Reentry Vehicle
SAASS	School of Advanced Air and Space Studies
SAC	Strategic Air Command
SAD	Strategic Air Division
SAEP	Space Acquisition Exchange Program
SAW	Strategic Air Wing
SCP	Squadron Command Post
SDE	Senior Developmental Education
SEI	Special Experience Identifier
SERV	Safety Enhanced Reentry Vehicle
SLBM	Submarine-Launched Ballistic Missile

SLEC-P	Spacelift Education & Crossover Program
SMES	Strategic Missile Evaluation Squadron
SMS	Strategic Missile Squadron (later just MS)
SMW	Strategic Missile Wing (later just MW)
STOS	Strategic Operations Squadron
TAC	Tactical Air Command
TRG	Training Group
UCP	Unified Command Plan
USAFWS	United States Air Force Weapons School
WIC	Weapons Instructor Course
WPS	Weapons Squadron

Glossary

Alert Duty	Consists of a combat-ready Missile Combat Crew performing duty within a Launch Control Center (LCC)
Combat-Ready	Refers to a Missile Combat Crew Member (MCCM) who has successfully completed initial unit-administered qualification check and has been certified as being knowledgeable and capable of performing alert duty.
Crew Member	Refers to an individual member of the two-person Missile Combat Crew (MCC) and will be used interchangeably with Missile Crew Member (MCM), or more formally known as Missile Combat Crew Member (MCCM).
DMCCC	Deputy Missile Combat Crew Commander, the junior officer assigned to a Missile Combat Crew.
EWO	Emergency War Order, authenticated orders transmitted by competent command authority directing Missile Combat Crews to take specific actions relative to alert preparedness or missile launch.
Hypergolic	Two oxidizers when combined combust. Hypergolic fuels began to be used with Titan II ICBMs because it was a storable liquid that removed the cryogenic constraints imposed by Atlas and Titan I liquid oxygen.
LCC	Launch Control Center, the facility in which the Missile Combat Crew performs alert duty. The LCC is normally located from 10 to 125 miles from the support base. It is a hardened, underground capsule containing all of the equipment necessary for the crew to monitor, control, and command the remotely located missiles.

LCF	Launch Control Facility, the soft, topside support facility above the hardened Launch Control Center that houses the required support personnel and equipment. Also known as the Missile Alert Facility (MAF).
LF	Launch Facility, the hardened missile silo that houses ICBM missiles
MCCC	Missile Combat Crew Commander, the senior officer assigned to a Missile Combat Crew.
MPT	Missile Procedures Trainer, an electronic, computer-operated simulator that closely resembles an actual Launch Control Center.
Support Base	The location of the Missile Wing and all base support facilities.

Bibliography

Academic Papers

Bonin, Stephen L. "Peace through Strength: The Relevance and Complementing Attributes of America's National Security Bedrock—Strategic Nuclear Deterrence." Paper presented as USAF Strategic Policy Fellow, 10 June 2015.

Cancellieri, Capt Robert and Maj David J. Willoughby. "A Study of the Relationships Between Demographic Factors and SAC Missile Combat Crew Members' Attitudes." Research Report no. LSSR 34-77B. Wright-Patterson AFB, OH: School of Systems and Logistics, Air Force Institute of Technology, 1977.

Danskine, Maj WM Bruce. "Fall of the Fighter Generals: The Future of USAF Leadership." Maxwell AFB, AL: The School of Advanced Airpower Studies, June 2001.

Drea, Edward. J., Ronald H. Cole, Walter S. Poole, James F. Schnabel, Robert J. Watson, and Willard J. Webb. *History of the Unified Command Plan, 1946-2012*. Washington, DC: Joint History Office, Office of the Joint Chiefs of Staff, 2013.

Engel, Capt Michael R. and Capt Patrick H. O'Neill. "The Impact of the Minuteman Education Program on Acquisition and Retention of Missile Launch Control Officers." Research Report no. LSSR 28-78B. Wright-Patterson AFB, OH: School of Systems and Logistics, Air Force Institute of Technology, September 1978.

