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U.S. Nuclear Weapons Policies, Ballistic Missile Defense, and the Quest for Weapons in Space: Military Research and Development and the New Arms Race

As we enter a new century, it appears that we have learned little from the past. Having thus far escaped catastrophe despite a half century on the nuclear precipice, the United States not only is continuing the arms race of the last century, it is initiating a new arms race for the next.

The official image of the U.S. Department of Energy nuclear weapons complex is of an enterprise whose role is to sustain Cold War vintage warheads while the nation fulfills its thirty year old promise, embodied in Article VI of the Nuclear Non-Proliferation Treaty (NPT), *"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."*[1] At the NPT 2000 Review Conference, 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."*[2]

While the U.S. is making these declarations in a forum where it has made a binding commitment to "good faith" disarmament efforts, its nuclear weapons laboratories and production plants are modernizing thousands of nuclear weapons, providing many of them with upgraded military capabilities. At the same time, the U.S. weapons research and development establishment is working to develop new weapons which will operate through and from space, ranging from ground-based ballistic missile defenses for the near term to space-based weapons for the decades to come. And as the quest for a new generation of high technology weapons intensifies, the role of the nuclear weapons laboratories in their development grows, further entwining these Cold War institutions in the renewed military-industrial complex and dimming the prospects for the elimination of nuclear arsenals.

Nuclear Weapons: Still Here and Still Ready to Go

Most Americans have no idea that their government continues to brandish nuclear weapons as the ultimate "big stick." But every government knows that a nuclear threat implicitly backs up every U.S. or U.S.-led military action anywhere in the world. More than ten years after the end of the Cold War, land based nuclear missiles remain ready to launch within two minutes. U.S. Trident submarines continue to patrol the seas, ready to fire hundreds more warheads on fifteen minutes notice. Altogether there are about 2300 "strategic" nuclear warheads on hair-trigger alert.[3] In addition, approximately 150 U.S. "tactical" nuclear weapons are deployed in NATO countries. In fact, over the past decade the U.S. has threatened the use of nuclear weapons against Libya (April 1996), North Korea (July 1994) and Iraq (1991 and 1998).

A 1995 study, "Essentials of Post-Cold War Deterrence," by a committee of the U.S. Strategic Command, puts it bluntly: *"Although we are not likely to use them in less than matters of the greatest importance, or in less than extreme circumstances,* ***nuclear weapons always cast a shadow over any***

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crisis or conflict in which the U.S. is engaged. Thus, deterrence through the threat of use of nuclear weapons will continue to be our top military strategy.*"*[4]

Presidential Decision Directive-60 (PDD-60), the first review of U.S. nuclear weapons policy since the Nuclear Non-Proliferation Treaty was extended indefinitely in 1995, reaffirmed the U.S policies of threatened first use and threatened massive retaliation and recommitted the U.S. to nuclear weapons as the "cornerstone" of its national security for the foreseeable future. Signed by President Clinton in December 1997, PDD-60 also contemplates nuclear retaliation against the use of chemical or biological weapons, part of the so-called "counterproliferation" program.

The annual White House national security strategy report released on January 5 2000, describes "a *forward-looking* national security strategy for the new century." The report states that:

"*Nuclear weapons serve as a guarantee of our security commitments to allies and a disincentive to those who would contemplate developing or otherwise acquiring their own nuclear weapons... The United States will continue to maintain a robust triad of strategic nuclear forces... In addition, some U.S. non-strategic nuclear forces are maintained in a forward-deployed status in NATO as a visible reminder of our security commitment*."[5]

Defense Secretary William Cohen, in his February 2000 Report to the President and Congress, described an expansive role for nuclear weapons, *"to deter any potential adversary from using or threatening to use nuclear, chemical, or biological (NBC) weapons against the United States or its allies, and as a hedge against defeat of U.S. conventional forces in defense of vital interests."*[6]

The Stockpile Stewardship Program: Nuclear Weapons for the 21st Century

How will this nuclear policy be sustained, especially in the absence of underground nuclear tests? The White House National Security Strategy document provides the answer:

"We must also ensure the continued viability of the infrastructure that supports US nuclear forces and weapons. The Stockpile Stewardship Program will provide high confidence in the safety and reliability of our nuclear weapons under the Comprehensive Test Ban Treaty."

Through this massive program, euphemistically called "Stockpile Stewardship," new nuclear weapons facilities of unprecedented sophistication are being built, a new generation of nuclear scientists is being trained, and nuclear weapons design and production is going forward. In fact, the U.S. is planning to spend at least $4.5 billion a year over the next decade on nuclear weapons research, development, testing and production.

