

Nuclear Operations



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FOREWORD

The task of protecting America's national security is different, and in many ways more complex, than it was during the cold war. Although the United States (US) no longer faces the same threats, there are new dangers emerging from regional instability. While the risk of global conflict is greatly reduced, as long as nuclear weapons exist the possibility of their use remains. These risks are aggravated as likely aggressor nations continue to work to acquire weapons of mass destruction (WMD). Therefore, the United States retains a reduced but highly effective nuclear force as a deterrent. The goals of nuclear operations are mutually supportive: deter the use of WMD by an enemy, effectively employ force if deterrence should fail, and support US national policy initiatives.

While the nuclear arsenals of other nations may threaten the United States itself, the continuing proliferation of WMD places US forces around the world at greater risk. Theater commanders in chief (CINCs) constantly consider these threats and develop alternatives for addressing them. One option includes the use, or threat of use, of nuclear weapons. The decision to use such weapons rests with civilian leaders, but it is the responsibility of the military to ensure that options are available.

Maintaining the ability to offer those options is critical. As the US military reduces its focus on nuclear warfare, the corporate knowledge regarding nuclear operations may fade. Nuclear doctrine provides a means of collecting that knowledge and ensuring it remains available for Air Force members who find, or will find, themselves working in the nuclear arena.

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15 July 1998

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INTRODUCTION

The influence of atomic energy on airpower can be stated very simply. It has made airpower all-important.

General Hap Arnold, 1945

PURPOSE

This doctrine provides guidance for Air Force nuclear operations. *This guidance is based on a body of knowledge gained from experience in organizing, training, and equipping nuclear forces in support of national security objectives.* The focus of the Air Force role in nuclear operations is to maintain effective forces with sufficient capability to hold at risk a broad range of targets, while placing great emphasis on safety and security. Achieving such a purpose in today's environment requires both an in-depth understanding of the modern world and a useful doctrine based on over 50 years of nuclear operations.

Despite the end of the cold war, the nuclear threat to the United States has not ended. Russia continues to maintain a formidable nuclear capability, and other nations such as China maintain intercontinental and theater-range weapons as well. While the direct threat to the United States may be limited, it is conceivable that a nuclear confrontation between other nations might involve the United States.

Much as the end of the cold war was unexpected, new threats could appear without warning. New governments could conceivably change the course of a country's development in such a fashion as to lead to another cold war. Tensions between the United States and other countries could increase to the point where a strong deterrent is required. Other strategic threats, not even imagined today, could develop in the years to come. The United States cannot afford to ignore its nuclear doctrine, allowing it to sit on the shelf until another threat arises; doctrine must be "living" if it is to be effective.

Nuclear deterrence is not limited to the threat of attack against the United States. *The development of weapons of mass destruction, including nuclear, biological, and chemical (NBC) weapons and their associated de-*

livery systems, threatens US forces and interests around the world. Because the United States lacks the ability for an in-kind response to chemical and biological weapons, it must maintain a credible nuclear deterrent against all forms of WMD. Department of Defense Directive 2060.2 directs the Services to develop doctrine supporting counterproliferation efforts; Air Force doctrine for nuclear operations is one important component of that requirement.

APPLICATION

This Air Force Doctrine Document (AFDD) applies to all active duty, Air Force Reserve, Air National Guard, and civilian Air Force personnel. It is authoritative but not directive. Therefore, commanders need to consider not only the contents of this AFDD, but also their particular situation when accomplishing their missions. This document is intended neither to advocate the use of nuclear weapons nor to suggest that the United States refrain from using them. It is simply designed to provide guidance to commanders, planners, and operators so that they may better develop options for civilian policymakers.

SCOPE

Nuclear operations doctrine focuses on posturing, maintaining, and exercising forces for deterrence, as well as on employing these forces should deterrence fail. It applies on a global scale as well as to activities within a theater of operations. The primary purpose in having a nuclear operations capability is to maintain a credible nuclear posture to deter enemy aggression.

CHAPTER ONE

NUCLEAR OPERATIONS

For to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the acme of skill.

Sun Tzu
The Art of War

Nuclear operations are a form of strategic attack. *Strategic attack is a military action carried out against an enemy's center(s) of gravity or other vital target sets, including command elements, war-production assets, and key supporting infrastructure, to effect a level of destruction and disintegration of the enemy's military capacity to the point where the enemy no longer retains the ability or will to wage war or carry out aggressive activity.* It is an offensive operation intended to accomplish national, multinational, or theater strategic-level objectives without necessarily engaging an enemy's fielded military forces. However, this would not preclude operations to destroy the enemy's fielded forces if it was required to accomplish strategic national objectives.

The nature of nuclear weapons is such that their use can produce political and psychological effects well beyond their actual physical effects. The employment of nuclear weapons may lead to such unintended consequences as escalation of the current conflict or long-term deterioration of relations with other countries. For this reason above all others, the decision whether or not to use, or even threaten to use, nuclear weapons will always be a *political* decision and not a *military* one.

DETERRENCE

Although nuclear forces are not the only factor in the deterrence equation, the fundamental purpose of America's nuclear arsenal is to deter an enemy's use of weapons of mass destruction. *Deterrence can be described as a state of mind created in an adversary's (or potential adversary's) leadership.* Their leadership must believe the cost of aggression against the United States, its interests, or its allies will be so high as to outweigh any possible gain. Deterrence requires the United

The Proliferation Of Chemical Weapons

“The limitations applied to the so-called inhuman and atrocious means of war are nothing but international demagogic hypocrisies.... Just because of its terrible efficacy, poison gas will be largely used in the war of the future.” Giulio Douhet, an early airpower visionary, soon saw his prophecy become fact, and the clear military restraint demonstrated during [World War II] by all but one country was not to be followed in the postwar period. The following list reflects an increasing willingness and capability among a growing number of nations to employ these weapons.

- ✪ Yemen (1963–67): Egypt used mustard bombs against Yemeni tribesmen.
- ✪ Laos (1975–83): The Vietnamese used Soviet-supplied chemical and toxin weapons, killing 700–1,000 rebellious Hmong tribesmen.
- ✪ Cambodia (1978–83): The Vietnamese used chemical agents on Cambodian resistance forces.
- ✪ Afghanistan (1979–83): Soviets employed a variety of chemical weapons against the Mujahedin guerillas. In one case, death was so sudden for three guerillas their hands still gripped their weapons.

One of the most notorious and publicized uses of chemical weapons happened during the Iran-Iraq war. United Nations' investigation teams positively confirmed the use of sulfur mustard, nerve (tabun) and blood (cyanide) agents during the years 1984–86. The casualty potential of these agents was graphically demonstrated on the village of Halabja, where unprotected Kurdish civilians were singled out for an Iraqi airborne gas attack. This one assault injured some 100,000 people and may have killed several thousand. Though the attack was confirmed and acknowledged by the Iraqis, there was no widespread global protest, only reinforcing the legitimacy of chemical weapons.

Bradley S. Davis

in *Global Security Concerns: Anticipating the Twenty-First Century*

States to maintain the ability to use force, which means having trained, capable, ready, and survivable forces; a robust command, control, communications, computers and intelligence structure; and timely, flexible, and adaptive planning capabilities. The second critical element of deterrence is the will to use nuclear weapons. If an enemy believes these tools will not be used, then their deterrent value is zero.