Frankel, Michael, James Scouras, and George Ullrich *The New Triad: Diffusion, Illusion, and Confusion in the Nuclear Mission*. NSAD-R-16-036. Laurel, MD: Johns Hopkins Applied Physics Laboratory, 2009.

Gosling, Maj Thomas J., Maj James W. Knapp, and Maj Kenneth R. Morrison. "Future Management Applications in the Minuteman Operations Career Area: A Call to Action." Research Report no. 3-9349-00219-4336. Maxwell AFB, AL: Air Command and Staff College, 1975.

Kissiar, Maj Niki J. "Reinvigorating the Nuclear Enterprise: Is it Time For a Separate ICBM Career Field?" Maxwell AFB, AL: Air Command and Staff College, April 2009.

Ogletree, Maj Greg. "The Missile Badge (a not-so-brief history)." Monograph, Association of Air Force Missileers, 1 May 2002.

Wingate, Capt Clark L. "Man and the Missile: Factors Affecting Human Efficiency and Morale." Maxwell AFB, AL: Air Command and Staff College, 1964.

Articles

"AF realigns B-1, LRS-B under Air Force Global Strike Command." *Secretary of the Air Force Public Affairs*, 20 Apr 2015. http://www.af.mil/News/Article-Display/Article/585547/af-realigns-b-1-lrs-b-under-air-force-global-strike-command/.

"AF releases new ICBM solicitation." *Air Force Nuclear Weapons Center Public Affairs*, 29 July 2016. http://www.af.mil/News/Article-Display/Article/881075/af-releases-new-icbm-solicitation/.

Baker III, Fred W. "Air Force to Establish New Nuclear Major Command." *American Forces Press Service*, 24 October 2008. http://archive.defense.gov/news/newsarticle.aspx?id=51660.

Brissett, Wilson. "Rebuilding the Missile Force." *Air Force Magazine*, February 2017, 20-23.

Burgess, Lisa. "Gates asks Air Force secretary, chief of staff to resign." *Stars and Stripes*, 6 June 2008. https://www.stripes.com/news/gates-asks-air-force-secretary-chief-of-staff-to-resign-1.79752#.WPZGIlLMyDV.

Callander, Bruce D. "Whatever Happened to the Plain Blue Suit?" *Air Force Magazine*, July 2006, 84-88.

Chase, Ivan D. "Vacancy Chains." *Annual Review of Sociology* 17, (1991): 133-154, http://www.jstor.org/stable/2083338?seq=1#page_scan_tab_contents.

Colaruso, Laura M. and Rob Hafemeister. "Forced Cuts: Air Force leaders plan to drop 40,000 airmen and civilians over 6 years starting in 2006." *Air Force News*, 26 December 2005.

Cotton, Maj Gen Anthony J. "Moving Forward." *Air Force Missileers* 24, no. 2 (June 2016): 1-6.

Cronk, Terri Moon. "No Significant Threat From Missile Glitch, Officials

Say." *DoD News*, 27 October 2010, http://archive.defense.gov/news/newsarticle.aspx?id=61450.

Everstine, Brian W. "Masters of Nuclear Deterrence." *Air Force Magazine*, October 2016. http://www.airforcemag.com/MagazineArchive/Magazine%20Documents/2016/October%202016/1016nukes.pdf.

Everstine, Brian. "Rand Confirmed as First 4-Star to Lead Global Strike Command." *Air Force Times*, 30 March 2015. https://www.airforcetimes.com/story/military/pentagon/2015/03/30/robin-rand-confirmed-first-4-star-to-lead-global-strike-command/70673488/.

Hafemeister, Rob. "Air Force to cut at least 8,000 officers, 11,000 enlisted." *Air Force News*, 26 July 2006.

Hammes, Senior Airman Rachel. "595th CACG activates at Offutt." *55th Wing Public Affairs*, 4 October 2016. http://www.offutt.af.mil/News/Article/963039/595th-cacg-activates-at-offutt/.

HQ SAC/DPXPM. "ADCOM Reorganization." *Missile Memos*, VOL I (July 1981) 4-6.

