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Recommended Citation

Hans M. Kristensen, "U.S. Strategic Command Force Structure Studies May 2001", nuke policy, May 30, 2001, <https://nautilus.org/nuke-policy/u-s-strategic-command-force-structure-studies-may-2001/>

The Matrix of Deterrence

U.S. Strategic Command Force Structure Studies

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May 2001

Introduction

For the second time since the end of the Cold War, the U.S. government has begun a major review of its nuclear posture. Newly elected President George W. Bush has pledged to cut the nation's nuclear arsenal quickly and reportedly considers reducing the alert level of the remaining forces. In response, Defense Secretary Donald Rumsfeld has ordered a nuclear posture review (NPR) to assess which weapons that can be cut and how the revised posture will serve the national security objectives in the future.

Of all of the inputs that will influence Rumsfeld's conclusions, one of the most important will be the recommendation from the U.S. Strategic Command (STRATCOM), the unified command with overall responsibility for nuclear planning and executing the nuclear strike plans in times of war. Rumsfeld said on May 1, that the Department of Defense (DOD) has "been working with [STRATCOM] and other elements in the department," and will "be making some recommendations to them in due course."¹

STRATCOM documents recently released under the Freedom of Information Act (FOIA) show what the nation's primary nuclear command is likely to recommend to the Secretary and where

STRATCOM is likely to resist cuts that affect critical forces and capabilities. The studies and briefings, which are reviewed in this report, date from 1991 through 1996 and resulted from STRATCOM's evolving analysis of deterrence and arms control after the Cold War. They illustrate that the nuclear command's influence on past reviews and resulting force structure decisions was considerable. The analyses strongly shaped the START II Treaty, the 1994 Nuclear Posture Review, and the 1997 Helsinki agreement on START III. In fact, STRATCOM's "preferred force structure" in 1992 essentially *became* the nation's nuclear posture. The force planning principles and priorities that resulted from these analyses continue to guide STRATCOM's position on future arms control agreements and posture planning, and will determine the recommendations that STRATCOM give to Rumsfeld during the current review.

Summary and Main Findings

The six force structure studies and briefings published between 1991 and 1996 were partly declassified and released by STRATCOM between 1995 and 2000 under provisions of the FOIA. The studies, the only force structure studies known to have been conducted by SAC/STRATCOM during that period,² took place during a time in which the U.S. nuclear posture was under considerable change due to introduction of new weapon systems, retirement of older weapons, and cancellation of others as a result of the sweeping world changes after the fall of the Berlin Wall in 1989. The six studies are:

- The Phoenix Study from 1991, the last force structure study conducted by U.S. Strategic Air Command (SAC) before it was replaced with STRATCOM in June 1992;
- STRATCOM's briefing to Defense Secretary Richard Cheney and Chairman Joint Chief of Staff Colin Powell in 1992 on the impact of the Washington Summit Agreement, the final preparation for START II;
- The Sun City study from 1993, which built on the findings in the Phoenix Study to examine post-START II force structures, and largely determined the outcome of the 1994 Nuclear Posture Review;
- The Sun City Extended study from 1994, building on Sun City but taking a closer look at China and "rogue" states;
- STRATCOM's white paper on post-START II arms control options from 1996, which analyzed the impact of Presidential Decision Directive 37 on future force options;³
- STRATCOM's Warfighter Assessment of post-START II Arms Reductions from 1996, presumably conducted in preparation for the START III agreement in Helsinki.

Although large sections of the documents remain classified and were deleted before release, the remaining sections provide considerable information about STRATCOM's force planning principles and priorities. The documents also illustrate the considerable leverage STRATCOM had (and continues to have) on the formulation of U.S. nuclear strategy and policy. Other agencies also contributed to shaping the nuclear posture and arms control agenda, but as the unified command in charge of nuclear planning, STRATCOM's prerogative is to translate the President's general guidance into strike plans for the nation's nuclear forces. To that end, the documents provide a unique and rare glimpse into the inner sanctums of the nuclear "priesthood," an essential (but often missing) element in the public's ability to assess and participate in nuclear posture reviews. The main nuclear planning principles for maintaining a credible deterrence are:

- Maintain a Triad of nuclear forces;

- Actual posture is a Twin Triad with SSBNs and ICBMs carrying day-to-day deterrence burden and bombers providing back-up;
- Maintain two-ocean SSBN force with full target coverage in both oceans, large operating areas, and maximum reconstitution (upload) capability;
- Protect MIRV on SSBNs;
- Retain warheads a level consisting with warfighting needs;
- Nuclear forces must be highly flexible, i.e. retain weapon platforms and most capable systems;
- Nuclear war planning system must be robust and highly flexible;
- Nuclear forces must be survivable;
- Command and Control (C2) connectivity must be survivable;
- Continue modernization of remaining forces;
- Secure hedge and reconstitution (upload) capacity;
- Arms control must ensure stability: retain most capable U.S. systems (including first strike and prompt retaliatory launch), but reduce most threatening Russian systems.

The unilateral Presidential Nuclear Initiatives from September 1991 and January 1992 were effective in breaking the deadlock of lengthy and complicated arms control negotiations. To the nuclear planners at U.S. Strategic Air Command (and subsequently STRATCOM), however, the initiatives brought confusion, uncertainty, and even danger of undermining stability. As the primary nuclear command,⁴ STRATCOM set out to restore order and predictability in the arms control process through its main asset: expertise in nuclear war planning and analysis. Very few people in the White House or the Congress have ever read the SIOP (Single Integrated Operation Plan), the nations main nuclear war plan, and even fewer understand the methodology that translates presidential guidance into the complex matrix matching warhead numbers, deployments, and targeting. Through the detailed analysis and lobbying conducted in support of the force structure studies from 1991 to 1996, STRATCOM managed to contain the ambitions for nuclear disarmament that marked the early phases of the 1994 Nuclear Posture Review and restore order to the arms control process. In doing so, STRATCOM largely succeeded in establishing the overall principles by which nuclear U.S. nuclear weapons reductions will be measured in the foreseeable future. "We are on a well thought-out course," Vice Admiral Richard M. Mies told U.S. Senate Armed Services Committee Chair Strom Thurmond in 1998, "it is stable, verifiable, and reciprocative."⁵

Nowhere are those principles more evident than in the 1993 Sun City study. By prescribing a "penalty for capability lost," it is not surprising that deeper cuts in nuclear weapons were deemed as "unjustifiable" unless the remaining forces became much more flexible and capable of holding at risk the full range of targets in the various strike options. The "preferred force structure" established by Sun City (building on the STRATCOM's View briefing described below) not only became the START II Treaty and the 1994 Nuclear Posture Review, but it also reaffirmed a "warfighter" mentality that continues to influence arms control and posture planning. This warfighter mentality builds on assumptions in the Phoenix Study from the Cold War about fighting and winning nuclear wars with survivable and superior forces by inflicting calculated and highly orchestrated damage to groups of targets in order to incrementally impact specific sections of an opponent's warfighting capability. To the nuclear planners at STRATCOM, this warfighting mentality is as fundamental to a "credible" nuclear deterrent today as it was during the Cold War.

