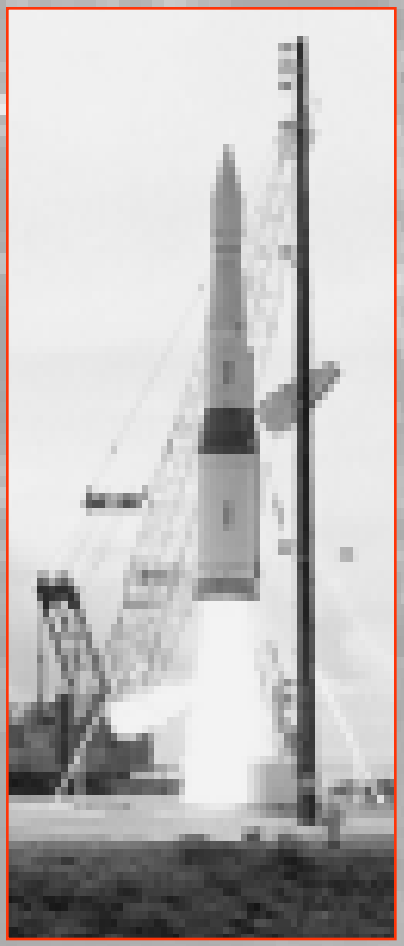
COALITION TO REDUCE NUCLEAR DANGERS
COUNCIL FOR A LIVABLE WORLD EDUCATION FUND

Pushing the Limits

The Decision on National Missile Defense

by Stephen W. Young

Foreword by Senator Joseph R. Biden, Jr.



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July 2000 SECOND PRINTING

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ACKNOWLEDGMENTS

The author gratefully acknowledges the work, assistance, and advice of the following people: Lisbeth Gronlund, on whose writing "The Readiness of the Technology" is based; Jonathan Dean, who wrote the origins of "The Effect on Arms Control;" Lisbeth Gronlund, George Lewis, Ted Postol, and David Wright, who grounded the information in the sidebar on "Countermeasures to the Proposed National Missile Defense;" and Bruce Blair, who wrote the box "Comments on U.S. 'Talking Points' on the ABM Treaty." Thanks to Joseph Cirincione, Tom Collina, Jonathan Dean, Vera Kistiakowsky, Ed Levine, Jack Mendelsohn, George Rathjens, and Kosta Tsipis for reading an entire draft, and to John Rhinelander, George Lewis, and Lynn Erskine for reading particular sections. Thanks to Stan Norris, Liesl Heeter, and Stephen Schwartz for assistance on numbers of various kinds. Particular thanks to Daryl Kimball and John Isaacs, who read repeated drafts, and to Jenny Smith and Daniel Siebers, who assisted in pulling materials together. Finally, special thanks to Sally James of Cutting Edge Graphics for copy editing, layout, and design, and to Daryl and Sally for their encouragement. The author takes full responsibility for the content. Not every member of the Coalition necessarily agrees with every statement in the report.

The Coalition to Reduce Nuclear Dangers gratefully acknowledges the support of the Colombe Foundation, the W. Alton Jones Foundation, the Stewart Mott Charitable Trust, and the Ploughshares Fund.

The Council for a Livable World Education Fund gratefully acknowledges the HKH Foundation, the W. Alton Jones Foundation, the MacArthur Foundation, the John Merck Foundation, the Stewart Mott Charitable Trust, the Ploughshares Fund, and the Town Creek Foundation for their support of the Education Fund's work on weapons of mass destruction.

SOURCES

Throughout this report, unless otherwise noted, information on nuclear arsenal size is based on information from the Natural Resources Defense Council, and information on the historical costs of national missile defense based on *Atomic Audit*, edited by Stephen Schwartz, Brookings Institution Press, 1998, and updated by Liesl Heeter of the Center for Strategic and Budgetary Assessments. All monetary figures are constant 2000 dollars.

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COVER PHOTOGRAPHS

Upper left: With U.S. assistance, a Soviet-era SS-19 missile silo is destroyed as required under the terms of START I. Under the U.S.-funded Cooperative Threat Reduction program, hundreds of missile silos have been destroyed in Russia, Kazakhstan, and Ukraine. (Defense Threat Reduction Agency photograph)

Bottom left: On June 1, 1988, Presidents Reagan and Gorbachev sign the Intermediate-range Nuclear Forces (INF) Treaty, leading to the destruction of all U.S. and Russian missiles with ranges between 500 and 5,000 kilometers. (Photograph by Bill Fitz-patrick, The White House)

Right: In the second test of the proposed national missile defense system, the interceptor lifts off from the Kwajalein Missile Range in the Pacific. Attempting to hit a target warhead launched from California, the test fails when sensors on the kill vehicle malfunction. (DoD photograph)

Background: The Safeguard ballistic missile defense system, designed to protect missile silos in North Dakota, began operating on October 1, 1975, and was shut down on January 27, 1976. At a total cost of $23.1 billion in today's dollars, it cost $194 million per day it operated. (U.S. Army photgraph CC100859)

Foreword

by Senator Joseph R. Biden, Jr.

The issue of whether, when, or how to deploy a national ballistic missile defense is at once strategic, technical and political. The debate on this issue—which has gone on for more than a generation—taps into our philosophical and psychological predilections, as well. The consequences of decisions made in the coming year could affect our and our children's lives for decades to come. Thus, there is no more important international issue than the one addressed in this briefing book.

We Americans are an optimistic, problem-solving people. For over two centuries, we have used modern technology to improve our lives and our security—from canals and steam engines to transcontinental railroads, electric lights, air travel, antibiotics, the Internet, nuclear weapons and ballistic missiles. We are most comfortable when we are pressing forward.

Sometimes we press too far, however, or too soon. There is a long history of missile defense systems that have simply failed or have not provided the security we sought.

Similarly, when we led the world in deploying land-based ballistic missiles with multiple reentry vehicles, we set off a costly arms race that we later concluded was a threat to crisis stability. A generation later, we are still trying to correct that mistake by bringing into force the START II treaty that bans those missiles. Ironically, if we should press ahead imprudently with a ballistic missile defense, the START process may be one of the first casualties.

The issues surrounding ballistic missile defense are complex. This briefing book is a serious effort to unravel that complexity at a crucial moment, as the Administration approaches its proclaimed deadline for deciding whether to proceed with deployment of a limited missile defense system. The issue of whether the Administration's criteria for deployment have truly been met must be decided on its merits, not on the basis of political advantage. To that end, I commend this book to every serious student of these issues and to all those who seek to influence this important debate.

Executive Summary

President Clinton is scheduled to decide this year whether to endorse deployment of a national missile defense that, in its first phase, is designed to detect, intercept and destroy a small number of missiles fired at the United States. The President has said that his decision will be based on four criteria: the readiness of the technology, the impact of deployment on arms control and relations with Russia, the cost of the system, and the threat. On each of these counts, the case for deciding to deploy is weak at best. A move toward deployment of the proposed "limited" national missile defense would diminish overall U.S. and international security, increasing rather than reducing nuclear dangers.

The Readiness of the Technology

Even advocates of missile defense admit it is one of the most complicated technical challenges ever attempted. A global system of satellites, radars, communications relays, booster rockets and interceptors all must work with each other almost perfectly for the defense to have a chance of success. However, at most three of 19 scheduled intercept tests will have been conducted by the time President Clinton is scheduled to make his decision. The first limited test hit its target, though questions remain as to whether it was truly successful; the next, more complicated test failed. With so few tests planned before the deployment decision, there will be insufficient information to determine whether the system is reliable and effective.

The Impact on Arms Control

U.S. deployment of a national missile defense could severely damage international security by ending the chance for verifiable reductions in the Russian nuclear arsenal. The proposed U.S. system would violate the 1972 Anti-Ballistic Missile (ABM) Treaty, which forbids nationwide missile defense. U.S. officials are seeking Russian agreement to modify the Treaty to allow "limited" national defenses. Recently leaked negotiating documents indicate the U.S. is essentially encouraging Russia to maintain a large nuclear arsenal at high levels of alert, to ensure Russia could overwhelm U.S. defenses. To date, despite these "assurances," Russia has opposed modifying the ABM Treaty. If the U.S. decides instead to abrogate or withdraw from the ABM Treaty, Russia has threatened to withdraw from the entire arms control process, conventional and nuclear. China believes that U.S. missile defense plans seek to undercut the Chinese deterrent. In response, China would likely step up plans to expand and improve its limited long-range nuclear arsenal.

The Threat

For forty years, the United States has lived with the threat of attack by missiles armed with chemical, biological or nuclear weapons. Russia's arsenal of thousands of nuclear warheads on long-range missiles could still destroy the United States in under an hour. However, missile defense advocates do not claim the defenses they propose could deal with a large Russian attack. They cite instead new threats to justify a first phase of missile defense: from North Korea, which recently froze its meager

ballistic missile testing program; Iran, although experts are divided on whether its nascent missile efforts will be able to threaten the U.S. within 10 years; and Iraq, which is currently under international sanctions that sharply hinder its ability to develop new missiles. If the U.S. deploys a missile defense in an attempt to counter a handful of missiles North Korea might build, it could exacerbate tensions with heavily-armed Russia and instigate a vigorous Chinese build-up. Even further, it is unclear why these countries would commit an almost certainly suicidal attack on the United States.

The Cost

The United States has spent more than $120 billion on theater and national missile defense, without fielding a single effective system. In February 2000, the Clinton Administration allocated $12.7 billion for national missile defense in its five year budget, $2.2 billion more than the previous year. Most estimates suggest the first stage of the Clinton proposal, designed to intercept at most two dozen warheads, would cost dramatically more. In May 2000, the Congressional Budget Office estimated that, through 2015, it would cost $60 billion to build and maintain the Clinton Administration's proposed two-site, 250-interceptor system, including a new satellite program. Many national missile defense supporters call for even larger and far more expensive programs that could cost $120 billion or more.

Alternatives: The First Lines of Defense

Since the development of long-range missiles, the United States has successfully depended on a broad and effective set of overlapping policies and programs to prevent missile attack. Intercepting missiles after launch has always been the most futile of these defenses, and that remains true today.

The primary defense against missile attack has always been deterrence—the threat of military retaliation. Because it is impossible to hide the point of origin of a missile launch, any attacker would be subject to an immediate counterstrike.

Hand in hand with the stick of deterrence goes the carrot of diplomacy. North Korea, the state most often cited as a threat, recently agreed to halt its flight test program while negotiating with the United States. The START nuclear arms reduction process is reducing the threat to the United States by sharply cutting the number of Russian nuclear-armed missiles. U.S. aid and expertise is helping Russia downsize its nuclear arsenal and control its massive stocks of the fissile material used for nuclear weapons.

Another line of defense is denial. The nuclear Non-Proliferation Treaty (NPT), the Chemical Weapons Convention (CWC) and the Biological and Toxin Weapons Convention (BWC) limit the proliferation of the weapons of mass destruction that might be delivered by these missile systems. The Australia Group and the Nuclear Suppliers Group are informal arrangements of industrial countries that seek to prevent, respectively, the spread of chemical and biological weapons material and technology, and nuclear weapons technology and material. The Missile Technology Control Regime (MTCR) helps slow the spread of missile technology and equipment. More can and should be done to strengthen these efforts, especially to control missile proliferation.

A small number of countries seek to evade these agreements. North Korea, Iran and Iraq could develop a limited capability to attack the United States within 15 years, using inaccurate missiles with small payloads. Rather than an unproven missile defense, the combination of strong and active diplomacy, a capable deterrent and continued denial strategies is far more effective response to this potential threat. In the end, the most powerful defense is to reduce the demand for missiles and missile technology by resolving the regional and international tensions that drive it.

Security as a Whole

The missile threat is just one of many dangers this country faces, from terrorist bombings to a renewal of Cold War-era tensions. Although the latent threat from Russia is orders of magnitude greater than the potential threat from North Korea, neither should be considered in isolation. Instead, the United States should seek policies and defenses that best address the full range of threats. By pursuing missile defenses, the United States risks creating new threats, while ignoring more pressing and realistic dangers. It is impossible to eliminate all threats; the goal is to minimize the greatest risks without exacerbating others. At present, national missile defense cannot meet this criterion.

Introduction

Since the first V2 rockets rained down on London during World War II, countries have sought, in fits and spurts, a defense against missile attack. Each time, defensive technology has proved no match for offensive missiles. This has not stopped countries, particularly the United States, from pursuing ballistic missile defenses. Today, the missile threat has changed dramatically from its Cold War peak, while potential new threats and new kinds of threats are emerging. Some argue the time for national missile defense has finally come, that the technology has finally caught up to the threat and that new threats demand a defense. Others counter that the technology is still uncertain, that the new threat is remote and that building missile defenses actually leads to a net U.S. security decline. This briefing book examines the current debate over national missile defense.