HQ SAC/DPXPM. "New Opportunities in the Missile Family." *Missile Memos*, VOL II (19 September 1979) 7-10.

HQ SAC/DPXPM. "Pocket Rocket." *Missile and Space Memos*, VOL VII, July 1981, 1.

Knee, SrA Daryl. "Airmen commemorate 50 years of nation's preeminent ICBM fleet." *90th Missile Wing Public Affairs*, 8 October 2009. http://www.afgsc.af.mil/News/Article-Display/Article/455458/airmen-commemorate-50-years-of-nations-preeminent-icbm-fleet/.

Kouri, Jim. "Task Force Recommends New Air Force Nuclear Command." *World Security Network*, 16 September 2008. https://www.worldsecuritynetwork.com/United-States/Kouri-Jim-1/Task-Force-Recommends-New-Air-Force-Nuclear-Command.

Kovich, Lt Col Andrew S. "Safeguarding the Nuclear Enterprise: Building and Maintaining Expertise in AFGSC." *High Frontier, The Journal for Space & Missile Professionals* 5, no. 2 (February 2009): 22-27.

Lopez, SSgt C. Todd. "8th Air Force to become new cyber command." *U.S.*

Air Force News, 3 November 2006. http://www.af.mil/News/Article-Display/Article/129190/8th-air-force-to-become-new-cyber-command/.

Lyle, TSgt Amaani. "Air Force stands up Global Strike Command." *Secretary of the Air Force Public Affairs*, 7 August 2009. http://www.afgsc.af.mil/News/Article-Display/Article/455475/air-force-stands-up-global-strike-command/.

Mehta, Aaron. "USAF Eyes Larger Say in Nuclear Enterprise." Defense News, 2 April 2015. http://www.defensenews.com/story/defense/air-space/strike/2015/04/02/usaf-eyes-larger-say-in-nuclear-enterprise/70827882/.

Pappalardo, Joe. "A Disgraced Air Force General's Last Interview: What a fired commander's last words say about the state of America's nuclear missiles." *Popular Mechanic*, 6 Jan 2014. http://www.popularmechanics.com/military/a9924/a-disgraced-air-force-generals-last-interview-16341301/.

Perez, 1st Lt Veronica. "Inspiring the Force: New 20th AF Vision and Mission Statements." *20th Air Force*, 9 December 2016. http://www.20af.af.mil/News/Article-Display/Article/1025963/inspiring-the-force-new-20th-af-vision-and-mission-statements

Peters, Katherine McIntire. "Air Force opens office to manage nuclear mission." *Government Executive*, 3 November 2008. http://www.govexec.com/defense/2008/11/air-force-opens-office-to-manage-nuclear-mission/27978/.

Power, Gen Thomas S. "SAC and the Ballistic Missile." *Air University Quarterly Review*, (Winter 1957/1958).

Power, Gen Thomas S. "Strategic Air Command." *Air Force Magazine*, (September 1959).

Shanker, Thom. "Former Commander of U.S. Nuclear Forces Calls for Large Cut in Warheads." *New York Times*, 15 May 2012. http://www.nytimes.com/2012/05/16/world/cartwright-key-retired-general-backs-large-us-nuclear-reduction.html.

Skinner, Thea. "ICBM 'aims high' at dedication." *21st Space Wing Public Affairs*, 11 August 2009. http://www.afspc.af.mil/News/Article-Display/Article/250755/icbm-aims-high-at-dedication/.

White, Airman 1st Class Dillon. "Malmstrom Airmen attend Peacekeeper dedication." *341st Space Wing Public Affairs Office*, 11 June 2008. http://www.malmstrom.af.mil/News/Article-Display/Article/348741/malmstrom-airmen-attend-peacekeeper-dedication/.

White, Ed. "Air Force brings back Missile Operations badges, Missile Wings." *Air Force Space Command Public Affairs*, 12 June 2008. http://www.patrick.af.mil/News/Article-Display/Article/330377/air-force-brings-back-missile-operations-badges-missile-wings/.