Because of this warfighting culture, and its demand for highly flexible forces fixated on prompt

destruction of military targets, nuclear forces can only be cut to a certain extent before the ability to inflict sufficient damage in a sufficient number of carefully orchestrated strike scenarios is considered undermined. Granted, the President can always issue new guidance for how much damage is enough, but in reality the expertise for calculating this and translating the guidance into a "credible" deterrent remains firmly in the hands of STRATCOM.

The content and structure of the different studies also provide indications of how the focus of nuclear planning changed during the 1990s. As the issue of the force structure size itself settled down in the 1993-1994 period with the START II treaty and the Nuclear Posture Review, the question of identifying potential future opponents gained more prominence. Most of the effort in the first two studies, for example, focused on the balance of the Triad (bombers, submarines, and intercontinental ballistic missiles), the number of warheads, and the flexibility of the war planning system. The residual Soviet nuclear arsenal in Russia and the other ex-Soviet states remained the focus. The third study, Sun City Extended in 1994, focused less on Russia and more on examining various threat scenarios involving particularly China and so-called "rogue" states. This evolving trend crossed a threshold in 1998 with STRATCOM reinserting China in SIOP planning after a hiatus of 16 years. As the U.S. over the next couple of years deploys the Trident II missile (some presumably with the high-yield W88 warhead) on strategic ballistic missile submarines (SSBNs) in the Pacific, the trend of reducing the Russian focus and increasing targeting of China is expected to continue.⁶

Beyond war planning itself, the force structure studies also provide insight into some of the rationales for how and why certain arms control terminology crept into U.S. national security objectives and how this terminology shaped the posture. Most important is the so-called hedge, which established an insurance in modern arms control by keeping in reserve thousands of nuclear warheads removed from delivery vehicles by arms control agreements in case Russia returned to a more hostile regime. This reserve has gradually increased to the point that, when the START II is implemented in 2007, the U.S. will retain enough extra warheads in inactive storage to quickly reconstitute (upload) the operational stockpile back to START I levels. While this may seem a prudent precaution to some, the hedge also allowed Russia to retain thousands of extra warheads, and created a shadow-arsenal on both sides that arms control planners are now struggling to identify and bring under control.

These planning principles result in a number of long-term trends for the U.S. nuclear posture that act as powerful roadblocks to deep cuts of nuclear weapons:

- As the number of warheads is reduced, a Triad of nuclear forces becomes *more* important because of increased vulnerability of fewer platforms to attack or failure;
- As the target base is reduced because of reductions in nuclear forces, the flexibility and capability of the Triad becomes paramount;
- As the number of nuclear warheads is reduced, transparency of the remaining numbers and types of nuclear forces becomes increasingly important;
- As strategic offensive nuclear weapons are cut, the impact of non-strategic nuclear weapons increases;
- As the number and type of nuclear warheads are reduced, the value of remaining systems increases;
- As the number of warheads is reduced, the impact of missile defense systems on both offensive and defensive nuclear war planning becomes more important;

In retrospect, the main observation that stands out from the force structure studies and briefings is just how much of STRATCOM's analysis and conclusions that actually became national policy. This is not to suggest that STRATCOM dictated policy or was the sole influence. Nonetheless, while the President and the administration may be setting the general parameters, these documents illustrate the considerable leverage STRATCOM had in the 1990s for shaping both the nuclear posture and the arms control agenda. One reason, obviously, is that presidential nuclear guidance is relatively vague and leaves it up to the nuclear experts, mainly at STRATCOM, to translate the guidance into military plans. In perspective, most administrations last only four years, a blink of an eye in the career of a nuclear bureaucrat - not to mention in the lifespan of most weapon systems.

Another important observation is how early in the 1990s the main lines for the current nuclear posture and arms control policy emerged. News reports of presidents signing START treaties and announcing nuclear posture reviews may be the landmarks by which the public recalls and identifies the evolution in the posture. Yet the STRATCOM studies and briefings suggest that these events to a large extent implemented a posture reform that evolved in the late 1980s and was refined in the early 1990s. Along with the prudent trimming of excessive (and expensive) forces, this reform involved retaining the most capable weapon systems, improving the flexibility and lethality of the remaining forces, and transforming the war planning system itself from a monolithic and time-consuming process focused on the Soviet Union into an adaptive and user-friendly tool capable of quickly responding to world changes and new presidential guidance:

This reform essentially meant the transition from a quantitative to a qualitative posture. Even though President Bill Clinton in 1997 issued new guidance to the war planners that reportedly removed all previous requirements for planning to fight and win protracted nuclear wars, the nuclear posture that resulted from STRATCOM's reform -- and the improved flexibility of the nuclear war planning system that flowed from it -- means that much remains the same: protracted nuclear war or not, STRATCOM still has to "win" any conceivable nuclear clash, whether it be with Russia, China, or so-called "rogue" states. This "credible deterrent" still requires flexible, multiple-platform, and hardened nuclear forces, planning principles that remain firmly rooted in STRATCOM's analyses from the 1990s.

The Phoenix Study (1991)

Only a few weeks before President Bush in September 1991 announced sweeping reductions in U.S. nuclear forces, SAC completed the Phoenix Study. It was the last force structure study conducted by SAC, which was disbanded and its functions overtaken by STRATCOM in June 1992, and was completed shortly after the signing of the START I Treaty in July 1991. The Phoenix Study, named after its classification level of Secret/Phoenix Only, followed several years of internal DOD review that reduced the number of targets in the SIOP from some 16,000 in the mid-1980s to approximately 7,000 in 1991. Building on this review, the Phoenix Study attempted to establish "rules of thumb" for analyzing the central issues of nuclear war planning: who should be targeted; what targets should be held at risk; how many aimpoints; what quality of weapons is needed; how many weapons; what special requirements; how many reserve weapons; and whether is it necessary to "hedge" against an uncertain future? The Phoenix Study is by far the most detailed of the six declassified documents, and it appears that its rules of thumb formed the basis of all the other studies conducted in the 1990s.