A History of Ballistic Missile Defense

The U.S. military began conducting research on ballistic missile defense systems shortly after World War II, even before the United States faced a direct missile threat. From those early efforts until today, the United States has spent over $120 billion on missile defense, but has yet to develop a reliable system.

The Soviet Union first deployed submarine-based missiles capable of hitting the United States in the late 1950s; its land-based arsenal appeared and expanded rapidly in the early 1960s. This direct theat spurred a substantial increase in U.S. ballistic missile defense programs.

From the 1957 "Nike Zeus" program to the follow-on "Nike X" to President Johnson's "Sentinel" system to the "Safeguard" system developed under President Nixon, the U.S. tried and repeatedly failed to develop a missile defense that could cope with the most likely long-range missile attacks. The Safeguard system, using interceptors tipped with nuclear warheads, was briefly deployed in the mid-70s. It became operational on October 1, 1975; a day later the House of Representatives voted to close it down, the Senate soon followed suit, and Safeguard was shut down in January 1976. Support for the system evaporated when it became clear that blast effects from the nuclear-tipped interceptors would blind Safeguard's own radars, while the "new" Chinese threat that motivated Johnson's Sentinel deployment had not materialized. (It was known early on that Soviet multi-warhead missiles could easily overwhelm the system.)

In 1983, President Ronald Reagan revived missile defense with his Strategic Defense Initiative. He envisioned a perfect, space-based shield that would protect the United States from a massive attack by Soviet nuclear weapons. The goal, according to Reagan, was to render nuclear weapons "impotent and obsolete." Commonly known as "Star Wars," the initiative spawned an array of sometimes fantastical efforts at missile defense, including space-based lasers powered by nuclear explosions. Since Reagan's announcement, the U.S. has spent over $69 billion on various missile defense programs, with little to show for it.

Over the years, various schemes for national missile defense were developed, then discarded as unworkable. After nearly a decade of attempts at a nationwide defense system against massive attack, the collapse of the Soviet Union, the resulting decline in the threat of overwhelming nuclear exchange, and the emergence of new threats led to a change in priorities.

Under President Bush, the focus began to shift to responding to more limited attacks, and to the threat from missiles with shorter ranges. As the Scud missile attacks in the Gulf War showed, short-range missile technology had spread. In 1993, President Clinton and Secretary of Defense Les Aspin responded to this new threat, renaming Reagan's Strategic Defense Initiative Organization the Ballistic Missile Defense Organization (BMDO), and changing its focus from nationwide to theater missile defense. They argued that not only was the short-range missile threat far more developed, but the goal of effective defense was more achievable, though still far from easy.

This did not stop missile defense advocates from arguing that the United States urgently needed a national missile defense. In the 1994 election campaign, it was one of the key planks of the Republican "Contract with America."

A New Congress, A Louder Cry

When Republicans gained control of Congress after the 1994 elections, they increased pressure on the Clinton Administration. Seizing what many perceived as a politically potent Reagan legacy issue, they pushed for rapid deployment of a national missile defense. In 1995, however, in a setback that surprised proponents, the House of Representatives defeated the provision of the "Contract" that required the U.S. to deploy a national missile defense "as soon as practical." For its part, the Senate passed legislation committing the U.S. to "develop for deployment a multiple site" missile defense. When that version was sent to the President, he vetoed the bill, citing the missile defense provision as a threat to the START process. In the end, Congress deleted the provision, but approved $3.7 billion for all forms of missile defense, a 30 percent increase over President Clinton's request.

In 1996, Senate Majority Leader Robert Dole and House Speaker Newt Gingrich introduced the "Defend America Act." The bill called for "a highly effective defense of all 50 states against limited, unauthorized and accidental attacks . . . augmented over time to provide a layered defense against larger and more sophisticated ballistic missile threats as they emerge." Cost estimates of $31–60 billion for building that defense undercut support for the Act, and it never came up for a vote.

Under the continuing Republican pressure, however, the Clinton Administration changed course in 1996. It announced a new plan for national missile defense calling for three years of research; if after that period deployment was approved, construction was planned to take three more years. This "3+3" approach drew criticism from all sides, with missile defense advocates calling for more rapid deployment, and opponents decrying the hurried approach.

The following year, new Senate Majority Leader Trent Lott introduced the "National Missile Defense Act of 1997," mandating deployment of a national missile defense by 2003. He never brought the bill up for a vote.

In 1998, Sen. Thad Cochran (R-MS) introduced a bill calling for deployment of a national missile defense "as soon as technologically possible." In two separate votes, supporters of the bill failed to get the 60 votes needed to begin debate. The issue did not come up in the House. In addition, a commission chaired by former secretary of defense Donald Rumsfeld issued a report in 1998 stating that missile threats could emerge with little warning from countries beginning to develop long-range missiles. This "new" threat became a central element in the Republican campaign for national missile defense, and helped persuade the Clinton Administration to move more rapidly toward deployment of missile defense.

A Decision Scheduled, Then Delayed

In January 1999, Secretary of Defense William Cohen announced that the Clinton Administration would decide in the summer of 2000 whether to build a national missile defense. At the same time, Cohen pushed back the deadline for initial deployment from 2003 to 2005, seeking to reduce what the Administration admitted was an extremely high level of technical risk in the program. Finally, the Clinton Administration for the first time allocated procurement funding to the national missile defense program, adding $6.6 billion to create a $10.5 billion budget over the next five years.

Not appeased by those steps, Senate missile defense supporters came back in 1999 with a bill that would make it the policy of the United States "to

A "Limited" Decision

President Clinton's decision could be a critical turning point for national missile defense and for American security as a whole. At the same time, the decision is somewhat symbolic, because many of the critical choices for building the system will not be made for years.

The Clinton Administration's goal—driven at least in part by estimates of when the threat from North Korea might emerge—is to have a working system by late 2005. According to the Pentagon, to meet that goal, construction of the system must begin in spring 2001. Only two choices must be made this year for the Pentagon to maintain that schedule. First, Clinton must approve the basic architecture, in particular specifying the location of the first interceptors, widely presumed to be Alaska. Second, contracts must be awarded for construction, in time to prepare for spring 2001. Every other decision—on the interceptor, booster, radars, satellites, and communications systems—will be made later, in many cases three years later. Delaying these decisions is possible because the Clinton Administration postponed the initial operating capability from 2003 to 2005; without that change, decisions on components would have to be made much sooner.

See Appendix 1, "The Decision on Deployment: Process and Players," for a description of how the decision will be made and who will be involved.

deploy as soon as is technologically possible an effective National Missile Defense system." Senate Democrats doubted that they again had the votes to prevent passage of the bill, and were unsure whether they could sustain a Presidential veto. In consultation with the Executive branch, they changed strategies and offered two amendments to modify the bill. The first amendment stipulated that missile deployment funds would have to be authorized and appropriated annually. The second amendment made it U.S. policy to "seek continued negotiated reductions in Russian nuclear forces." Both amendments passed by a 99–0 vote, and the bill itself passed 97–3. The House later accepted the Senate version.

On signing the legislation in July 1999, President Clinton set out criteria for the decision on national missile defense:

> Any NMD system we deploy must be operationally effective, cost-effective, and enhance our security. In making our determination, we will also review progress in achieving our arms control objectives, including negotiating any amendments to the ABM Treaty that may be required to accommodate a possible NMD deployment.

Over the following months, the Clinton Administration set out four specific criteria for reaching a decision: the readiness of the technology; the impact on arms control and relations with Russia, including discussions on the ABM Treaty; the cost; and the threat.

In March 2000, the Pentagon announced a two-month postponement in the next scheduled test for the system, forcing a delay also of the Pentagon's review of the technology, which will precede the President's decision. In May 2000, a second delay of one to two more weeks was announced, pushing the test to July 7, or perhaps later. It is unclear whether this will lead to a postponement of the Pentagon's review; if not, an already high-risk schedule will be further compressed. Although Administration officials had already modified Secretary Cohen's original announcement of a summer 2000 decision to this summer "at the earliest," these latest delays in the testing program mean the President is not likely to reach a decision until sometime this fall.

This briefing book provides background on missile defense and related issues, and evaluates the four criteria set out by the President.

Clinton Administration's National Missile Defense Proposal

Beginning in 1996, the Clinton Administration put forward a three-stage plan for developing and deploying its proposed national missile defense. The proposed system is far removed from President Reagan's vision of a space-based shield against all attacks. Instead, the Clinton plan is designed to deal with small attacks of a few tens of warheads at most.

Until late in 1999, this was the Clinton Administration's three-stage proposal:

Capability-1 (C-1): 20 interceptors based in Alaska; upgrades to five existing early warning radars located in Alaska, on the East and West Coast, in Greenland and in the United Kingdom; a new "X-band" radar at the Western tip of the Aleutian islands off Alaska; a battle management system; and communications relays to provide guidance information to interceptors in-flight. The system was scheduled to have its "initial operating capability," i.e., begin working, in late 2005. According to the Pentagon, this system would have the capacity to handle an attack by a "few warheads" using "simple penetration aids" (countermeasures that would attempt to evade or defeat the interceptor).

Capability-2 (C-2): 100 interceptors based in Alaska; additional X-band radars in Alaska, Great Britain, and Greenland. The interceptors could be operational by 2007. According to the Pentagon, this system could handle a launch at the United States of a "few tens" of warheads with simple countermeasures, or a few warheads with more sophisticated countermeasures.

Planned System Architecture and Operation

BMC3 = Battle Management, Command, Control and Communications

DSP/SBIRS = Defense Support Program or Space-Based Infrared System

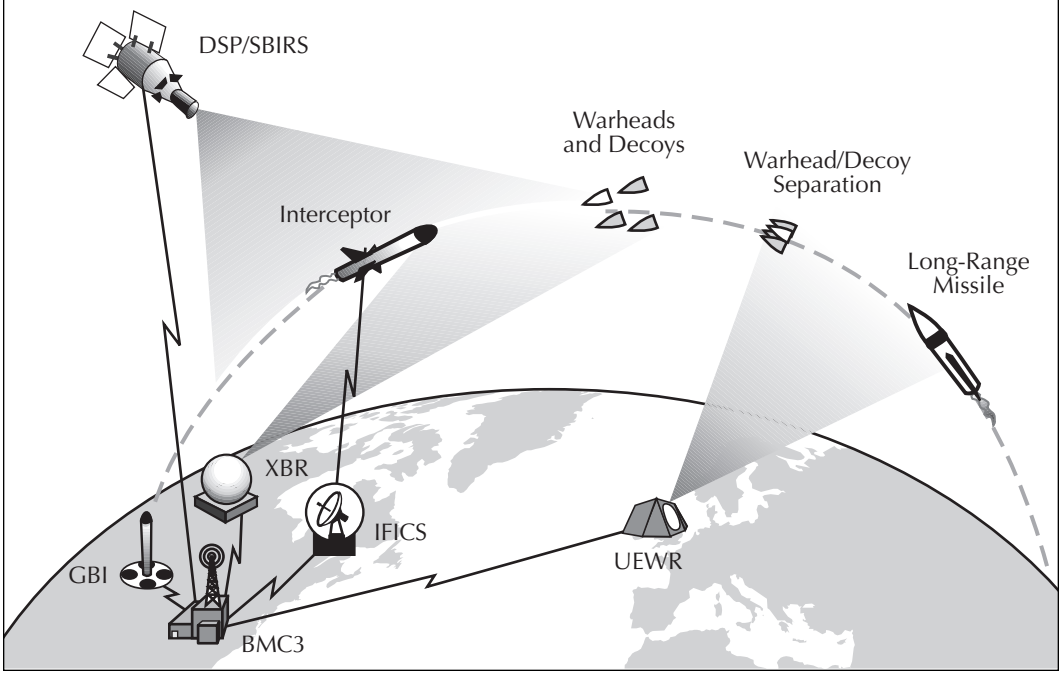
GBI = Ground-Based Interceptor

IFICS = In Flight Interceptor Communications System

UEWR = Upgraded Early Warning Radar

XBR = X-Band Radar

= Communication Link



Note: Locations in this figure are for illustrative purposes only and are notional.

Capability-3 (C-3): Up to 250 interceptors based in Alaska and at a second site in North Dakota. It would also include additional X-band radars on both U.S. coasts and possibly in South Korea. According to the Pentagon, this system would have the capability to handle a "few tens" of warheads with "complex penetration aids," meaning more advanced countermeasures. This system could be deployed by 2010 or 2011.

A New Goal: "Expanded" C-1

In late 1999, however, the Clinton Administration decided to pursue a new alternative, skipping the 20 interceptor deployment and going straight to 100 interceptors, probably in Alaska, in what officials called an "expanded C-1 architecture." Additional upgrades to five early-warning radars were also approved. All 100 interceptors will not be ready by 2005, when the system is scheduled to begin operating; that goal would probably not be reached until 2007.