New Nuclear Missions, New Military Capabilities -- Just Don't Call Them New Nuclear Weapons

Stockpile Stewardship facilities can be used to do more than merely maintain existing nuclear warheads in working order. In his October 7, 1999 testimony to the Senate Armed Services Committee on ratification of the Comprehensive Test Ban Treaty, Sandia National Laboratory Director Paul Robinson stated that while the national laboratories *"cannot create completely new concepts without testing, many previously tested designs could be weaponized to provide new military capabilities.*

Over time, the question of whether the U.S. stockpile contains the appropriate warheads for the evolving threats is bound to become an issue. For example, if nuclear weapons emerge as the right answer to deter the use of other weapons of mass destruction in a regional conflict, the nuclear weapons we currently deploy may carry too high a yield and be far too disproportionate a response to be a credible deterrent. Proven designs of lower yield exist that might be adaptable for new military requirements in the future. I believe that such weapons could be deployed this way without the need for nuclear tests."[7]

One such modification, the B61-11 gravity bomb, already has been developed and deployed without underground testing. The B61-11 is an earth-penetrating bomb with a variable yield, which can be delivered by the B-2 stealth bomber. Using Stockpile

Stewardship capabilities, the U.S. weapons laboratories also are developing replacement warhead designs for submarine launched ballistic missiles carried on Trident submarines, although no deployment plans have been made public. Under the misleadingly-named Submarine Warhead Protection Program, two new warhead design options are being pursued for possible future use to replace the W76 (100 kiloton) and the W88 (475 kiloton). One, a "mature" pre-tested design, would use a recycled plutonium pit. The other would use an entirely new, untested design, to be certified without underground tests. Also in progress is an upgrade of the arming, fuzing components of the W76, the most numerous warhead in the U.S. arsenal. Under the pretense of replacing aging weapons parts to prevent potential age-related defects, this upgrade will give W76 warheads a near-ground-burst capability, making them more lethal against hardened targets, and upgrading them to potential "first strike" weapons. This could compensate for the loss of land-based ICBM hard-target killers, slated to be removed from the arsenal under START II.[8]

Under the Stockpile Stewardship program, modifications or upgrades -- including in some instances enhanced military capabilities -- are planned for every weapon type in the U.S. arsenal.[9] In a recent interview, Undersecretary of Energy Ernest Moniz declared: *"Our tools under stockpile stewardship are working so well today that we are not only able to certify safety and reliability... but we are also able to meet new military requirements."*[10]

"Ideas for new weapons systems derive in the first place, not from the military, but from different groups of scientists who are concerned to replace or improve old weapons systems....At base, the momentum of the arms race is undoubtedly fueled by the technicians in government laboratories and in industries which procure armaments."
Lord Solly Zuckerman, former Chief Scientific Advisor to the British Government and the Secretary of State for Defense.

The Nuclear Weapons Laboratories, Missile Defense, and the Weaponization of Space

The National Missile Defense (NMD) proposal to deploy missiles intended to counter missile warheads aimed at the continental United States has received a great deal of attention in recent months, particularly because of its potential to erode the existing Cold War arms control regime. But the initial phase of NMD is only a small part of a far broader set of initiatives for weapons and other military systems which would operate through and from space, systems which would to a large extent share a common technology base and infrastructure. The U.S. is expanding funding for development of a wide range of space-based weapons, surveillance, and communications systems:

" ...[I]n preparation for the transition to an Aerospace Force, the Air Force S&T [science and technology] *community has more than doubled its S&T investment in "space-only" technologies from about 13% in FY 1999 to 32% a year by FY 2005. This increase in investments is primarily focused in five areas: space-based radar, space-based lasers, reusable launch vehicles like the space operations vehicle, satellite survivability, adaptive optics, and hyperspectral Imaging..."*[11]

The Department of Energy (DOE) nuclear weapons laboratories have done ballistic missile defense (BMD) work for decades, and their involvement continues today. Lawrence Livermore National Laboratory (LLNL) in California was the birthplace in the early 1980's of Ronald Reagan's Strategic Defense Initiative (aka "Star Wars"), and the DOE laboratories continue to work on BMD for the Ballistic Missile Defense Organization under a Memorandum of Understanding between DOE and the Department of Defense (DOD).[12]

Sandia National Laboratory, responsible for engineering non-nuclear components for nuclear warheads at its facilities in Albuquerque, New Mexico and Livermore, California, does extensive work for the Ballistic Missile Defense Organization:

"Sandia provides technology in the areas of countermeasures, space technology, pulsed power, threat definition, smart targets, rocket launch services,

reentry vehicle technology, missiles, smart mines, sensors, testing, instrumentation, control technology, radiation hardening, microwaves, and computing. Some support is based on our experience in nuclear weapons design and on the DOE's Inertial Confinement Fusion Program. Sandia also provides technology in the areas of radiation-hardened satellite communications transceivers; flight tests; analysis of strategic defense systems; and development, analysis, and testing of potential countermeasures."[13]

Similarly, the current LLNL Institutional Plan states that *"We analyze the capability of various interceptor systems to defend against and negate the effects of ballistic-missile-delivered WMD."*[14]

Lasers and Pulsed Power: From Nuclear Weapons Research to Directed Energy Weapons

In addition, some of the facilities which the U.S. government claims it needs to maintain its nuclear arsenal can be used for a wide range of other weapons research. The National Ignition Facility (NIF), currently under construction at the Lawrence Livermore National Laboratory in California, is promoted by the Department of Energy as the centerpiece of the Stockpile Stewardship program. It is a laser driven, inertial confinement fusion machine the size of a football stadium, designed to create for the first time, "nuclear fusion ignition"-- very brief, contained thermonuclear explosions. The NIF, which will be forty times larger than any laser in the world today, is likely to have little direct role in maintaining already existing nuclear warheads.[15] It is slated to be used for a wide range of other nuclear weapons applications, from training weapons designers in nuclear weapons science to nuclear weapons effects testing. The NIF, in combination with other Stockpile Stewardship facilities could play a role in the development, over the long term, of pure fusion weapons not requiring plutonium or uranium.

In addition, the NIF may, for example, prove useful in research on low-yield nuclear interceptors for use against ballistic missiles capable of carrying biological or chemical agents, as well as nuclear warheads. According to one LLNL document,

"The U.S. and its allies face a growing threat of ballistic missiles capable of carrying biological/chemical agents or contact/salvage-fuzed nuclear warheads. The limited effectiveness of the interceptors being developed by the U.S. against this threat, using fragments or hit-to-kill vehicles, can be expected to generate increased interest in evaluating the lethality of a low-yield nuclear interceptor option against this threat. NIF provides large fluences of both fusion and fission neutrons with the very short pulse widths characteristic of low-yield nuclear intercepts, that can be used to establish lethal criteria for chemical/biological agents and nuclear warhead targets."[16]

Research conducted at the DOE nuclear weapons laboratories also is relevant to a number of the space weapons concepts currently being explored by the U.S. military. Laser research, for example, has been a major focus at the Livermore and Los Alamos National Laboratories for decades, including use in simulation of nuclear weapons phenomena, efforts to design directed energy weapons as part of the Reagan-era Star Wars program, and use in various weapons fabrication processes. A recent Defense Department study urged more systematic integration of DOE laser research programs into DOD laser weapons efforts, which include the development of a Space Based Laser that could be used for both missile defense and to attack targets on the ground,[17] stating that

"The DoD should leverage HEL [high energy laser] relevant research being supported by the DOE and other government agencies, and also by commercial industry and academia. DOE is funding related HEL technologies such as Solid State Lasers [SSL] *and new beam diagnostics. The development of such technologies has potentially large payoffs if leveraged properly to DoD weapons applications. Conversely, DoD developments in HEL technologies may have significant potential for DOE missions, and DOE should take advantage of those developments. Also, advances in SSL, simultaneously being pursued by both DoD and DOE, could be coordinated more effectively. The DOE National Laboratories have opened the door to new lethality mechanisms that offer options for defeating targets with lower power lasers than previously thought. This should provide a rich set of opportunities for DoD-DOE collaboration."*[18]