The rules of thumb were based on historical targeting data for the calculation of the number of weapons required to defeat a given number of installations (targets). The Phoenix Study had its roots deep in the Cold War and essentially summarized SAC's experience from more than 40 years of

nuclear planning. Although the details of these rules of thumbs were deleted from the study before it was released under FOIA, the remaining unclassified sections contain sufficient information to give an idea of how the number of identified targets in potentially hostile countries translate into number of warheads to achieve a certain degree of damage. This calculation involves four steps in response to the guidance issued by the president or secretary of defense:

- Target Development
- Probability of Arrival (PA)
- Aim Points (Desired Ground Zero)
- Probability of Damage (PD)

Because some warheads will fail to reach their target because of factors such as technical malfunction, pre-launch survivability, local defenses, and adverse weather conditions, the Phoenix Study prescribed an unclassified rule of thumb of 20 warheads per eight targets to ensure sufficient Probability of Arrival (PA).⁷ The number of warheads per target was different for each type of weapon system, and bombers were considered three times more vulnerable than ballistic missiles and therefore require more launch platforms to inflict the same level of damage.

Although some aimpoints in special cases may be assigned more than one warhead (layered targeting), the assumption in the Phoenix Study was that each aimpoint -- called Desired Ground Zero (DGZ) -- required one warhead. "Given the high quality of today's weapons," the study concluded, "we can generally assume that if any weapon arrives, it will accomplish the task required."⁸

By combining PA with target characteristics such as hardness and proximity to other targets, the number of aimpoints needed to guarantee destruction of each target or target group can be estimated (see table below).⁹ The resulting START I ratio of 6,000 warheads for 2,400 aimpoints roughly corresponds to unofficial estimates of some 2,500-3,000 targets in today's SIOP.¹⁰ By the same measure, the number of aimpoints for 2,500 warheads in a future START III posture would correspond to some 1,050-1,430 targets.

Warhead to Target Ratio^a

Treaty framework	Warheads	Aimpoints (DGZ) ^b	Installations (targets) ^c
START I	6000	2400	2500-3500
START II	3500	1400	1450-2000
START III	2500	1000	1050-1430
START IV	1500	600	630-860
START V	1000	400	420-570

^a Based on 1991 Phoenix Study example of 20 warheads per 8 aimpoints. This ratio only reflects probably of arrival, not whether desired damage will be achieved.

^b There are more warheads than aimpoints to compensate for the fact that some warheads will fail to reach their targets for various reasons. Others warheads are held in reserve.

^c There are more installations than aimpoints because targeting involves grouping installations in the National Target Base (NTB) into aimpoints where the minimum number of weapons (even a single warhead) will achieve guidance-directed Probability of Damage (PD) against individual installations or groups of installations.

As the number of targets in Russia continues to decline to perhaps fewer than 500 under START III,¹¹ the number of aimpoints -- and therefore required warheads -- will also decrease for this portion of the SIOP. Because of this trend, the importance of China and other potential adversaries to the overall targeting matrix will increasingly influence the composition of the nuclear posture and the war plans. Targets identified by military planners in response to vague presidential guidance will therefore have a proportionally greater impact on defining future limits on nuclear cuts. Conversely, if the guidance becomes more precise and requirements for damage probability and degree of destruction are eased, a "credible" deterrence could be maintained with many fewer weapons and a much more relaxed posture.

Another important feature of the Phoenix Study is its portrayal of strategic submarines as playing a much more prominent role in the strike plans than their normal image of serving merely as a retaliatory second-strike force held in reserve. The study states that the secure reserve force "handles contingencies" and provides only a "limited restrike capability." Instead the SSBNs are described as one of the two *main* pillars in the Triad -- comparable to that of the ICBM force, which has traditionally been the backbone in the offensive nuclear strike force. In fact, the Phoenix Study assumed only 25 percent of SSBNs as earmarked for the strategic reserve force.¹² The basis for this assumption is the dramatic improvement in the capability of sea-based ballistic missiles with the introduction of the Trident missile system, which gave targeters new offensive capabilities, and of the bomber force becoming less prominent in the posture. The resulting posture was described by the Phoenix Study as a "Twin Triad" posture based on the two ballistic missile legs forming the main thrust of the nation's deterrent, with bombers mainly providing back-up.¹³ Indeed, the Phoenix Study concluded that the Secure Reserve Force, which is mostly sea-launched ballistic missiles (SLBMs), "is not a hedge," and that the Twin Triad concept "places the day-to-day deterrence burden on the two ballistic legs."¹⁴

By formulating or reaffirming many of the arms control and force planning principles that later influenced the START II agreement and the 1994 Nuclear Posture Review -- and which continue to guide force planning even today, the Phoenix Study is a case study of how much of SAC's nuclear planning principles were inherited and perpetuated by its successor, STRATCOM. These principles include:

- The Soviet Union (later Russia) remains the only nation capable of destroying the US. "Handle the Soviet Union and you can deter all other potential threats;"¹⁵
- The Triad will be more important in the future because: (1) fewer warheads on fewer delivery vehicles; and (2) fewer types of both warheads and delivery vehicles;¹⁶
- The creation of a Twin Triad, a force structure consisting of ICBMs and SLBMs with bombers acting primarily as backup to failure of either of the other two legs;
- The Twin Triad concept uses the bombers to augment attacks by ICBMs and SLBMs and then is sized to be used in a real hedge role for the first time against the failure of one of the ballistic legs;¹⁷
- To "hedge" against uncertainty in the developments in the Soviet Union, and maintain a "reserve" of inactive nuclear weapons that can relatively quickly be reconstituted onto the operational force;
- Maintain nuclear force capability so that allies don't see a need to deploy nuclear weapons.

With the 2001 NPR possibly reducing the bomber-leg of the Triad -- perhaps even denuclearizing one of the strategic bombers, the features of the Twin Triad posture presented by the Phoenix Study are likely to be strengthened. Such a development would dramatically increase the prominence of the sea-based leg of the SSBNs.