As part of the system, the U.S. plans to deploy a new satellite-based launch detection system called Space-Based Infrared System High, or SBIRS High. It will replace the current Defense Support Program (DSP) early warning satellites, providing first reports of any missile launch by orbiting high above the Earth to detect exhaust plumes from firing boosters. It could be ready in 2005, in time to work with an initial national missile defense. While significantly improved over its DSP predecessor, SBIRS High does not fundamentally alter space-based detection systems and capabilities.

The U.S. also intends to deploy Space-Based Infrared System Low, or SBIRS Low, which—if it works—will expand substantially the role of satellites in missile defense. Using two types of infrared sensors, SBIRS Low is designed to track missiles throughout their trajectory and guide interceptors in-flight to the incoming warheads. Deployment of these satellites was scheduled to begin in 2006–2007, but is likely to be delayed. It requires a far greater number of satellites, 24, versus six for SBIRS High. More significantly, unlike SBIRS High, SBIRS Low would violate the ABM Treaty, which prohibits space-based sensors capable of tracking and providing targeting information to interceptors.

Star Wars Redux

Many advocates of missile defense decry the limited nature of the Clinton Administration's goal of a two site, 250-interceptor national missile defense system. Instead, these advocates call for expanded plans that involve space-, sea- and air-based components. Although the capabilities of their schemes are more modest than plans during the 1980s, their proposals harken back to President Reagan's highly controversial Strategic Defense Initiative.

The original "Star Wars" proposal developed under the Reagan Administration called for hundreds of space-based lasers and thousands of ground-based interceptors. It was replaced by "Brilliant Pebbles," which would have involved placing a thousand or more small interceptors in orbit around the earth, each one constantly watching for a missile launch.

With the demise of the Soviet Union, and the possibility that new threats could emerge, the Bush Administration developed a new proposal that attempted to deal with a limited nuclear strike or an accidental launch. Called GPALS for Global Protection Against Limited Strikes, this system required three layered components: a ground-based national missile defense, a ground-based theater missile defense, and a space-based global defense based on the Brilliant Pebbles idea.

It is this type of layered system that many missile defense supporters advocate today. However, the extremely high cost of such systems has and will likely continue to undercut support for these proposals. In 1996, the Senate Budget Committee estimated it would cost up to $184 billion to build and maintain a system similar to GPALS.

Other missile defense advocates offer alternatives to the Clinton Administration proposal, including sea-based options, proposals to attack missiles soon after launch in what is called "boost-phase intercept," or a combination of the two. These options may deserve further research, but they are not a part of the Clinton Administration decision this year. Before a decision is made to deploy any missile defense, however, the four criteria set out by the Clinton Administration must be carefully considered.

Nuclear Arms Control and the ABM Treaty

Potential new threats from countries developing long-range missiles is just one of many problems the United States faces. The greatest threat to U.S. security remains the enormous Russian nuclear arsenal. To reduce this threat, the United States has pursued arms control agreements with Russia to cut both countries' long-range nuclear arsenals. That process has stalled, however, in part because the U.S. pursuit of national missile defenses has complicated those efforts.

Nuclear Arsenals and the START Process

With the end of the Cold War, the number of ballistic missiles in the world has declined substantially. The Soviet Union has collapsed, and thousands of nuclear warheads have been destroyed, taken off alert, or removed from missiles and stored. A deliberate, massive nuclear exchange between the United States and Russia is increasingly unlikely. (Nuclear strikes are still possible through accident or miscalculation, however, given the high alert status of both countries' arsenals.)

U.S. and Russian Nuclear Arsenals

Both the United States and Russia maintain large nuclear arsenals of strategic and tactical nuclear weapons. Those arsenals have declined substantially from their Cold War peaks, but still remain at levels far in excess of any reasonable current military requirement.

The U.S. is helping the Russian military safely dismantle much of its nuclear arsenal. From a peak of nearly 70,000 nuclear warheads in the late 1980s, the total number of U.S. and Russian warheads has declined to about 30,500 today.[1]

The START process has begun reducing strategic nuclear arsenals built up during the Cold War. Strategic—or long-range—arsenals peaked in the late 1980s at around 24,000 warheads total. Under START I, which is still being implemented, U.S. and Russian deployed strategic nuclear forces must drop to 6,000 warheads or less each. In 1996, the U.S. Senate approved ratification of the next round of reductions, START II. In April 2000, the Russian Duma finally followed suit. Once the Treaty enters into force, long-range arsenals will drop to 3,000-3,500 deployed warheads for each country. Along with numerical limitations, START II also bans multi-warhead land-based missiles.

Despite Duma approval, START II will not enter into force until the U.S. Senate approves a protocol to START II, as well as three agreements to update the ABM Treaty. Negotiated in 1997 and intended to encourage Russian ratification, the START II protocol delays the required destruction of delivery vehicles—missiles, launchers and long-range bombers—from January 2003 to December 2007. Forces to be destroyed will be deactivated by 2003.

The ABM Treaty agreements, concluded at the same time as the START II protocol, delimit the interceptor speeds for allowed missile defense interceptors and name Russia, Belarus, Ukraine, and Kazakhstan as the successor states to the Soviet Union. (See "The Anti-Ballistic Missile (ABM) Treaty," p. 9.) As part of its approval of ratification in April, the Russian Duma attached conditions that require the U.S. to comply with the ABM Treaty and to ratify these agreements before START II can enter into force.

The ABM Treaty

In 1972, the United States and the Soviet Union ratified a treaty that seems, at first, counter-intuitive. In the ABM Treaty, they agreed to NOT try to defend their entire territory against missile

attack. The Treaty allows each country to build two sites (later reduced to one) that could attempt to protect limited areas.

In the logic of the nuclear age, this Cold War treaty makes sense. Missile defenses encourage offensive force increases. Both countries knew that missile defense, no matter how capable, could be overwhelmed by massive attack. If one country built defenses, the other would simply increase its arsenal, seeking to maintain the ability to inflict unacceptable damage on the first. Each country sought the capability to carry out, after an attack by the other, a substantial retaliatory strike. As long as that capability was preserved, each would be deterred from attacking the other. By agreeing not to build national missile defenses, the two countries sought to maintain deterrence while limiting and stabilizing the size of the other's arsenal. Even without missile defense, however, the two pursued a nuclear arms race that led to the build-up of tens of thousands of nuclear warheads on both sides, a level that is now being reduced by the START process.

Also paradoxically, relying on missile defenses can actually decrease stability in a crisis, because it increases the temptation to attack first. If one country has a missile defense system that can intercept even a few incoming missiles, it has an incentive to strike first, destroying as much of the other country's arsenal as possible, and then rely on missile defense to blunt the counter-attack. This unstable dynamic pushes the other country to be able to launch *its* arsenal first, before the first attacks (or before its missiles hit—so-called "launch-on-warning"), to ensure it can overwhelm the defense. This instability is greatly compounded by the "attractive" target presented by multi-warhead missiles. By hitting those targets first, an attacker could theoretically destroy many warheads with one, again

U.S. and Russian Strategic Forces

Declining Under START Treaties

	September 1990[1]	December1998	START II December 2007[2]	START III December 2007[3]
ICBMs				
Russia	6,612	3,590		
U.S.	2,450	2,000		
SLBMs				
Russia	2,804	1,576		
U.S.	5,760	3,456		
Bombers				
Russia	855	606		
U.S.	2,353	1,750		
Total				
Russia	10,271	~6,000	~3,000[4]	~2,000[4]
U.S.	10,563	~7,200	~3,500	~2,000

ICBMs: Intercontinental Ballistic Missiles, or long-range land-based missiles

SLBMs: Submarine-Launched Ballistic Missiles, or long-range sub-based missiles

Sources: Natural Resources Defense Council, Arms Control Association

[1] Warhead numbers are based on START I counting rules. Figures include weapons in Belarus, Kazakhstan, Russia and Ukraine.

[2] Assumes that START II enters into force but no START III agreement is reached. Figures include weapons in Russia only and are based on START II counting rules.

[3] Assumes that START III is successfully negotiated. Under the 1997 draft framework, the United States and Russia will be permitted to deploy 2,000-2,500 strategic warheads each; more recently Russia has proposed lowering that to 1,500 each.

[4] These outcomes depend on Russia's economic situation and relations with the United States. Under some scenarios, Russia would deploy significantly fewer warheads.

The Anti-Ballistic Missile (ABM) Treaty

On May 26, 1972, President Nixon and General Secretary Brezhnev signed two agreements: the Interim Agreement on the Limitation of Strategic Offensive Arms (SALT I), which set ceilings on long-range land- and sea-based nuclear weapons, and the Treaty on the Limitation of Anti-Ballistic Missile Systems (ABM Treaty), which limited each side to two local-area missile defense sites. The ABM Treaty entered into force on October 3, 1972.

With the ABM Treaty, the U.S. and Soviet Union sought to end an emerging competition in defensive systems that threatened to spur an offensive nuclear arms race, and to create more favorable conditions to further limit strategic nuclear weapons.

At the time of the ABM Treaty's signature, Russia deployed a limited missile defense system around Moscow, while the U.S. had shifted from a planned "thin" defense of a dozen American cities to the "Safeguard" system that it was beginning to deploy to protect two bases for U.S. strategic nuclear forces. The U.S. completed but soon abandoned one site in North Dakota; it dismantled the second site as required under the Treaty.

In the ABM Treaty, as amended by the 1974 Protocol, both countries agreed that:

- each may only have one missile defense deployment site with that site prohibited from providing a nationwide missile defense system or becoming the basis for developing one;
- at the allowed site, no more than 100 launchers/missiles may be deployed and guidance radars must be within a circle with a diameter of 150 kilometers;
- new early warning radars may only be deployed on the periphery of national territory and oriented outward;
- non-nationwide missile defense systems (e.g., theater missile defense systems and early warning radars and sensors) may not be given nationwide capability or tested in an nationwide mode;
- the transfer of missile defense components to and deployment in foreign countries is prohibited.

Further, both sides agreed to prohibit development, testing, or deployment of sea-based, air-based, mobile land-based, or space-based missile defense systems and their components, and they agreed to limit other qualitative improvements to their ABM technology.

On September 26, 1997, the United States, Russia, Belarus, Kazakhstan, and the Ukraine signed a series of agreements related to the ABM Treaty and START designed to help encourage Russian ratification of START II. The START agreements would ease the deadlines for weapons destruction under START II. The 1997 ABM agreements consist of:

- The "Lower Velocity" agreement, on interceptors with speeds less than 3 km/sec, which permits deployment of these theater missile defense systems provided that they are not tested against ballistic missile targets with velocities greater than 5 km/sec or ranges that exceed 3,500 km. Under the U.S. interpretation of this agreement, the U.S. can deploy the Army PAC-3, Theater High Altitude Area Defense (THAAD) and the Navy Area Defense systems.
- The "Higher Velocity" agreement, which covers interceptors with speed greater than 3 km/sec, and prohibits testing of such systems against targets with velocities greater than 5km/sec or ranges greater than 3,500 km. It bans the development, testing or deployment of space-based components. The U.S. Navy Theater-Wide (NTW) system falls in this category, and the U.S. maintains it complies with this agreement.
- The Memorandum of Understanding on Succession designates Russia, Ukraine, Belarus, and Kazakhstan as the successor states to the Soviet Union.

The Clinton Administration planned to submit the ABM/START II agreements to the Senate at some point after the Duma approves START II, but has yet to do so. Russian implementation of START II was made contingent on U.S. approval of the agreements and adherence to the ABM Treaty. If the Senate were to reject the 1997 ABM agreements, it would not affect the legal status of the Treaty itself, but it could disrupt talks on its modification.

The ABM Treaty is of unlimited duration, but each Party has the right to withdraw on six months notice if it decides that its supreme interests are jeopardized by "extraordinary events related to the subject matter of this Treaty."

pushing the defender to "use it before you lose it." These three factors—the requirement to preserve deterrence, the capability to overwhelm any missile defense, and the instability created by missile defenses and multi-warhead missiles—led to the ABM Treaty.

As permitted by the ABM Treaty, the U.S. developed and, in 1975–6, briefly deployed the Safeguard missile defense system. Russia continues to operate a missile defense system around Moscow, designed to protect the capital from missile attack. Because it is limited to 100 interceptors, the missile defense system would easily be overwhelmed should the U.S. (or even France) decide to launch a major strike against Russia.

Today, the ABM Treaty is under assault as never before. Some Treaty critics in Congress, intent on deploying defenses, want the U.S. to withdraw from the Treaty immediately; some erroneously claim that it no longer applies because the Soviet Union has collapsed. The Clinton Administration says it would like to maintain the Treaty, but is also considering deployment of a national missile defense that would violate it. To avoid that outcome, the Clinton Administration has initiated talks with a resistant Russia to modify the ABM Treaty so that it would permit the proposed "limited" national missile defense. According to the Clinton Administration, the proposed system will not fundamentally alter the strategic balance because Russia can still overwhelm the "limited" defense. Whether Russia concurs and will agree to modify the Treaty in ways the Clinton Administration proposes is unclear. Whether the U.S. Senate, which would have to ratify any amendment or protocol to the Treaty, would approve the limited changes sought by the Clinton Administration is also uncertain. In April 2000, 25 Republican Senators, including Majority Leader Trent Lott and Foreign Relations Committee Chair Jesse Helms, wrote a letter to Clinton indicating their judgement that any agreement on limited ABM Treaty modifications "would have little hope of gaining Senate consent to ratification." Senator Helms, in May 2000, went even further, saying any deal the Clinton Administration might reach would be "dead on arrival."