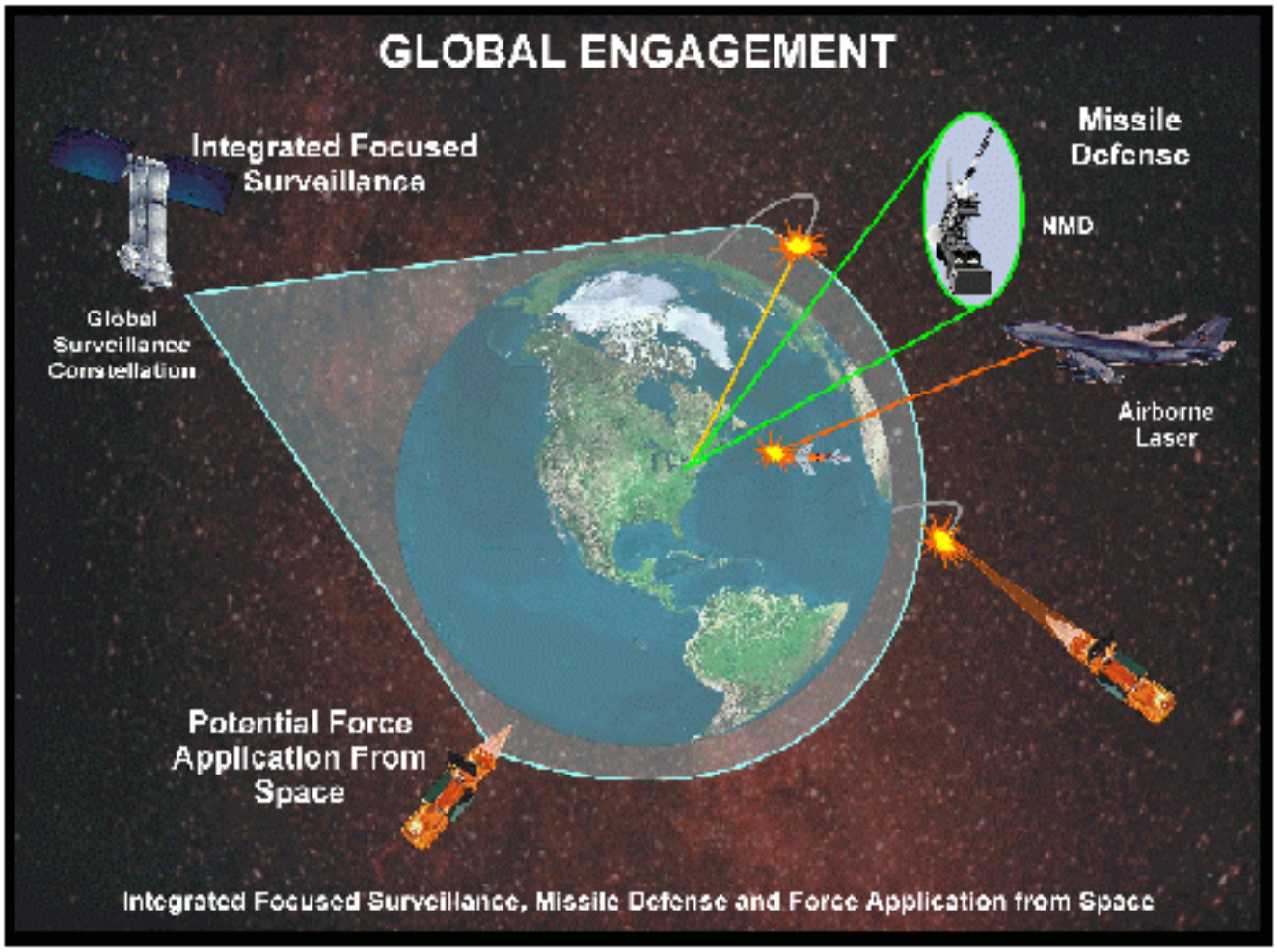

Figure 6-1 Operational Concept for Global Engagement

"USCINCSPACE's vision seeks to revolutionize surface and air surveillance, missile defense, and Force Application from the ultimate "high ground." Its abilities will be even more dramatic than that of military aircraft decades ago." Figure and text from U.S. Space Command, Long Range Plan: Implementing USSPACECOM Vision for 2020 (1998), pp.49-50.

Air Force research and development funding documents describe the development of *"low cost, scalable, high power solid state laser architectures"* as needed for *"next generation weapons applications such as space-based lasers and airborne lasers."*[19] New Mexico Senator Pete Domenici, chair of the Senate Budget Committee and long a powerful advocate of the DOD and DOE weapons laboratories, introduced legislation in May 2000 to coordinate military directed energy research and to increase funding for the 2001 fiscal year for directed energy programs, including *"cooperative programs or activities with other Federal agencies, institutions of higher education, and the private sector, including the national laboratories of the Department of Energy, for the purpose of enhancing the programs, projects, and activities of the Department of Defense relating to directed energy technologies, systems, and weapons."*[20]

High Power Microwaves: New Recipes for Cooking Electronics

The Air Force FY97 Directed Energy Technology Area Plan (DETAP) outlines other directed energy weapons initiatives underway at the DOD and DOE laboratories. It notes for example that *"High Power Microwaves (HPM) represent a major potential*

advance in Electronic Warfare technology by extending conventional RF [radio frequency] power output several orders of magnitude. This enables the damage and disruption of a much broader range of targets and simplifies the threat-specific nature of systems." Military applications of radio frequency and other directed energy weapons envisioned by the Air Force range from "Agent Defeat" weapons for use against chemical and biological weapons to "Suppression of Enemy Air Defenses" to "Counterspace Negation."[21]

Regarding "Counterspace Negation," the Air Force 1998 *Long Range Plan* states that

Today, we have conventional abilities that produce mostly permanent effects against satellite ground stations. In the future, we need land, sea, air and space-based systems. These flexible, negation systems must strike precisely to produce reversible and permanent effects against all nodes of a potential adversary's space systems....