STRATCOM's View: 1992 Briefing to the Secretary of Defense

The findings of the Phoenix Study were prominent in the minds of STRATCOM officials in November 1992, when they went to Washington, D.C., to brief Defense Secretary Richard B. Cheney and Chairman Joint Chiefs of Staff Colin Powell on the implications of the Washington Summit Agreement signed by President George H. W. Bush and President Boris Yeltsin in June 1992. After President Bush's unilateral cuts in September 1991 and January 1992, the nuclear posture was in turmoil. With the START II Treaty on the horizon, long-term stability was at stake, and the Office of the Secretary of Defense wanted an in-depth study of the strategic nuclear forces. The Joint Staff and the Air Force, both traditionally strong players in shaping the nuclear posture, considered a formal study to be STRATCOM's responsibility. After all, bringing nuclear planning together under a single command was what had motivated the creation of STRATCOM in the first place.¹⁸

In a number of conferences with the Joint Staff, the Air Staff, and the OPNAV Staff (Office of the Chief of Naval Operations), Air Combat Command (ACC), and the commanders of the surface and submarine fleets in the Atlantic and Pacific, STRATCOM developed a "preferred USSTRATCOM force structure" to guide the Clinton administration.¹⁹ STRATCOM's recommendations to Cheney and Powell included the following main points:

- Flexibility is key to war planning, i.e. retain weapon platforms;
- New nuclear certification schedule for the B-2;
- Transition B-1 to conventional role;
- Modification of B-52Hs by removing internal ALCM capability from 47 aircraft and removing the external ALCM capability from 47 B-52Hs scheduled to receive heavy conventional upgrade by the fall of 1996 (the latter delayed until the FY96 POM);
- Assignment of Air Reserve Component to nuclear bomber functions;
- Modernization and life-extension of Minuteman III ICBMs;
- Maintain Peacekeeper ICBM until 2001;
- Transfer some W87 warheads from retired Peacekeepers to Minuteman III ICBMs;
- Maintain two-ocean SSBN force with full target coverage in both oceans, large operating areas, and maximum reconstitution capability;
- Less than 18 SSBNs is undesirable;
- Protect MIRV on SLBMs since START prohibits uploading.

This preferred force structure subsequently became the basis for the Sun City study, which shaped the 1994 Nuclear Posture Review and, in turn, the 1997 Quadrennial Defense Review. In preparing for the briefing, the Office of the Assistant Secretary of Defense/International Security Policy (ASD/ISP) stressed to the Secretary of Defense that the study "highlights the importance of identifying, in the near term, the force structure with which we will want to move into the 21st century."²⁰

The study was also STRATCOM's first chance to prove its worth since replacing the split Air Force-Navy nuclear planning structure from the Cold War. By centralizing all nuclear command and

control in a single command, the hope was to ensure a more impartial and realistic nuclear planning. Indeed, in undertaking the study, the ASD/ISP told Cheney after visiting Offutt Air Force Base prior to the briefing, STRATCOM had "filled the void that we sought to eliminate through the establishment of the Command: provide a single voice which could (1) analyze impartially the full range strategic force issues, integrating force structure, targeting, operational, and arms control considerations; and (2) speak to these national requirements in programmatic and budgetary fora, and bring them forward for your review."²¹

Yet the establishment of STRATCOM as a nuclear "super command" also monopolized somewhat the analysis of the nuclear posture. A change in structure did not necessarily mean a change in mindset, and a central principle in STRATCOM's efforts continued to be that the preferred force structure should maintain highly survivable, flexible, and modern offensive forces. In other words, the force structure should meet the needs of the "warfighter." This principle was deeply rooted in the Cold War nuclear planning culture and significantly limited the changes that would be acceptable.

The Sun City Study (1993)

The incoming Clinton Administration essentially endorsed the Bush posture by quickly signing the START II Treaty in January 1993, thus approving STRATCOM's preferred force structure. This undercut the effort by the late Secretary of Defense, Les Aspin, to fundamentally reform the posture through the Bottom-Up-Review (BUR) and NPR. Instead, STRATCOM ended up playing a central tutor-function in the NPR process, where it was invited to provide input at virtually every step in the process.²²

Although it managed to steer the NPR in its preferred direction, further reductions were inevitable. Coinciding with its effort in the NPR process, STRATCOM therefore conducted a study, called Sun City, of alternative force structures that examined nine different options, six of which were at the 3,500 START II accountable limit. Option 1 was the "preferred" force level briefed to the Secretary of Defense in November 1992. The three remaining options were "well below" 3,500 weapons,²³ and are likely among the options that are currently under consideration by the 2001 review.

The main objective of Sun City was to "capture the effectiveness" of each force structure option in its ability to hold the threat at risk, its planning flexibility, and its affordability. STRATCOM's core concern was to evaluate -- from the warfighter's perspective -- the impact of few, heavily MIRVed platforms (term used loosely to indicate concentration of weapons on a platform) versus many, more lightly MIRVed platforms, and the ability to effectively plan the forces. In doing so, STRATCOM relied on the rules of thumb developed in the Phoenix Study to calculate the number of weapons required for a given number of installations.²⁴

Sun City assigned a "penalty for capability lost as compared to Option 1," STRATCOM's own preferred START II force structure from November 1992. Changes to the mix of the Triad, for example, were assigned penalties for degraded flexibility and capability compared with Option 1. Not surprisingly, Sun City therefore found that it was undesirable to cut too much and that the preferred force structure was the most desirable. The smaller force structure options (and target sets) were analyzed mainly for "parametric purposes" because STRATCOM considered them useful in "realizing the magnitude of the force structure required for smaller target sets" (for example China and rogue states). This also illustrates the significant impact that vague presidential guidance can have on force requirements if it allows -- or even requires -- targeters to broaden the types or location of targets to be included in nuclear strike planning.

Sun City also calculated U.S.-Russian strategic stability by examining the impact of various

"advantage ratios" and "stability measures." The advantage ratios included a comparison of U.S. and Russian delivery vehicles, weapons, mega-tonnage, and hard target kill (including Time-Urgent Hard Target Kill). Advantage ratios turned out to be "non-discriminating" for the different force options (down to 3,500 weapons). Stability measures, on the other hand, did not discriminate between force options but included the following variables:²⁵

- Stability index;
- Sensitivity to generate;
- Sensitivity to Prompt Retaliatory Launch;
- Second Strike Dialect;
- Incentive Index;
- Drawdown curves.

Among these, the Stability Index was one of the "first strike stability measures analyzed" in Sun City. The index was used to express the cost of initiating a nuclear strike versus the cost of waiting to strike, essentially the "use them or lose them" dilemma. "Cost" was considered damage to "us" and loss of damage to "them," and a higher index was typically considered to be more stable.²⁶ In other words, an opponent's temptation to initiate a first strike was reduced by the U.S. maintaining a highly capable posture that included a capability to strike first.

