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Missiles of Empire: America's 21st Century Global Legions

While the limited discourse among politicians, arms controllers, and the media that passes for "national debate" focuses narrowly on upgrades to nuclear warheads such as the Robust Nuclear Earth Penetrator, the Pentagon and its contractors are poised to begin development of a new generation of long range delivery systems. These range from cheap, versatile missiles to more accurate and maneuverable re-entry systems capable of delivering either conventional or nuclear weapons. Such systems, intended primarily to increase the already formidable U.S. advantage in conventional weapons and to reduce political obstacles to fighting the "small wars" of a global military empire, may in the long run be more dangerous than proposed improvements in nuclear warheads. At the same time, the government is considering options for replacement of the intercontinental ballistic missiles that are the core of the U.S. nuclear arsenal. New delivery systems for nuclear weapons would involve many of the same technologies, from more maneuverable re-entry vehicles to improvements in guidance systems, that would be developed for long-range missiles carrying non-nuclear payloads. These technologies could provide the building blocks for new nuclear capabilities, particularly in combination with warhead modifications now in progress or under consideration.

New or modified nuclear weapons such as the Robust Nuclear Earth Penetrator and weapons with lower yields are intended to make nuclear weapons use more effective for particular missions, such as destruction of deeply buried targets and of chemical and biological agents, and to lower political obstacles to nuclear weapons use by reducing levels of death, destruction, and contamination.[1] But significant questions remain about the efficacy of nuclear weapons for such missions, and the taboo against nuclear weapons use, although perhaps weakening among U.S. elites, remains strong in most of the world.[2] New types of ballistic missiles, capable of delivering a wide range of conventional weapons from the United States at global range with great accuracy, or of being launched in large numbers from forward deployed delivery platforms, would be extremely tempting instruments for the new gunboat diplomacy. In the eyes of their advocates, such systems allow the rapid application of overwhelming force with impunity from afar, avoiding practical and political obstacles ranging from obtaining basing and overflight rights from U.S. allies growing increasingly uncomfortable with aggressive U.S. policies, to combat casualties that make interventions more difficult to sustain politically at home.[3]

The push for conventional ballistic missiles with global range is giving added impetus to programs that have been underway for years aimed at modernizing existing strategic ballistic missiles and expanding their roles. After the Cold War, missile technology research and development continued, although slowed by reduced funding. These programs, however, already were accelerating in the late 90's, as the contractor and service constituencies of the strategic nuclear forces, the weapons laboratories and their representatives in Congress worked to repackage much of the high-tech Cold War military, including nuclear weapons and their delivery systems, for a new "counterproliferation" mission. These efforts received an enormous boost as virtually all constraints on military budgets were removed following the September 11, 2001 attacks. Programs already in progress to modernize existing missiles and command and control systems received increased funding, and concepts for new

systems, including a variety of ideas for global delivery of non-nuclear weapons, quickly became programs. At no time has there been any coherent public debate concerning the broader implications of a set of systems that together would constitute an across the board modernization of the strategic missile arsenal, with significant new conventional *and* nuclear capabilities.

New and improved ballistic missile systems now proceeding or under consideration include:

–A program to increase the accuracy of the reentry system for the W76 nuclear warhead for Trident submarine launched ballistic missiles (SLBM's). The original W76 system was less accurate than the newer W88 Trident warhead, the most modern deployed nuclear warhead. Together with warhead modifications already underway for the W76, this upgrade likely would increase significantly the ability of the W76 to destroy hard targets such as missile silos.

–A maneuvering reentry vehicle called the Common Aero Vehicle (CAV), that would glide to the target with considerable ability to maneuver and decelerate, and that could carry a variety of conventional weapons of the kind that can be dropped from aircraft. Although only non-nuclear payloads currently are being considered, the CAV could be designed to carry nuclear weapons as well. The CAV is envisioned to be deliverable in a variety of ways: via current or new-design ballistic missiles, and in the future by a "Hypersonic Cruise Vehicle" that would take off and land like an airplane, delivering several CAV's from near space, or by a military space plane or "space operations vehicle" that could deliver CAV's from space.

–New land-based intercontinental ballistic missiles (ICBM's), designed to replace the existing Minuteman III missiles that are the land-based element of the old nuclear "strategic triad." This program is in its early stages, with contractors being asked for concepts to support an analysis of alternatives, including nuclear ICBM's with new capabilities, such as improved reentry vehicle maneuverability. The alternatives analysis also will consider a variety of ideas for delivering non-nuclear weapons with ICBM's.

–A new intermediate range ballistic missile to be deployed on submarines, capable of carrying either nuclear or conventional warheads. This program also is in its early stages, with contractors being asked to submit concepts.

If they proceed, these programs will add lethal new elements to an increasingly complicated set of global strategic arms confrontations. By providing greater accuracy and maneuverability for missiles with global reach, such systems could allow both conventional weapons and lower yield nuclear weapons to have a larger strategic role. Conventionally armed ICBM's also would add a new layer of complexity to strategic calculations. More tempting to use in a crisis due to their less indiscriminate and devastating effects, they could nonetheless trigger a nuclear catastrophe if mistaken for nuclear missiles by a nuclear-armed adversary– or by another country in the region having only minutes to estimate the likely target of a U.S. launch.

These programs begin to implement the vision set forth in the 2002 Nuclear Posture Review (NPR), in which U.S. strategic forces would augment the existing nuclear "triad" with powerful, long-range non-nuclear strike capabilities. Adding new conventional weapons with global reach would, according to the NPR, allow "greater flexibility in the design and conduct of military campaigns to defeat opponents decisively. Non-nuclear strike capabilities may be particularly useful to limit collateral damage and conflict escalation. Nuclear weapons could be employed against targets able to withstand non-nuclear attack, (for example, deep underground bunkers or bio-weapon facilities)."[4]

Adding these unprecedented conventional capabilities, however, is not enough in the view of the current government. Both nuclear warheads and their delivery systems are to be upgraded as well.

> Today's nuclear arsenal continues to reflect its Cold War origin, characterized by moderate delivery accuracy, limited earth penetrator capability, high-yield warheads, silo and sea-based ballistic missiles with multiple independent reentry vehicles, and limited retargeting capability....
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> New capabilities must be developed to defeat emerging threats such as hard and deeply buried targets (HDBT), to find and attack mobile and relocatable targets, to defeat chemical or biological agents, and to improve accuracy and limit collateral damage. Development of these capabilities, to include extensive research and timely fielding of new systems to address these challenges, are imperative to make the New Triad a reality.[5]

The military's label for the "mission" envisioned by the NPR, encompassing long-range delivery of both nuclear and conventional weapons, is "prompt global strike." As described in the Air Force Space Command Strategic Master Plan for FY 04 and Beyond,

> A viable prompt global strike capability, whether nuclear or non-nuclear, will allow the US to rapidly strike high-payoff, difficult-to-defeat targets from stand-off ranges and produce the desired effect. This capability provides the US with the flexibility to employ innovative strategies to counter adversary anti-access and area denial strategies. Such a capability will provide warfighting commanders the ability to rapidly deny, delay, deceive, disrupt, destroy, exploit and neutralize targets in hours/minutes rather than weeks/days even when US and allied forces have a limited forward presence."[6]

Global Strike: Death from Above in Two Hours or Less, Anywhere on Earth

A key element of this vision is "a new transformational capability that would provide a means of delivering a substantial payload from within the continental United States (CONUS) to anywhere on Earth in less than two hours."[7] The proposals for this capability that have attracted the most public attention are various concepts for reusable military "space planes" that would be boosted into space by rocket propulsion and for reusable hypersonic aerospace vehicles that would take off and land like an airplane, delivering weapons from a suborbital trajectory or from orbit (see sidebar, "The Military Space Plane"). Both reusable space launch and powered, reusable hypersonic flight, however, have proven to be difficult technologies to perfect. Even with greatly increased funding, a hypersonic near-space vehicle or a space plane likely would take a decade or more to develop, and may also prove too expensive as the more mundane costs of empire escalate in places like Iraq and Afghanistan. At the core of all of the "global strike" concepts, however, are more maneuverable, accurate re-entry vehicles and warheads. Unlike reuseable launch and hypersonic vehicle concepts, which require significant advances in propulsion, high temperature materials, and other areas, these largely require only incremental improvements in technologies that already are in widespread use, and are well understood.

The most ambitious near-term program is the Common Aero Vehicle (CAV), an "unpowered, maneuverable, hypersonic glide vehicle capable of carrying approximately 1,000 pounds in munitions or other payload."[8] Under consideration since the mid-1990's, the CAV got a new start budget line of its own in the FY 2004 budget, with the Air Force and the Defense Advanced Research Planning Agency (DARPA) directed to set up a joint program office to accelerate its development.[9] The current CAV proposal is described as meeting requirements for "rapid conventional strike worldwide to counter the proliferation of weapons

The Military Space Plane: Surveillance and Enforcement for a Global Empire

The military long has had on its wish list a reusable vehicle that could reach space, perform a variety of missions, and then land again like an airplane. A variety of concepts for a space plane have been explored, using combinations of rockets and air breathing very high speed (hypersonic) propulsion to reach orbit, and after re-entry into the earth's atmosphere gliding to a landing, as does the current space shuttle.