Laser and radio frequency technologies offer promise to provide improved permanent effects without fratricide to friendly and neutral systems....

High-Power Microwaves may be able to disrupt, degrade, and destroy electronics in communication and information systems. They would use bandwidths at high peak power to damage electronic information processing and communications or bandwidths at high average power to disrupt them.[22]

This work is continuing, with Air Force budget documents showing research on *"high power microwave (HPM) and other unconventional weapons concepts" to "support a wide range of Air Force missions such as suppression of enemy air defenses, command and control warfare, and vehicle self protection...."* These efforts include *"assessment of the vulnerability of U.S., NATO, and foreign satellites to the effects of directed energy weapons, primarily high energy lasers and high power microwaves."*[23]

The DOE laboratories collaborate with DOD in these areas as well:

DOE laboratory representatives participate in TPDEW [Technology Sub-Panel for Directed EnergyWeapons *meetings to improve coordination and identify areas for cooperation. For example, cooperative or collaborative work exists with DOE laboratories on pulse power, compact HPM source development, RF* [radio frequency] *effects tests, power beaming technology investigations, specialized security sensor development, RF coupling code development, and mid-IR* [infrared] *semiconductor laser diode development.*[24]

Laser and high power microwave research has a broad range of military applications. But as the Air Force *FY98 Space and Missiles Technology Area Plan* makes clear, these activities are part of a broad campaign by the military to move towards the weaponization of space, despite the fact that there is no national consensus to begin such a new round of dangerous and destabilizing arms racing:

"The Space Force Projection Enterprise provides focus and direction to technology investments that address the application of force from and through space to points in space, in the air and on the ground. The scope of this Enterprise is wide and includes leading technology initiatives in areas such as the Military Space Plane, Space Based Lasers and ballistic missile systems. Though current treaty implications limit the actual fielding of weapons in space, low end capabilities providing entry levels of graduated deterrence are needed now. ***The technology base required to meet future space weapon needs must be developed and matured today if it is to be available for future warfighter needs."***[25]

The immense, multi-faceted U.S. nuclear weapons laboratories are closely interconnected with a variety of military research programs increasingly dependent on high technology and high performance computing, including missile defense and space-based weapons. The use for a broad range of weapons research of particular facilities whose core mission purportedly is to maintain the "safety and reliability" of the nuclear arsenal is likely to complicate the path to nuclear disarmament in several ways. The perceived value for other military initiatives of facilities with extensive nuclear weapons research capabilities will add a further element to transparency problems, as there will be incentives to maintain a high level of secrecy at particular facilities and for larger numbers of particular programs and experiments. And even where

"Figure ES-1 visually depicts some of the key capabilities we will provide by the end of the 25-year planning period. Our future AFSPC capabilities will enable a fully integrated Aerospace Force to rapidly engage military forces worldwide. Our space forces will move beyond being primarily force multipliers to also being direct force providers. Global real-time, situational awareness will be provided to our combatant commanders through space-based Navigation, Satellite Communications (SATCOM), Environmental Monitoring (EM), Surveillance and Threat Warning (S&TW), Command and Control (C2), and Information Operations (IO) systems. Robust and responsive spacelift and improved satellite operations capabilities will provide on-demand space transportation and on-demand space asset operations ensuring our ability to access and operate in space. Full spectrum dominance in the space medium will be achieved through total space situational awareness, protection of friendly space assets, prevention of unauthorized use of those assets, negation of adversarial use of space and a fully-capable National Missile Defense (NMD). Our ICBMs will continue to provide a credible strategic deterrence, while advanced, conventional weapons operating in or through space will provide our National Command Authorities (NCA) with formidable and flexible options for prompt, global, conventional strike." **Air Force Space Command, *Strategic Master Plan FY02 and Beyond,* February 9, 2000, Executive Summary**.

Figure ES-1: Future AFSPC capabilities will enable a globally integrated Aerospace Force capable of providing continuous deterrence and prompt engagement.

Glossary

AFSPC: Air Force Space Command CAV: Common Aero Vehicle [maneuverable re-entry vehicle capable of deploying a variety of munitions] ELV: Expendable Launch Vehicle EO: Electro-Optical ICBM: Inter-Continental Ballistic Missile IR: Infrared NBC: Nuclear, Biological, Chemical WX: Weather

a facility or program has potentially provocative nuclear weapons research and design capabilities or presents verification problems sufficient to compel its closure if nuclear arms control were the sole policy concern, its potential for other military applications may tip the balance, providing a rationale -- and a constituency -- for its continuation.