This assessment of the impact of arms reductions on stability continued to influence STRATCOM's attitude to new cuts throughout the 1990s. Because analysis of stability is closely linked to the question of alert level, STRATCOM sees the issue of stability as increasingly important as the number of weapons is cut. According to Vice Admiral Richard W. Mies, former commander of strategic submarines in the Atlantic and currently commander-in-chief of STRATCOM:

"Stability is the most important criterion as we proceed down the glide slope to lower numbers of nuclear weapons. Control of the glide path is critical - the journey is just as important as the destination. [...]"

Reducing the alert status of our forces, in isolation, can diminish the credibility and survivability of our deterrent forces. However, if a de-alerting initiative does not degrade our strategic capability or impair our arms control position, I would consider supporting it. In general, de-alerting initiatives should not be adopted unless they are reciprocal, verifiable, and, most importantly, stabilizing. [...]"

Many de-alerting proposals jeopardize the existing stability against a preemptive first strike because they create a premium for attacking first. Any potential adversary's perception that a strategic advantage could be gained by a preemptive strike would be destabilizing. Additionally, any unilateral act to restore de-alerted assets or any act which might be perceived as restoring de-alerted forces, creates a potential for instability."²⁷

The bottom line of Sun City was that Option 1 remained STRATCOM's preferred warfighting force structure to implement START II because it provided the greatest capability and flexibility for all criteria examined. Sun City concluded that strategic nuclear forces "led the way during the cold war, brought an end to that confrontation, and continue to lead now." Overall recommendations for the future force structure were:

- Flexibility and capability of the Triad are paramount, especially in light of the thinning target base;

- The size of the force must be sufficiently capable against a range of threats;
- The *mix* of bombers, ICBMs, and SSBNs must retain flexibility and capability;
- The force must be affordable.

Sun City validated the targeting principles of the 1991 Phoenix Study and became the basis for the 1994 NPR and implementation of START II. It drew a line in the sand against further cuts by declaring that, "we've already paid at the bank" in reduced force structure and modernization by a 2-to-1 margin.²⁸ Nonetheless, it is likely among the Sun City's analysis of three sub-START II force level options that the main lines of the future posture resulting from the 2001 NPR are to be found.

The Sun City Extended Study (1994)

During the Nuclear Posture Review deliberations in early 1994, STRATCOM completed the Sun City Extended study. Emerging less than a year after completion of the original Sun City study from 1993, the new analysis contained important changes compared with its predecessor.

Although the declassified Sun City Extended is heavily redacted, perhaps the most interesting feature is its comparatively extensive analysis of strike options against China. While its predecessor, the 1993 Sun City study, focused on U.S.-Russian nuclear relations and only mentioned China in passing, Sun City Extended dedicated a total of thirteen pages to examining various "China Scenarios." Two specific "potential US/China adversarial scenarios" were declassified and released in some detail, one evolving from a conflict over North Korea and the other being a direct U.S.-Chinese confrontation.²⁹

- "1st scenario depicts a US/NK/China excursion
 - regional as opposed to global concern
 - calls for an adaptively planned response against NK
 - >>Not a full scale attack against China
 - DPF, NSNF, or conventional (CALCM/SLCM-C)
- 2nd scenario focuses on a China/CONUS confrontation
 - implies a need for a major-attack response plan"

The increased focus on China was important for several reasons. First, China had been removed from the SIOP in 1982 to reflect normalization of relations and its value as a potential partner against the Soviet Union. During this time, nuclear planning against China was confined to a small number of contingency options involving the strategic reserve force and non-strategic nuclear weapons. The Joint Strategic Capabilities Plan (JSCP) for Fiscal Year 1984, for example, did order the preparation of a contingency plan (CONPLAN) for the employment of nuclear weapons against China's power projection capabilities (presumably ballistic missile and air bases). But this requirement was dropped again in the FY85 JSCP.³⁰

As the Soviet threat faded away, China's status as a potential military opponent in the East Asia region increased in the early- to mid-1990s. Coinciding with U.S. intelligence reports about China's slow but steady modernization of long-range strategic nuclear forces, some military planners began arguing that it was necessary to begin to target China on a more ongoing and fundamental basis. During the 1994 Nuclear Posture Review, STRATCOM and some DOD offices unsuccessfully lobbied for increasing nuclear planning against China.³¹ Indeed, Sun City Extended could seem intended to try to support the case by identifying the need for a nuclear "major-attack response plan" in a direct

U.S.-Chinese confrontation.³²It wasn't until 1998, however, following Presidential Decision Directive 60 (PDD-60), that STRATCOM formally was able to bring China back into the SIOP.

STRATCOM White Paper: Post START II Arms Control (1996)³³

After the Nuclear Posture Review was completed in September 1994 and START I entered into force three months later, STRATCOM began preparing for what would come after START II. To ensure international support for an indefinite extension of the Nuclear Non-Proliferation Treaty (NPT) at the NPT Review and Extension conference in New York in April 1995, the White House promised further nuclear reductions in compliance with the treaty's Article VI.

Coinciding with the conference, President Clinton in the late spring of 1995 signed into effect Presidential Decision Directive 37 (PDD-37) to provide guidance to the agencies on arms control after START II. PDD-37 included a list of four "first principles" that should guide the U.S. approach to arms control:³⁴

- Deterrence;
- Stability;
- Hedge;
- Equivalence.

To link the analysis more clearly to PDD-37 in preparation of the next phase, then CINCSTRAT Admiral Henry D. Chiles directed the Policy and Doctrine Branch (J512) to prepare a paper that outlined STRATCOM's position on post-START II arms control. The resulting white paper was prepared under the direction of Air Force Major J. L. Hogler and approved by the Strategy and Policy Division on September 16, 1996. The white paper based its analysis on the four principles in PDD-37, which was described as the "primary source" for guiding post-START II arms control.³⁵

Three of the four principles were well known to STRATCOM from the Sun City and Sun City Extended studies. The fourth principle, equivalence, was a new term closely linked to stability and the increasingly important issues of transparency and irreversibility of future cuts. Using these four "first principles, the white paper identified the following U.S. objectives for post-START II arms control:³⁶

- Protect the U.S. strategic nuclear delivery vehicle force structure. Because no new platforms are planned, "it's important to retain as many of the existing ones as possible" (hedge);
- Retain U.S. warheads at a level consistent with war-fighting needs (deterrence);
- Minimize the impact of "those Russian systems, [deleted], that pose the greatest threat to U.S. interests" (deterrence, stability);
- Reduce and eliminate U.S. and Russian non-deployed warheads and fissile materials (equivalence, stability);
- Address non-strategic nuclear forces as part of the overall effort to stem the proliferation threat. [deleted] (equivalence, stability).