Currently, the military is considering a set of related concepts for unmanned vehicles that would operate in orbit, including a "space operations vehicle" (SOV) and a "space maneuver vehicle (SMV)." The space operations vehicle would deliver the space maneuver vehicle to orbit, both would be able to land for re-use. The SOV also would be able to deliver other payloads, such as multiple weapons-carrying Common Aero Vehicles (CAVs), and the SMV could place smaller payloads into orbit and could remain in space for months at a time for such missions as servicing or fueling satellites. In some scenarios, the SMV could be used for "space control" missions, such as temporarily jamming or disabling an adversary's satellites.

Space plane development exploits technology being developed for the "civilian" space program through National Aeoronautic and Space Administration (NASA) research to develop a replacement for the aging Space Shuttle, or, more likely, a cheaper, less technologically ambitious and risky interim solution that will allow human access to space for such missions as servicing and manning the International Space Station. In early 2002, NASA and the Air Force conducted a study to explore the possibilities for common technology development for military and NASA re-usable launch vehicle programs. Materials prepared by Air Force and NASA officials for industry briefings reveal the types of missions envisioned by Military Space Plane (MSP) advocates. The Space Plane would conduct "offensive and defensive counterspace operations" employing radio frequency, microwave and jamming systems; deploy a variety of systems for surveillance, communications, and reconnaissance, and would provide "Decisive Precision Firepower." Offensive missions would include "Covert and Non-nuclear strike," and "Halt Phase" operations against a mobile adversary before other U.S. forces could be deployed.[10] Space Plane combat operations "may include preemptive strikes" against "hard and deeply buried targets," "National level leadership control nodes," "WMD and missile launch and storage sites," air defense systems, and a variety of other targets.[11] A space plane could carry a number of Common Aero Vehicles, which in turn, according to space plane advocates, would enable "interchangeable use of virtually the entire arsenal of next generation air munitions currently in development at the Air Force's Air Armaments Center. It protects the munitions during hypersonic reentry and dispenses them with the same accuracy and effect as if being dropped from aircraft."[12]

The current Defense Advanced Research Projects Agency (DARPA) initiative that includes the CAV also will attempt to develop technologies applicable to a hypersonic cruise vehicle (HCV), "a reusable, hypersonic aircraft capable of delivering 12,000 pounds of payload to a target 9,000 nautical miles from CONUS in less than two hours."[13] The HCV also is seen as a possible reusable first stage for a two stage to orbit approach to placing objects in space.[14]

A space plane or HCV that could fulfill this mission wish list likely would take at least ten to twenty years to develop. The military hopes to advance many of the required technologies through less ambitious efforts like the Common Aero Vehicle, which both provide near-term capabilities for long range strike and an opportunity for research on relevant issues of controlled hypersonic flight.[15] If a reliable military reusable launch vehicle is successfully developed, it will open the way for far more extensive military space operations, including space-based components for missile defenses and weapons operating through and from space.

of mass destruction and provide a forward presence without forward deployment."[16] The CAV is envisioned as being "capable of dispensing a variety of munitions against ground targets to include WMD storage sites, C2 [command and control] facilities, maritime forces and massed ground forces."[17] A single CAV, with its 1000 pound capacity, could deliver several submunitions, such as small diameter bombs or "Wide Area Autonomous Search Munitions," or single larger payloads such as earth penetrators designed to destroy hard targets.[18] Payloads envisioned for each CAV in previous concept studies include a deployable unmanned aerial vehicle (UAV) Hunter/Killer" package, an agent defeat payload, unmanned aerial vehicles for battle damage assessment, and electromagnetic pulse (EMP) weapons designed to disrupt or destroy electronic equipment.[19]

In order "to accomplish near-term conventional global strike capability," the government plans first to develop a version of the CAV based largely on existing technologies, together with a relatively inexpensive "small launch vehicle" (SLV). Both projects are part of a DARPA inititative called Force Application and Launch from CONUS [Continental United States], or FALCON. In addition to the CAV and SLV, the FALCON program includes as a long-range goal a hypersonic cruise vehicle (HCV), which could deliver as many as 6 CAV's. Current plans call for a CAV flight test by the end of 2007, and an initial "operational capability for prompt global strike from CONUS" by approximately 2010.[20] Materials supporting the FALCON bid solicitation state that "CAV designs based on existing technologies are predicted to have a downrange glide on the order of 3,000 nautical miles."[21] Previous concept studies described such an initial CAV design as posing few difficult technical problems.[22] The FALCON program also will explore more advanced CAV designs, with greater maneuverability and a range of approximately 9000 miles. Such designs, currently referred to as the "enhanced CAV," would require more extensive technology development.[23]

Initial plans call for the CAV to be deployed on a small launch vehicle, a relatively inexpensive rocket booster system "suitable for launching either a global range Enhanced CAV with an approximate 1,000 pound munitions payload (2,000 pound total CAV weight) or inserting a small satellite into a specified low Earth orbit."[24] Since the program's inception, there has been concern that a conventionally armed intercontinental ballistic missile launched from the United States (for example, against a target in Southwest Asia) could be mistaken by Russia or China for a nuclear missile aimed at them, with catastrophic results.[25] Due to this concern and the danger that boosters from launch of a non-nuclear missile from missile fields in the central or western U.S. might fall on populated areas (a concern deemed insignificant in the context of the global nuclear warfare that previously was the principal "mission" for land-based strategic missiles), the military has proposed basing conventionally armed ICBM's at Vandenberg Air Force Base in California and Cape Canaveral, Florida.[26] This supposedly would make it easier to distinguish a conventional launch from a nuclear armed ICBM launched from silos in the central United States.

Although current publicly announced plans call for non-nuclear armaments to be carried by the CAV, previous planning documents considered the potential for the CAV to carry a variety of nuclear weapons as well. The 1997 Air Force *Space Force Application Mission Area Development Plan* noted the CAV's potential to provide new nuclear, as well as non-nuclear capabilities:

> Common Aero Vehicles (CAVs) can deliver both nuclear and non-nuclear weapons to targets anywhere on the globe from CONUS [continental U.S.] bases with appropriate deployment systems. The CAV can be deployed from multiple deployment vehicles including missiles, Military Spaceplanes (MSPs), or space based platforms. The inherent maneuverability of the CAV, provides increased accuracy, lethality, and enemy defense evasion. The aerodynamic shape and

> glide capability substantially extends the range and cross-range of the weapon system. Additionally, it can be fitted with various sensors to provide for target acquisition, tracking, and identification as well as increased accuracy.[27]

The *Space Force Application Mission Area Development Plan* examined in some detail the deployment of the CAV on a Minuteman III missile, but stressed that the CAV concepts "are essentially independent of the deployment system used.... Subtle changes may be necessary for each deployment mechanism, but have little impact on the reentry vehicle concepts themselves."[28] Nuclear weapons listed in the *Space Force Application Mission Area Development Plan* as potential payloads for the CAV included the W78 and the W87, both high yield nuclear warheads currently deployed on Minuteman and MX missiles, the "B-61 [a versatile bomb design with many variants, including a limited earth penetrator] or penetrator," and an unspecified "low-yield nuclear weapon."[29] Nuclear-armed CAV's were envisioned to be deployed in silos already housing nuclear missiles, providing greater range and accuracy than current reentry vehicles.[30]

New Land-Based Missiles: Getting Ready to Target Everything, Everywhere

"Currently, HQ AFSPC/DRM estimates maximum range requirement to be global."[31]

The nuclear CAV concept was dropped in the 1990's, a time when the political climate was relatively inhospitable to the development of new nuclear warheads and delivery systems.[32] But with nuclear weapons enthusiasts dominating the highest levels of the Bush administration, the deployment of nuclear armed reentry vehicles with radically upgraded capabilities on next-generation land-based ICBM's becomes more likely. The Nuclear Posture Review called for an analysis of alternatives for an ICBM to replace the Minuteman III in 2018. The systems envisioned would not merely maintain existing capabilities, but would seek to address "a number of needs beyond the current baseline ICBM mission, such as extended range, trajectory shaping, strategic relocatable targets, and hardened deeply buried targets."[33]

This program is now in its early stages, with a request for information from contractors for concepts for "transformational delivery vehicles" published by Air Force Space Command in July. The notice and supporting materials encouraged submission of a broad range of ideas not limited to merely replacing the silo-based Minuteman III missiles that will constitute the land-based leg of the nuclear weapons "triad" after MX missile deactivation is complete, stating that "the system may also use innovative deployment and basing strategies in addition to or in place of existing MM III silos, including but not limited to: mobile basing, fixed basing with mobile elements, new silo schema, etc."[34] The supporting Mission Need Statement defining the scope of the alternatives analysis envisioned possible new systems "capable of rapidly holding at risk a wide range of surface and subsurface targets to include, but not limited to, fixed soft and hard targets; hard and deeply buried targets; chemical and biological production, storage, and delivery system facilities; strategic relocatable targets; heavily defended targets; and targets that emerge unexpectedly on short notice." To meet this "need," contractors were told to submit concepts that could "take advantage of emerging technologies to ensure deterrent effectiveness in an uncertain future strategic environment," exploiting "[q]uantum advances in information processing and advanced technologies" that "may produce warfighting capabilities that include delivery means for payloads with self-contained sensors; accuracy to enable sufficient lethality within the sub-kiloton yield; search, loiter, and redirection capability; and/or enhanced defense penetration."[35]

The Mission Need Statement suggests the possibility of a redesigned Minuteman missile, with a "new post-boost section incorporating advanced technologies." This would allow the delivery not only of the multiple independently targeted reentry vehicles (MIRVs) and the powerful warheads

currently deployed on the Minuteman and MX missiles, but "a newly designed reentry vehicle that could incorporate low or multiple yield weapons, and a trajectory shaping vehicle (TSV) carrying weapons capable of holding at risk the range of targets previously described and each delivered with enhanced accuracy."[36]

In addition, delivery of conventional weapons via various types of reentry vehicles, including MIRVs and Common Aero Vehicles (CAVs), is to be considered, along with technologies for re-targeting conventional weapons while in flight. Both nuclear and conventional earth-penetrating warheads also are on the concept list to be explored. Nuclear-armed CAV's and in-flight retargeting of nuclear weapons are not included as concepts currently under consideration.[37] Should these technologies be developed and deployed successfully, however, it seems unlikely that applying them to nuclear weapons delivery would pose great technical problems.