US nuclear policy is not static and is shaped by numerous considerations. *As the civilian leadership changes American policy due to new threats or technologies, the Air Force will need to develop new concepts, sys-*

tems, and procedures. For instance, the concepts of “mutual assured destruction” and “flexible response” require different types of weapons, different plans, and different degrees of survivability for command and control systems. Stated policies will also affect the ability to deter an enemy. As an example, US policy on using nuclear weapons to respond to an adversary’s battlefield use of WMD is purposely vague. The ambiguous nature of American policy makes it impossible for an enemy to assume such a response would not be forthcoming. Even though there is no guarantee nuclear force would be used to respond to a WMD attack, planners must prepare alternatives for civilian policymakers to make that option available.

THE TRIAD

There are three global delivery platforms for nuclear weapons: intercontinental ballistic missiles (ICBMs), bombers, and submarine-launched ballistic missiles (SLBMs). They are maintained by the US Air Force and Navy, while their nuclear operational use is controlled by US Strategic Command (USSTRATCOM). Each has its advantages and limitations. By maintaining the Triad of forces, the limitations of each are balanced by the other systems and their vulnerability to attack is lessened. ICBMs, bombers, and SLBMs comprise a system that allows for a nuclear option regardless of the method of attack used by an enemy.



ICBMs offer rapid targeting and execution.

Intercontinental Ballistic Missiles

ICBMs can hold time-urgent targets at risk and can be rapidly retargeted against mobile and emerging targets. They maintain a high alert rate and can be quickly launched once an execution order is received. Their hardened launch facilities afford them a chance for survival if attacked. They have a high degree of accuracy, giving them the ability to destroy hardened targets. Among their shortcomings is the fact that their locations cannot be kept secret, making it very easy for an enemy to target them. Also, once launched they cannot be recalled or destroyed, making it difficult to use them for posturing.



Bombers like the B-2 give decision makers more flexibility.

observed by a potential enemy and serve as notice that the United States is prepared to respond to an attack. Tanker aircraft, many of which are flown by the Air Reserve Component (ARC), provide bombers both extended range and the flexibility to be redirected and hold a variety of targets at risk, including mobile targets. However, the time required for them to reach their targets can limit their effectiveness. In addition, they are “soft” targets and are vulnerable on the ground, which means that tactical warning is essential if they are to remain a viable option. Dispersing the bomber and tanker force to other airfields or assuming an airborne alert posture can enhance survivability.

Bombers

Air Force bombers may be used to carry nuclear gravity bombs or nuclear-armed air-launched cruise missiles. These aircraft can be used effectively to send a message of American resolve to an adversary. Various stages of alert, from generating the bomber force to launching aircraft, may be observed



Once they submerge, submarines are hidden from enemy eyes.

resolve as they surge out to sea, but that is the extent of the posturing for which submarines can be used. The submarines have historically suffered from other limitations as well. They carried missiles that were not as accurate as ICBMs, limiting their effectiveness against hardened targets, and it was difficult to communicate with them. Advances in both weapons and communications technologies, however, have reduced the impact of these shortcomings.

Submarine-Launched Ballistic Missiles

The Navy's SLBMs are closely integrated with Air Force nuclear platforms to maximize the effectiveness of the Triad. These systems have the advantage of operating from hidden locations and can be close enough to an enemy to deny significant warning of an attack. Submarines in port can be used to signal American

The Cuban Missile Crisis – 1962

On 8 September, the Soviet cargo ship *Omsk* docked in Havana, and at night, to defeat spy planes, unloaded its cargo of medium-range [ballistic] missiles (MRBMs). A second shipment of these SS-4 missiles arrived one week later on the *Poltava*. These...missiles had a range of some 600–1,000 miles, and from their Cuban bases could reach Washington, DC, and about 40 percent of the bomber bases of Strategic Air Command, with a flying time of less than twenty minutes. Since the US radar early-warning system was designed to detect incoming missiles from the Soviet Union, there would have been little warning if they were fired. The Soviets prepared six bases for the MRBMs, and three for the longer-range SS-5 [intermediate-range ballistic missiles]. These intermediate-range missiles, which could reach 2,200 miles, would be able to hit most of the continental United States, and all of its SAC [Strategic Air Command] bases. The planned deployment of forty launchers with eighty warheads would have increased the Soviet first-strike capability by about 80 percent, according to a study written at the time by the State Department analyst Ray Garthoff. Once fully deployed and operational, only 15 percent of the US strategic forces could be assured of surviving a first strike.

Martin Walker
The Cold War: A History

THEATER-RANGE WEAPONS

Air Force forces operating in a theater of operations may be called upon to use smaller-yield nuclear weapons. *Though often referred to as “tactical” weapons, the designation is misleading. Terming the effect “tactical” implies attaining only limited military objectives.* Activities at the tactical level of war focus on the arrangement and maneuver of combat elements in relation to each other and the enemy. While the use of nuclear weapons will affect an ongoing engagement between friendly and enemy forces, their use should also be designed to help achieve the political goals of the operation. Such use will additionally have an impact on America’s long-term relations with other countries.

The Air Force may employ theater-range weapons using either long-range bombers or fighters designated as “dual-capable aircraft.” Crews for these aircraft must be trained on their nuclear function as well as their conventional mission. *Cruise missiles* allow for standoff attack which puts crew members at minimal risk and may deny an adversary significant tactical warning. Terrain features may limit their effectiveness, however, and their weapon yield may be greater than is called for by the situation. *Gravity bombs* allow more flexibility in employment but put

Some fighter units have a nuclear mission in addition to their conventional role.



crew members at direct risk in a high-threat environment. Their delivery platforms, whether bombers or fighter aircraft, may require significant support in the form of aerial refueling or electronic warfare escort.

Since the United States is unlikely to engage in a major conflict unilaterally, the use of theater-range nuclear weapons would presumably occur while working in conjunction with other nations' militaries. When operating with members of treaty organizations, standardized nuclear policies may already exist. When functioning as part of a short-term coalition, however, common procedures for coalition forces should be developed during that conflict.

AIR AND SPACE SUPERIORITY

As articulated in Air Force Doctrine Document 1, *Air Force Basic Doctrine*, success in air, land, sea, and space operations depends upon air and space superiority. It provides freedom to attack as well as freedom from attack. This is as true for nuclear missions as it is for any other form of attack. Air and space superiority strongly enhances nuclear operations by protecting manned systems and space assets. It denies enemy access to space for purposes of surveilling and targeting American forces, as well as inhibiting enemy nuclear command and control. In addition, control of the aerospace medium will allow US forces to be warned of and assess ballistic missile attacks, target enemy locations, exercise positive control of nuclear systems, conduct damage assessment, and plan follow-on operations.

Air superiority is achieved by negating an enemy's offensive and defensive airpower. It involves more than just air-to-air combat. To reduce the effectiveness of an enemy's air force, US forces may attack aircraft on the ground, destroy or disable airfields, or impair their command and control capabilities. Since US nuclear systems will be a prime target in a theater of operations, an adversary's offensive airpower cannot be allowed to threaten them. Enemy defensive systems can also limit the ability of US nuclear forces to strike their targets. Enemy aircraft and surface-to-air missiles can reduce the effectiveness of manned systems and cruise missiles, requiring an increase in the number of resources used to enable mission accomplishment. Destruction of these enemy systems allows friendly forces to deliver ordnance and conduct airborne reconnaissance and command and control operations more effectively.

Like air superiority, space superiority provides the freedom to conduct operations without significant interference from enemy forces. Although the United States has not yet had to fight for space superiority, in future conflicts other nations may have a variety of space-based capabilities, from force application and information warfare to sophisticated imaging and communications systems. Additionally, critical ground links must be defended and protected from enemy attack. To ensure that forces have the ability to operate without being seen, heard, or interfered with from space, it is essential to gain and maintain space superiority. Defensive counterspace operations are a major concern of the joint force commander today to preserve the ability to conduct intelligence, surveillance and reconnaissance (ISR) operations; to command and control forces; and to communicate and navigate.