White, Ed. "Air Force brings back Missile Operations Badges, Missile Wings during museum ceremony." *Air Force Space Command Public Affairs*, 6 June 2008. http://www.nationalmuseum.af.mil/Upcoming/Press-Room/News/Article-Display/Article/198894/air-force-brings-back-missile-operations-badges-missile-wings-during-museum-cer/.

White, Ed. "Celebration of ICBM history kicks off museum exhibit." *Air Force Space Command Public Affairs*, 20 May 2008. http://www.afspc.af.mil/News/Article-Display/Article/251085/celebration-of-icbm-history-kicks-off-museum-exhibit/.

Books

Futrell, Robert Frank. *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907-1960*, vol. 1. Maxwell AFB, AL: Air University Press, December 1989.

Hughes, Thomas P. *Rescuing Prometheus*. New York: Vintage Books, a Division of Random House, Inc., 1998.

Lloyd, Alwyn T. *A Cold War Legacy: A Tribute to Strategic Air Command – 1946-1992*. Missoula, MT: Pictorial Histories Publishing Company, Inc., 1999.

Mendell, Mindell A. *Digital Apollo: Human and Machine in Spaceflight*. Cambridge, MA: Massachusetts Institute of Technology, 2008.

Mitchell, Vance O. *Air Force Officers: Personnel Policy Development, 1944-1974*. Washington, DC: Air Force History and Museums Program, 1996.

Neufeld, Jacob. *Ballistic Missiles in the United States Air Force, 1945-1960*. Washington, DC: Office of Air Force History, 1990.

Neufeld, Jacob. “Ace in the Hole: The Air Force Ballistic Missiles Program.” In *Technology and the Air Force: A Retrospective Assessment*, edited by Jacob Neufeld, George M. Watson, Jr., and David Chenoweth, 110-121. Washington, DC: Air Force History and Museums Program, 1997.

Ogletree, Greg, “Missileer Creed.” In *Air Force Missileers*, compiled by Association of the Air Force Missileers, 48-49. Paducah, KY: Turner Publishing Company, 1998.

Spires, David N. *On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011*. Colorado Springs, CO: Air Force Space Command, 2012.

Wenger, Etienne. *Communities of Practice: Learning, Meaning, and Identity*. New York, NY: Cambridge University Press, 1998.

White, Harrison C. *Chains of Opportunity: Mobility in Organizations*. Cambridge, MA: Harvard University Press, 1970.

Briefings/Point Papers/Memos/Messages

Briefing. Hyten, Gen John E. commander, USSTRATCOM, Commander’s Conference Briefing. Subject: USSTRATCOM Organization, 28 April 2017.

Briefing. Jones, Lt Gen. AF/A1. Subject: 13S Split Implementation Plan at Fall 2012 CORONA, 7 December 2012.

Briefing. Tyner, David W. Capability and Resource Integration Directorate. Subject: J8, Directorate Briefing, 23 June 2011. http://www.dtic.mil/ndia/2011/SET/TYNER.pdf.

Briefing. Kaya, Maj David and Capt Richard Harrop. Air Force Personnel Center Road-Show. Subject: 13S Assignments and Force Development, 2011.

Career Counseling Booklet for Commanders of Missile Organizations, 1970 ca. Provided by Association of Air Force Missileers.

Dieterle, Maj Chad, AFPC 13N Assignment Team, Randolph AFB, TX. To the author. E-mail. Subject: Missileer Force Development, 2 November 2016.

McPeak, Gen Merrill A., chief of staff of the U.S. Air Force. To Richard B.

Cheney, Secretary of Defense. Memorandum. Subject: Twentieth Air Force (20AF) Transfer, ca 12 November 1992.

Tollerud, Maj Roger, Maj Steve Kucynda, and Maj Don Karcewski. Guide for Minuteman Missile Maintenance Managers, 1970 ca. Provided by Association of Air Force Missileers.

Government Documents

Air Force Doctrine Document (AFDD) 2-12. *Nuclear Operations*, 7 May 2009.