From the Sea: Nuclear Missile Boat Diplomacy

Of all the missile programs on the Pentagon agenda, accuracy upgrades for submarine launched ballistic missiles (SLBM's) are likely to be the first to be deployed. This program too is intended to make possible new kinds of missile capabilities, both conventional and nuclear. The "Enhanced Effectiveness" program will develop a new reentry system with "dramatically improved accuracy" for the Trident D5 missile, in order to provide "increased capabilities articulated in the NPR, such as prompt accurate strike, defeat of critical targets and selective nuclear options."[38] The program "is intended to demonstrate a near-term capability to steer a SLBM warhead to Global Positioning Satellite (GPS)-like accuracy," culminating in flight tests by 2007.[39] Although intended for use in the near term on the Trident D5 SLBM, "the technology being developed applies to ballistic missiles in general."

One area where the technologies developed in the "Enhanced Effectiveness" program might be applied in the future is in new intermediate range ballistic missiles capable of being launched from either submarines or surface ships. The Navy in September asked contractors to submit concepts for submarine launched intermediate range ballistic missiles [SLIRBM]. The purpose of the information request is to assist the Navy "in developing a comprehensive SLIRBM project plan." "Both conventional and nuclear payloads" are to be considered, with the "[c]onventional payload system to have GPS accuracy." The notice also requested information regarding deployment of intermediate range ballistic missiles on surface ships.[40]

In addition, the Navy also is developing shorter range submarine launched missiles capable of carrying new design conventional earth penetrating warheads. The Tactical Missile–Penetrator (TACM-P) program "will demonstrate integration of the Army Tactical Missile System (ATACMS) booster with a Navy reentry vehicle to provide a high-availability, all-weather, survivable and short response time means to destroy hard and deeply-buried targets." The reentry vehicle will be upgraded for increased earth penetrating capabilities by the Sandia National Laboratory, with initial flight tests scheduled for late 2003.[41] In the 2005 fiscal year, the Navy plans to begin testing a modular launch system for ATACMS-type missiles that will allow them to be deployed aboard former ballistic missile submarines newly converted to carry large numbers of smaller, shorter range cruise and ballistic missiles.[42] The TACM-P missile and earth penetrator warhead also will be deployed by the Army.[43]

The New Missile Build-Up: Many Paths, One Goal

It is impossible to tell in advance which particular set of new missile concepts will in the end be developed and deployed. What is clear, however, is that the United States government has embarked on an intensive campaign to modernize its strategic arsenal, and to obtain radical new capabilities for both nuclear and non-nuclear

weapons with global range, great accuracy, and a broad range of options tailored to destroy any target that military contingency planners can imagine. There is considerable overlap, furthermore, among the technologies applicable for many of the new weapons concepts being considered or already underway. Development of many of these technologies has been continuous for decades, despite the dip in funding in the decade after the Cold War. In the latter years of the Clinton administration, for example, work on global positioning system (GPS) aided guidance applicable to a variety of missile concepts was underway, with many of the programs now being accelerated by huge military budget increases already under consideration. A FY2000 report on Air Force research noted that

> Reentry blackout and signature effects are predicted for advanced systems under development such as Common Aero Vehicle (CAV), Military Spaceplane (MSP), Conventional ICBM, Ballistic Missile Replacement, and other advanced systems. Recent developments include design optimization for minimizing reentry blackout of GPS navigation for a missile technology demonstration flight test. The basic research component of the program investigates the underlying chemistry and physics that lead to effects on systems and investigates potential breakthrough technologies for hypersonics.[44]

The current set of programs aims to integrate research on missile and space launch technologies to the maximum extent possible, and to develop guidance and reentry vehicle technologies that can be used on a variety of ballistic missiles. The accuracy upgrades for the Trident submarine launched ballistic missile will involve technology development applicable to ballistic missiles in general. DARPA is requesting that contractors develop concepts for "inter/intra-theater CAV delivery capability," suggesting that CAV's could be one possible payload for submarine launched missiles, for which new concepts such as intermediate range missiles also are being developed.[45] DARPA plans to use technology for the Common Aero Vehicle development to explore technologies relevant to its Hypersonic Cruise Vehicle concept, including "efficient aerodynamic shaping for high lift to drag, lightweight and durable high temperature materials, thermal management techniques including active cooling and trajectory shaping (such as periodic flight), target update and autonomous flight control."[46] The Hypersonic Cruise Vehicle also is a candidate technology for a reuseable first stage of a military space plane system, the far-term technology being considered for cheaper, more reliable spacelift and for global delivery of weapons.[47] The Small Launch Vehicle proposed as the near-term means for CAV launch also is intended to provide a near-term means to launch small satellites. The Analysis of Alternatives for future strategic land-based missiles also "will study each concept's potential as a multiple-use platform; that is, how it might satisfy, or partially satisfy, other AFSPC mission needs such as Prompt Global Strike and Operationally Responsive Spacelift."[48]

It is important to remember that the "global strike" programs involving missiles are only one set of programs aimed at increasing and integrating long-range nuclear and conventional weapons capabilities. In addition to research on nuclear weapons with new capabilities such as earth penetrators, the military is doing extensive research to increase its understanding of nuclear weapons effects, and also is spending billions of dollars to upgrade the systems and software used to plan and execute nuclear strikes. These latter efforts also aim to integrate nuclear and conventional attack planning, providing commanders with computer-based tools that will allow them to compare the effects of nuclear and conventional attacks on a variety of targets.[49] And these in turn are part of a broader high tech weapons buildup, encompassing everything from unmanned aircraft to new, stealthier aircraft, improved cruise missiles, and a wide range of surveillance and communications technologies to better coordinate forces and target weapons.

It is unlikely that all of the systems on the

"Global Strike" wish list will be built. Unless there is a fundamental change in the direction of U.S. policy, however, it is likely that many will. For the wars of the 21st Century, the United States is seeking unilaterally assured destruction, the capacity to reach across the planet to destroy an adversary's most dangerous weapons before they can be used, or to kill leaders it has declared to be unacceptable, and then to prevent retaliation against either U.S. forward deployed forces or the United States itself.

The End of Arms Control?

A focused effort across multiple administrations and Congresses, involving the civilian and military leadership of the Department of Defense (DoD), produced a broad vision, currently embodied in Joint Vision 2020, of what is needed to meet the range of emerging situations and expectations. That vision is intended to refocus goals from the marginal superiority of the Cold War to the dominance demanded across the spectrum of twenty-first century challenges to US and allied national security. Transformation Study Report, Executive Summary, Prepared for the Secretary of Defense April 27, 2001 p.7

The acceleration of high-tech weapons development by the United States, together with a policy and practice of unilateral warfare against those that the U.S. declares to be unacceptable threats, likely has destroyed the last meaningful vestiges of Cold War arms control. To free itself from restraints on its own weapons development, the United States has withdrawn from the Anti-Ballistic Missile Treaty and repudiated the Comprehensive Test Ban Treaty. These two actions alone break important U.S. commitments made only three years ago, at the 2000 Nuclear Non-Proliferation Treaty (NPT) Review Conference, to take concrete steps that would manifest an "unequivocal undertaking" to accomplish the total elimination of nuclear weapons.[50] Together with a declared intention to seek nuclear superiority for the foreseeable future, and a wide range of actions to develop new capabilities in every element of nuclear weapons systems from strike planning and command and control to bombs, missile warheads, and intercontinental ballistic missiles, these steps also represent a final, decisive repudiation of the central element of the NPT bargain: the promise by the nuclear weapons states to negotiate in good faith for the elimination of their nuclear arsenals. The "disarmament" obligation entered into by the nuclear weapons states that are NPT parties encompasses not only nuclear explosives, but "the means of their delivery." (See sidebar, "the NPT Disarmament Obligation") The United States is engaged in no negotiations for the elimination of nuclear weapons. And U.S. policy calls not for nuclear parity, but superiority:

> The fielding of a credible and effective land-based strategic nuclear deterrent force beyond 2020 supports the DoD [Department of Defense] corporate-level goals of shaping the international security environment and responding throughout the full spectrum of conflict by deterring hostile actors/activities in peacetime and in times of crisis. This force also will prepare the US for an uncertain future by maintaining US qualitative superiority in nuclear warfighting capabilities in the 2020-2040 time frame.[51]

The wide ranging effort by the United States to develop missiles with a new set of capabilities– far greater accuracy, improved maneuvering, and the ability to slow down in the atmosphere and deploy a wide range of armaments, ranging from self-guiding conventional munitions to senors– also is likely to make control of long-range missiles through diplomacy and international agreements impossible in the foreseeable future. Effective, universal missile controls, beginning with the easily verifiable mechanism of a ban on flight testing of long-range missiles for military purposes, are technically feasible. A flight test ban would be a far cheaper, and likely more effective, solution to the "rogue state missile threat" as it has been represented to the American people by their government than ballistic missile defenses.[52] Yet

The Disarmament Obligation of the Nuclear Non-Proliferation Treaty

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control. **Article VI , Treaty on the Non-Proliferation of Nuclear Weapons.** Signed at Washington, London, and Moscow July 1, 1968, Entered into force March 5, 1970. China and France joined the Treaty in 1992.