The United States must ensure it has the ability to use its space-based assets.

EMPLOYMENT

Different targeting strategies can enhance deterrent capability and, if employed, successfully achieve warfighting objectives. Changing circumstances will also affect the conditions under which the United States should be prepared to employ nuclear weapons. An understanding of these issues is critical for the nuclear planner or commander at the global or theater level of conflict.

Countervalue and Counterforce

One of the precepts of deterrence is to hold at risk what the enemy holds dear. Determining what that is may be difficult, but it is necessary for deterrence to work. **Should deterrence fail, it is essential to strike the targets that will bring about a swift halt to hostilities.** *Target selection will depend not only upon friendly objectives but also upon the enemy's objectives.* What an adversary considers important will be determined by what it hopes to accomplish. The United States must also consider what it hopes to achieve by the use of these weapons. Is it the destruction of a nation, a long-term economic effect, or simply the negation of the enemy's military capability? The use of weapons may be divided into the categories of *countervalue* and *counterforce*.

Countervalue targeting involves holding enemy cities, industry, and other economic resources at risk. *Destruction of these targets would mean not only significant casualties in the short run but also the long-term degradation of the society.* If the goal of the United States is to significantly affect a country's development, it can do so through striking the infrastructure or primary means of production. This might include such things as harbors, industrial centers, or oil pipelines. Targeteers must understand what is important from the enemy's point of view, not just from an American perspective, before nominating targets.

If US objectives are more limited, a counterforce strategy of employment might be more appropriate. *This refers to the use of weapons against the enemy's immediate war-fighting capability.* While there will certainly be long-term effects from the use of a nuclear device against any target, counterforce strategy focuses on the more immediate operational effect. Nuclear weapons might be used to destroy enemy WMD before they can be used, or they may be used against enemy conventional forces if other means to stop them have proven ineffective. This can reduce the

threat to the United States and its forces and could, through the destruction of enemy forces, bring an end to the conflict.

Law of Armed Conflict

What is termed the “law of armed conflict” is not based on a single treaty but is instead grounded in various treaties, customs, and national practices regarding the conduct of war. *This body of international law protects combatants and noncombatants, safeguards human rights, and facilitates the achievement of peace by limiting the amount of force and the manner in which it can be applied.* While there is a connection between the destruction of life and property and the defeat of enemy armed forces, neither the law of armed conflict nor US policy sanction devastation as an end unto itself. That having been said, the law of armed conflict does not expressly prohibit the use of nuclear weapons. Under international law, *the use of a nuclear weapon must be based on the same targeting rules applicable to the use of any other lawful weapon*, i.e., the counterbalancing principles of military necessity, proportionality, distinction, and unnecessary suffering.

Launch-on-Attack and Launch-on-Warning

In order for the United States to leave all its options available, and to increase the uncertainty in the mind of an aggressor, it is US policy not to reveal in detail how it would respond to an attack. While the United States does not rely on its ability to launch-on-attack or launch-on-warning to ensure the credibility of its deterrence, its ability to carry out such options complicates an aggressor’s assessments of war outcomes and enhances deterrence. **If nuclear weapons are going to be employed only in response to an attack, rather than in a preemptive strike, the United States might maintain one of two degrees of readiness and survivability.**

Launch-on-attack is the more conservative approach. *Forces would not be launched until an attack has actually occurred and enemy weapons have struck (or begun striking) their targets.* Such a strategy requires survivable weapons and a command and control system that will still be operable after an attack. The advantage to this method is that decision makers would have more time to consider the scenario and would be unlikely to launch nuclear weapons based on false indications. On the downside, there is the likelihood that some forces will be lost on the ground, and it is



B-52s perform minimum interval takeoffs in response to tactical warning.

possible that communications may be degraded to the point that it is difficult to pass critical information or send orders to the field.

The other valid option is launch-on-warning. *In this case, forces would be launched upon receipt of indications of an enemy attack.* This allows US missiles to launch and aircraft to disperse before being destroyed on the ground. The biggest disadvantage to this strategy is the possibility of launching in error. Missiles, of course, cannot be recalled once launched. While aircraft can be recalled, the act of launching aircraft may precipitate an enemy attack. Thus, launching on warning could escalate a previously stabilized situation.

WEAPON EFFECTS

The destruction wrought by nuclear weapons can be immense, or it can be tailored and limited for a particular scenario. The physical impact of a nuclear strike includes both short- and long-term effects. Beyond the physical repercussions are significant psychological and political effects, which may lead to unintended consequences.

The physical effects of nuclear weapons are pronounced. *The degree of destruction depends upon a number of factors such as weapon design and yield, location and height of burst, weather, and others.* Planners must consider the political and military objectives and the desired degree of destruction, then factor in the local conditions and available weapons and delivery systems. The immediate operational impact of a nuclear detonation varies and may come from blast and heat, the subsequent

electromagnetic pulse (EMP), or more far-reaching effects, depending on the variables discussed above. This will have an immediate effect on enemy forces, logistics, and command and control. Communications and computer capability will be severely impacted by EMP, which is an operational effect that may lead to a long-term, strategic impact if the enemy is unable to completely restore those capabilities. Another operational effect with strategic implications is radiation, which will limit the effectiveness of enemy forces as they take protective measures but may also render enemy territory uninhabitable for a long period of time. Other significant effects may include extreme overpressure, dust, and debris.

Theater commanders and planners must consider that the operating environment after a nuclear exchange can be equally inhospitable for friendly forces. Movement through an area that has experienced a nuclear detonation will be slow because significant protective measures are required. Communications and computer systems that are survivable in a nuclear environment must be available. The use of nuclear weapons to repel enemy forces in friendly territory will lead to long-term effects that may be unacceptable.

There are psychological effects associated with nuclear weapons that go beyond physical destruction. *Similar physical effects might be achieved through conventional weapons, but the fact that nuclear weapons have actually been employed will have additional implications.* It is difficult to determine exactly what that effect might be. A limited use of nuclear weapons may convince an enemy that the United States is committed to using whatever degree of force is required and encourage them to cease and desist. It may have the opposite effect, enraging the enemy to the point where it escalates the conflict. When planning a nuclear option, it is important to consider the potential psychological impact as well as the enemy's ability to escalate.

Nuclear weapon use may also have short- and long-term negative effects on relations with other countries. The use of such weapons may be unacceptable to allies or other friendly nations. Their support for the conflict may be lost, and long-term relations may be permanently damaged. It also has the potential to spur other nations to develop nuclear weapons. Civilian policymakers will make the ultimate decision, and they will have to consider all of these factors. Military planners and commanders should understand these factors, too, so they can *present military options in the full context of their effects rather than in isolation.*

WAR TERMINATION

The goal behind using nuclear weapons is to achieve US political objectives and resolve a conflict on terms favorable to the United States. *Nuclear operations, like all military operations, should use the minimum force necessary and should be terminated once the objectives have been attained.* This requires that decisive targets be struck first, mandating the need for effective intelligence and targeting capabilities. While nuclear operations are in progress, a reliable command and control system is essential if operations are to be terminated when no longer needed or continued if required. Finally, the United States must maintain forces in reserve which will continue to protect against coercion following a nuclear strike, convincing the adversary that further hostilities on its part will be met by a swift response.

Combat assessment is a critical tool for understanding when to terminate and when to continue the attack. It has three major components: battle damage assessment, munitions effects assessment, and reattack recommendation. The objective of combat assessment is to identify recommendations for the course of military operations. *Intelligence analysts must understand, and collection assets must be designed to measure, the unique effects of nuclear weapons.* The joint force air component commander (JFACC) may find that more appropriate collection or analytical resources are available from USSTRATCOM or other supporting commands.