Due to economic constraints, Russia cannot at present engage the United States in an all-out arms race. However, the Cold War dynamic that first drove the bilateral ABM Treaty still applies. Russia will seek to maintain its capacity to overwhelm any missile defense system the U.S. builds, regardless of whether the two countries agree to modify the ABM Treaty. Russia is also concerned that any U.S. missile defense could rapidly expand to a much more capable system; the Clinton Administration's admission that the initial system is only a first phase contributes to that fear. For its part, China, already in a slow modernization program, is likely to increase the size and pace of arsenal improvements to maintain its limited deterrent, if the U.S. decides to deploy even a "limited" national missile defense.

The Readiness of the Technology
Unproven and Uncertain

Effective missile defense is an enormous technical challenge. Commonly compared to "hitting a bullet with a bullet," missile defense is in fact much harder. The warheads of long-range missiles travel at speeds of 15,000 mph or more, a velocity that must be matched by the interceptor. Early efforts to have the interceptor explode close enough to the incoming target to destroy it have been largely abandoned as ineffective. The current U.S. proposal instead calls for so-called "kinetic kill," in which the interceptor literally slams into the warhead, destroying it by the mere force of impact. The United States has shown that it is possible to "hit a bullet with a bullet," but not that this can be done reliably in a real-world setting.

In a Deployment Readiness Review (DRR) now scheduled for late July 2000, the Pentagon will assess the technical readiness for deployment of the proposed national missile defense system. The DRR will be based in large part on the results of three intercept tests that will have taken place before July 2000; the first two tests took place on October 2, 1999, and January 18, 2000. Following the failure of the second test, the third test was delayed until late June, then further delayed to July. As a result, the time the Pentagon has to evaluate test results before the DRR will be cut in half. The latest in a long line of stumbling blocks, these delays make it even clearer that the Pentagon will not have enough information to assess the national missile defense system this year.

Independent Reviews

In February 1998, a Pentagon-appointed panel chaired by former Air Force Chief of Staff Gen. Larry Welch issued a report strongly critical of all missile defense programs, finding what the panel called a "rush to failure" approach. In 1999, the Welch panel reconvened, and was asked to assess the reconfigured testing and development program for the national missile defense system. In its September 1999 report, the panel once again found the Pentagon's approach extremely high risk, stating that "the DRR should be regarded more as a feasibility decision with some long-term deployment actions rather than a readiness decision." (See the box on the Welch panel findings on p. 12.)

In February 2000, the Pentagon's Director of Operational Testing and Evaluation (DOT&E), responsible for oversight of all Department of Defense (DOD) testing and development programs, expressed similar concerns. As part of its FY1999 Annual Report, DOT&E stated that the current schedule for developing the national missile defense program places "unrealistic pressure" on the BMDO because the program is "schedule driven" (based on an external calendar), rather than "event driven" (proceeding from test results). The report recommends that the DRR "allow time for a thorough analysis" of the next test before going ahead. In announcing the first delay of the third test, however, the Pentagon also disclosed a reduction from 60 to 30 days in the time allowed to analyze test results. It was exactly this type of schedule

Welch Panel: Planned Deployment Decision Premature

Following a string of failures and delays in its test programs, the Pentagon appointed an independent review panel to assess its ballistic missile defense programs. Headed by retired Air Force General Larry Welch and composed almost entirely of supporters of national missile defense, the panel first issued a report in February 1998. The panel found that both the national missile defense program and several theater-level programs were on a "rush to failure" course. At least in part because of the Welch panel's findings, the Pentagon postponed its planned initial operating capability from 2003 to 2005, allowing delays in acquisition decisions for several system components, including the booster and kill vehicle.

In 1999, at the request of the Senate Armed Services Committee, the panel reconvened to examine the revised national missile defense testing program. In their second report, "National Missile Defense Review," the panel recommended delaying a decision to deploy. Specifically, the panel proposed that the Pentagon's assessment of the technology this year be considered a "system development feasibility review rather than a deployment readiness review." Completed in September 1999 but released to the public two months later, the report suggests that a decision on deployment should only be made once key program elements, such as the ground-based interceptor, are proven through testing. Under the current schedule, that will not happen before 2003.

The Welch panel explained why a decision to deploy should not take place before 2003:

> If all goes according to the restructured plan, by June 2000, BMDO will have demonstrated the "feasibility" of a NMD [national missile defense] system but not the "readiness to deploy" of the system. The demonstration of readiness will not come until 2003 at the earliest, when the integrated GBI [ground-based interceptor] (i.e., operational version of the booster and the EVK [exoatmospheric kill vehicle]) is to be demonstrated.

The Welch panel recommended that even the feasibility assessment be postponed if, as has happened, any further delays occur:

> Do not allow further compression of the schedule. If there are additional slips in key events, adjust the DRR as needed to avoid regressing to a very high risk schedule.

Despite this recommendation, following the first announced delay in the next test the Pentagon cut in half the time for analysis before the DRR. Whether the DRR will be postponed following the second delay is unknown.

The panel notes a number of risks that remain, including uncertainties in the performance of the kill vehicle with the new, as yet unbuilt booster rocket:

> One of the highest EKV risk areas is its ability to withstand the environmental loads of the new booster that will fly on [the seventh flight test]. . . the expected shock loads are an order of magnitude greater than those imparted from the [surrogate test booster now in use]. We are not certain that the EKV will be able to withstand these loads, and we will not know with any degree of certainty until [flight test 13], the flight in which the EKV and new booster are first mated together. That flight is planned for 2003.

The report, written before the first two tests, emphasizes that intercepts must be accomplished reliably:

> The panel believes that the government and the integrating contractor continue to underestimate the challenge of reliably performing exoatmospheric HTK [hit-to-kill, or interception of a warhead].

Because of continuing concerns, the Pentagon asked the Welch panel to review the testing program again. In a June 2000 report, the panel found that the 2005 deployment goal "remains high risk." The report states that the DRR should be a feasibility assessment and that a decision to deploy should not take place before 2003. The report identifies several remaining risks, including "continuing schedule compression," and calls for a "well-defined, funded program" to develop the capability to handle "likely countermeasures." Although the panel did conclude that the "technical capability" to meet the "defined limited threat" exists, that threat is defined to exclude the countermeasures available to any country developing long-range missiles.

The full set of recommendations of the second Welch Panel are available in Appendix 3, and the full report on the web at: http://www.acq.osd.mil/bmdo/bmdolink/html/docs.html

compression that the Welch panel strongly recommended the Pentagon prevent to "avoid regressing to a very high risk schedule."

Criteria for Technical Readiness

Any decision on deploying a military system depends on a variety of criteria; technology is only one factor. Depending on its political and military objectives, a state may decide to deploy a military system that is not mature or has not been demonstrated to be effective. However, the Administration has included technical readiness as a deployment criteria for the national missile defense system. Indeed, because the stated goal of the planned system is to defend the United States against an attack involving a few tens of nuclear, chemical, or biological warheads, it is important that the United States understand its technical capabilities before making a deployment decision.

What does it mean for a system to be technically ready? To assess the technical readiness of any system—military or commercial—for deployment, the following questions must be answered:

1. Is the technology mature? In simple terms, can it work at a basic level?
2. How operationally effective would the system be in the real world? Would it work against several missiles equipped with readily-available countermeasures?
3. How reliable will it be? Does it work consistently?

In some cases, it may be possible to answer these questions and to establish without testing that the system would be operationally effective and reliable. For example, the United States did not test the type of nuclear bomb it dropped on Hiroshima before it was used. The bomb design virtually ensured it would detonate, and there was nothing unpredictable about the environment in which the bomb would be used. However, a rigorous test program is the only way to assess the maturity, operational effectiveness and reliability of the planned national missile defense system.

The Pentagon's Planned Test Program

The Pentagon plans to conduct 19 intercept tests prior to completing deployment of the national missile defense in 2005. At most, only three of those tests are likely to take place before President Clinton is scheduled to make a deployment decision this year. Moreover, all but the last three of these 19 tests are development tests. Only the last three tests are operational tests, which will use production-quality components and the actual military users to assess how the system would work in the real world.

The first intercept attempt, on October 2, 1999, tested only the exoatmospheric kill vehicle (EKV)—the part that actually hits the incoming warhead—and not the entire system. It used a surrogate booster, and none of the other system components, such as ground-based radars, satellite-based infrared sensors, and communications systems, were integrated into the test. Instead, to simulate the information that would normally be provided by the radars and sensors, the incoming mock warhead carried a Global Positioning System (GPS) transmitter (with a C-band transmitter backup) to broadcast its position to the booster, allowing the booster to put the kill vehicle within range.

After the kill vehicle was released, it operated on its own. It used its heat-seeking infrared sensors to home in on the warhead and hit it. In addition to the mock warhead, one balloon decoy was released by the booster, and the kill vehicle had to distinguish between the two. However, because the planners knew in advance that the warhead was not disguised and that it would have the smaller infrared signal, this was not a test of whether the kill vehicle could distinguish between a warhead and a decoy that were similar in appearance. Indeed, in a briefing the day before the test, a Pentagon official stated that the difference in thermal signature of the reentry vehicle and balloon would be "pretty significant."

In fact, the size of the balloon decoy may have been crucial to the success of the test. Information released by the Pentagon two months after the test indicates the kill vehicle could not locate itself in space, and thus did not know where the target was. Though it was lost, the kill vehicle was able to spot the much larger balloon decoy, and homed in on that until it found the nearby, smaller mock warhead. It is not clear whether the kill vehicle would have found the mock warhead if the decoy had not been present. Thus, the test cannot accurately be classified as either a success or a failure.

In the second intercept test, on January 18, 2000, the kill vehicle failed to hit the mock warhead. According to the Pentagon, a malfunction in both of the infrared sensors that guide the kill vehicle

to its target caused the miss. A leak in the sensors' coolant system may have led to the malfunction. Unlike the first test, this test incorporated the ground-based radars and battle management system, but it still did not integrate all the components of the proposed national missile defense. As in the first test, a single balloon decoy, substantially larger than the target warhead and with a different infrared signature, was released.

Following two separate delays, the next test and first integrated system test (including all the components) is now scheduled for July 2000. Even that test will use a surrogate booster to launch the kill vehicle. The fifth test, scheduled for 2001, is scheduled to be the first to use a prototype of the actual booster. Delays in testing of the prototype, however, may force a change in that schedule. Because the real booster will accelerate at a much faster rate than its surrogate and will therefore subject the kill vehicle to more stress, the Welch panel expressed serious concern that the kill vehicle may not function when mated with the booster. A test of both together will not occur before 2003.

The Pentagon will also conduct ground-based tests and computer simulations in an attempt to provide data that cannot, because of time and/or cost constraints, be gained from intercept tests. However, in its recent Annual Report, the DOT&E found numerous flaws and weaknesses in these tests as well. For example, current ground test facilities cannot simulate the closing velocities of actual intercept. During the last round of ground tests, in October 1999, only one of six scenarios operated successfully. Finally, software critical to running many of the computer simulations has been delayed by months, and may not be ready for the DRR. In a separate statement on the software, the DOT&E said "absence of a functioning and valid [simulation system] will place significant limitations on the Defense Department's ability to assess the potential effectiveness" of the national missile defense.

What Will the Pentagon's Test Program Reveal?

What might—and what can't—the United States learn about technical readiness by this year? What more might it learn by the 2005 target date for completion of initial deployment?

Technological Maturity

To assess the maturity of the basic technology, a prototype of the full system must be tested under controlled conditions. Even if all three were successful, these first tests would not adequately assess the technological maturity of the system, since only one—still with a surrogate booster—is a full system test. Such an assessment should be possible by 2005, since full-system tests using prototype components will be conducted by then.

Operational Effectiveness

The operational effectiveness of a system refers to its expected performance under real-world conditions, not controlled test conditions. In particular, the real-world performance of the national missile defense system will depend on the countermeasures used to defeat it. To assess the operational effectiveness of the system, it must be tested against a wide variety of attack geometries and countermeasures that approximate as closely as possible those that would be available to emerging missile states. The tests must be conducted using production-quality components, and by the actual military users, not contractors.

The September 1999 National Intelligence Estimate (NIE) that assessed the ballistic missile threat to the United States warned that North Korea and other emerging missile states should be expected to use readily available countermeasure technology. (See box, "Countermeasures to Ballistic Missile Defenses," p. 15.)