Based on these objectives, the white paper first examined the U.S. force structure to identify those forces that must be protected (i.e. the most capable) and those that can be included in further reductions (i.e. those already earmarked for cuts and excessive forces). Next it examined the Russian force structure, but on that side of the equation the methodology was the reverse: the most

threatening (i.e. capable) forces would also be the most important candidates for negotiated reductions. Finally the white paper discussed the issues of safeguards, transparency, irreversibility, warhead elimination, and the disposition of fissile materials.

Since the requirement of retaining the *warfighting* capability was a primary determinant for how deep the cuts could go, the impact of target selection in counterforce strategies became a major roadblock to extensive reductions. The white paper's list of potential post-START II arms control actions recommended against reducing strategic offensive weapons below 2,000-2,500 (which may eventually be the outcome of the 2001 NPR). Within this constraint, the white paper outlined the various force structure combinations of mainly SSBNs and bombers. It concluded that the large number of air-launched cruise missiles still allocated to B-52H bombers would have a significant impact on how many SSBNs could be retained. Since SSBNs form part of the increasingly important Twin Triad outlined in the Phoenix Study, the less valuable bombers may therefore be likely candidates for cuts under the 2001 NPR. As for ICBMs, a reduction of U.S. Minuteman IIIs missiles below 500 would only have "modest value" in encouraging Russia to accept mobile ICBM reductions. Reductions in the ICBM force under the 2001 NPR are therefore more likely to involve implementation of past decisions, such as retiring the MX Peacekeeper prematurely or complete downloading of all Minuteman IIIs from three to one warhead each. Besides, STRATCOM concluded in the 1996 white paper, further reduction in the number of U.S. ICBM silos "erodes the number of [Russian] strategic targets in the U.S. and could be considered destabilizing."³⁷

The white paper ended by combining this three-part force structure analysis into a comprehensive recommendation for a post-START II arms control framework. Although much of this recommendation remains classified, the released portions reveal important principles that likely still color the current U.S. approach to deep cuts. Foremost among these principles was that warheads from cuts accomplished in earlier agreements should be dealt with (i.e. eliminated) *prior* to agreeing to further force reductions. Key to this objective was the need for an increase in transparency and irreversibility, and the most important goal was to obtain verifiable data about total Russia warhead numbers.³⁸

The issue of fissile material disposition, however, was deemed less important. In what appeared to be a confirmation of the Threat Reduction Program in Russia, the white paper concluded that, "it is not desirable to proceed with warhead elimination until detailed, verifiable information on the strategic and nonstrategic stockpiles is obtained." Fissile material disposition was described as "a worthy goal" but not crucial, and STRATCOM concluded that failure to reach an agreement on the disposition of fissile material from eliminated warheads "should not be a showstopper" for deeper cuts.³⁹

Two years later, in June 1998, many of the white paper's conclusions resurfaced in connection with the nomination hearing of Vice Admiral Richard W. Mies as commander-in-chief of STRATCOM. In response to written questions from Senate Armed Services Committee Chairman Strom Thurmond, Mies explained:

"Further reductions in strategic delivery systems beyond START III should be complimented by more comprehensive considerations of increased stockpile transparency, greater accountability and transparency of non-strategic/tactical nuclear warheads, limitations on production infrastructures, third party nuclear weapon stockpiles, the impact on our allies, and the implications of deploying strategic defensive systems. [With fewer weapons, these issues] become more complex and sensitive. Whereas at existing START I/II levels our deterrent forces are relatively less sensitive to 'cheating'."⁴⁰

Post Start II Arms Reductions: The Warfighter's Assessment (1996)

In December 1996, a few months after the white paper on post-START II arms control was completed, and only a few months before the U.S. and Russia agreed in March 1997 in Helsinki to a START III framework of 2,000-2,500 warheads, STRATCOM published the results of another force structure study on post START II arms reductions. As with many of the previous studies of the 1990s, the new study reemphasized STRATCOM's nuclear warfighting philosophy, this time highlighted in the title itself: "The Warfighter's Assessment."

Up front the study established that the guidance for employment of nuclear weapons remained "unchanged."⁴¹ This meant that planning principles that were used to analyze a START III force structure were based on the same overall guidance as the principles that formed the basis for the 1993 Sun City study, which, in turn, was based on presidential guidance dating back as far as President Ronald Reagan's National Security Decision Directive (NSDD-13) from October 1981.

As in several of the previous force structure studies, the Warfighter's Assessment concluded that as the overall number of weapons continued to decline in the future, the characteristics of the force mix would become increasingly important both for deterrence and warfighting.⁴² The implication was that the flexibility of the remaining forces had to be maintained under future arms control treaties. The study concluded that, "credible, effective deterrence is a package deal" which involves many of the traditional warfighting principles from the Cold War, including:⁴³

- Force modernization;
- Stockpile stewardship;
- Survivable forces;
- Robust planning capability;
- Survivable C2 connectivity; and
- Timely threat warning.

This "package deal" was clearly evident during the subsequent nomination hearings of Vice Admiral Richard W. Mies only 18 months later in June 1998. When asked by Senate Armed Services Committee Chairman Strom Thurmond whether a Triad of nuclear forces would still be required under a START III agreement, Mies' answer echoed the conclusions of the Warfighter Assessment and eight years of post-Cold War STRATCOM analysis:

"I support maintaining a Triad under START III. Each of the legs of the Triad provide unique attributes that enhance deterrence and reduce risk; submarines provide survivability, bombers provide flexibility, and intercontinental ballistic missiles provide prompt response. Together, they provide a stable deterrent and complicate an adversary's offensive and defensive planning. The Triad is also a synergistic force that provides a protection hedge against failure of a single leg. Permanent reduction of one or two legs of the Triad would dramatically reduce our capability to overcome an unexpected failure of a remaining leg."⁴⁴

Conclusion

President Bush has announced his intention to quickly cut U.S. nuclear forces and reduce the alert level of the remaining posture. A nuclear posture review has been initiated to study the various options. Although the conclusions will not be announced until later this year, part of the review is likely to fall back on planning principles and assumptions developed by STRATCOM studies over the last decade.