SAFETY AND SECURITY OF NUCLEAR WEAPONS

Whether working with continental US (CONUS)-based strategic forces or conducting theater nuclear operations, commanders must ensure the safety and security of their weapons. While the appropriate infrastructure already exists at CONUS bases with nuclear forces, commanders in a theater must consider the additional needs incurred if they are going to have nuclear weapons deployed into their area of responsibility.

Nuclear Surety

All individuals involved with nuclear weapons are responsible for the safety of those devices. Because of the destructive potential of these weapons, and the possibility that their unauthorized or accidental

The Thule Accident

On January 21, 1968, [a] bizarre bomber accident occurred. [A] B-52 was on a routine monitor mission when a fire broke out in the lower crew compartment. The pilot prepared for an emergency landing at Thule [a US early warning radar station in Greenland], but then ordered an immediate evacuation of the plane when dense smoke filled the cabin and all electrical power went out. There was no time for the B-52 or the Thule command post to contact SAC headquarters before the evacuation of the plane. The pilotless B-52 passed directly over the Thule base, turned 180 degrees, and then crashed into the ice approximately seven miles away.

The plane was carrying four B-28 thermonuclear gravity bombs when it crashed. The conventional high explosive materials on all four weapons detonated on impact, spreading radioactive plutonium across the ice. There was, however, no nuclear explosion. The weapons had been designed so they would not create a nuclear detonation when subjected to the pressure and heat of a crash. Fortunately, this important safety feature worked.

Scott D. Sagan
The Limits of Safety

use might lead to war, safety is paramount. Certain nuclear surety guidelines must be followed.

- ✦ There shall be positive measures to prevent nuclear weapons involved in accidents or incidents or jettisoned weapons from producing a nuclear yield.
- ✦ There shall be positive measures to prevent *deliberate* prearming, arming, launching, firing, or releasing of nuclear weapons, except upon execution of emergency war orders or when directed by competent authority.
- ✦ There shall be positive measures to prevent inadvert prearming, arming, launching, firing, or releasing of nuclear weapons in all normal and credible abnormal environments.
- ✦ There shall be positive measures to ensure adequate security of nuclear weapons.

These measures may take the form of mechanical systems, such as permissive action links that do not allow the arming or firing of a weapon



Security forces protect nuclear weapons and delivery systems.

until an authorized code has been entered. They may also involve personnel monitoring systems, such as the Personnel Reliability Program or the Two-Person Concept. Commanders are responsible for ensuring that appropriate systems are in place, as described by appropriate Air Force policies.

Security of Nuclear Weapons and Delivery Systems

Nuclear weapons must not be allowed to become vulnerable to loss, theft, sabotage, damage, or unauthorized use. Nuclear units should ensure measures are in place that provide the greatest possible deterrent against hostile acts. Failing deterrence, security should ensure detection, interception, and defeat of the hostile force before it is able to seize, damage, or destroy a nuclear weapon, delivery system, or critical components.

A security infrastructure exists at bases that routinely handle nuclear weapons. **However, weapons and their delivery systems may be moved to other bases to enhance survivability or may be deployed into a theater.** Commanders at such locations must ensure appropriate storage facilities are established and proper security measures are in place.

The storage of nuclear weapons on a base not only requires a secure location and additional security personnel, but also impacts other areas such as driving routes, local flying area restrictions, aircraft parking areas, the use of host-nation or contract personnel, and other aspects of day-to-day operations. Note, too, that weapons are most vulnerable in transit or when deployed for use, so special care must be taken at those times. Commanders and, in fact, all individuals have a responsibility for force protection, and the security of nuclear weapons is a key component of that concept. Air Force policies which outline security requirements must be understood by all affected personnel.

Information Security

To prevent unauthorized employment of nuclear weapons, certain encryption devices and code systems are used to validate the authenticity of nuclear orders. **Access to these systems and codes are tightly controlled to ensure unauthorized individuals are not permitted to gain access to the means to order or terminate nuclear weapons employment.** Conversely, once appropriate orders have been sent, weapon system operators must respond in a timely manner if weapons are to be employed effectively before the situation changes. This requires a standard set of procedures for validating messages and initiating or terminating operations. Knowledge of these procedures could allow an adversary to determine the time required to conduct operations and the methods crew members will use to accomplish them, allowing that adversary to take more effective measures to counter or limit a nuclear strike. Though CONUS-based nuclear weapon systems have an information security structure in place, theater commanders need to consider how best to protect information in a forward-deployed location. They may turn to supporting commands and agencies for assistance, such as USSTRATCOM, the National Security Agency, and the Air Force Office of Special Investigation. Allowing unauthorized persons to have knowledge of nuclear procedures can sharply reduce operational effectiveness. As with any other component of force protection, information security is critical to mission success.

ALTERNATE TECHNOLOGIES

The decision to use nuclear weapons is one that must be made only after careful consideration of all relevant factors. One issue which must be addressed is whether the objectives may be achieved through other

means. The use of nuclear weapons carries with it the potential for undesirable political consequences. There are also additional logistical requirements associated with deploying such weapons. **Commanders and planners should consider exactly what effects they are trying to produce and consider nonnuclear alternatives as well.**

If the focus of operations is on physical impact, **other munitions may provide the degree of limited or widespread destruction desired without the long-term effects that would result from nuclear weapons.** Precision-guided munitions may allow for destruction of hardened facilities without excessive collateral damage. Fire bombs can be used to destroy a wide area; consider that the destruction caused by dropping such weapons on Japanese cities in World War II exceeded that caused by detonating the atomic bombs over Hiroshima and Nagasaki.

Psychological effects can also be achieved with conventional munitions. If the goal is to strike fear in an adversary's leadership or fielded forces, nuclear weapons are not the only means available. The Gulf War demonstrated that a combination of heavy aerial bombardment and psychological operations can severely degrade an enemy's operational effectiveness.

Planners must fully understand the political and military objectives before advocating the use of nuclear weapons. Depending upon the goal of the attack, it may be possible, and preferable, to use conventional weapons to achieve the same effects.

SUMMARY

The role of nuclear weapons is, first and foremost, to deter an attack against the United States and its interests. Should deterrence fail, employment of these weapons may be required. Commanders must be prepared to provide nuclear options to the National Command Authorities (NCA). If the United States is to engage in nuclear operations, planners must have a clear understanding of the objectives involved, the conditions in the theater, the disposition of forces, and the weapons available. Commanders should attempt to terminate hostilities as quickly as possible but must be prepared to continue operations as needed. Nuclear operations involve issues beyond simply launching weapons, and commanders must understand the constraints that will be placed upon them by using these tools. Other systems may provide the same result with fewer logistical and support concerns.

CHAPTER TWO

COMMAND AND CONTROL OF NUCLEAR OPERATIONS

The United States command and control system has provided a high degree of control through the history of the United States nuclear weapons program. Perhaps one of the biggest dangers faced from new nuclear powers is a lack of a sophisticated system to control their nuclear weapons

Richard A. Paulsen

The Role of US Nuclear Weapons in the Post-Cold War Era

Effective command and control (C²) is critical for the proper employment of nuclear weapons. A strong C² capability allows for employment of the proper force against a target in a timely manner. It also provides the means to order the termination of a conflict and avoid further escalation. Command and control is a vital component of US deterrent capability, as it guarantees the ability of the United States to respond even after suffering an attack. C² systems should be designed to operate vertically and horizontally to allow effective control of nuclear assets and forces by the NCA at all affected levels. Proper planning and implementation will ensure that C² systems are interoperable, secure, timely, efficient, and survivable.