The U.S. View: Ballistic Missile Defense Means Nuclear Weapons Forever

It is apparent that the United States has no plans to reduce the essential character or significance of its nuclear arsenal. 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

Treaty on the Non-proliferation of Nuclear Weapons, Signed at Washington, London, and Moscow July 1, 1968, Entered into force March 5, 1970.

Article VI
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 a strict and effective international control.

"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."* [26]

The determined pursuit of ballistic missile defenses by the dominant factions within U.S. policy elites, then, is occurring with full cognizance that ballistic missile defenses will make meaningful progress towards the *elimination* of nuclear arsenals (as opposed to the rationalization of arsenals driven to immense heights by the excesses of Cold War ideology) impossible.

The End of Arms Control?

The role of the nuclear weapons laboratories in missile defense and other high technology weapons development may make progress towards nuclear disarmament more difficult for a variety of reasons. Continued modernization of U.S. nuclear forces, in combination with missile defenses and new "conventional" high-tech weapons which may be able to destroy hardened targets like missile silos and command centers, are likely to make Russia and China more reluctant to agree to significant reductions in nuclear arsenals. And it is important to recognize that enormous, high-technology weapons programs like ballistic missile defense and research on space-based weapons, with their long lead times and their potential for unforseen weapons innovations, don't have to be successful in the immediate sense to be destabilizing.

At the same time that U.S. ballistic missile defense programs contribute to the deadlock in arms reduction efforts by eroding even the modest stability afforded by the ABM Treaty, the continuation by the U.S. of intensive research on nuclear weapons technologies weakens other crucial elements of the current nuclear arms control regime, the Nuclear Non-proliferation Treaty (NPT) and the still unratified Comprehensive Test Ban Treaty (CTBT).

"Stockpile Stewardship" undermines the CTBT's stated goal of *"constraining the development and qualitative improvement of nuclear weapons and ending the development of advanced new types of nuclear weapons."* With its explicit aim of maintaining a large nuclear arsenal indefinitely, along with the ability to reconstitute an even larger arsenal in the future, Stockpile Stewardship contravenes the NPT Article VI obligation, reinforced in July 1996 by the International Court of Justice, which unanimously held 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."*

Moreover, new nuclear weapons designs, modifications and improvements, ten years after the

end of the Cold War and three decades after the NPT entered into force, are inconsistent with the Article VI provision requiring good faith negotiations for the *"cessation of the nuclear arms race at an early date...."* In fact, the close interconnections between research, design and testing of thermonuclear weapons and other forms of advanced weapons research, as described above, could ignite entirely new arms races.

The new Russian national security doctrine, released in January 2000, recognizes this possibility, and places it -- correctly -- in context:

"*The transition of NATO to the use of force (military force) beyond the zone of its responsibility and without the sanction of the UN Security Council, which has been elevated to the level of a strategic doctrine, is fraught with the destabilization of the strategic situation in the world.*

The growing technological surge of some leading powers and their growing possibilities to create new-generation weapons and military hardware are creating prerequisites for a qualitatively new stage in the arms race and a dramatic change in the forms and methods of waging hostilities."[27]

The main thrusts of U.S. strategic weapons policy-- continued refinement of nuclear arsenals, the pursuit of ballistic missile defenses and the development of increasingly accurate, stealthy, and long-range conventional armaments, with greater ability to destroy hard targets like missile silos and command and control facilities, are making the nuclear "balance of terror" increasingly unstable. Together with the push towards weapons in space, with the military envisioning near-term transition technologies such as maneuverable intercontinental ballistic missile re-entry vehicles with highly accurate conventional payloads, these policies threaten to destroy what remains of the Cold War arms control framework altogether, leaving nothing in its place but the raw pursuit of power.

U.S. Arms Policy and the Pursuit of Global Domination

Neither fine-tuning of arms control machinations nor critique of individual arms programs as overly expensive or technically unworkable will be enough to counter the growing momentum of the new U.S.--led arms race. Instead, it will be necessary to ask the purposes for which this overwhelming military force is being sought. For U.S. Space Command, the answer is clear:

"Historically, military forces have evolved to protect national interests and investments -- both military and economic. During the rise of sea commerce, nations built navies to protect and enhance their commercial interests....Likewise, space forces will emerge to protect military and commercial national interests and investment in the space medium due to their increasing importance....