The meaning of the disarmament goal referred to in NPT Article VI is further elucidated by the Treaty's preamble, which says in part:

> Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament,
>
> Urging the cooperation of all States in the attainment of this objective,
>
> Recalling the determination expressed by the Parties to the 1963 Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water in its Preamble to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end,
>
> Desiring to further the easing of international tension and the strengthening of trust between States in order to facilitate the cessation of the manufacture of nuclear weapons, the liquidation of all their existing stockpiles, and the elimination from national arsenals of nuclear weapons and the means of their delivery pursuant to a Treaty on general and complete disarmament under strict and effective international control....

Article VI of the NPT requires more than endless decades of negotiations that leave in place nuclear arsenals capable of destroying civilization in a day. The International Court of Justice (the judicial arm of the United Nations, and the most authoritative court in the world on international law questions) ruled unanimously in 1996 that "There exists an obligation to pursue in good faith *and bring to a conclusion* negotiations leading to nuclear disarmament in all its aspects under strict and effective international control." International Court of Justice, Legality of the Threat or Use of Nuclear Weapons, General List No.95 (Advisory Opinion of 8 July 1996), sec. 105F, (emphasis added).

the United States has shown no interest in any kind of *universal* controls that might rein in both the spread of dangerous missile technologies on the one hand, and on the other, the development of more capable, threatening missiles by those who, like the United States, already have large, advanced missile arsenals. The kinds of missile controls the U.S. has been willing to back all assume and enforce a world of technological haves and have-nots, in which the United States may continue to expand its advantage in missile technology at will, while threatening war to force others to adhere to rules it would never accept.

One reason for this is that the main concern of U.S. policy makers is *not* a bolt from the blue attack against U.S. territory, as has been implied by the mainstream U.S. debate over missile defense, with its almost exclusive focus on mid-course interception of intercontinental ballistic missiles aimed at the United States. The principal near-term

worry of U.S. military planners is that the spread of missiles, together with chemical, biological, and nuclear weapons, will make it difficult to project overwhelming military force in regions where it demands access to resources and markets on favorable terms. This is the meaning of turgid Defense Department formulations like that in its *Quadrennial Defense Review:*

> A reorientation of the posture must take account of new challenges, particularly anti-access and area-denial threats. New combinations of immediately employable forward stationed and deployed forces; globally available reconnaissance, strike, and command and control assets; information operations capabilities; and rapidly deployable, highly lethal and sustainable forces that may come from outside a theater of operations have the potential to be a significant force multiplier for forward stationed forces, including forcible entry forces.[53]

Translated into plain English, this means the following: The United States claims the need and the right to deploy overwhelming military force right up to the shores of distant potential adversaries.[54] Previously, the U.S. largely could do this with impunity, because the targets of its "small wars" lacked any means to hit the huge U.S. air bases, military seaports, and lines of supply necessary to support war-making on the other side of the world.[55] The acquisition of missiles and nuclear (and to a lesser extent chemical or biological) weapons by countries the United States may wish to intimidate, coerce or attack makes these bases and supply lines vulnerable. The current United States response to this is a full-bore attempt to retain global military dominance through high-tech weapons, including missile defenses and new generations of strategic weapons operating through and from space, intended to both defend forward-deployed forces and reduce the need for them..[56] Nuclear weapons continue to play a central role in U.S. expeditionary warfare strategy, providing, in the words of a recent Air Force "transformation" planning document, "the deterrent umbrella under which joint conventional forces operate."[57]

The U.S. government claims that more useable nuclear weapons and conventional strategic weapons with global range will make war, and nuclear weapons use, less likely. They contend that the endless enhancement of the spectrum of violence makes U.S. threats more "credible," and as a result adversaries will be "deterred."[58] The way this is presented to the U.S. population rests on a central fiction: that all these weapons are intended only to defend the United States against unprovoked attack. But the Bush Administration, in its September 2002 *National Security Strategy of the United States*, announced a policy of preventive war, in which it claimed the right to attack any country it unilaterally determines to be a threat. And the Iraq war shows that it will attack other countries for reasons of its own choosing, without U.N. authorization, and without credible evidence of a present threat to the United States.

To understand the implications of the massive high-tech weapons buildup now underway, we must consider how the United States looks to the rest of the world. With a government that grows more duplicitous by the day, we may never know the exact mix of motivations– control of Iraq's oil, more grandiose geopolitical visions of 'imposing democracy on the region,' along the way assuring stable access for Western corporations to its markets and resources– that drove those in power to attack Iraq. But that war, combined with the continuing stream of veiled and overt threats issued by influential U.S. government officials against countries ranging from North Korea to Syria and Iran, suggest that the U.S. is an unpredictable and dangerous power with shifting internal political alignments, dominated by factions that will push for war for a variety of reasons.

Against this background, the pursuit of new and improved strategic weapons of all kinds, combined with the unprecedented advantage held by the United States in conventional arms and the logistical capacity to deploy large military forces

across great distances, is rapidly eroding existing arms control measures, and erecting enormous obstacles to future negotiations. The United States long has taken the position that its own behavior plays little part in decisions by others to seek nuclear, chemical, and biological weapons and the means to deliver them, claiming that despite U.S. efforts, for example, to modernize its nuclear weapons complex, "proliferation drivers for other states, such as international competition or the desire to deter conventional armed forces, would remain unchanged...."[59] This position flies in the face of reality in a world where the United States deploys powerful– and growing-- military forces in most regions, and where increasingly the "conventional armed forces" that potential proliferators "desire to deter" are those of the United States and its nuclear-armed allies.

U.S. officials do in fact believe that their huge military buildup will influence the behavior of other states; they just hope to send a different message. In the words of the *National Security Strategy of the United States*, "Our forces will be strong enough to dissuade potential adversaries from pursuing a military build-up in hopes of surpassing, or equaling, the power of the United States."[60] (See sidebar, "Capabilities-Based Deterrence.") And should such "dissuasion" prove less than satisfactory in the unilateral and unreviewable judgment of U.S. political and military leaders, the United States "will act against such emerging threats before they are fully formed."[61]

The Wages of Empire: One Two Three Many Arms Races

The greatest risks flowing from the endless refinement of strategic weaponry by the United States are likely to fall in the near term on people far outside its borders. The policies and actions of the United States, by providing incentives and excuses for governments to acquire nuclear weapons, make dangerous regional arms races more likely. The U.S. proclaims its own nuclear weapons to be good, and gives them a central role in the task of preventing the spread of nuclear weapons. The nuclear weapons of friends and allies also are good, or, in the case of Israel, officially considered invisible. The blatant contradictions of U.S. "nonproliferation" policy provide elites with a variety of arguments for acquiring nuclear weapons, ranging from their continuing legitimacy in the eyes of the leading Western power to the "need" to deter the United States itself.

North Korea has made the incoherence (if not outright hypocrisy) of the U.S. nuclear nonproliferation stance the centerpiece of its bargaining position. Framing the central "bargain" of the NPT as "the obligation of nuclear states not to use the nuclear weapon against states which do not possess it," North Korea claims, in essence, that U.S. nuclear threats against it has relieved North Korea of its obligation to abjure nuclear weapons.[62]

India and Pakistan, locked in a nuclear arms and emerging missile race amidst intense, sporadic warfare on a long, contested border, both point to U.S. nuclear weapons policies as a justification for their own actions.[63] India models its emerging nuclear establishment on that of the United States, envisioning "a triad of aircraft, mobile land-based missiles and sea-based assets...."[64] With warning times in minutes and economies hard-pressed to support the profligate spending that "survivable" nuclear forces and elaborate command and control structures entail, this new nuclear confrontation threatens to be fundamentally different, and in some ways more dangerous, than the Cold War.[65] Although the nuclear arsenals deployed in South Asia are not of the world-destroying magnitude of those possessed by the United States and Russia, the short warning times and shaky controls may pose a significantly greater risk of large-scale nuclear war than the dangers faced in the last century. And even a "small" nuclear exchange in that densely populated region would be a catastrophe of unprecedented proportions.[66]

The regional missile and nuclear arms races of the future, if they are allowed to proceed, are more likely to look like that in South Asia than the

Capabilities-Based Deterrence:" A "To Whom it May Concern"[67] Arsenal

The new defense strategy is built around the concept of shifting to a "capabilities-based" approach to defense. That concept reflects the fact that the United States cannot know with confidence what nation, combination of nations, or non-state actor will pose threats to vital U.S. interests or those of U.S. allies and friends decades from now. U.S. Department of Defense, Quadrennial Defense Review, 2001, p.13

*The capacity of the infrastructure to upgrade existing weapon systems, surge production of weapons, or develop and field entirely new systems for the New Triad can discourage other countries from competing militarily with the United States. "*U.S. Department of Defense, Nuclear Posture Review 2001, p.14.