AUTHORIZATION FOR USE OF NUCLEAR WEAPONS

The decision whether or not to use nuclear weapons will always be made by civilian leaders. *The President of the United States, or the appropriate successor, is the only person with the authority to order their use.* Working with the Secretary of Defense, the President may determine nuclear weapons are required to resolve a situation. These individuals comprise the NCA, and they will issue the execution order through the Chairman of the Joint Chiefs of Staff to the combatant commander and, ultimately, to the forces in the field exercising direct control over the weapons.

To allow for the timely execution of this order, a series of emergency action procedures (EAP) must be developed that allow for a

quick response to an authentic execution message. EAP should be simple enough to allow for rapid action while at the same time ensuring that an execution order is accurate and has been received from an approved authority. Personnel involved in the actual employment of nuclear weapons must be intensively trained in these procedures so they can respond quickly while at the same time resolving any problems that might occur in the transmission of the order.

WEAPON SYSTEM SAFETY RULES

Nuclear command and control must be guided by weapon system safety rules (WSSRs). *These rules ensure that nuclear weapons are not detonated, intentionally or otherwise, unless authorized.* Safety rules apply even in wartime. While commanders may deviate from a specific rule in an emergency, they may not expend a nuclear weapon until an authentic execution order has been received. This has led to the so-called “usability paradox.” Nuclear weapons must be “usable enough” so an enemy is convinced they may be rapidly employed in the event of an attack. They must not be so “usable,” however, as to allow for the unauthorized use due to individual action or mechanical error.

WSSRs are implemented through a combination of mechanical means, security procedures, flying rules, and personnel programs. Different weapon systems will have different rules based on their capabilities. Storage and movement of weapons must also be consistent with WSSRs. Commanders and operators must follow applicable Air Force policies for their weapon system and must ensure that non-US personnel adhere to applicable Air Force and multinational requirements. One key component of WSSRs is that, while preventing the unauthorized use of nuclear weapons, they allow for timely employment when ordered. To this end, all personnel involved in the com-



Proper security is essential for maintaining WSSRs.

The Personnel Reliability Program

The personnel reliability program (PRP) identifies nuclear duty positions and assesses the reliability of individuals assigned to them. Its objective is to ensure that only those individuals who meet the highest suitability and reliability standards are assigned to nuclear duty positions. PRP guidelines apply to all military personnel, civil service employees, and civilian contractor personnel. These personnel are neither trained for nuclear weapon duties nor assigned to them until they are properly screened.

Personnel identified for nuclear duty positions are further designated as critical or controlled. This determination is based on the actual nuclear duties to be performed. A critical nuclear duty position is one in which the incumbent either has access to nuclear weapons under the two-man concept and possesses technical knowledge or functions in a command and control capacity. Critical nuclear duty includes positions that require accomplishing, supervising, or inspecting nuclear weapon modifications, retrofits, maintenance, render-safe procedures, or quality control checks. Command and control critical nuclear duty positions include commanders of nuclear support, delivery, and warhead support units; permissive action link teams; and personnel with emergency action message or employment authentication responsibilities.

A controlled nuclear duty position is one in which the incumbent has access under the two-man concept but does not perform duties that require technical knowledge of nuclear weapons. Types of controlled nuclear duty positions are personnel, including supervisors, who perform assembly, maintenance, prefire, or fire procedures; personnel who handle nuclear weapons, including operators of vehicles, equipment, or aircraft; nuclear weapon couriers; and members of the nuclear weapon storage site security force.

Donald R. Cotter
in Managing Nuclear Operations

mand, control, and support of nuclear weapons must be familiar with WSSRs for their system.

COMMUNICATION SYSTEMS

The nuclear environment can seriously degrade the ability of the civilian leadership to communicate with forces in the field. If nuclear weapons have already been employed by the United States or an adversary, an EMP may have damaged communication systems, command centers may have been destroyed, and essential links may no longer be effective. The means must exist to exercise positive control over nuclear forces.

Survivability

Command and control links must be able to survive in a nuclear, biological, or chemical environment. A conventional conflict can also interfere with US ability to exercise control over dispersed forces. While some systems are “soft” by their nature, and will probably not be usable after an initial exchange of weapons, other systems must be able to survive. Airborne or mobile command posts and space-based communication links can allow C² elements to be removed from the direct conflict. Certain types of radio systems will be able to operate in a degraded environment and must be made available for nuclear C².

Redundancy

The effects of nuclear weapons on communications will vary by system. **To ensure communications are available, redundant systems must be in place in the event one or more lose their effectiveness.** Having redundant systems also enhance deterrence by denying an enemy the opportunity to destroy friendly C² capability with a single blow.

Secure Versus Nonsecure Communications Systems

Secure communications systems afford friendly forces the ability to issue orders while denying valuable intelligence to an enemy. They can also help ensure messages passed to nuclear forces are authentic and not part of enemy deception operations. However, encryption systems by their nature may garble messages or slow their transmission rates, the possibility of which may not be acceptable. The use of code systems with nonsecure communications may be more appropriate than encryption and decryption, though they do not have all of the same capabilities. **C² personnel must strike the appropriate balance between security, timeliness, and accuracy, depending on the contingency and the enemy intelligence threat.**

Interoperability

C² communications systems need to be interoperable so critical information can be exchanged following a nuclear attack. Communications systems that use proprietary information technology standards are closed systems, and their value will be severely limited if they do not interoperate with other proprietary systems. At a minimum, these systems should employ information technology standards from the Joint Technical Architecture.

INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE

Proper use of ISR assets is critical to the planning, conduct, and assessment of nuclear operations. *ISR affords the commander the ability to gather information and make decisions in a timely fashion.* Warning systems must be in place that allow civilian leaders to determine if a nuclear response is appropriate. Planners must have the means of finding decisive targets and determining the proper weapon to employ. Post-attack assessment of both friendly and enemy capabilities is essential for determining the need for and ability to conduct follow-on attacks.



Defense Support Program satellites provide early warning of a missile attack.

Space assets provide essential information for early warning and attack assessment, as well as enemy strike or nuclear detonation detection. They also provide communications, navigation, and trans- and post-attack damage assessment support. Airborne assets are also critical for target detection and damage assessment. Air and space superiority is vital if these systems are to provide information on enemy status and force disposition. Nuclear planners and commanders must have easy access to the information gathered from appropriate ISR sources.

AIR FORCE ORGANIZATION FOR CONUS-BASED NUCLEAR OPERATIONS

The Air Force is responsible for organizing, training, and equipping ICBM and bomber forces for nuclear combat operations. *Air Force major commands (MAJCOMs) and numbered air forces (NAFs) oversee the day-to-day operations of these forces.* ICBMs are organized within the Twentieth Air Force in Air Force Space Command, while the bombers are found in the Eighth Air Force in Air Combat Command. Tankers, reconnaissance and surveillance, and C² aircraft are also operated and maintained by Air Force MAJCOMs. Except for ICBMs, these forces may have conventional missions in addition to their nuclear role.