Many of those principles are described in the six studies and briefings presented in this paper. They illustrate the considerable influence STRATCOM had on shaping not only the nuclear forces but also the nation's arms control policy during the 1990s. Rather than using reduced force levels as a justification for relaxing the warfighting requirements, fewer warheads instead has caused STRATCOM to increase the demand for a much more flexible and capable residual posture. Lower numbers became a threat to stability because it inevitably affected the flexibility of the remaining forces. As a result, many of the primary war planning principles that were used during the Cold War survived and have continued to shape the post-Cold War posture, leaving in place – and in some cases even enhancing -- some of the most offensive and threatening capabilities.

The same principles now threaten to undercut the scope of the new nuclear posture review. The outcome will depend on the extent to which the Bush/Rumsfeld review is willing to – and capable of – reduce the influence of the "warfighter" in shaping U.S. deterrence policy. The international community came out of the Cold War with the anticipation that complete nuclear disarmament was more realistic than ever before, an end goal most visibly codified in the indefinite extension of the Nuclear Non-Proliferation Treaty in 1995. At the beginning of the 21st century, however, the prospect of reaching that end goal seems to have retreated.

In his speech on May 1, 2001, Bush spoke of a "new concept" of deterrence that is no longer solely based on the threat of nuclear retaliation but instead relies on both offensive and defensive forces. Yet, in doing so he emphasized that the remaining nuclear weapons will continue to have "a vital role to play in our security and that of our allies." Indeed, Bush reaffirmed a commitment to maintaining a "credible deterrent" with the "lowest possible number of nuclear weapons consistent with our national security needs, including our obligations to our allies."⁴⁵ This "credible deterrent," which STRATCOM described in its 1996 Warfighter Assessment as a "package deal" requiring certain force capabilities, is likely to continue to encompass a wide range of attack options by flexible and highly effective offensive systems on multiple platforms. In the words of Vice Admiral Mies:

"We continue to plan a range of options to ensure that the United States can deter potential aggression in a manner appropriate to various levels of provocation rather than being left with an 'all or nothing' response. Among those options is the capability to respond promptly to any attack, thus complicating an adversary's offensive and defensive planning calculations."⁴⁶

Faced with such strongly embedded planning principles, the 2001 NPR may reduce warhead numbers and alert levels along the lines of one of the Sun City study's three sub-START II force structure options. The emergence of a truly new concept of deterrence, however, is unlikely as long as the contours of the future "credible deterrent" continue to be determined by the warfighter culture that STRATCOM inherited and refined in its force structure studies in the 1990s.

Abbreviations and Acronyms

ACC	Air Combat Command
ALCM	Air Launched Cruise Missile
ASD(ISP)	Assistant Secretary of Defense (International Security Policy)
C2	Command and Control
CALCM	Conventional Air Launched Cruise Missile
CINCSTRAT	Commander-in-Chief, U.S. Strategic Command
CONPLAN	Contingency Plan
CONUS	Continental United States
BUR	Bottom-Up Review
DGZ	Desired Ground Zero (aimpoint)
DOD	Department of Defense
DPF	Deliberate Planning Forces
FOIA	Freedom of Information Act
ICBM	Intercontinental Ballistic Missile
JSCP	Joint Strategic Capabilities Plan
MIRV	Multiple Independently-Targetable Reentry Vehicle
NK	North Korea (Democratic People's Republic of Korea)
NPR	Nuclear Posture Review
NPT	Nuclear Non-Proliferation Treaty
NSNF	Non-Strategic Nuclear Forces
NSDD	National Security Decision Directive
NTB	National Target Base
NUWEP	Nuclear Weapons Employment Policy
PA	Probability of Arrival
PD	Probability of Damage
PDD	Presidential Decision Directive
PNI	Presidential Nuclear Initiative
SAC	U.S. Strategic Air Command
SECDEF	Secretary of Defense
SIOP	Single Integrated Operation Plan
SLBM	Sea-Launched Ballistic Missile
SSBN	Nuclear Powered Ballistic Missile Submarine
START I	Strategic Arms Reduction Treaty I signed in July 1991
START II	Strategic Arms Reduction Treaty II signed in December 1992
STRATCOM	U.S. Strategic Command
TLAM-C	Tomahawk Land Attack Missile, Conventional
QDR	Quadrennial Defense Review
WSA	U.S.-Russian Washington Summit Agreement from June 1992

Endnotes

¹ Adam J. Herbert, "Bush: U.S. Will Quickly and Unilaterally Move to Cut Nuclear Weapons," Inside the Pentagon, May 3, 2001, pp. 5-6.

² FOIA requests to STRATCOM for force structure studies published later than the ones described in this report received a "no records" response.

³ This document was obtained under FOIA by Joshua Handler from Princeton University. It was not identified in the replies STRATCOM sent to the author in response to requests for force structure studies.

⁴ STRATCOM's responsibility is directed in the Unified Command Plan. Apart from overall responsibility for maintaining the strategic nuclear war plans and reconnaissance forces, STRATCOM provides theater nuclear and counterproliferation support to combatant commanders to assist them in developing tailored annexes designed to counter weapons of mass destruction. STRATCOM also provides specialized planning and consequence analysis, when requested by other combatant commanders. Additionally, CINCSTRAT works closely with other combatant commanders to initiate crisis action procedures contained in the Nuclear Supplement to the Joint Strategic Capabilities Plan. In crisis situations, when assigned as a supporting CINC, CINCSTRAT supports planning and execution of military operations for the combatant commander. See: Vice Admiral Richard W. Mies, U.S. Navy, Director, Strategic Target Plans, U.S. Strategic Command, Commander, Allied Submarines, Mediterranean, Commander, Submarine Allied Command, Atlantic, written response to Strom Thurmond, Chairman, Committee on Armed Services, U.S. Senate, June 15, 1998, reprinted in U.S. Senate, Committee on Armed Services, *Nominations Before the Senate Armed Services Committee, Second Session, 195th Congress*(Washington, D.C.: U.S. Government Printing Office, 1999), S. HRG. 105-868, pp. 362-363.

⁵ *Ibid.*, p. 363.

⁶ Walter Pincus, "U.S. Considers Shift In Nuclear Targets," *Washington Post*, April 29, 2001, p. A23.

⁷ U.S. Strategic Air Command/XP, "Secret/Phoenix," September 11, 1991, p. 35. Phoenix Eyes Only. Partially declassified and released under FOIA.

⁸ *Ibid.*, p. 10. Each target may have more than one DGZ depending on hardness and geographical size. Conversely, each aimpoint may be sufficient to destroy several targets due to proximity of facilities.

⁹ *Ibid.*, p. 50.