In the first and second tests, a single balloon decoy was used, but as noted above planners knew in advance the warhead's signal would be smaller than that of the decoy. Those decoys and the one in the next intercept test will help the Pentagon assess whether the kill vehicle can distinguish a warm object from a cool one, a fairly straightforward endeavor. However, to assess operational effectiveness, quite different intercept tests are required. For example, realistic tests would cool the warhead or heat decoys to different temperatures, or put the warhead in a balloon and release similar but empty balloons, all with surface coatings that would maintain slightly different temperatures in the sunshine.

Discussing the first intercept test, Brig. Gen. Willie Nance, program manager of the BMDO's National Missile Defense Joint Program Office, characterized the warhead and single decoy "as 'more than representative' of the decoys and countermeasures that a rogue state might employ."[2] However, BMDO's assessment sharply contrasts that of the DOT&E.

Countermeasures to the Proposed National Missile Defense

Countermeasures intended to overwhelm or deceive the defensive system make effective missile defense far more challenging. It is substantially easier and cheaper to deploy simple and effective countermeasures against missile defenses than it is for the defense to respond to them. The most effective countermeasures against the proposed national missile defense include submunitions — which stymy all but boost-phase defenses — and decoys.

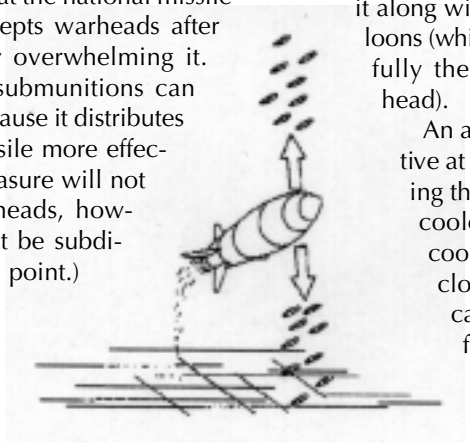
Countermeasure technology is within the reach of countries developing long-range missiles. The September 1999 National Intelligence Estimate (NIE) assessed the ballistic missile threat to the United States. According to the unclassified version of NIE:

> Many countries, such as North Korea, Iran, and Iraq probably would rely initially on readily available technology — including separating RVs [reentry vehicles, or warheads], spin-stabilized RVs, RV reorientation, radar absorbing material (RAM), booster fragmentation, low-power jammers, chaff, and simple (balloon) decoys—to develop penetration aids and countermeasures.

Moreover, the NIE states, "Russia and China each have developed numerous countermeasures and probably are willing to sell the requisite technologies."

Submunitions

For chemical or biological warheads, a particularly effective countermeasure is to divide the payload into tens or even hundreds of submunitions that can be released early in flight, at the end of the boost phase. This simple countermeasure would defeat the national missile defense—which intercepts warheads after their boost phase—by overwhelming it. Moreover, deploying submunitions can benefit the attacker because it distributes the payload of the missile more effectively. (This countermeasure will not work for nuclear warheads, however, since they cannot be subdivided beyond a certain point.)



A missile releasing submunitions during ascent.

High-Altitude Countermeasures

Because of its design, the ground-based interceptor for the proposed national missile defense system can only hit targets outside the atmosphere or, possibly, in its upper layers. In the atmosphere, friction causes atmospheric heating that blinds the infrared sensors these interceptors use to home in on the target. Thus, the interceptor has a minimum altitude below which it does not work. Outside the resistance caused by the atmosphere, however, objects of different weights and shapes maintain the same relative speed. This means a very lightweight false target (decoy) and a much heavier warhead can be made to travel through space in an identical manner. The decoys and warheads can also be designed to be indistinguishable to both the defense's radars and infrared sensors. If, along with the warhead, an attacker releases a large number of decoys in space (adding only minimal weight to the missile payload), the defense must either launch an interceptor at every target, or wait until they descend into the atmosphere, where the lighter decoys will slow more rapidly than warheads. However, at that point there may not be enough time to hit the warhead before the interceptor is blinded.

For the radars and sensors, the difficult task is not detecting all the possible targets, but discriminating between warheads and decoys. Decoys could be simple foil balloons shaped like warheads that are inflated and deployed at the end of the boost-phase. Perhaps even more effective are "anti-simulation" techniques where the warhead is made to look like a decoy by enclosing it in a foil balloon, and releasing it along with large numbers of empty balloons (which could be equipped to mimic fully the balloon containing the warhead).

An alternative to decoys, also effective at high altitudes, would be encasing the warhead in a liquid nitrogen-cooled shroud. The shroud would cool the warhead to temperatures close to those in space, dramatically reducing its visibility to infrared sensors on the interceptor.

AP/WIDE WORLD PHOTOS

In 1986, the Challenger space shuttle (above) exploded shortly after lift-off, killing the seven astronauts on board. Unfortunately, history is littered with such dramatic failures, even with well-known technologies. In 1998–99, three successive U.S. Titan rocket launches failed, either exploding or delivering their satellite cargos into useless orbits.

In its FY1999 Annual Report, DOT&E stated that the Pentagon will not conduct tests using real-world countermeasures before the deployment decision. DOT&E found that the national missile defense testing program "is building a target suite that, while an adequate representation of one or two [warheads], may not be representative of threat penetration aids, booster, or post-boost vehicles . . . Test targets of the current program do not represent the complete 'design-to' threat space and are not representative of the full sensor requirements spectrum (e.g., discrimination requirements)."

Even further, it is unclear whether the Pentagon will conduct tests against realistic countermeasures by 2005, when initial deployment is scheduled for completion. Although the countermeasures used will presumably be more capable as the testing program proceeds, whether these countermeasures will accurately represent the real-world threat is unknown.

The 1999 Welch panel report identified another way in which the planned test program will not simulate real-world attacks. It noted that only a limited number of "endgame geometries" are planned, meaning that the mock warhead and the kill vehicle would approach each other from similar or even identical directions in the different flight tests. The Welch report noted that the simulations based on those flight tests are "likely to be compromised seriously by the level of extrapolation that is required."

Reliability

Reliability is a statistical indication of how consistently effective a system would be in use. According to media reports, the Pentagon has set extremely high requirements for the proposed national missile defense system. Each kill vehicle is required by contract to have approximately 90 percent chance of successful intercept, while as a whole the system is required to have nearly a 100 percent probability of success.[3] To attempt to achieve that goal, the system will fire three to four interceptors at each target, giving the system multiple chances. However, even with four attempts, achieving a near 100-percent success rate will be extremely difficult. At the same time, this success rate is substantially greater than the operational requirements for other major defense acquisition programs.

Why is it necessary for the U.S. military and political leadership to be highly confident that they know how effective the national missile defense system is likely to be? First, the military must know how effective each individual intercept attempt is likely to be in order to decide how many interceptors to fire at each target. Second, if the system is to have any utility against a deliberate attack that the United States could either avoid or prevent by other means, the U.S. political leadership must know how big a risk they run that a warhead targeted at a U.S. city would get through the national missile defense.

If the United States deploys a national missile defense system, it is reasonable to assume that it will be used very infrequently. In fact, most military systems that require destructive testing are rarely tested sufficiently to give a statistically significant measure of their reliability before deployment. For the majority of systems, additional information is gained from training and combat experience, but the United States does not have that option for the national missile defense system because any failure could be catastrophic. The only practical method to assess the reliability and effectiveness of the system is to test the production version (not a prototype) enough times to give statistically meaningful data. Under current testing plans, this will not happen this year or even by 2005.

Ironically, while the Pentagon has set extremely high effectiveness goals for the national missile defense system, at the same time, due to the compressed development schedule, it expects to test the system less before deployment than it would a typical military system. Instead, reliability testing will depend largely on training once the system is operating, as well as on computer simulations.

A Cautionary Testing Tale

The danger of insufficient testing is demonstrated dramatically by the Patriot anti-missile system. The Patriot was adapted from an anti-aircraft system and achieved a perfect test record, hitting its missile target in all 17 of its intercept attempts. When used in the field during the Gulf War, however, it failed dramatically. According to the General Accounting Office, only 9 percent of Gulf War intercept attempts by Patriot can be judged successful. The U.S. Army's own analysis showed only a 40 percent success rate for missiles fired at Israel.

One of the major causes of this failure was the unpredictable behavior of the Iraqi Scud missiles, which typically broke into pieces on descent, creating numerous unstable targets for the Patriot interceptor. Various factors, from unrealistic testing to a target for which the system was not designed, may account for this result. Whatever the cause, the Patriot's failure, although extremely costly in terms of human life, was not catastrophic because the Iraqi Scuds were armed only with small conventional explosives. This might not be the case with a national missile defense, where an enormous potential for disastrous failure exists.

The Pentagon's Criteria for Technical Readiness

Despite the factors described above, the Pentagon has established lenient criteria to determine the technology's readiness. Those criteria require two successful intercept tests before the Pentagon recommends that the United States begin deployment, provided one is a full-system test. To lower the bar even further, however, the DRR can give a provisional green light based on one intercept of any kind, as long as a successful full-system intercept occurs before construction begins. (If a decision is made to deploy, construction is currently scheduled to begin in April 2001.) Thus, the October 1999 intercept could provide the Pentagon with sufficient justification to give the missile defense

program a provisional green light for deployment. In other words, even though the second intercept test was a failure and a full-system test has not yet been conducted, the Pentagon can, under its criteria, declare the national missile defense system technically ready for deployment.

"Rushing to Review"

The Welch panel stated that 2000 is too soon to make a meaningful determination of the system's technical readiness, and called instead for a "feasibility review." Events since the panel issued its report—including the failure of the January 18 test, the postponements of the next test, the compression of the schedule, and the delays in delivery of software used for simulating tests—all highlight the high-risk nature of the program and the increasing stress to which it is subject.

Even further, the Pentagon originally wanted to have at least five to six intercept tests conducted before it carried out the DRR. This became impossible under the current schedule because the first test, in October 1999, took place only after a 20-month delay. The recent DOT&E report highlights its concerns about the current schedule in this way:

> [S]ince the DRR date has not been deferred, undue pressure has been placed on the program to meet an artificial decision point in the development process. The DRR will be a "come as you are" type of review which will examine the maturity and potential of the program at that point. This is driving the program to be "schedule" rather than "event" driven. This pattern has historically resulted in a negative effect on virtually every troubled DoD development program.

Given all these considerations, it is highly unlikely that the Pentagon will have enough information this year to make a realistic and thorough assessment of the technical readiness of the proposed national missile defense system.

The Effect on Arms Control

Increasing Nuclear Dangers

Since the emergence of a missile threat to the United States in the late 1950s, American security has relied on arms control, deterrence, and an active and engaged diplomacy. With the end of the Cold War, the disintegration of the Soviet Union, and the changing relationship between the United States and Russia, the basis and structure of the international security regime have significantly changed. The massive military forces built up by both sides have declined, and the two countries have sought to work together on security issues. However, a stable balance has not emerged, and the two countries continue to struggle to create a relationship that enhances the security of both. This is nowhere more evident than in U.S. consideration of national missile defense.

In the 1972 ABM Treaty, the United States and Russia agreed not to deploy nationwide missile defense. To build its proposed national missile defense, the Clinton Administration must either get Russian agreement to modify the Treaty, or withdraw from it. At present, the Clinton Administration wants to preserve the Treaty in some form; President Clinton and other officials regularly refer to it as the "cornerstone of strategic stability."

To that end, President Clinton and then-Russian President Boris Yeltsin announced on June 10, 1999, that the two countries would begin discussions on both the ABM Treaty and START III. Several rounds of high-level talks have occurred.

The initial phase of the Clinton Administration's proposed national missile defense would violate the ABM Treaty in three principal ways. First, Article 1 of the Treaty forbids any system, or the base for any system, that attempts to protect the entire territory of either country. Second, the proposed system will initially deploy interceptors in Alaska. Under the current ABM Treaty agreements, the U.S. is only allowed interceptors at Grand Forks, North Dakota. Finally, the U.S. wants to upgrade and deploy radar systems around the globe to strengthen early warning and guidance capabilities; these would violate the ABM Treaty's strict limits on the kinds and locations of radars.

U.S. plans do not stop at that first phase, however, and the additional phases would necessitate further Treaty modifications. Changes would be required to permit up to 250 interceptors in Alaska and North Dakota, along with additional radars and new satellites that provide targeting information to the interceptor—another Treaty violation.

In the Clinton Administration's view, these changes are fully consistent with the intent and purpose of the ABM Treaty. As Secretary of State Madeleine Albright said in a speech on November 10, 1999, "The changes we are contemplating in the ABM Treaty are limited. They would not permit us to undermine Russia's deterrent." Walter B. Slocombe, Under Secretary of Defense for Policy, said in testimony before Congress on October 13, 1999:

> The limited defensive system we have in mind is fully consistent with the fundamental purpose of

> the ABM Treaty, which is to ensure that each party's strategic deterrent is not threatened by missile defenses of the other party. We believe the Treaty can be amended to permit deployment of a limited NMD, while preserving the fundamental principle of the Treaty that prohibits large-scale defense that would threaten strategic deterrence.