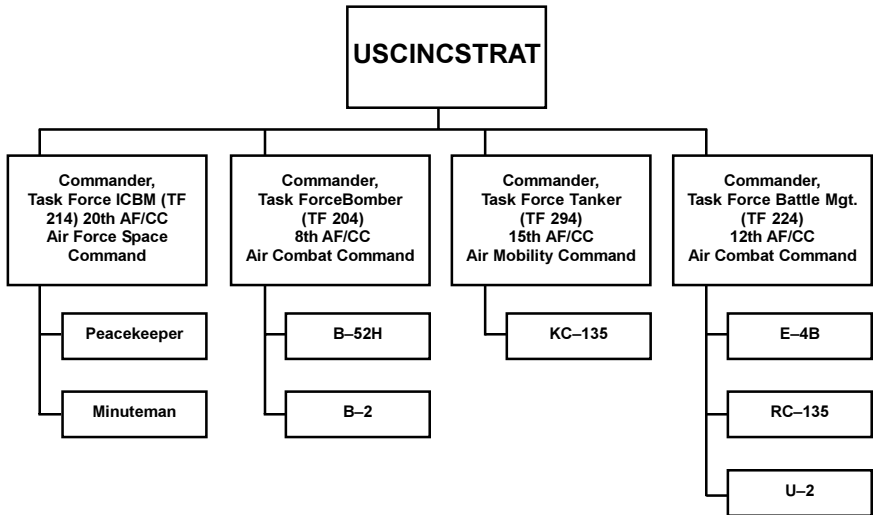


Figure 2.1 US Strategic Command Task Force Organization for US Air Force Forces

Rather than having individual Service components, USSTRATCOM is organized by functional task forces. For example, Task Force ICBM (TF 214) consists of elements of the Twentieth Air Force, while Task Force Bomber (TF 204) includes those organizations in the Eighth Air Force that are assigned a nuclear mission. Comparable task forces exist for the Air Force's operational support forces, as well as for the Navy's submarines. *The commanders of the affected NAFs have a second responsibility as commander of their applicable task force.* When forces are engaged in nuclear operations, the commander in chief, US Strategic Command (USCINCPAC) exercises operational control through task force commanders.

This structure represents a break from standard Air Force operational doctrine. Under normal conditions Air Force units assigned to a unified command will be part of an Air Force component and fall under a single Commander, Air Force Forces (COMAFFOR). This individual typically exercises operational, tactical, and administrative control over the assigned and attached Air Force forces. Given the dispersion of forces, the use of pre-existing command structures, and the limited duration of nuclear operations, however, *there is no COMAFFOR in the USSTRATCOM chain of command.* The unique nature of CONUS-based nuclear operations requires an exception from the more common organizational structure.

SUMMARY

C² involves the ability to gather information, make decisions, and communicate orders to forces in the field. Command relationships must be clear and understood by all personnel in the chain of command. Procedures must be in place to allow for accurate processing and authentication of orders. Communication systems must allow commanders to exercise control under a wide range of conditions. Timely and accurate information allows decision makers to examine the situation and develop options. C² is an essential component in the effective employment and deterrence value of nuclear weapons.

CHAPTER THREE

PLANNING AND SUPPORT CONSIDERATIONS

The great lesson to be learned in the battered towns of England and the ruined cities of Germany is that the best way to win a war is to prevent it from occurring. That must be the ultimate end to which our best efforts are devoted. Prevention of war will not come from neglect of strength or lack of foresight or alertness on our part. Those who contemplate evil and aggression find encouragement in such neglect. Hitler relied heavily upon it.

*US Strategic Bombing Survey,
Summary Report (Europe)*

As with all military operations, nuclear options may be carried out against an enemy's military, political, economic, and information targets. The goal is to achieve national objectives by neutralizing or destroying the enemy's war-making capabilities and will to fight.

Plans for nuclear operations are prepared by USSTRATCOM and the geographic unified commands, in accordance with guidance provided by the Chairman of the Joint Chiefs of Staff and the NCA. These plans respond to threat assessments, targeting directives, and policy requirements. Accurate and timely intelligence is critical to planning nuclear operations.

PLANS

Nuclear operations can either be **preplanned against specific targets** using planned routing (as in the Single Integrated Operational Plan or [SIOP]) or **adaptively planned against emerging targets**. *Preplanning provides the opportunity to conduct detailed planning and analysis against theater targets without the time pressures normally associated with a crisis action scenario.* Preplanned options maintain centralized control while minimizing response time. Plans provide a variety of targeting options, which allow the NCA the flexibility to achieve objectives. As circumstances change during a conflict, adaptive planning allows leadership to retarget and strike emerging, mobile, or previously unknown targets. Quick reac-

tion by nuclear forces can prevent enemy leadership from using resources to its advantage.

Planning for theater-level nuclear operations should be integrated into the CINC's operational plans. This will maximize the desired effects, identify and prioritize intelligence, planning, and force requirements, and ensure proper levels of coordination and support necessary for successful mission operations. USSTRATCOM is tasked by the Nuclear Supplement to the Joint Strategic Capabilities Plan to provide specific support to geographic combatant commanders for their nuclear planning. Liaison teams are assigned to work with the joint force commander and the components in the development of nuclear options.

Given the fluid nature of the modern security environment, the need for strategic intelligence may be greater than ever. *For planning to be effective, emerging threats must be identified long before they pose a significant danger to US interests.* A strong link between intelligence and planning allows for the recognition of threats years in advance and enables the United States to take steps to defend against them, or possibly even deter or prevent their emergence. Successful planning requires more than just an understanding of today's environment; it demands a forward-thinking paradigm that is proactive, rather than reactive, in nature.

TIMING AND DECONFLICTION

Large-scale nuclear employment is closely coordinated within the SIOP to combine targeting, mutual support, and defense, as well as national strategies and objectives. The options contained therein provide sufficient detail to ensure mutual support and defense suppression. Of particular concern is the timing and deconfliction of weapons. Fratricide, or the destruction of one weapon by another, will reduce the effectiveness of the nuclear strike. The SIOP coordinates between different weapons to ensure they do not conflict. **Air Force planners and USSTRATCOM liaison teams in a theater of operations must also ensure that weapons are deconflicted before being employed.**

Another issue of particular concern in a theater is the risk of **friendly casualties**. Planners must fully understand the effects of the weapons, applicable meteorological data, and location of US or allied forces. The impact on combat effectiveness will be far greater than simply the physical destruction of troops if it should turn out that American forces are killed by their own nuclear weapons.

LOGISTICS

Logistics is the science of planning and carrying out the resupply and maintenance of forces. **Effective logistics support is critical for aerospace nuclear forces to be successful.** *Nuclear logistics support structures must be organized, sized, and maintained to support all likely nuclear operations.* Logistics support includes such things as day-to-day maintenance and support operations, generating bombers and ICBMs for nuclear alert in a crisis, deployment into a theater of operations, as required, and dispersal and reconstitution actions (before and after hostilities). Support structures should operate effectively throughout the range of military operations, including nuclear operations. When considering the possibility of nuclear options, planners must review the logistical issues involved and ensure all support requirements are met before moving weapons to new locations.

Security is an important concept in day-to-day support, as well as in dispersal and deployment operations. Weapons are particularly vulnerable when in transit or deployed under ad hoc field conditions, so appropriate measures must be taken to protect them. Planners and commanders should consider, among other things, the current threat level and local community concerns.

Maintenance for nuclear weapons and their delivery systems requires specialized personnel. The decision to deploy or disperse nuclear weapons also requires the deployment or mobilization of maintenance personnel, who typically require their own facilities separate from conventional munitions. Planners need to incorporate such unique support requirements when planning for nuclear operations away from an established infrastructure.



Specialized maintenance personnel are required for nuclear weapons and their delivery systems.

Because nuclear systems and facilities are lucrative targets, air base personnel may encounter NBC weapons effects. US forces should be capable of responding to and executing operations in an NBC environment with minimal degradation of force effectiveness. Implementing the principles of NBC defense—avoidance, protection, and decontamination—will help preserve the fighting capability of the forces.