....Although unlikely to be challenged by a global peer competitor, the United States will continue to be challenged regionally. The globalization of the world economy will also continue, with a widening between "haves" and "have-nots." [28]

The main concern of U.S. military technology planners is that some of these "have not" nations may place chemical, biological, or nuclear weapons on missiles, which could cause substantial casualties to U.S. expeditionary forces protecting "national interests and investments" around the world.[29] Space Command's response to this is ballistic missile defense and the weaponization of space:

"Development of ballistic missile defenses using space systems and planning for precision strike from space offers a counter to the worldwide proliferation of WMD [Weapons of mass destruction]. *"*[30]

The nuclear weapons establishment has a similar solution for the challenges of the 21st century: more nuclear weapons, and this time around ones we can really use.

Paul Robinson, the Director of Sandia National Labs, argued that new designs are needed precisely to make nuclear weapons use easier to contemplate: *"Although I believe all of us would wish that the US will never need new nuclear weapons designs; based on the past, this is quite unlikely. The US will undoubtedly require a new nuclear weapons, either for a different delivery mode or vehicle or, quite likely, because it is realized that the yields of the weapons*

left over from the Cold War are too high for addressing the deterrence requirements of a multipolar, widely proliferated world. Without rectifying that situation, we would end up being self-deterred."[31]

If the nuclear weapons and space power advocates are successful, the beginning of the 21st century will be remembered as the beginning of a new arms race, both on earth and in space– if there is anyone left to remember. It is up to all of us to decide whether we want our vision for the future to be the endless quest for military domination, or the use of our position as the wealthiest society in history to begin the search for global economic equity and for a way of life which can sustain both humanity and the natural world.

Notes

1. Treaty on the Non-proliferation of Nuclear Weapons, Article VI, Signed at Washington, London, and Moscow July 1, 1968, Entered into force March 5, 1970. Quotations in text throughout in italics, emphasis added in bold.

2. U.S. Department of State, *The United States of America Meeting its Commitment to Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons,* April 2000, p.5.

3. See Bruce G. Blair, "Trapped in the Nuclear Math," *The New York Times,* Op Ed page, June 12, 2000.

4. U.S. Strategic Command, Policy Committee, *Essentials of Post-Cold War Deterrence,* 1995, obtained under the Freedom of Information Act by Hans M. Kristensen..

5. *A National Security Strategy for a New Century*, The White House, December 1999, The White House Office of the Press Secretary, January 5, 2000.

6. William S. Cohen, U.S. Secretary of Defense, *Annual Report to the President and Congress 2000*, Chapter 2, "The Military Requirements of the Defense Strategy."

7. Statement of C. Paul Robinson to the U.S. Senate Armed Services Committee, October 7, 1999.

8. Greg Mello, "That Old Designing Fever," *The Bulletin of the Atomic Scientists*, January/February 2000.

9. U.S. Department of Energy Office of Defense Programs, *Stockpile Stewardship and Management Plan,* February 1996, and *Stockpile Stewardship and Management Plan: First Annual Update,* October 1997. See also, Andrew Lichterman and Jacqueline Cabasso, *Faustian Bargain 2000: Why 'Stockpile Stewardship is Fundamentally Incompatible with the Process of Nuclear Disarmament,* Western States Legal Foundation, May 2000.

10. Quoted in James A. Kitfield, "The Decline of the Nuclear Stockpile," *Air Force Magazine*, February 2000 Vol. 83, No. 2.

11. Statement of Mr. Keith R. Hall, Assistant Secretary of the Air Force (Space) and Director, National Reconnaissance Office before the U.S. Senate Committee on Armed Services Subcommittee on Strategic Forces, March 8, 2000.

12. See National Defense Authorization Act for Fiscal Year 1998, Public Law 105-85, Sec. 3131. Subsection C provides that DOE laboratory activities under the Memorandum of Understanding (MOU) " may include the identification of technical modifications and test techniques, the analysis of physics problems, the consolidation of range and test activities, and the analysis and simulation of theater missile defense

deployment problems."

Legislation pending as of July 2000 proposes a revised MOU between the Ballistic Missile Defense Organization and the new National Nuclear Security Administration, which now administers DOE's nuclear weapons programs. The new MOU would provide for "mechanisms that increase the cooperative relationship between those organizations." It would also allow "jointly funded projects" which "contribute to sustaining--(A) the expertise necessary for the viability of such laboratories; and (B) the capabilities required to sustain the nuclear stockpile," which would further intertwine nuclear weapons maintenance and development with other high technology weapons initiatives. See Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001, H. R. 4205, Sec. 3132, "Enhanced Cooperation Between National Nuclear Security Administration and Ballistic Missile Defense Organization."