These concepts, of boundless potential enemies and a "strategy" of maintaining weapons research and production capacities so large that other states will not dare to compete, together constitute a blank check for expansion of the military industrial complex. The record $66 billion Defense Department research and development budget recently approved by Congress exceeds the entire military budgets of most countries, and dwarfs those of states touted as "threats," such as Iran and North Korea.[68] Buoyed by the Nuclear Posture Review vision, the Sandia National Laboratory, a nuclear weapons engineering center, even created a unit to manage new opportunities in non-nuclear weapons research, labeled the New Triad Line of Business.[69]

The nuclear weapons business, however, also remains robust. The U.S. is spending an additional six billion dollars a year to operate and modernize its nuclear weapons complex, including new and more advanced nuclear weapons research and production facilities.

These include:

- The National Ignition Facility (NIF), now nearing completion at the Livermore National Laboratory in California. The NIF is a laser driven fusion machine the size of a football stadium, designed to create very brief, contained thermonuclear explosions. It is slated to be used for a wide range of applications from training weapons designers in nuclear weapons science to nuclear weapons effects testing. NIF experiments, together with other fusion research being conducted at the nuclear weapons laboratories, could, in the long run, lead to the development of pure fusion weapons, not requiring plutonium or uranium.

- The Dual Axis Radiographic Hydrotest Facility (DARHT). This facility, at the Los Alamos National Laboratory in New Mexico, will join several already existing facilities where mockups of primaries or "pits", the first stage of a thermonuclear weapon, are imploded while very fast photographic or x-ray images are generated, thus allowing scientists to "see" inside the implosion. The U.S. government already is developing technology for an even more sophisticated "hydrodynamic testing" facility, the Advanced Hydrotest Facility.

- Pulsed power technologies: Further experiments exploring the extreme conditions created in a nuclear weapon explosion are studied using various types of "pulsed power," in which a large amount of energy is stored up and then released very quickly in a small space. Pulsed power facilities at government laboratories are used to explore nuclear weapons function and effects and directed energy weapons concepts, and could play a role in the development of a wide range of high technology weapons, including new types of nuclear weapons.

The data from these and other experimental facilities, along with that from "subcritical" tests which implode nuclear materials but have no measurable nuclear yield and the archived data from over 1000 past U.S. nuclear tests,are integrated via the Advanced Strategic Computing Program. This multi-billion dollar supercomputing program reaches beyond the weapons laboratories, seeking to incorporate the nation's leading universities into an effort to attract and train yet another generation of nuclear weapons designers.

Initial planning and design also is proceeding for the Modern Pit Facility, a new factory to mass produce plutonium pits, the atomic trigger at the core of modern thermonuclear weapons. As currently proposed, this facility could produce as many as 450 pits per year in single shift operation, and more by operating more than one shift if desired (by comparison, China's entire nuclear arsenal, the third largest in the world, is estimated at approximately 400 nuclear weapons.) New nuclear weapons production processes are being developed to allow flexible, small lot manufacturing.

In addition to the Modern Pit Facility, the U.S. is pursuing a wide range of programs to modernize its nuclear weapons production infrastructure. These range from a smaller pit manufacturing capability at Los Alamos National Laboratory in New Mexico to upgraded nuclear weapon component manufacturing facilities at Oak Ridge National Laboratory and tritium facilities at Savannah River, Georgia. In addition, the government will be producing tritium for nuclear weapons at civilian nuclear power plants operated by the Tennessee Valley Authority (TVA).[70]

East-West competition of the late 20th century. Short warning times, problematic command and control, great differences in the non-nuclear military capabilities of opposing states, and societies already overstressed by demographic and economic crisis will bring unimaginable complexity to any new rounds of nuclear confrontation in regions like the Middle East and Northeast Asia. The dangers of these new arms races are likely to be exacerbated by an array of emerging technologies, ranging from information warfare to microwave weapons, intended to confuse, disable or destroy the electronics central to both warning and command and control systems. And lurking over the horizon in every contested region are the world-destroying arsenals of the original nuclear-armed states, with that of the United States increasingly brandished as an everyday tool of national power.

From the perspective of ordinary people, nuclear weapons bring nothing but increased insecurity. Even if a country never uses nuclear weapons, their testing and production contaminates land and water, destroying many thousands of lives over decades. These problems too are likely to be exacerbated by nuclear weapons production amidst vast poverty, with even fewer resources devoted to environmental controls, and even less political power for the "downwinders" of tomorrow to protest, or even discover, the damage done to them and their descendants.[71] The enormous costs of a nuclear weapons complex, from testing and production to delivery systems and command and control, diverts resources from the needs of the least powerful, and also from solutions to the resource scarcity and environmental decline that in many parts of the world play a growing role in tensions that can lead to war. For ordinary people, war brings only misery and death, with the majority of those killed by industrialized modern warfare and the inevitable chaos that follows civilians, and most of the rest conscripts or acolytes, sent to fight for reasons they seldom fully understand. Nuclear war is all of this, multiplied beyond imagining.

Bombs, Missiles, and the American Way

"Atomic bombs are the natural product of the kind of society we have created. They are as easy, normal, and unforced an expression of the American Standard of Living as electric iceboxes." –Dwight McDonald, 1945.[72]

McDonald's assessment of American society perhaps was unduly harsh in 1945. In the decades immediately following World War II, there actually was debate in the United States about its growing commitments to both nuclear weapons and high-tech militarism There were worries that both– then generally considered by most to be at best grim necessities– could become permanent features of our way of life. The nuclear weapons and the military industrial complex were new, and even those who presided over their growth expressed grave doubts:

> This conjunction of an immense military establishment and a large arms industry is new in the American experience. The total influence -- economic, political, even spiritual -- is felt in every city, every State house, every office of the Federal government. We recognize the imperative need for this development. Yet we must not fail to comprehend its grave implications. Our toil, resources and livelihood are all involved; so is the very structure of our society....
>
> We must never let the weight of this combination endanger our liberties or democratic processes. We should take nothing for granted. Only an alert and knowledgeable citizenry can compel the proper meshing of the huge industrial and military machinery of defense with our peaceful methods and goals, so that security and liberty may prosper together. --President Dwight D. Eisenhower, Farewell Address, January 17, 1961

Today, however, both the doubts and the "alert and knowledgeable citizenry" are nowhere to be found. What is most alarming about the current round of U.S. missile "modernizations," "concepts," and "replacements" is not that they represent some major change in direction, but that they don't. Nuclear weapons, missiles, and the constant

generation of new high-tech military hardware surely have become "as easy, normal, and unforced an expression of the American Standard of Living as electric iceboxes"-- or perhaps personal computers. Tens of thousands of nuclear weapons and delivery systems have rolled out of U.S. factories. Hundreds of ideas like the Hypersonic Cruise Vehicle and the Common Aero Vehicle have moved from concept development to production, all spun off from the Cold War nuclear warfare infrastructure of intercontinental ballistic missiles, high-tech aircraft, surveillance and communications satellites, and the equally highly developed political machinery for converting mass-produced fear into military appropriations. For the military-industrial complex, it is as routine as selling next year's cars or high-concept movie ideas: market your strengths and go for a bigger market share.[73]

Criticizing the Hubcaps while the Juggernaut Rolls On

The U.S. military-industrial complex today is so immense as to defy comprehension. Even those few paying attention tend to focus on one small piece at a time. One month it may be proposals for nuclear weapons with certain new capabilities. Then the attention may shift to missile defense– but there too, only a small part of the program attracts public debate, with immense programs like the airborne laser proceeding almost invisibly. Proposals for the intensive militarization of space like the Space Plane come to light for a day or two, attracting a brief flurry of interest; the continuing, broad development of military space technologies, from GPS-aided guidance to radiation hardened microchips to space power generation, draw even less scrutiny. There is so broad a consensus among political elites supporting the constant refinement of conventional armaments that new generations of strike aircraft, Navy ships, and armored vehicles attract little notice outside industry and professional circles, with only spectacular cost overruns or technical failures likely to draw the occasional headline. A few Congresspeople will challenge one or another particularly extreme new weapon (e.g. the "Robust Nuclear Earth Penetrator"), but usually on narrow pragmatic grounds: we can accomplish the same "mission" with less risky or cheaper weapons. But the question of "why," seldom is asked, only "how," or "how much does it cost?" Most of the programs that constitute the military machine glide silently onward undisturbed, like the body of a missile submarine invisible below the deceptively small surfaces that rise above the sea.

The United States emerged after both World War II and the Cold War as the most powerful state on earth-- the one with the most choices. The first time, all of this was still new. We could perhaps understand our ever deeper engagement with the machinery of death as a series of tragic events, of the inevitable outcome of fallible humans grappling with the titanic forces they had only recently unleashed, in the context of a global confrontation layered in secrecy, ideology, and fear. But this time around, since the end of the Cold War, we must see the United States as truly choosing, with every new weapon and every new war, to lead the world into a renewed spiral towards catastrophe.

The past is written, but our understanding of it changes from moment to moment. The United States began the nuclear age as the most powerful nation on earth, and proclaimed the character of the "American Century" with the bombings of Hiroshima and Nagasaki, a cryptic message written in the blood of innocents. Its meaning has come clear over fifty years of technocratic militarism, punctuated by the deaths of millions in neo-colonial warfare and underscored always by the willingness to end the world rather than share power with anyone.