SUMMARY

Nuclear operations require careful consideration. Plans must be developed in advance to provide alternatives to the NCA and should include preplanned options while also maintaining the flexibility to adapt to changing situations. Just as the SIOP has been created for strategic scenarios, theater commanders will develop appropriate nuclear contingencies in their campaign plans. These plans should take into account deconfliction with other weapons and means to avoid friendly casualties. In making the decision to move nuclear weapons, the commander must understand the significant logistical and support concerns, such as airlift and maintenance facilities, which will require resources that might be used elsewhere. Commanders must be aware of the requirements of nuclear operations long before such weapons are ever employed.

CHAPTER FOUR

TRAINING

In no other profession are the penalties for employing untrained personnel so appalling or irrevocable as in the military.

General Douglas MacArthur
Annual Report of the Chief of Staff of the US Army, 1933

The credibility of the Air Force's nuclear program is founded in the skill of its combat and support crews. Realistic training, high standards for technical competence, strong analytical skills, and personal reliability are key elements that shape its force. The importance of high-quality training cannot be overstated.

Training for Air Force members in nuclear operations is conducted by a variety of agencies. In most cases initial training is conducted within a consolidated system, while recurring training is performed by the individual unit. Initial and recurring training in both the functioning of the weapon system and wartime procedures are critical if the highest possible standards of performance are to be maintained.

TYPES OF TRAINING

Some Air Force members find themselves working only in nuclear operations, while others must be prepared to transition from conventional to nuclear missions. In either case, **training requirements are very strict due to the sensitive nature and destructive potential of nuclear weapons.**

ICBM and aircraft crews require an understanding of both their weapon system and USCINCPAC Emergency Action Procedures (EAP-STRAT). Extensive weapon system training allows crew members to perform day-to-day operations and respond to weapon system failures and emergencies. Thorough EAP-STRAT training ensures crews can provide a timely response to orders from the NCA and helps them understand how the degraded environment of a nuclear exchange will differ from day-to-day operations. *In the time-sensitive environment expected in*



Simulators are a useful tool for both initial and recurring training.

nuclear operations, crew members often will not have the time to read through manuals and policy documents, so in-depth EAP-STRAT training is critical.

LEVELS OF TRAINING

For Air Force members in the nuclear arena, training is a continuous process. Initial and recurring training must provide nuclear personnel with the highest possible degree of skill and the most current information on weapon systems and procedures.

Initial training is focused on the knowledge level of learning. It introduces the crew member to nuclear operations and develops basic skills necessary to be a contributing member. Initial training focuses on *what* to do rather than *why* it is done. It enables the student to perform the mission. Once crew members can perform the essential tasks required of them, they are ready to expand their abilities through recurring training.

Recurring training allows crew members to move on to the application level of learning. They learn more about how their systems work, enabling them to resolve problems when the system does not function as it is supposed to. It is also a means of sharpening basic skills and educating personnel about changes in policies and procedures. Finally, it prepares individuals for increased responsibility for training others, leading forces, and planning operations.

EXERCISES AND WARGAMES

Exercises and wargames are effective means of maintaining and honing the skills of commanders, planners, and combat forces.

Exercises involve moving actual forces, while wargames, which are generally for the benefit of staffs, simulate the movement of forces. They may be conducted at the base, unit, or command level or be Air Force-wide.

While exercises are useful, it is important to consider all the implications of conducting one.

First, safety and nuclear surety are paramount, and great care must be taken anytime weapons or nuclear facilities are involved in an exercise. Second, distinctions between real-world activities and exercise activities must be explicit so there is no question as to whether actual or simulated actions should be performed. Those distinctions should be clear to others as well; training activities may appear provocative to an adversary and must be designed to avoid precipitating a conflict. Finally, large-scale exercises may not afford the opportunity to stop and start again, applying lessons along the way. This is one primary advantage of wargames involving small groups of people.

SUMMARY

High-quality training is essential for high-quality performance. Personnel working in nuclear operations must maintain the highest standards of competence, rather than simply meeting the minimum. Training in normal and emergency weapon system procedures, as well as in combat operations, prepares crew members to react quickly to orders and changing situations. Recurring training should build upon initial training to further develop capabilities within the crew force. Exercises and wargames are effective means of training forces and commanders, and the differences between the two allow for training that is tailored to the needs of the student.

SUGGESTED READINGS

Bruce G. Blair, *Strategic Command and Control* (The Brookings Institution). 1985.

Ashton B. Carter, John D. Steinbruner, Charles A. Zraket (ed.), *Managing Nuclear Operations* (The Brookings Institution). 1987.

Concept for Future Joint Operations (Joint Warfighting Center). 1997.

Daniel Ford, *The Button: The Pentagon's Strategic Command and Control System* (Simon and Schuster). 1985.

Jerome A. Kahan, *Nuclear Threats From Small States* (US Army War College Strategic Studies Institute). 1994.

Joint Vision 2010 (Joint Warfighting Center). 1996.

Dr. Karl P. Magyar (ed.), *Global Security Concerns: Anticipating the Twenty-First Century* (Air University Press). 1996.

National Military Strategy of the United States (Chairman of the Joint Chiefs of Staff). (1995)

A National Security Strategy for A New Century (The White House). 1997.

Maj Richard A. Paulsen, USAF, *The Role of Nuclear Weapons in the Post-Cold War Era* (Air University Press). 1994.

Scott D. Sagan, *The Limits of Safety* (Princeton University Press). 1993.

Martin Walker, *The Cold War: A History* (Henry Holt and Co.). 1993.

GLOSSARY

Abbreviations and Acronyms

AFDD	Air Force Doctrine Document
ARC	Air Reserve Component
C²	command and control
CINC	commander of a combatant command; commander in chief
COMAFFOR	Commander, Air Force Forces
CONUS	continental United States
EAP	emergency action procedures
EAP-STRAT	USCINSTRAT Emergency Action Procedures
EMP	electromagnetic pulse
ICBM	intercontinental ballistic missile
ISR	intelligence, surveillance, and reconnaissance
JFACC	joint force air component commander
MAJCOM	major command
MRBM	medium-range ballistic missile
NAF	numbered air force
NBC	nuclear, biological, chemical
NCA	National Command Authorities
PRP	personnel reliability program
Pub	publication
SAC	Strategic Air Command
SIOP	Single Integrated Operational Plan
SLBM	submarine-launched ballistic missile
TF	task force
US	United States
USCINSTRAT	Commander in Chief, United States Strategic Command
USSTRATCOM	United States Strategic Command
WMD	weapons of mass destruction.
WSSR	weapon system safety rule

Definitions

administrative control. Direction or exercise of authority over subordinate or other organizations in respect to administration and support, including organization of Service forces, control of resources and equipment, personnel management, unit logistics, individual and unit training, readiness, mobilization, demobilization, discipline, and other matters not included in the operational missions of the subordinate or other organizations. (Joint Pub 1-02)

air and space superiority. That degree of dominance in the air and space battle of one force over another which permits the conduct of operations by the former and its related land, sea, air and space forces at a given time and place without prohibitive interference by the opposing force.

airborne alert. A state of aircraft readiness wherein combat-equipped aircraft are airborne and ready for immediate action. It is designed to reduce reaction time and to increase the survivability factor. (Joint Pub 1-02)

alert. The period of time during which troops stand by in response to an alarm. See also **airborne alert**. (Joint Pub 1-02)

area of responsibility. The geographical area associated with a combatant command within which a combatant commander has authority to plan and conduct operations. Also called **AOR**. (Joint Pub 1-02)

coalition. An ad hoc arrangement between two or more nations for common action. (Joint Pub 1-02)

combat assessment. The determination of the overall effectiveness of force employment during military operations. Combat assessment is composed of three major components, (a) battle damage assessment, (b) munitions effects assessment, and (c) reattack recommendation. The objective of combat assessment is to identify recommendations for the course of military operations. The J-3 is normally the single point of contact for combat assessment at the joint force level, assisted by the joint force J-2. Also called **CA**. (Joint Pub 1-02)

command and control. The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. Also called **C²**. (Joint Pub 1-02)

command, control, communications, and computer systems. Integrated systems of doctrine, procedures, organizational structures, personnel, equipment, facilities, and communications designed to support a commander's exercise of command and control across the range of military operations. Also called **C⁴ systems**. (Joint Pub 1-02)

counterforce. The employment of strategic air and missile forces in an effort to destroy, or render impotent, selected military capabilities of an enemy force under any of the circumstances by which hostilities may be initiated. (Joint Pub 1-02)

counterspace. Those offensive and defensive operations conducted by air, land, sea, space, special operations, and information forces with the objective of gaining and maintaining control of activities conducted in or through the space environment.