The Russian Response and the Breakout Potential

The predominant message from Russian military and political officials has been that modifying the ABM Treaty is out of the question. Russian President Putin has, on occasion, hinted at some flexibility. Secretary of State Albright met with Putin in early February 2000, and reported that he might consider modifications to the Treaty, as long as its fundamental principles were maintained. The June 2000 Clinton-Putin summit in Moscow, however, produced no hint of any progress toward the Clinton Administration's goal.

If Russia does consider modifications, the question becomes whether the Clinton Administration's proposals will be acceptable. In May 2000, U.S. "talking points"—negotiating documents provided to Russia in January 2000—were leaked to the media. They indicate that, for the most part, the first changes to the Treaty requested by the United States, although substantial, would not necessarily undermine the goals of the ABM Treaty.

The documents, however, also indicate that as soon as March 1, 2001, the United States could seek additional changes that would allow subsequent phases of the proposed national missile defense system. Those next phases, already envisioned by the Clinton Administration, create the potential for "breakout," a situation in which the U.S. could increase rapidly the capability of the missile defense before Russia could respond.

This "breakout" potential would emerge once the full system of radars and satellites were in place. At that point, the U.S. missile defense could be quickly and dramatically expanded by simply adding more interceptors. Unlike radar construction and satellite launches, which cannot easily be hidden, interceptors can be built covertly, so Russia may fear that it would have little or no warning should the U.S. suddenly chose to exceed new limits set in ABM Treaty modifications.

Even further, Russia's calculations of the breakout potential would not be based on its ability to overwhelm U.S. defenses in a first strike, but on whether Russia could still retaliate after an attack by the United States that might eliminate a substantial portion of the Russian arsenal.

Finally, Russia's concerns may be heightened by the other missile defense systems the U.S. is researching, such as air- and space-based lasers, sea-based interceptors, and other theater-level programs. Given the continuing pressure for more missile defense from advocates in Congress, Russia may worry about whether the Senate would approve any ABM modifications Russia agrees to and where the expanding U.S. missile defenses would stop.

The Future of the ABM Treaty

Outcome One: Russia Agrees to Modify the ABM Treaty

As noted above, it is possible that Russia could agree to some modifications of the ABM Treaty, permitting the U.S. to deploy at least a first phase of a national missile defense system. On this point, the Clinton Administration believes that Russia has no realistic choice, because the Russian nuclear arsenal is declining and the next U.S. administration may simply withdraw from the Treaty rather than trying to modify it. Vladimir Putin's ascendancy has increased the likelihood of agreement, and not only because he might be more amenable to modifications than Yeltsin was. After Yeltsin's resignation on December 31, 1999, Russia presidential elections were held on March 26, rather than in June. This has provided three additional months for ABM Treaty and START discussions with President Putin, who may, with his clear victory, have more freedom of action than Yeltsin had.

The most likely avenue for Russian agreement on ABM Treaty changes would be in exchange for U.S. concessions on START III. The framework agreement for START III concluded by Clinton and Yeltsin in 1997 set limits of 2,000–2,500 deployed strategic warheads for each country. Because Russia is likely to have severe financial difficulties maintaining an arsenal of that size, it has proposed that the limit be set at 1,500 warheads or less. The U.S. has resisted that proposal, primarily because current U.S. nuclear war plans call for maintaining a minimum of 2,000 strategic warheads. In May 2000, the Joint Chiefs of Staff testified before Congress on whether the United States could drop below that level. They indicated that it could be possible, but that an analysis of the implications of such reductions would have to take place before they would support such cuts.

(On the other hand, in the leaked "talking points" documents, the United States declares that Russia is likely to maintain a large nuclear arsenal —on high levels of alert—for the foreseeable future. In the U.S. view, as long as Russia maintains this posture, it will be able to overwhelm U.S. missile defenses. In essence, the United States is encouraging Russia to maintain the posture so that the U.S. can pursue missile defenses against a threat that does not yet exist. See "Comments on U.S. 'Talking Points' on the ABM Treaty," p. 26.)

If the U.S. and Russia can reach a deal leading to further arsenal cuts, this would diminish one of the most adverse impacts of U.S. missile defense deployment. Verified nuclear reductions would continue, and the U.S.-Russian relationship would be strengthened. However, even with Russian agreement, the U.S. would likely face a backlash against missile defense from China, and might still face strong questions from U.S. allies such as France and Germany. Moreover, as the U.S. "talking points" highlight, the road to reductions in Russia's arsenal below START III levels may be barred if Moscow seeks to maintain its deterrent against U.S. defenses.

The Chinese reaction has been especially pointed. Chinese leaders have expressed strong opposition to U.S. proposals for missile defense, and co-sponsored with Russia and Belarus a 1999 UN General Assembly resolution calling for maintaining the ABM Treaty. In an interview published on July 1, 1999, Sha Zukang, director of the Arms Control Department of the Chinese Ministry of Foreign Affairs, made China's position very clear:

> [S]ome enthusiastic advocates of national missile defense in the United States have repeatedly claimed that China is a main target for the development of national missile defense by the United States, because they think national missile defense, with its limited capacity, is not very effective in defending against Russia's huge nuclear arsenal, but may be very effective if used to guard against the potential threat posed by China's limited nuclear capability. This kind of Cold War logic will seriously undermine the positive coordination and cooperation between China and the United States in relevant fields over the years. Furthermore, if the situation so demands, China will have no choice but to review a series of policies on arms control, disarmament, and prevention of proliferation.

During the Cold War, China remained largely outside the nuclear arms race. Russia and the United States, as well as the United Kingdom and France, developed substantial arsenals of solid-fueled, multi-warhead long-range missiles, many kept on high alert. China, on the other hand, developed a relatively small force of 20 or so long-range, liquid-fueled, single-warhead missiles, which it keeps unfueled, hours from being ready to launch. This de-alerted status brings into question one of the nominal motivations for the U.S. national missile defense proposal, the threat of "accidental" attack from China. With unfueled missiles, the chances of accidental launch are extremely low.

China's concern over U.S. missile defenses stems from the number of interceptors the U.S. plans to deploy. As described above, the U.S. plans to launch up to four interceptors at each incoming warhead in an effort to achieve nearly a 100 percent probability of a successful intercept. With an initial deployment of 100 interceptors, the U.S. could have at least a theoretical capability to intercept and destroy a full-scale attack by China's current arsenal. China's original motivation for developing nuclear weapons was to prevent domination by Russia or the U.S. by deploying its own small nuclear deterrent. If this is nullified, or perceived to be nullified, by missile defenses, and China maintains its original motive, it will very likely increase its nuclear arsenal.

China is already in the process of slowly modernizing its nuclear arsenal to include longer-range missiles, some with multiple warheads. In August 1999, China used decoys and other countermeasures in the live test of one long-range missile, the Dongfeng-31. Another land-based mobile missile and a submarine-based missile may also be in development. The pace and size of these increases, along with the use of countermeasures, could be accelerated in response to deployment of a U.S. national missile defense.

It was precisely this type of action-reaction dynamic between the United States and the Soviet Union that led to the bilateral ABM Treaty. If the U.S. deploys a national missile defense, China can increase the capability of its deterrent, whether or not Russia agrees to modify the ABM Treaty.

China would have at least two options for defeating a U.S. missile defense system. First, it could field more warheads than the 200-plus interceptors the U.S. plans to deploy. As the 1999 National Intelligence Estimate describes, "China has had the technical capability to develop multiple [warhead missiles] for 20 years."

It would probably be cheaper and almost as effective for China to employ decoys and other

countermeasures to defeat the U.S. missile defense system. As described above, China recently tested such countermeasures on a long-range missile, and the National Intelligence Estimate specifically noted that both China and Russia have already developed this capability.

A larger Chinese arsenal would not only increase the threat to the United States, it could have significant regional impacts as well. India and then Pakistan could respond by increasing their budding arsenals. Japan and South Korea could also feel pressure to react. Finally, as is possible in Russia, the Chinese government could take a turn for the worse, either by adopting a more threatening stance to the United States and/or by proliferating weapons of mass destruction and missile technology.

Western allies have also expressed strong reservations about U.S. deployment of a national missile defense system. Those reservations were reflected in the December 1999 vote on the UN General Assembly resolution introduced by Belarus, China and Russia in support of the ABM Treaty. Only Albania, Israel and Micronesia voted with the United States in opposing the resolution. The United Kingdom, Germany and most other U.S. allies abstained, while France and Ireland voted for it. In the end, 80 countries voted for the resolution, four voted against it, and 68 abstained.

Europeans leaders have several concerns about U.S. plans for national missile defense. First and foremost, they fear the U.S. deployment could ignite a new arms race and increase tensions with Russia, even if the two nuclear giants agree to modify the ABM Treaty. Second, many think U.S. missile defense is an elaborately technological and ultimately futile response to a remote threat. Others believe that U.S. efforts will create a strategic imbalance, potentially weakening the transatlantic alliance by creating two tiers of security, with Europe vulnerable and the U.S. not. Finally, some fear unilateral U.S. missile defenses could lead to a more confrontational U.S. security policy, potentially heightening global tensions.

Many of these concerns are reflected in the comments made by French President Jacques Chirac in an interview in *The New York Times* on December 17, 1999:

> If you look at world history, ever since men began waging war, you will see that there's a permanent race between sword and shield. The sword always wins. The more improvements that are made to the shield, the more improvements are made to the sword. We think that with these systems [missile defense], we are just going to spur swordmakers to intensify their efforts. China, which was already working harder than we realized on both nuclear weapons and delivery vehicles for them, would of course be encouraged to intensify those efforts, and it has the resources to do so. India would be encouraged to do the same thing, and it, too, has the resources. And it would also increase tensions within NATO, which would be too bad.

German officials have also voiced reservations. In November 1999, Foreign Minister Joschka noted: "There's no doubt this [missile defense] would lead to split security standards within the alliance. I see lots of problems developing in this respect, which we must discuss calmly and reasonably with our American friends."

In Greenland, where the U.S. plans to upgrade its existing early warning radar and later build a new X-band radar installation, the local government has also expressed concern about U.S. intentions, and has suggested that it will allow the U.S. to carry out its plans only if Russia agrees. Denmark, which sets Greenland's foreign policy, may also oppose unilateral U.S. action.

Finally, some U.K. officials suggested that any missile defense should be extended to protect the United Kingdom, as well, if not Europe as a whole. That would be extremely difficult under current Clinton Administration plans, because of range limitations of the ground-based interceptors. British opinion, like Danish, is particularly relevant because the U.S. plans to upgrade radars based in Great Britain for the national missile defense system.

Outcome Two: Abrogating the ABM Treaty

U.S. deployment of a national missile defense system without Russian agreement to modify the ABM Treaty could radically change the international security environment. Whether done by Clinton or the next U.S. administration, such a move would be viewed by allies and potential adversaries alike as a unilateral show of power, and a rejection of the multilateral security structure of the post-Cold War. It would end U.S.-Russian negotiated stockpile reductions, and undercut hopes for the entry into force of the Comprehensive Test Ban Treaty (CTBT) and the negotiation of a fissile material production cut-off treaty. Arms control as practiced since the 1960s would likely end, with a return to competitive nuclear policies and perhaps a new Russian-Chinese alliance.

The U.S. Senate's October 1999 rejection of the Comprehensive Test Ban Treaty strengthens the international perception that the U.S. is increasingly "going it alone" in security issues. Outside the United States, the test ban vote was almost universally perceived as a threat to the international security system and the non-proliferation regime. It increased fears that the U.S. would pursue a unilateralist approach to the world, an anxiety heightened by the U.S. position as the sole remaining superpower.

The Clinton Administration is aware of this dynamic. As previously noted, it has repeatedly stated that the ABM Treaty is the "cornerstone of strategic stability." Administration officials claim to prefer an agreement with Russia to modify the Treaty over a move to withdraw from it.

At the same time, U.S. officials continue to threaten to pull out of the Treaty. The December 1999 White House publication, "National Security Strategy for a New Century," explicitly states: "[T]he Administration has made clear that it will not give any state a veto over any missile defense deployment decision that is vital to our national security interests." The Clinton Administration is also implicitly threatening the Russians with the possibility that the next president of the United States might quickly abrogate the Treaty without regard for Russian concerns.