The path ahead still can be changed, but we must begin with an understanding of where we are, and how we got here. In the United States, there is a very long way to go before we have a debate about the uses of military force that addresses honestly the weapons we have and seek to develop, much less about the complex social forces which impel the United States to maintain its extraordinary

levels of forces and armaments. Most Americans don't know what their government is doing in their name, or why. Their government, regardless of the party in power, lies about both its means and its ends on a routine basis. And there is nothing the government lies about more than nuclear weapons, proclaiming to the world for the last decade that the United States was disassembling its nuclear facilities and leading the way to disarmament, while rebuilding its nuclear weapons plants and planning for another half century and more of nuclear dominance.[74]

It is clear by now that fighting violence with yet more violence, claiming to stop the spread of nuclear weapons by threatening the use of nuclear weapons, is a dead end. The very notion of "enforcement," that some countries have the right to judge and punish others for seeking "weapons of mass destruction," has become an excuse for war making, a cover and justification for the power and profit agenda of secretive and undemocratic elites. The only solution that will increase the security of ordinary people anywhere is for all of us, in our respective societies, to do everything we can to get the most violent elements in our cultures– whether in or out of uniform– under control. In the United States, this will require far more than changing a few faces in Washington. We will need a genuine peace movement, ready to make connections to movements for ecological balance, and for social and economic justice, and by doing so to address the causes of war. Before we can expect others to join us, it must be clear that we are leaving the path of violence.

By Andrew M. Lichterman
rev. October 2003

Notes

1. The goal of reducing "collateral damage" from nuclear weapons use also is reflected in programs researching nuclear weapons effects, with Pentagon planners desiring increased understanding of nuclear weapons function in a context where "[t]echnical challenges are presented by the rapidly developing need to hold evolving enemy targets at risk using the reduced stockpile, and recognizing greatly increasing political and environmental constraints." U.S. Department of Defense, Deputy Under Secretary of Defense (Science and Technology), *Defense Technology Objectives for Defense Technology Area Plan*, (2000), "Nuclear Phenomenology," p. II-372, obtained by Western States Legal Foundation WSLF) under the Freedom of Information Act. Available at http://www.wslfweb.org/docs/dstp2000/dtopdf/24-NT.pdf

For an overview of current U.S. research and development aimed at making nuclear weapons more useable, see *Sliding Towards the Brink: More Useable Nuclear Weapons and the Dangerous Illusions of High-Tech War*, WSLF information Bulletin, March 2003, http://www.wslfweb.org/docs/nucpreppdf.pdf

2. See Robert W. Nelson, "Low-Yield Earth-Penetrating Nuclear Weapons," *Federation of American Scientists Public Interest Report* January/February 2001 Volume 54, Number 1, http://www.fas.org/faspir/2001/v54n1/weapons.htm; Sidney Drell, Raymond Jeanloz, and Bob Peurifoy, "Bunkers, Bombs, Radiation," Commentary, *Los Angeles Times*, March 17, 2002; and Ian Hoffman, "Mini-nukes Are Too Risky, Experts Say," *Oakland Tribune*, March 5, 2003.

3. On this note, a recent RAND study for the U.S. Air Force (USAF) stated that

> Most U.S. military operations for the foreseeable future will be undertaken with limited or less-than-majority American public support. Technological advances that expand the USAF's effectiveness will help it play an important role overcoming possible domestic constraints on the use of force such as casualty sensitivity.

Among the "examples of technological advances that might provide the USAF with capabilities that will help overcome or alleviate U.S. domestic constraints" identified by the RAND study were "[h]ighly effective unmanned

weapons, such as cheap standoff munitions and space-based assets, that pose no risk of U.S. casualties." D. L. Byman, M. C. Waxman, E. V. Larson, *Air Power as a Coercive Instrument*, Rand Corporation, 1999, p.132.

4. U.S. Department of Defense, Nuclear Posture Review, 2001, pp. 12-13, "Nuclear Posture Review Excerpts," Globalsecurity.org, at http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm For a more detailed analysis of the Nuclear Posture Review and current U.S. nuclear weapons policies and their relationship to other high-tech weapons programs, see Andrew Lichterman and Jacqueline Cabasso, *The Shape of Things to Come: The Nuclear Posture Review, Missile Defense, and the Dangers of a New Arms Race*, WSLF Special Report, April 2002, http://www.wslfweb.org/docs/shape.pdf For additional information from a variety of sources about the Nuclear Posture Review, see the WSLF NPR information page at http://www.wslfweb.org/nukes/npr.htm

5. *Ibid* at p.46

6. Air Force Space Command, *Strategic Master Plan FY04 and Beyond*, 2002, p.4

7. Defense Advanced Research Projects Agency, FALCON Force Application and Launch from CONUS, Broad Agency Announcement, PHASE I Proposer Information Pamphlet (PIP) for BAA Solicitation 03-35 Defense Advanced Research Projects Agency July 29, 2003, p. 1.

8. *Id.*

9. Air Force RDT&E Budget Item Justification Sheet (R-2 Exhibit), PE 0604856F, Common Aero Vehicle, Project A012, February 2003.

10. NASA- USAF Reusable Space Launch Development 120 Day Study, Industry Day Briefing, Payloads and Sensors Team, January 15-18, 2002, downloaded from http://www.losangeles.af.mil/smc/xr/public/p_and_s_industry_day.ppt, now available at http://www.wslfweb.org/docs/msp/p_and_s_industry_day.ppt, slide 16

11. *Ibid.*, slide 21.

12. "The Military Space Plane: Providing Transformational and Responsive Global Precision Striking Power: A White Paper on the Operational Utility of a Military Spaceplane in the Emerging 21st Century International Security Environment," (draft), Proposed by members of ONE TEAM in Conjunction With the 120 Day Reusable Launch Vehicle Study, January 2002, p.12 (hereafter Space Plane White Paper). Downloaded from http://www.losangeles.af.mil/smc/xr/public/military_spaceplace_utility.doc, now available at http://www.wslfweb.org/docs/msp/military_spaceplace_utility.doc

13. Defense Advanced Research Projects Agency, RDT&E Budget Item Justification Sheet (R-2 Exhibit), February 2003, PE 0603285E Defense-wide Advanced Technology Development, Advanced Aerospace Systems, Project ASP-02, Hypersoar.

14. Defense Advanced Research Projects Agency, FALCON (Force Application and Launch from CONUS), Broad Agency Announcement, PHASE I Proposer Information Pamphlet (PIP) for BAA Solicitation 03-35 Defense Advanced Research Projects Agency July 29, 2003, p.1

15. "Many of the technologies required by CAV are also applicable to this [HCV] vision vehicle concept such as high lift-to-drag technologies, high temperature materials, thermal protection systems, and periodic guidance, navigation, and control." Defense Advanced Research Projects Agency, RDT&E Budget Item Justification Sheet (R-2 Exhibit), February 2003, PE 0603285E Defense-wide Advanced Technology Development, Advanced Aerospace Systems, Project ASP-02, Hypersoar.

16. *Id.*

17. *Air Force Space Command Strategic Master Plan for FY02 and Beyond*, February 9, 2000, section 6.2.2, http://www.spacecom.af.mil/hqafspc/library/AFSPCPAOffice/2000smp.html

18. Defense Advanced Research Projects Agency, FALCON (Force Application and Launch from CONUS), Broad Agency Announcement, PHASE I Proposer Information Pamphlet (PIP) for BAA Solicitation 03-35 Defense Advanced Research Projects Agency July 29, 2003, p.*5; Air Force Space Command Strategic Master Plan for FY02 and Beyond*, February 9, 2000, section 6.2.2

19. National Security Space Architect, National Security Space Roadmap (1999), "Common Aero-Vehicle (CAV) for Military Spaceplane (MSP)," available at http://www.wslfweb.org/docs/roadmap/irm/internet/forceapp/init/html/cavmsp.htm (obtained by Western States Legal Foundation via the Freedom of Information Act); and *Report on Why and Whither Hypersonics Research in the US Air Force*, December 2000, p.35 http://www.sab.hq.af.mil/archives/reports/2000/Hypersonics-Report.PDF pp. 50-51.

20. Defense Advanced Research Projects Agency, FALCON (Force Application and Launch from CONUS), Broad Agency Announcement, PHASE I Proposer Information Pamphlet (PIP) for BAA Solicitation 03-35 Defense Advanced Research Projects Agency July 29, 2003, p.3

21. *Ibid*, p. 1

22. "Basic CAV designs are relatively mature technology and have been flight tested successfully in several Ballistic Missile Organization/Advanced Strategic Missile Systems (BMO/ASMS) programs." U.S. Air Force, *1997 Space Force Application Mission Area Development Plan*, p.49. Obtained in part by Western States Legal Foundation via the Freedom of Information Act.

23. Defense Advanced Research Projects Agency, FALCON (Force Application and Launch from CONUS), Broad Agency Announcement, PHASE I Proposer Information Pamphlet (PIP) for BAA Solicitation 03-35 Defense Advanced Research Projects Agency July 29, 2003, p. 1

24. *Ibid.*, p.7

25. The House Armed Services Committee recently reiterated this concern while at the same time recommending higher funding levels for the CAV than the administration requested:

> The committee is aware that CAV could appear to be a non-conventional launch and directs the Secretary of Defense to develop and provide a concept of operations for CAV that precludes any misperception of CAV launch intent to the congressional defense committees, prior to conducting any developmental launches of CAV and no later than March 31, 2004. National Defense Authorization Act For Fiscal Year 2004, Report of The Committee on Armed Services, House of Representatives, on H.R. 158, p.