countervalue. The employment of strategic air and missile forces in an effort to destroy, or render impotent, selected industrial and economic capabilities of an enemy force under any of the circumstances by which hostilities may be initiated.

counterproliferation. The activities of the Department of Defense across the full range of US Government efforts to combat proliferation, including the application of military power to protect US forces and interests; intelligence collection and analysis; and support to diplomacy, arms control, export controls; with particular responsibility for assuring that US forces and interests can be protected should they confront an adversary armed with weapons of mass destruction or missiles. (United States Air Force Counterproliferation Master Plan)

deterrence. The prevention from action by fear of the consequences. Deterrence is a state of mind brought about by the existence of a credible threat of unacceptable counteraction. (Joint Pub 1-02)

dual capable aircraft. An aircraft assigned to a nuclear certified delivery unit capable of executing both conventional and nuclear mission.

electromagnetic pulse. The electromagnetic radiation from a nuclear explosion caused by Compton-recoil electrons and photoelectrons from photons scattered in the materials of the nuclear device or in a surrounding medium. The resulting electric and magnetic fields may couple with electrical/electronic systems to produce damaging current and voltage surges. May also be caused by nonnuclear means. Also called **EMP**. (Joint Pub 1-02)

flexible response. The capability of military forces for effective reaction to any enemy threat or attack with actions appropriate and adaptable to the circumstances existing. (Joint Pub 1-02)

force protection. Security program designed to protect soldiers, [all other military personnel,] civilian employees, family members, facilities, and equipment, in all locations and situations, accomplished through planned and integrated application of combating terrorism, physical security, operations security, personal protective services, and supported by intelligence, counterintelligence, and other security programs. (Joint Pub 1-02) [Words in brackets added for clarity and completeness.]

intercontinental ballistic missile. A ballistic missile with a range capability from about 3,000 to 8,000 nautical miles. Also called **ICBM**. (Joint Pub 1-02)

law of war. That part of international law that regulates the conduct of armed hostilities. Also called the **law of armed conflict**. (Joint Pub 1-02)

mutual assured destruction. A theory of nuclear deterrence which is based on the premise that neither opponent will initiate a nuclear attack because the ensuing conflict would be unrestrained and would destroy both nations.

operational control. Transferable command authority that may be exercised by commanders at any echelon at or below the level of combatant command. Operational control is inherent in combatant command (command authority). Operational control may be delegated and is the authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks,

designating objectives, and giving authoritative direction necessary to accomplish the mission. Operational control includes authoritative direction over all aspects of military operations and joint training necessary to accomplish missions assigned to the command. Operational control should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and Service and/or functional component commanders. Operational control normally provides full authority to organize commands and forces and to employ those forces as the commander in operational control considers necessary to accomplish assigned missions. Operational control does not, in and of itself, include authoritative direction for logistics or matters of administration, discipline, internal organization, or unit training. Also called **OPCON**. See also **tactical control**. (Joint Pub 1-02)

operational level of war. The level of war at which campaigns and major operations are planned, conducted, and sustained to accomplish strategic objectives within theaters or areas of operations. Activities at this level link tactics and strategy by establishing operational objectives needed to accomplish the strategic objectives, sequencing events to achieve the operational objectives, initiating actions, and applying resources to bring about and sustain these events. These activities imply a broader dimension of time or space than do tactics; they ensure the logistic and administrative support of tactical forces, and provide the means by which tactical successes are exploited to achieve strategic objectives. See also strategic level of war; tactical level of war. (Joint Pub 1-02)

positive control. The use of design features, procedures, safety rules, or accident prevention or mitigation measures that reduce the likelihood, severity, or consequence of an accidental or deliberate threat involving a nuclear weapon or nuclear weapon system.

proliferation. The spread of nuclear, biological, and chemical capabilities and the means to deliver them. (United States Air Force Counterproliferation Master Plan)

strategic attack. Strategic attack is a military action carried out against an enemy's center(s) of gravity or other vital target sets, including command elements, war-production assets, and key supporting infrastructure, to effect a level of destruction and disintegration of the enemy's military capacity to the point where the enemy no longer retains the ability or will to wage war or carry out aggressive activity. (AFDD 1)

strategic level of war. The level of war at which a nation, often as a member of a group of nations, determines national or multinational (alliance or coalition) security objectives and guidance, and develops and uses national resources to accomplish these objectives. Activities at this level establish national and multinational military objectives; sequence initiatives; define limits and assess risks for the use of military and other instruments of national power; develop global plans or theater war plans to achieve these objectives; and provide military forces and other capabilities in accordance with strategic plans. See also **operational level of war; tactical level of war.** (Joint Pub 1-02)

strategic warning. A warning prior to the initiation of a threatening act. See also **tactical warning.** (Joint Pub 1-02)

submarine-launched ballistic missile. A missile, launched from a submarine, which does not rely upon aerodynamic surfaces to produce lift and consequently follows a ballistic trajectory when thrust is terminated.

tactical control. Command authority over assigned or attached forces or commands, or military capability or forces made available for tasking, that is limited to the detailed and, usually, local direction and control of movements or maneuvers necessary to accomplish missions or tasks assigned. Tactical control is inherent in operational control. Tactical control may be delegated to, and exercised at any level at or below the level of combatant command. Also called **TACON.** See also **operational control.** (Joint Pub 1-02)

tactical level of war. The level of war at which battles and engagements are planned and executed to accomplish military objectives assigned to tactical units or task forces. Activities at this level focus on the ordered arrangement and maneuver of combat elements in relation to each other and to the enemy to achieve combat objectives. See also **operational level of war; strategic level of war.** (Joint Pub 1-02)

tactical warning. 1. A warning after initiation of a threatening or hostile act based on an evaluation of information from all available sources. 2. In satellite and missile surveillance, a notification to operational command centers that a specific threat event is occurring. The component elements that describe threat events are: Country of origin—country or countries initiating hostilities. Event type and size—identification of the type of event and determination of the size or number of weapons. Country un-

der attack—determined by observing trajectory of an object and predicting its impact point. Event time—time the hostile event occurred. Also called integrated tactical warning. See also **strategic warning**. (Joint Pub 1-02)

theater. The geographical area outside the continental United States for which a commander of a combatant command has been assigned responsibility. (Joint Pub 1-02)

Two-Person Concept. Designed to prohibit access by an individual to nuclear weapons and certain designated components by requiring the presence at all times of at least two authorized persons, each capable of detecting an incorrect act or unauthorized procedure with respect to the task to be performed. (AFI 91-101)

weapons of mass destruction. In arms control usage, weapons that are capable of a high order of destruction and/or of being used in such a manner as to destroy large numbers of people. Can be nuclear, chemical, biological, and radiological weapons, but excludes the means of transporting or propelling the weapon where such means is a separable and divisible part of the weapon. Also called **WMD**.(Joint Pub 1-02)

You are the United States Air Force