U.S. abrogation would have immediate adverse consequences. First, the negative reactions of China and NATO allies would be greatly magnified. Already concerned about Senate rejection of the test ban, countries may become more reluctant to cooperate with the U.S. on other issues, such as trade or limiting the spread of missile technology and weapons of mass destruction. The U.S. could end up isolated, despite its economic and social leadership. As noted above, Russian ratification of START II was conditioned on continued U.S. adherence to the ABM Treaty. Speaking to the Duma on the day it approved ratification of START II, Russian President Putin indicated that entire fabric of arms control treaties would come into question if the U.S. stopped adhering to the ABM Treaty: "I want to stress that, in this case, we will have the chance and we will withdraw not only from the Start II treaty, but from the whole system of treaties on the limitation and control of strategic and conventional weapons." Significantly, the National Intelligence Estimate notes, "If Russia ratifies START II, with its ban on multiple warheads on ICBMs [intercontinental ballistic missiles], it would probably be able to maintain only about half of the weapons it could maintain without the ban."

Some U.S. officials argue that Russia's strategic nuclear arsenal will decline even without treaties. When asked if Russia could rebuild its nuclear arsenal, Assistant Secretary of Defense Edward Warner, in testimony before the Senate in April 1999, replied, "They are in such miserable condition that it is really not an option for them. Even

Withdrawing from the ABM Treaty

A decision by President Clinton to deploy a national missile defense would not immediately violate the ABM Treaty. If the U.S. does not get Russian agreement to modify it, however, at some point the U.S. would be forced either to abrogate the Treaty or use its withdrawal clause. Under that clause, the U.S. can provide Russia with six month's notification of the U.S. intent to pull out. The question is, when does a Treaty violation occur?

Numerous Clinton Administration officials had said a violation occurs when the U.S. first pours concrete to install components. Under the current schedule—if Clinton endorses deployment—that will happen in May 2001, necessitating a November 2000 notification of U.S. intent to withdraw.

In June 2000, however, Clinton Administration officials acknowledged that their attorneys had developed interpretations holding that pouring concrete does not violate the Treaty and proposing three actions, further along in construction, that could be violations. If accepted by officials, this could allow Clinton to endorse deployment, yet claim continued adherence to the Treaty for the rest of his term. This would force Russia to choose between crying foul—creating a potential crisis—or allow the U.S. interpretation to stand.

Alternatively, the United States could begin construction and proclaim continued adherence to the Treaty, ignoring the reality on the ground. When in the 1980s Moscow began construction of a radar in the middle of its territory—a Treaty violation—the Soviet Union did not withdraw. (Under U.S. pressure, the Soviets halted construction.)

the issue of being able to avoid the downward path does not seem to be a serious option."

This decline is largely due to the increasing age and high cost of maintaining Russia's long-range missile force. Many of Russia's long-range missiles are nearing the end of their life-spans. As a result, Russia's strategic nuclear arsenal could decline to a fewer than 1,500 warheads over the next decade, even without the START process. However, there are important uncertainties in the future composition and size of that arsenal, including the number of multi-warhead missiles, depending on choices made by Moscow and on its relations with the United States.

These uncertainties result from reliance on a non-negotiated decline in Russia's nuclear arsenal. First, under the START process, the reductions in Russia's arsenal are verified by the United States. Missiles are eliminated, and the warheads removed, most for dismantlement. START I is reducing the Russian strategic arsenal to roughly 6,000 deployed warheads. START II would cut that to 3,000-3,500. As described above, Russia has already proposed that START III set limits of 1,500 strategic warheads each. U.S. abrogation of the ABM Treaty could end these reductions, as well as the potential for even deeper cuts.

Second, if unrestrained by START II, Russia could attempt to reverse the decline in its forces by, for example, putting multiple warheads on the Topol-M mobile missiles now being built, and by increasing its production rate. (START II bans multi-warhead land-based missiles.) At present, Russia is producing about ten Topol-M missiles per year. This low production rate is primarily due to Russia's troubled economy. It may be a mistake, however, to assume that trouble will continue indefinitely.

Alternatively or in addition, Russia could hold onto some of its missiles longer—including the 10-warhead SS-18, the most powerful nuclear-capable missile ever built. One of the primary goals of U.S. START II negotiators was to eliminate this missile. It is expected to reach the end of its life-span in the next ten years, but its service could be extended. Alexei Arbatov, a member of the Defense Committee of the Russian Duma, recently stated that Russia could, with modest expenditures, maintain an arsenal of 2,500 strategic warheads. Other Russian analysts have suggested even higher figures.[4]

U.S. withdrawal from the ABM Treaty could also prompt an asymmetrical Russian reversal in the unilateral reductions in tactical nuclear weapons made by Presidents Bush and Gorbachev in 1991. With the decline in Russia's conventional forces, Russian military officials have already become more reliant on tactical nuclear weapons, and could deploy more to counter NATO's much stronger conventional military forces. In this vein, Russia announced in January 2000 a new military doctrine that lowered the threshold for use of nuclear weapons. While not a direct threat to the United States, this could have serious implications for U.S. allies in Europe.

Finally, as the National Intelligence Estimate warns, unilateral deployment of a ballistic missile defense could alter Russian and Chinese behavior with regard to the export of missiles and missile technology. The United States has, with some success, opposed exports of missiles and missile technology by both countries. Since 1994, neither country has exported entire missiles. While the National Intelligence Estimate judges it unlikely, it notes that U.S. actions on missile defense, as well as economic considerations, could change that pattern. Russia or China could chose to counter U.S. global predominance by intentionally seeking to proliferate threats to the United States.

Impact on the Non-Proliferation Regime

Along with wreaking havoc on the nuclear arms reduction process, U.S. abrogation of the ABM Treaty could dangerously undermine the non-proliferation regime. In particular, the strength of the NPT could be badly shaken. Under the NPT, the five declared nuclear-weapon states—China, France, Russia, the United Kingdom and the United States—agreed to pursue nuclear disarmament. In return, all other Treaty members—a group which includes every country in the world except India, Pakistan, Israel and Cuba—agreed to renounce nuclear weapons entirely.

From April 14 to May 19, 2000, the NPT held the first Review Conference since 1995, when the Treaty was made permanent. At the 1995 conference, Treaty members agreed to three interlocking and politically binding commitments: a permanent Treaty; a strengthened review process for the Treaty; and a set of *Principles and Objectives for Nuclear Non-Proliferation and Disarmament*. The last of these established a set of benchmarks for progress on nuclear disarmament. It includes commitments to achieving the Comprehensive Test Ban Treaty and to the "determined pursuit by the nuclear-weapon

States of systematic and progressive efforts to reduce nuclear weapons globally, with the ultimate goals of eliminating those weapons. . ."

At the 2000 conference, the vast majority of states raised concerns about U.S. plans for national missile defense and supported maintaining the ABM Treaty. A serious breakdown was avoided, however, when the five nuclear weapons states — the United States, Russia, China, the United Kingdom, and France — agreed on a statement that called for the "preserving and strengthening" the ABM Treaty. This phrasing allowed the U.S. to maintain that modifying the Treaty would strengthen it, while others could continue to oppose any changes. By avoiding this critical issue, the conference reached an agreement than included an "unequivocal undertaking" by the nuclear weapons states to eliminate their nuclear arsenals.

This outcome, however, could easily be reversed by U.S. deployment of national missile defenses. Senate rejection of the test ban, U.S. abrogation the ABM Treaty, and the continuing delays in START II implementation despite Russian ratification, all point to broken U.S. and Russian commitments to nuclear arms reduction under the NPT. Already, countries increasingly perceive that the United States and Russia are planning to retain their nuclear arsenals permanently. This could, over time, prompt some countries to withdraw publicly from the NPT and construct their own nuclear arsenals, as one senior Japanese official has forecast. Other countries might be tempted to circumvent the NPT, developing clandestine nuclear weapons programs.

Another significant danger could arise from reduced cooperation between the United States and Russia in controlling the latter's enormous stockpile of fissile materials (the building blocks for nuclear weapons). Despite numerous reports and occasional incidents, to date there have been few leaks from Russia's minimally protected nuclear facilities. If the U.S. were to abrogate the Treaty, however, Russian interest in cooperating with the West on materials control may decline. This could increase the threat (already far more likely than a missile attack) that a terrorist group or state might obtain or build a nuclear weapon and float it into New York harbor on a boat, or drive it across U.S. borders.

Finally, U.S. abrogation of the ABM Treaty could severely hinder efforts to persuade China, North Korea, India and Pakistan to ratify the Comprehensive Test Ban Treaty, and would thus preclude its entry into force, even if the U.S. Senate ratified it. It would also hinder U.S. efforts to negotiate a ban on the production of the fissile material used in nuclear weapons. Agreement on such a ban is the highest U.S. priority at the multilateral arms control negotiations at the Conference on Disarmament.

In short, by building national missile defenses, the U.S. may stimulate new threats, unraveling the entire post-Cold War structure for controlling nuclear and missile technology and weapons. U.S. withdrawal from the ABM Treaty would jeopardize four non-proliferation and disarmament treaties—the NPT, the CTBT, and START I and II—as well as the potential for START III, for even deeper cuts, and for the ban on fissile material production. Some Russian officials have even hinted that the Intermediate-range Nuclear Forces (INF) Treaty, which completely eliminated nuclear-tipped missiles with a range of 500–5,500 kilometers, could come into question. Prospects for mutual, cooperative steps to reduce nuclear dangers outside the treaty process would also diminish sharply.

Comments on U.S. "Talking Points" on the ABM Treaty

In May 2000, U.S. negotiating documents from the talks with Russia on modifying the ABM Treaty—"Talking Points for ABM Treaty Negotiations"—were leaked to the Bulletin of the Atomic Scientists. Dr. Bruce Blair, President of the Center for Defense Information and former nuclear missile officer, made the following comments on the documents:

The Clinton Administration's proposal for altering the ABM Treaty to allow the U.S. to build a missile defense system accurately states that defenses have been opposed because of "concerns that one side might have the ability to make a surprise disarming first strike against the enemy and then deploy a broad strategic missile defense system to knock out the enemy's combat resources which had survived the first strike and were being launched against the assailant."

However, the proposal seriously misstates the adverse effects of the proposed "limited" U.S. national missile defense on Russia's strategic deterrent. ***Moreover, the proposal, which encourages Russia to maintain its hair-trigger posture indefinitely, means the continued, and increasing risk of a mistaken or unauthorized launch of nuclear missiles. The U.S. should be seeking to reduce, not embrace, Russia's readiness to launch on warning.***

The proposal undermines stability in the following ways:

- It states that the U.S. missile defense system will be limited to protect against a threat from a few dozen warheads, while Russia would keep between 1,000 and 2,000 to have "the certain ability to carry out an annihilating counterattack. . ." In reality, a surprise offensive U.S. strike could potentially destroy all but a few tens of Russian warheads, and Russia's control over these surviving weapons might be lost. In the future (2010–2015), the size of the Russian force could easily drop below 500 warheads, in which case the protection afforded by a "very limited" U.S. NMD system would be much more threatening to Russia.
- It asserts that the Russian strategic forces that would survive a U.S. strike could deliver a minimum of a few hundred warheads. But this is higher than Russian planners would estimate.

And a minimum of a few hundred deliverable Russian warheads is not even an acceptable number of surviving weapons from a Russian standpoint, just as several hundred surviving U.S. forces would not be acceptable to the United States. As a point of reference, the United States currently requires its strategic forces to be able to destroy, in retaliation to Russian attack the vast majority of the nearly 3,000 targets assigned to them.

- It cites the hair-trigger alert status of Russian nuclear missiles as grounds for Russian confidence that they could mount an annihilating counterattack. In reality, Russian—and U.S.— high-alert posture means the continued and increasing risk of a mistaken or unauthorized launch. The U.S. should be seeking to reduce, not embrace, Russia's readiness to launch on warning.
- It encourages Russia to maintain its hair-trigger posture indefinitely. The most urgent priority today is to get Russia, and the United States, to take their strategic forces off high alert in order to buy a larger margin of safety against a catastrophic failure of command and control. Russia's ability to accurately detect a nuclear attack is deteriorating rapidly. Their early warning network is in shambles. Russian confidence in their nuclear command system has declined sharply.
- Finally, the U.S. proposal offers the following reassurance: ". . .the tremendous risks associated with initiating a nuclear war under any circumstances make these theoretical calculations largely irrelevant. Obviously, neither side could ever contemplate such an assault." No, but they nonetheless PREPARE such an assault, and both Russia and the United States base their nuclear policy on each other's capabilities, not on their intentions. The inconvenient truth is that both sides are planning for the contingency of all-out nuclear attack.

  The Russians would have to pay more attention to the fact that if the U.S. made a launch decision, the order could be carried out within about two minutes. Officers in their launch centers would validate the order, re-target their missiles in seconds, and immediately launch about 2,000 strategic warheads. About ten minutes later, another 400 warheads would break water from the U.S. ballistic missile submarines on launch-ready alert at all times.

The Cost of National Missile Defense

Tens of Billions and Rising

The United States has already spent roughly $122 billion on various systems designed to intercept incoming missiles. Since President Reagan unveiled his Strategic Defense Initiative (SDI) in 1983, the U.S. has spent $69 billion. An effective system has never been fielded. Time and again, defensive capabilities proved inadequate to address the threat.