26. See, e.g., National Security Space Architect, National Security Space Roadmap (1999), "Conventional Ballistic Missile (CBM) with Common Aero-Vehicle (CAV)," available at http://www.wslfweb.org/docs/roadmap/irm/internet/forceapp/init/html/cbmcav.htm (obtained by Western States Legal Foundation via the Freedom of Information Act); and also from the Space Roadmap, "Eastern Range," http://www.wslfweb.org/docs/roadmap/irm/internet/forceapp/init/html/eastrang.htm and "Western Range," http://www.wslfweb.org/docs/roadmap/irm/internet/forceapp/init/html/westrang.htm

27. U.S. Air Force, *1997 Space Force Application Mission Area Development Plan*, p.38 Obtained in part by Western States Legal Foundation via the Freedom of Information Act.

28. *Id.*

29. *Ibid.*, pp. 38-39

30. *Ibid*, pp 44-45

31. "Measures of Effective and Measures of Performance" (MOE's and MOP's), materials accompanying Air Force Space Command, "Request for Information/initial Delivery Vehicle Concept Call for the next generation Land Based Strategic Deterrent (LBSD) Analysis of Alternatives (AoA)," September 8, 2003 (unpaginated) http://www.hill.af.mil/icbm/lm4/Documents/MOEsand%20MOPs.pdf

32. The 1997 *Space Force Application Mission Area Development Plan* directly acknowledged these political difficulties. The nuclear CAV concept was rejected after the document was complete but before it was issued, resulting in a statement on its cover that

> "References to using the Common Aero Vehicle (CAV) to deliver nuclear weapons should be disregarded. AFSPC [Air Force Space Command] is no longer considering using the CAV to deliver nuclear weapons. Where CAV is mentioned for nuclear weapons, the term Maneuvering Reentry Vehicle (MaRV) should be used. (Refer to the 1996 development plan.) These changes reflect current political realities and were brought to light after printing."

33. Nuclear Posture Review, p. 41, provided in "Nuclear Posture Review Excerpts," Globalsecurity.org, at http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm

34. Air Force Space Command, "Request for Information/initial Delivery Vehicle Concept Call for the next generation Land Based Strategic Deterrent (LBSD) Analysis of Alternatives (AoA)," September 8, 2003 http://www.hill.af.mil/icbm/lm4/Documents/PCODelvehcRFI.pdf

35. *Final Mission Need Statement, Land Based Strategic Nuclear Deterrent*, AFSPC 001-00, January, 2002, p.3 http://www.hill.af.mil/icbm/lm4/Documents/LBSND%20MNS.pdf

36. *Ibid*, p.5

37. "Measures of Effective and Measures of Performance" (MOE's and MOP's), materials accompanying Air Force Space Command, "Request for Information/initial Delivery Vehicle Concept Call for the next generation Land Based Strategic Deterrent (LBSD) Analysis of Alternatives (AoA)," September 8, 2003 (unpaginated) http://www.hill.af.mil/icbm/lm4/Documents/MOEsand%20MOPs.pdf

38. Statement of Rear Admiral Charles B. Young, Director, Strategic Systems Programs, before the Strategic Subcommittee of the Senate Armed Services Committee April 8, 2003.

39. U.S. Navy, RDT&E Budget Item Justification Sheet (R-2 Exhibit), February 2003, PE 0101221N, Strategic Submarine and Weapons Systems Support, Project J0951

40. Department of the Navy, Strategic Systems Programs, Special Notice, Submarine Launched Intermediate Range Ballistic Missile Technical Exchange, Reference-Number-08252003-0358, August 25, 2003.

41. "Sandia Designs, Tests, Builds Non-nuclear Guided Penetrator Weapon for Military Targets of Tomorrow," *Sandia Lab News*, Vol. 55, No. 6 March 21, 2003.

42. U.S. Navy, RDT&E Budget Item Justification Sheet (R-2 Exhibit), February 2003, PE 0604327N, Project J2331, Hardened Target Munitions.

43. U.S. Army, RDT&E Budget Item Justification Sheet (R-2 Exhibit), February 2003, PE0604768A - Brilliant Anti-Armor Submunition (BAT), Project MD6, Army Tactical Missile System -Penetrator.

44. Department of the Air Force, DOD [Department of Defense] In-House RDT&E Activities Report FY2000, p. 4-103. The Navy and Air Force have several ongoing programs to sustain and modernize their strategic ballistic missile forces, including programs on guidance systems, reentry vehicles, and rocket propulsion. See Nuclear Posture Review, pp.42-43, provided in "Nuclear Posture Review Excerpts," Globalsecurity.org, at http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm

45. Defense Advanced Research Projects Agency, FALCON (Force Application and Launch from CONUS), Broad Agency Announcement, PHASE I Proposer Information Pamphlet (PIP) for BAA Solicitation 03-35 Defense Advanced Research Projects Agency July 29, 2003, p. 5

46. *Ibid*, p.3

47. *Ibid*, p.1

48. Air Force Space Command, "Request for Information/initial Delivery Vehicle Concept Call for the next generation Land Based Strategic Deterrent (LBSD) Analysis of Alternatives (AoA)," September 8, 2003.

49. For an overview of these programs, see Andrew Lichterman, *Sliding Towards the Brink: More Useable Nuclear Weapons and the Dangerous Illusions of High-Tech War*, Western States Legal Foundation Information Bulletin, March 2003, http://www.wslfweb.org/docs/nucpreppdf.pdf

50. 2000 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Final Document, NPT/CONF.2000/28, 22 May 2000.

51. U.S. Air Force Space Command, Final Mission Need Statement, Land Based Strategic Nuclear Deterrent, AFSPC 001-00, January, 2002,p. 1

52. For an overview of ballistic missile control proposals and an argument for their revival, see A. Lichterman, Z. Mian, M.V. Ramana, and J. Scheffran, *Beyond Missile Defense*, International Network of Engineers and Scientists Against Proliferation and Western States Legal Foundation Briefing Paper No. 8, January, 2002, http://www.inesap.org/pdf/Briefing8_02.pdf

53. U.S. Department of Defense, *Quadrennial Defense Review Report*, September 2001, p.25.

54. Again, in the inimitable jargon of the 2001 *Quadrennial Defense Review:*

> "DoD's new planning construct calls for maintaining regionally tailored forces forward stationed and deployed in Europe, Northeast Asia, the East Asian littoral, and the Middle East/Southwest Asia to assure allies and friends, counter coercion, and deter aggression against the United States, its forces, allies, and friends." at p.20.

55. In its 2001 report *Proliferation: Threat and Response*, the Defense Department stated that

> ...[T]he United States must be prepared to fight and win under conditions where an adversary may use asymmetric means against us —unconventional approaches that avoid or undermine our strengths while exploiting our vulnerabilities. Because of our conventional military dominance, adversaries are likely to use asymmetric means, such as WMD, information operations, or terrorism. Such asymmetric attacks could be used to disrupt the critical logistics pipeline —from its origins in the United States, along sea and air routes, at in-transit refueling and staging bases, to its termination at airfields, seaports, and supply depots in theater —as well as our forces deployed in the field. U.S. Department of Defense, Office of the Secretary of Defense, *Proliferation: Threat and Response* (January 2001) p.77.

56. These priorities are reflected in the military's views on missile defense. As the recently retired Commander of U.S. Joint Forces Command stated in the fall of 2000,

> This issue's been studied by panel after panel after panel and we got it-- Our current policy is one that I support and understand. The priority is lower tier theater ballistic missile defense systems first, upper tier systems second, national missile defense third. That's the way the threat is arrayed. Admiral (Retired) Hal Gehman, former Commander-in-Chief, US Joint Forces Command, speaking at a Washington, D.C. conference, "National Strategies and Capabilities for a Changing World," November 16, 2000, transcript at http://www.ifpafletcherconference.com/army2000/new.htm

57. U.S. Air Force, HQ USAF/XPXT, Transformation Division, *The USAF Transformation Flight Plan FY03-07*

58. For example,

> As you are well aware, our efforts to strengthen deterrence involve denying sanctuary to our adversaries. This may mean making our nuclear weapons more tailored to the target type, which is not equivalent to making them more likely to be used. Tailored weapons strengthen deterrence, which in turn makes them less likely to be used. Also, a robust nuclear earth penetrator is only one piece of the overall solution for targets contained in these types of structures. Other capabilities such as advanced conventional, information operations, and special operations capabilities must be developed as well. A full spectrum of capabilities strengthens deterrence and maintains the nuclear threshold by developing a range of options for the President to counter the growing hard and deeply buried target set. Statement of John A Gordon, National Nuclear Security Administration Administrator, Before the House Armed Services Committee Procurement Subcommittee June 12, 2002

59. United States Department of Energy, Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management, September 1996, p. 2-11.

60. At p. 30

61. President George W. Bush, Letter announcing the *National Security Strategy of the United States,* September, 2002.

62. "North Korean Says Nation Unable to Comply With Key Arms Pact," Reuters, December 31, 2002.

63. See, for example, the Preamble of the 1999 *Draft Report of National Security Advisory Board on Indian Nuclear Doctrine,* which states:

> Nuclear weapon states have asserted that they will continue to rely on nuclear weapons with some of them adopting policies to use them even in a non-nuclear context. These developments amount to virtual abandonment of nuclear disarmament. This is a serious setback to the struggle of the international community to abolish weapons of mass destruction....
>
> Autonomy of decision making in the developmental process and in strategic matters is an inalienable democratic right of the Indian people. India will strenuously guard this right in a world where nuclear weapons for a select few are sought to be legitimised for an indefinite future, and where there is growing complexity and frequency in the use of force for political purposes.