Air Force Instruction (AFI) 36-2640. *Executing Total Force Development*. 16 December 2008.

Alert Operations and the Strategic Air Command, 1957-1991. Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 7 December 1991.

Clark, Rita, Vincent A. Giroux, Jr., and Todd White. *History of the United States Strategic Command, June 1, 1992-October 1, 2002*. Offutt AFB, NE: Command Historian's Office, United States Strategic Command, 15 January 2004.

Department of Defense. *Nuclear Posture Review Report*. Washington, DC: Office of the Secretary of Defense, April 2010.

Department of the Air Force. *Air Force Officer Career Path Guide*. San Antonio, TX: Headquarters Air Force Personnel Center, 2000 ca.

Department of the Air Force. *Air Force Officer Career Path Guide*. San Antonio, TX: Headquarters Air Force Personnel Center, 2006 ca.

From Snark to Peacekeeper: A Pictorial History of Strategic Air Command Missiles. Offutt AFB, NE: Office of the Historian, Headquarters Strategic Air Command, 1 May 1990.

History of Twenty-Fourth Air Force and 624th Operations Center. Twenty-Fourth Air Force, 17 January 2014. http://www.24af.af.mil/Portals/11/documents/About_Us/AFD-140429-035.pdf?ver=2016-04-26-113101-810.

National Security Strategy of the United States. Washington, DC: The White House, January 1988.

United States Government Accountability Office. "*Military Transformation:*
Additional Actions Needed by U.S. Strategic Command to Strengthen Implementation of Its Many Missions and New Organization." GAO-06-847, Washington, DC: Government Accountability Office, September 2006.

United States Government Accountability Office. "*Nuclear Weapons: DOD Assessed the Need for Each Leg of the Strategic Triad and Considered Other Reductions to Nuclear Forces*." GAO-16-740, Washington, DC: Government Accountability Office, September 2016.

Personal Communications – Interviews/E-mails

Poon, Lt Emma. Missileer, Malmstrom AFB, MT. Drawing, November 2008.

Wynne, Michael. In Billman, Andrew S., Office of the Historian, 341 Missile Wing, Malmstrom AFB, MT. To historian Jerome E. Schroeder, the AFSPC Office of History, Museum & Field History Program Manager, Air Force Space Command, Peterson AFB, CO. Subject: RE: 72 Hour Alert Study. E-mail, 4 August 2008.

Reports

Air Force Nuclear Task Force. *Reinvigorating the Air Force Nuclear Enterprise*. Washington, DC: Headquarters, United States Air Force, 24 October 2008.

Anderson, Lt Col William L. "Organizing and Manning Ballistic Missile Units." In *Air Force Report on the Ballistic Missile: Its Technology, Logistics, and Strategy*, edited by Lt Col Kenneth F. Gantz, 81-89. Garden City, NY: Doubleday & Company, Inc., 1958.

Ashbaugh, Captain Dennis M. and Captain Larry J. Godfrey. *The Impact of the SAC Missile Management Working Group on Missile Combat Crew Member Attitudes*. Research Report no. SLSR 14-76B. Wright-Patterson AFB, OH: School of Systems and Logistics, Air Force Institute of Technology, September 1976.

Inspector General, United States Department of Defense. *Assessment of Air Force Global Strike Command Organizational Structures, Roles and Responsibilities*. DODIG-2012-113. Arlington, VA: Department of Defense Inspector General, 20 July 2012.

Koser, Donald L. *Morale and the Fore Improvement Program, Part I – ICBM*.
Air Force Global Strike Command Historical Study #5. Barksdale AFB, LA: AFGSC History and Museums Program, AFGSC.

Kunsman, David M., and Douglas B. Lawson. *A Primer on U.S. Strategic Nuclear Policy*. Sandia Report SAND2001-0053. Albuquerque, NM: Sandia National Laboratories, January 2001.

Lonnquest, John C., and David F. Winkler. *To Defend and Deter: The Legacy of the United States Cold War Missile Program*. USACERL Special Report 97/01, November 1996. Reprint, Bodega Bay, Canada: Hole in the Head Press, 2014.