13. U.S. Department of Energy, Sandia National Laboratory, *FY2000 – 2005 Institutional Plan*, pp.114-115.

14. U.S. Department of Energy, Lawrence Livermore National Laboratory, *Institutional Plan FY 2000–2004* p.33.

15. The argument that extensive nuclear weapons physics ICF experiments are needed to "exercise" the skills of weapons scientists is less relevant to maintaining existing weapons than to retaining the capability to develop new ones. Richard Garwin, an advocate of the "Stockpile Stewardship" program, notes that

> "...[O]nly a portion of the very expensive and controversial National Ignition Facility (NIF), for example, is coupled directly to the stockpile stewardship task, and much of that portion has more to do with maintaining expertise and developing capabilities that would be useful in case the CTB regime collapsed than with maintaining the enduring stockpile of the nine existing weapon designs safely and reliably for the indefinite future." Richard L. Garwin, "The Future of Nuclear Weapons Without Nuclear Testing," Arms Control Today November/December 1997 Volume 27, Number 8.

16. Lawrence Livermore National Laboratory, *Nuclear Weapon Effects Test Facilitization of the National Ignition Facility*, August 8, 1995, de-classified version, CD-95-0055.

17. The Space Based Laser program, funded by the Air Force and the Ballistic Missile Defense Organization (BMDO), aims at designing laser platforms with global reach to provide "a global boost phase intercept option for both national and theatre missile defense" as well as "many ancillary capabilities, including air defense, global surveillance, and target detection and designation for other systems." BMDO RDT&E Budget Item Justification, *Advanced Technology Development, Space Based Laser*, PE 0603174 (February 2000). See also U.S. Air Force RDT&E Budget Item Justification, *Advanced Technology Development, Space Based Laser*, PE 0603876F, February 2000.

18. U.S. Department of Defense, *Report of the High Energy Laser Executive Review Panel: Department of Defense Laser Master Plan,* March 24, 2000 p.10.

19. U.S. Air Force RDT&E Budget Item Justification, *Advanced Technology Development, Advanced Weapons Technology,* PE 0603605F, February 2000.

20. 106th Congress 2d Session, s.2573, "Directed Energy Coordination and Consolidation Act of 2000," Sec. 2(d)(2)(f)

21. U.S. Air Force Materiel Command, Directorate of Science and Technology, *FY97 Directed Energy Technology Area Plan*, pp ii, 18, 21.

22. U.S. Space Command, *Long Range Plan: Implementing USSPACECOM Vision for 2020*, p. 46

23. U.S. Air Force RDT&E Budget Item Justification, *Applied Research, Directed Energy Technology,* PE 0602605F, February 2000.

24. U.S. Air Force Materiel Command, Air Force Research Lab, Wright Patterson Air Force Base, *FY98 Directed Energy Technology Area Plan,* p.4.

25. U.S. Air Force Materiel Command, Directorate of Science and Technology, *FY98 Space and Missiles Technology Area Plan,* p.ii. (Emphasis added).

26. "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 "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.* These documents were obtained originally and provided to the *Times* by the *Bulletin of Atomic Scientists,* and can be found in full on their web site at http://www.bullatomsci.org/issues/2000/mj00/mj00schwartz.html

27. *National Security Concept of the Russian Federation,* full English translation from Rossiiskaya Gazeta, January 18, 2000, Approved by Presidential Decree No. 1300 of 17 December 1999 (given in the wording of Presidential Decree No. 24 of 10 January 2000, emphasis added) .

28. U.S. Space Command, *Vision for 2020* (unpaginated, 1997)

29. The threat to the territory of the United States posed by weapons of mass destruction in the hands of alleged "rogue states" (now re-named in official parlance "states of concern," in a creatively Orwellian synthesis of euphemism and demonization) is at best controversial (see, most Recently, Elaine Sciolino and Steven Lee Myers, "U.S. Study Reopens Division Over Nuclear Missile Threat," *The New York Times* (Web edition), July 5, 2000).

30. U.S. Space Command, *Vision for 2020* (unpaginated, 1997)

31. "Maintaining a Viable Nuclear Weapons Program in a Test Ban Environment: A Strong Technical Foundation in the Laboratories," C. Paul Robinson, President and Laboratories Director, Sandia National Laboratories (presented at the Nuclear Security Decisionmakers Forum, March 28, 2000, Albuquerque, NM.)

The quote from Lord Solly Zuckerman in the box on page 3 is from Zuckerman, *Nuclear Illusion and Reality* (London: 1982), quoted in Marek Thee, "Military Technology– A Driving Force Behind the Arms Race and an Impediment to Arms Control and Disarmament," in H.G. Brauch, ed., *Military Technology, Armaments Dynamics and Disarmament: ABC Weapons, Military Use of Nuclear Energy and of Outer Space and Implications for International Law* (New York: 1989), p.39, at 46.

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