And for Pakistan, an address by the Permanent Representative of Pakistan on "Non-Proliferation, Arms Control and Disarmament : A Policy Framework for South Asia" at the Defence Threat Reduction Agency on 2 June 1999, which noted that

> US nuclear diplomacy centres on efforts to strengthen the status quo and to stabilize the balance of power through

> non-proliferation and arms control. Nuclear disarmament, in the sense of bringing about a material change in the nuclear status quo and world security order, has at best been kept on the back burner, and at worst been used synonymously with non-proliferation. Even arms control efforts appear in practice to be an instrument of strategic policy to get rid of redundant weapon systems while, at the same time, gaining some political capital....
>
> However, the long term goal of de-nuclearization of South Asia can only be achieved with progress on the third track, or global nuclear disarmament. Frankly speaking, the long list of prescriptions and moral sermons addressed to South Asia smack of double standards in the face of almost negligible advances in the field of global nuclear disarmament.
>
> Unfortunately, some nuclear weapon states have misinterpreted the indefinite extension of the NPT to signify an endorsement of their right to retain nuclear weapons indefinitely. Global peace and security is more than threatened by the thousands of nuclear weapons in the inventory of nuclear weapon states. Even more dangerous is the fact that some nuclear weapon states have adopted nuclear war fighting doctrines which even envisage the use of nuclear weapons against conventional threats.

64. *Draft Report of National Security Advisory Board on Indian Nuclear Doctrine,* section 3.1.

65. See Zia Mian, "A Nuclear Tiger by the Tail: Problems of Command and Control in South Asia," and Admiral L. Ramdas, "Nuclear Weapons and National Security," in M.V. Ramana and C. Rammanohar Reddy, *Prisoners of the Nuclear Dream,* (Orient Longman, Hyderabdad, 2003) p.74 and p.53.

66. See Matthew McKinzie, Zia Mian, A.H. Nayyar and M.V. Ramana, "The Risks and Consequences of Nuclear War in South Asia," in *Out of the Nuclear Shadow,* Smitu Kothari and Zia Mian, eds., (London: Zed Books, 2001) p.195.

67. " ... I believe that nuclear weapons do have a place and purpose today in other than a Russian or Chinese context. Rather than inflame debates prematurely as to who is or may become America's enemies or adversaries, I would call the second force capability the 'Non-Russian Force,' or simply CapTwo. In my early thinking on this subject, I even referred to this second force as the 'To Whom It May Concern Force.'" Sandia National Laboratory Director C. Paul Robinson, "A White Paper: Pursuing a New Nuclear Weapons Policy for the 21st Century," 2001.

68. Military budgets are inherently difficult to compare, due to the differences in purchasing power of given sums of money among states. Estimates in the Stockholm International Peace Research Institute (SIPRI) "Top Fifteen Major Spenders" table for Iran's 2001 military spending , for example, range from $17.5 billion based on exchange rate to $20.2 billion adjusted for purchasing power. North Korea did not place among the top 15. (Available at http://projects.sipri.org/milex/mex_major_spenders.pdf) The U.S. Central Intelligence Agency internet Fact Book estimated North Korea's 2002 military spending at $5.2 billion. http://www.cia.gov/cia/publications/factbook/rankorder/2067rank.html

69. "The New Deterrence Triad isn't all Nuclear," *Sandia Lab News,* March 21, 2003, p.7.

70. For more on the modernization of the U.S. nuclear weapons complex, see Andrew Lichterman and Jacqueline Cabasso, *Faustian Bargain 2000: Why Stockpile Stewardship is Fundamentally Incompatible with the Process of Nuclear Disarmament, Western States Legal Foundation,* April 2000 http://www.wslfweb.org/docs/fb2000.pdf, and Andrew Lichterman, *Mass Producing Weapons of Mass Destruction: U.S. Plans for a New Nuclear Weapons Factory and the Global Resurgence of Nuclear Arms* Western States Legal Foundation and Los Alamos Study Group Information Bulletin, Summer 2003, http://www.wslfweb.org/docs/mpfinfo.pdf

71. For an overview of the likely consequences of sustained nuclear weapons research and production in India, see M.V. Ramana and Surendra Gadekar, "The Price We Pay: From Uranium to Weapons," in M.V. Ramana and C. Rammanohar Reddy, *op. cit.*, p.411.

72. Quoted in Michael S. Sherry, *The Rise of American Air Power: The Creation of Armageddon* (New Haven: Yale University Press, 1987), p.177.

73. So, for example, a set of Los Alamos National Laboratory view graphs sketched out a strategy for cashing in on the Bush Administration's enthusiasm for military space projects, suggesting a "Lab-wide initiative to expand portfolio," six months of preliminary work during which the Lab would "Learn about potential customers, and competition / partners," after which it would "decide on program development, sales, build programs..." Viewgraphs, "Military Space Initiative." Los Alamos National Laboratory, June 2001.

74. At the NPT 2000 Review Conference, during the final year of the Clinton presidency, The U.S. delegation distributed a glossy public relations portfolio, stating that

> "As the United States reduces the numbers of its nuclear weapons, it is also transforming the means to build them. Over the past decade, the United States has dramatically changed the role and mission of its nuclear-weapon complex from weapon research, development, testing, and production to weapon dismantlement, conversion for commercial use, environmental remediation, and stockpile stewardship."

And the U.S. signed on to a final NPT document including

> An unequivocal undertaking by the nuclear-weapon States to accomplish the total elimination of their nuclear arsenals leading to nuclear disarmament to which all States parties are committed under Article VI. 2000 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Final Document*, New York, NPT/CONF.2000/28 (Vol. I, Part I and II) 22 May 2000

At the same time, U.S. negotiating documents supporting Anti-Ballistic Missile Treaty (ABMT) negotiations summarizing arguments intended to persuade Russia that a "limited" U.S. ABM system would not be a threat to its nuclear deterrent stated that

> "Both the United States and the Russian Federation now possess and, as before, *will possess under the terms of any possible future arms agreements*, large, diversified, viable arsenals of strategic offensive weapons consisting of various types of ICBM's, submarine-launched ballistic missiles, and heavy bombers." (Emphasis added.)"Proposal on ABM: 'Ready to Work with Russia,'" The New York Times, April 28, 2000, p. A10 (emphasis added). The document quoted from was a document, originally leaked to the Bulletin of Atomic Scientists, "that American negotiators have presented to the Russians with proposals for amending the 1972 ABM treaty, in order to allow the United States to build a limited national missile defense system." *(Id.)*

Web Resources

Missiles, Missile Defenses, and Weapons in Space

The International Network of Engineers and Scientists Against Proliferation (INESAP) and the Nuclear Age Peace Foundation are sponsoring a **"Moving Beyond Missile Defense"** initiative, which brings together experts and activists from across the globe to consider alternatives to missile defenses, including measures to control ballistic missiles. More information on this initiative can be found at http://mbmd.org

For an overview of ballistic missile control proposals and an argument for their revival, see A. Lichterman, Z.Mian, M.V. Ramana, and J. Scheffran, Beyond Missile Defense, International Network of Engineers and Scientists Against Proliferation and Western States Legal Foundation Briefing Paper No. 8, January, 2002, http://www.inesap.org/pdf/Briefing8_02.pdf

For information on previous efforts to control ballistic missiles, see J. Jerome Holton, Lora Lumpe, and Jeremy J. Stone, "Proposal For a Zero Ballistic Missile Regime,"1993 Science and International Security Anthology, AAAS: Washington, 1993 pp. 379-396; Lora Lumpe, "Zero Ballistic Missiles and the Third World,"Arms Control, Volume 14, number 1, April 1994, and other materials available at http://www.fas.org/asmp/campaigns/missile.html

For more information on U.S. programs to further militarize space, see the Western States Legal Foundation page on ballistic missile defense and space at http://www.wslfweb.org/space.htm, and our library of U.S. government military space documents at http://www.wslfweb.org/space/spacedocs.htm

The Global Network Against Weapons and Nuclear Power in Space provides both information and comprehensive organizing resources at http://www.space4peace.org

For addition information on the Common Aero Vehicle and Military Space Plane programs, see ***The Military Space Plane, Conventional ICBM's, and the Common Aero Vehicle: Overlooked Threats of Weapons Delivered Through or From Space*****,** WSLF Information Bulletin, Fall 2002, http://www.wslfweb.org/docs/mspcav.pdf

U.S. Nuclear Weapons Policies and Programs

For more information on U.S. nuclear weapons programs, see ***Sliding Towards the Brink: More Useable Nuclear Weapons and the Dangerous Illusions of High-Tech War,*** WSLF information Bulletin, March 2003, http://www.wslfweb.org/docs/nucpreppdf.pdf and

The Shape of Things to Come: The Nuclear Posture Review, Missile Defense, and the Dangers of a New Arms Race, WSLF Special Report, April, 2002, http://www.wslfweb.org/docs/shape.pdf
For additional publications on U.S. nuclear weapons programs and policies, see the **Western States Legal Foundation on-line Documents Library** at http://www.wslfweb.org/doclib.htm

For links to a wide range of government and non-government resources on nuclear weapons, see the **Western States Legal Foundation web resource guide** at http://www.wslfweb.org/links.htm