Snyder, Don, Sarah A. Nowak, Mahyar A. Amouzegar, Julie Kim, and Richard Mesic. *Sustaining the U.S. Air Force Nuclear Mission*. RAND Report TR-1240-AF. Washington, DC: RAND Project Air Force, 2013.

Weitzel, Michael P. and John A. Belt. *Career Development: Missile Officers' Perceptions and Opportunities*. Technical Report no. 114. Wichita, KS: Center for Human Appraisal and Communication Research, Wichita State University, 1975.

Woolf, Amy F. *The New START Treaty: Central Limits and Key Provisions,* CRS Report R41219 (Washington, DC: Congressional Research Service, 1 February 2017), 1-2.

Woolf, Amy F. *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*. CRS Report RL33640. Washington, DC: Congressional Research Service, 10 February 2017.

Speeches

Donley, Michael B. secretary, U.S. Air Force. "Reinvigorating the Air Force Nuclear Enterprise." Address. Center for Strategic and International Studies, Washington, DC, 12 November 2008.

Goldfein, Gen David L. chief of staff, U.S. Air Force. "The Future of American Airpower." Address. American Enterprise Institute, Washington, DC, 18 January 2017.

Obama, Barack, president of the United States. "Prague Speech." Prague, Czech Republic, 5 April 2009.

Internet Content

"Air Force Global Strike Command Strategic Plan, 2016," Air Force Global Strike Command, 2016, 8, http://www.afgsc.af.mil/Portals/51/Docs/AFGSC%20Strategic%20Plan_2016_CC%20Signed.pdf?ver=2016-05-06-144801-403.

"AF to restructure nuclear, missile operations (13N) career field." *Air Force Global Strike Command Public Affairs*, 7 April 2016. http://www.af.mil/News/Article-Display/Article/715304/af-to-restructure-nuclear-missile-operations-13n-career-field/.

Air Force Association. "Awards Presented at the Conference Opening and Awards Ceremony." Accessed 22 February 2017. https://www.afa.org/informationfor/military/nataerospaceawards/awardspresented.

"Biographies," United States Air Force, http://www.af.mil/About-Us/Biographies/.

Cadette, Sr Amn Stephen. "14th AF Commander Receives 3rd Star," 30th Space Wing Public Affairs, 10 January 2008. http://www.schriever.af.mil/News/Article-Display/Article/278611/14th-af-commander-receives-3rd-star/.

Christian, Roxanne and Nicole Padilla. "Air Force Nuclear Weapons Center to Grow." Air Force Nuclear Weapons Center, 30 January 2009. https://www.stratcom.mil/news/2009/58/Air_Force_Nuclear_Weapons_Center_to_Grow/.

Crawford, Sarah. "Air Force Nuclear Command Center at BAFB will employ 236." *Shreveport Times*, 3 April 2017. http://www.shreveporttimes.com/story/news/2017/04/03/air-force-nuclear-command-center-activated-barksdale-employ-236/99996698/.

Defense-Aerospace. "Missile Squadron Poised for 72-Hour Alerts." 3 October 2006, http://www.defense-aerospace.com/articles-view/release/3/73891/usaf-tests-new-duty-schedules-for-icbm-crews.html.

F. E. Warren Air Force Base. "Twentieth Air Force." http://www.warren.af.mil/AboutUs/FactSheets/Display/tabid/3813/Article/719524/twentieth-air-force.aspx.

"Functional Components," U.S. Strategic Command, http://www.stratcom.mil/components/.

Gildea, Debbie. “Nuclear, missile officer development team convenes in December,” *Air Force Personnel Center Public Affairs*, 18 November 2014, http://www.afpc.af.mil/News/Article-Display/Article/856322/nuclear-missile-officer-development-team-convenes-in-december/.

“Hagel demands answers on ‘rot’ at Air Force nuclear missile base.” Fox News Politics, 9 May 2013. http://www.foxnews.com/politics/2013/05/09/hagel-demands-answers-on-rot-at-nuke-missile-base.html.