¹⁰ See: Bruce Blair, "Removing The Hair Trigger On Nuclear Forces," *The Brookings Institution*, remarks at the Carnegie International Non-Proliferation Conference, January 12, 1999, p. 3; Elaine Grossman, "SIOP List Reportedly Grew 20 Percent: Nuclear Weapons Expert Says U.S. Warfighting Plan Now Targets China," *Inside the Pentagon*, Volume 15, Number 2, January 14, 1999.

¹¹ William M. Arkin and Hans M. Kristensen, "Dangerous Directions," *Bulletin of the Atomic Scientists*, March/April 1998, Vol. 54, No. 2, p. 29.

¹² U.S Strategic Air Command/XP, "Secret/Phoenix," September 11, 1991, p. 27. Phoenix Eyes Only. Partially declassified and released under FOIA.

¹³ *Ibid.*, pp. 31, 37, 38.

¹⁴ *Ibid.*, pp. 37, 38.

¹⁵ *Ibid.*, p. 4.

¹⁶ *Ibid.*, pp. 31, 37.

¹⁷ *Ibid.*, p. 38.

¹⁸ Stephen J. Hadley, ASD(ISP), to Michelle McIntyre, Executive Assistant to the Secretary of Defense, "Schedule Proposal," October 30, 1992, w/attachment: Stephen J. Hadley, ASD(ISP), to Secretary of Defense/Deputy Secretary of Defense, "Visit to U.S. Strategic Command on 6 October 1992 - Trip Report," October 10, 1992. Secret. Partially declassified and released under FOIA.

- ¹⁹ John P. Jumper, MGEN, USAF, Office of the Secretary of Defense, "Note for ASD(ISP)/CJCS," October 27, 1992, w/attachment: Transcript, Assistant Secretary of Defense (International Security Policy), to Executive Assistant to the Secretary of Defense/Under Secretary of Defense for Policy, "Schedule Proposal," n.d.[October 1992]. Released under FOIA.
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- ²² For an insightful study of the 1994 Nuclear Posture Review, see: Janne Nolan, *An Elusive Consensus: Nuclear Weapons and American Security After the Cold War* (Washington, D.C.: Brookings Institution Press, 1999).
- ²³ U.S. Strategic Command, "Sun City," n.d. [1993], pp. 1, 2, 5. Secret. Partially declassified and released under FOIA.
- ²⁴ *Ibid.*, p. 9.
- ²⁵ *Ibid.*, p. 39.
- ²⁶ *Ibid.*, pp. 39, 41.
- ²⁷ Vice Admiral Richard W. Mies, U.S. Navy, Director, Strategic Target Plans, U.S. Strategic Command, Commander, Allied Submarines, Mediterranean, Commander, Submarine Allied Command, Atlantic, written response to Strom Thurmond, Chairman, Committee on Armed Services, U.S. Senate, June 15, 1998, reprinted in U.S. Senate, Committee on Armed Services, *Nominations Before the Senate Armed Services Committee, Second Session, 195th Congress*(Washington, D.C.: U.S. Government Printing Office, 1999), S. HRG. 105-868, pp. 363-364, 365.
- ²⁸ U.S. Strategic Command, "Sun City," n.d. [1993], p. 47. Secret. Partially declassified and released under FOIA.
- ²⁹ U.S. Strategic Command, "Sun City Extended," February 1, 1994, p. 39. Secret. Partially declassified and released under FOIA.
- ³⁰ Commander-in-Chief, U.S. Pacific Command, "CINCPAC Command History 1984," September 27, 1985, pp. 170-171. Top Secret. Partially declassified and released under FOIA.
- ³¹ Bruce Blair, *Brookings Occasional Papers: Global Zero Alert for Nuclear Forces* (Washington, D.C.: The Brookings Institution, 1995), pp. 7-8.
- ³² U.S. Strategic Command, "Sun City Extended," February 1, 1994, p. 39. Secret. Partially declassified and released under FOIA.
- ³³ This document was obtained under FOIA by Joshua Handler from Princeton University.
- ³⁴ U.S. Strategic Command, "White Paper: Post-START II Arms Control," September 18, 1996, pp. 1,

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³⁵ Ibid., p. 1.

³⁶ Ibid., p. 2.

³⁷ Ibid., pp. 4, 6, 7.

³⁸ Ibid., p. 4.

³⁹ Ibid., p. 16.

⁴⁰ Vice Admiral Richard W. Mies, U.S. Navy, Director, Strategic Target Plans, U.S. Strategic Command, Commander, Allied Submarines, Mediterranean, Commander, Submarine Allied Command, Atlantic, written response to Strom Thurmond, Chairman, Committee on Armed Services, U.S. Senate, June 15, 1998, reprinted in U.S. Senate, Committee on Armed Services, *Nominations Before the Senate Armed Services Committee, Second Session, 195th Congress*(Washington, D.C.: U.S. Government Printing Office, 1999), S. HRG. 105-868, p. 365.

⁴¹ U.S. Strategic Command, "Post-START II Arms Reductions: Warfighter's Assessment," December 30, 1996, p. 5. Top Secret. Partially declassified and released under FOIA.

⁴² Ibid., p. 30.

⁴³ Ibid., p. 43.

⁴⁴ Vice Admiral Richard W. Mies, U.S. Navy, Director, Strategic Target Plans, U.S. Strategic Command, Commander, Allied Submarines, Mediterranean, Commander, Submarine Allied Command, Atlantic, written response to Strom Thurmond, Chairman, Committee on Armed Services, U.S. Senate, June 15, 1998, reprinted in U.S. Senate, Committee on Armed Services, *Nominations Before the Senate Armed Services Committee, Second Session, 195th Congress*(Washington, D.C.: U.S. Government Printing Office, 1999), S. HRG. 105-868, p. 365.

⁴⁵ The White House, Office of the Press Secretary, "Remarks by the President to Students and Faculty at National Defense University," May 1, 2001.

⁴⁶ Vice Admiral Richard W. Mies, U.S. Navy, Director, Strategic Target Plans, U.S. Strategic Command, Commander, Allied Submarines, Mediterranean, Commander, Submarine Allied Command, Atlantic, written response to Strom Thurmond, Chairman, Committee on Armed Services, U.S. Senate, June 15, 1998, reprinted in U.S. Senate, Committee on Armed Services, *Nominations Before the Senate Armed Services Committee, Second Session, 195th Congress*(Washington, D.C.: U.S. Government Printing Office, 1999), S. HRG. 105-868, pp. 363-364.

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