Heroes for a Better World. “General Lee Butler.” http://www.betterworld.net/heroes/pages-b/butler-lee-quotes.htm.

Losey, Stephen. “Air Force outlines plans for a more senior nuke force.” *Air Force Times*, 20 July 2016. https://www.airforcetimes.com/story/military/2016/07/20/air-force-outlines-plans-more-senior-nuke-force/87338836/.

Mailes, Yancy. “Air Force Global Strike Command: Five Years in the Making.” *Office of the Director, AFGSC History and Museums Program*, 7 August 2014. http://www.afgsc.af.mil/News/Commentaries/Display/Article/629822/air-force-global-strike-command-five-years-in-the-making/.

McLaughlin, Lt Col J. Kevin. “Military Space Culture.” Federation of American Scientists, January 2001. https://fas.org/spp/eprint/article02.html.

“Nuclear Deterrence Operations Service Medal.” Air Force Personnel Center, 29 June 2016. http://www.afpc.af.mil/About-Us/Fact-Sheets/Display/Article/856019/nuclear-deterrence-operations-service-medal/.

Nuclear Threat Initiative. “Air Force Nuclear Command Pushes to Guard Against Electronic Strikes.” 27 September 2012. http://www.nti.org/gsn/article/air-force-nuclear-command-pushes-guard-against-computer-strikes/

Pawlyk, Oriana. “Air Force nuclear officers need earlier education, mentorship, commander says.” *Air Force Times*, 30 July 2016. https://www.airforcetimes.com/story/military/2016/07/30/air-force-nuclear-officers-need-earlier-education-mentorship-commander-says/87632546/.

Public Broadcasting Station. “Oral History: Charles Horner.” Frontline. http://www.pbs.org/wgbh/pages/frontline/gulf/oral /horner/1.html.

Pampe,Carla. “AFGSC stands up Air Force NC3 Center.” *Air Force Global Strike Command Public Affairs*, 3 April 2017.
http://www.afgsc.af.mil /News/Article-Display/Article/1139359/afgsc-stands-up-air-force-nc3-center/.

Pampe, Carla. “Force Improvement Program team moving forward.” *Air Force Global Strike Command Public Affairs*, 8 April 2014. http://www.af.mil/News/Article-Display/Article/478226/force-improvement-program-team-moving-forward/.

Pampe, Carla. “Maj. Gen. Carpenter Takes the Reins of the Mighty Eighth,” *8th Air Force Public Affairs*, 10 June 2009. http://www.barksdale.af.mil/News/ArticleDisplay/tabid/2668/Article/321744/maj-gen-carpenter-takes-the-reins-of-the-mighty-eighth.aspx.

Pampe, Carla. “Rand takes command of AF Global Strike Command,” *AFGSC Public Affairs*, 28 July 2015. http://www.af.mil/News /ArticleDisplay/tabid/223/Article/611280/rand-takes-command-of-af-global-strike-command.aspx.

Raatz, Amn 1st Class Joseph. “New ICBM career model instituted across 20th AF.” *Air Force Global Strike Command Public Affairs*, 12 November 2014. http://www.afgsc.af.mil/News/Article-Display/Article/629422/new-icbm-career-model-instituted-across-20th-af/.

San Antonio Air Logistics Center. “A Brief History of Kelly AFB.” Office of History. http://proft.50megs.com/kelly.html.

U.S. Air Force. “AF approves special pay for nuclear career fields.” 2 October 2014, http://www.af.mil/News/Article-Display /Article/503220/af-approves-special-pay-for-nuclear-career-fields/.

U.S. State Department. “The Collapse of the Soviet Union.” Office of the Historian. https://history.state.gov/milestones/1989-1992/collapse-soviet-union.

U.S. State Department. “Treaty Between The United States of America

And The Union of Soviet Socialist Republics On The Elimination Of Their Intermediate-Range And Shorter-Range Missiles (INF Treaty)." Accessed 15 March 2017, https://www.state.gov/t/avc/trty/102360.htm.