Almost all the $69 billion spent since Reagan's proposal has gone for research and development of potential systems, rather than their production. Actually building the space-based systems proposed in SDI would have cost well over $100 billion. However, even the limited system envisioned by the Clinton Administration will cost tens of billions of dollars. In May 2000, the Congressional Budget Office reported that, through 2015, the Clinton Administration's proposal would cost almost $30 billion for just its first phase; planned additional phases would total $60 billion.

The $30 billion figure includes the deployment and initial operating costs for the "expanded Capability 1" system, with 100 interceptors at one site, one new "X-band" radar, and five upgraded early warning radars. If a decision is made to deploy, the system is scheduled to have an initial capability in 2005 and be fully in place by 2007. The second and third phases of the Clinton Administration proposal, with a second interceptor site, a total of 250 interceptors, eight more "X-band" radars, and a new satellite system—SBIRS Low—bring the costs to $60 billion. That figure leaves out a separate set of new satellites—SBIRS High—that will contribute to the system. Undertaking the additional testing that should be done to ensure the effectiveness and reliability of the system would drive up costs even further.

The cost escalation that results from tabulating the full price of missile defense systems has in the past led to sharp declines in support for the proposal. For example, in 1996, the Congressional Budget Office estimated it would cost $31–$60 billion to build the system envisioned in the "Defend America Act" proposed by Majority Leader Robert Dole and Speaker Newt Gingrich. That estimate did not include the cost of operating and maintaining the system. The resulting "sticker shock" effectively killed the bill.

Missile defense advocates learned from that episode. Lowering the cost of system was one of the factors motivating the "limited" national missile defenses now proposed by the Clinton Administration.

In its estimates, the Clinton Administration cites relatively modest cost figures. In January 1999, it earmarked procurement money for national missile defense for the first time by adding $6.6 billion to its five-year budget, creating a $10.5 billion program. In February 2000, cost estimates rose, in part

because of the new plan to deploy 100 interceptors as soon as possible. The Clinton Administration added a further $2.2 billion in procurement money for the additional interceptors and to implement many of the recommendations of the 1999 Welch panel.

A December 1999 media report, however, quoted an unnamed Pentagon source who said building and maintaining the Clinton Administration's proposed system would cost $16 billion over five years and $32.1 billion over the next ten years. The source noted even that figure omits nearly $4 billion in acquisitions for system components already bought that the Pentagon does not count in its cost estimates.[5]

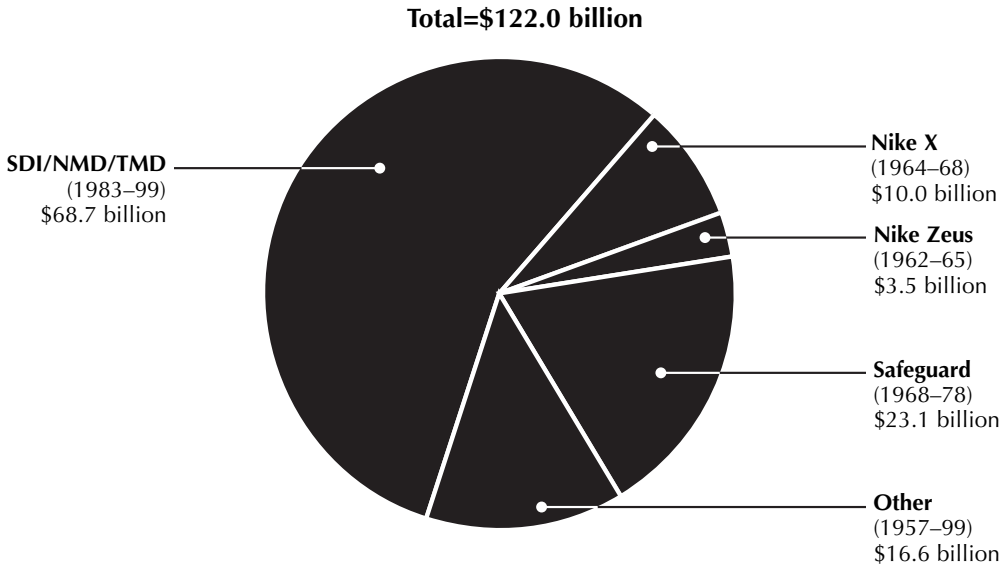
Despite necessarily higher costs, many missile defense supporters, including some in Congress, call for vastly larger deployments—including sea- and space-based components—than the Clinton Administration proposal. These more expansive systems could again drive costs for building and maintaining the system to well over $100 billion. In 1996, the Senate Budget Committee estimated it would cost as much as $184 billion to build and operate a system that included substantial space-based components.

Since the Clinton Administration's system is not yet fully designed and components are still being developed, the above estimates can only be viewed as preliminary and are likely to be lower than actual costs. In general, the Pentagon tends to underestimate development and acquisition costs by 15 to 20 percent. Historically, however, for complicated programs such as the proposed national missile defense, cost increases have been far greater.

For example, the B-2 bomber—the Air Force's first and only long-range "stealth" aircraft—experienced enormous cost increases. The B-2 program originally called for 132 planes at an estimated cost of $21.9 billion, or $160 million per plane. When the program was finally capped, the Pentagon built 20 planes for $44.4 billion in then-year dollars, or approximately $2.2 billion per plane, an increase of 1,375 percent.

The Cost of U.S. Ballistic Missile Defense Programs, 1957–99*

in 2000 constant dollars



* Prior to 1962, spending on missile defense programs was not tracked. Roughly $1.6 billion was spent on missile defense before then, including Nike Zeus, but cannot be disaggregated.

Source: *Atomic Audit,* Stephen Schwartz, Editor, Brookings Institution Press, 1998, updated by Liesl Heeter, Center for Strategic and Budgetary Assessments, March 2000.

The Rising Costs of National Missile Defense

Estimate	Cost
Clinton Administration Initial Budget for C-1	$10.5 billion over five years (January 1999)
Clinton Administration Update for 'expanded' C-1	$12.7 billion over five years (January 2000)
Unnamed Pentagon Source for 'expanded' C-1	$16 billion (plus $4 billion) over five years (December 1999)
Congressional Budget Office for 'expanded' C-1	$29.5 billion through 2015, deployment and operating costs (May 2000)
Unnamed Pentagon Source for C-2	$32.1 billion (plus $4 billion) over 10 years (December 1999)
Congressional Budget Office for C-3	$48.8 billion
Components of the proposed NMD not included in above figures	
SBIRS High	$7.6 billion
SBIRS Low	$10.6 billion
BMD Spending To Date	
U.S. spending on missile defense since 1957	$122 billion
U.S. spending on missile defense since 1962	$120.4 billion
U.S. spending on missile defense since 1983	$68.7 billion
Amount budgeted for 2000	$4.5 billion
Number of national missile defense systems fielded	0

C-1: Initial one-site system with 20 interceptors.

'Expanded' C-1: Enlarged system with 100 interceptors.

C-2: Adds additional radars and sensors.

C-3: Two-site system with up to 250 interceptors.

SBIRS High and Low: satellites that detect and track missiles.

Cost-Effectiveness and Cost-Effective Alternatives

The United States already spends more annually on missile defense, roughly $4.5 billion per year, than the estimated total military budgets of North Korea and Iraq combined, at $3.7 billion.[6] However, if any potential attacker, from North Korea to Russia, chooses such cheaper and effective alternatives as decoys and countermeasures to defeat the missile defense system, the defense will not be cost-effective. Although these countries may not have tens of billions of dollars to deploy missile defenses, even North Korea can be expected to afford technologies that may render the initial phase of U.S. defenses ineffective. This is true no matter how large a defense system the United States builds, because offense is cheaper—in this case substantially cheaper—than defense.

Rather than spending large sums of money on missile defenses, the United States would be better served by focusing on preventing new threats from emerging and by directly reducing existing threats. As described in the next chapters, the United States can pursue initiatives and expand existing activities to reduce potential proliferators' demand for and access to missiles and missile technology, as well as nuclear, chemical, and biological weapons and weapons technology. Related steps would cut nuclear arsenals and reduce the likelihood of an accidental or unauthorized launch of nuclear-tipped missiles.

AP/WORLDWIDE PHOTOS

A Russian Topol-M long-range balllistic missile is launched on October 1, 1999. With Cold War-style saber-rattling, Russia's military has been making a rare show of its nuclear forces as Moscow denounces U.S. calls to modify the ABM Treaty. The military has threatened to put multiple nuclear warheads on its new Topol-M missiles should the U.S. withdraw from the ABM Treaty.

The Threat
Real and Potential

The United States has faced the threat of nuclear missile attack for forty years. Ten years after the Cold War ended, Russia maintains 2,000 strategic nuclear warheads on high alert, together capable of destroying the United States in under an hour. No plausible missile defense could defend against such an attack.

Instead, the proposed national missile defense system is designed to blunt an attack on the United States by a few tens of warheads. The potential for a threat of this size comes from North Korea, Iran and Iraq, three states cited as seeking long-range missiles, or from a small accidental or unauthorized launch by Russia or China. In fact, of the three, only North Korea has any kind of long-range missile test program, which it froze in 1999 while pursuing talks with the United States.

Two developments heightened concern over potential new threats. The first was the July 15, 1998, release of the study by the Commission to Assess the Ballistic Missile Threat to the United States, known as the Rumsfeld report. Chaired by former Secretary of Defense Donald Rumsfeld, the Commission described a potential threat much greater than previous intelligence estimates had suggested:

> Concerted efforts by a number of overtly or potentially hostile nations to acquire ballistic missiles with biological or nuclear payloads pose a growing threat to the United States, its deployed forces and its friends and allies. These newer, developing threats in North Korea, Iran and Iraq are in addition to those still posed by the existing ballistic missile arsenals of Russia and China, nations with which we are not now in conflict but which remain in uncertain transitions. The newer ballistic missile-equipped nations' capabilities will not match those of U.S. systems for accuracy or reliability. However, they would be able to inflict major destruction on the U.S. within about five years of a decision to acquire such a capability (10 years in the case of Iraq). During several of those years, the U.S. might not be aware that such a decision had been made.

This report, particularly its emphasis that states *could* begin to develop long-range missiles or acquire missile technology without U.S. knowledge, changed the tenor of the debate over the threat of missile attack. Previously, intelligence estimates had focused on what was *likely* to occur, not what was merely possible.

The second development occurred on August 31, 1998, when North Korea tested a three-stage version of the Taepo Dong-1 missile. The North Korean government claimed the rocket launched a small satellite, but Western radar tracking indicates that the third rocket stage failed, tumbling erratically and burning up on re-entry. Despite its failure, many Western analysts were surprised by the presence of a third stage, a capability few thought North Korea had achieved. The missile's flight path over northern Japan heightened tensions in the region.

The Missile Threat to the United States: Dominated by Russia

Global Strategic and Nuclear Arsenals, January 2000

	ICBMs	ICBM Warheads	SLBMs	SLBM Warheads	Bombers	Bomber Warheads	Total Delivery Vehicles [1]	Total Strategic Warheads[2]	All warheads (including tactical, hedge)[3]
US	550	2,000	432	3,456	92	1,750	1,074	~7,200	~10,500
Russia	756	3,540	348	1,576	69	790	1,174	~6,000	~20,000
China	20	20	0	0	0	0	20	20	~410
France	0	0	64	384	0	0	64	384	~464
UK	0	0	48	185	0	0	48	185	185
Israel	0	0	0	0	0	0	0	0	~200
India	0	0	0	0	0	0	0	0	60[4]
Pakistan	0	0	0	0	0	0	0	0	30[4]
N. Korea	0[5]	0	0	0	0	0	0	0	?[6]
Iran	0	0	0	0	0	0	0	0	0[7]
Iraq	0	0	0	0	0	0	0	0	0[8]

ICBMs: Intercontinental Ballistic Missile, i.e., long-range land-based missile
SLBMs: Submarine-Launched Ballistic Missile, i.e., long-range sea-based missile

Sources: Natural Resources Defense Council, Institute for Science and International Security

1 "Delivery Vehicles" includes ICBMs, SLBMS and bombers

2 "Total Strategic Warheads" includes all warheads on the delivery vehicles above.

3 All warheads includes short- and medium-range warheads, including those on land- and sea-based missiles and on bombers, and warheads in the "hedge"—dormant storage, but not disassembled. Both the U.S. and Russia maintain such a reserve.

4 India and Pakistan may have enough fissile material for these numbers of nuclear weapons; it is unknown whether they have weaponized the materials, but they are on a path to do so.

5 North Korea has built one prototype of a long-range missile, the Taepo Dong-2, that theoretically could hit the United States with a nuclear warhead if it is equipped with a third stage, but it has never been tested.

6 North Korea may have enough fissile material to make two nuclear weapons, produced before it shut down its nuclear program as required under the 1994 Agreed Framework with the United States. It is unknown, however, whether they have refined the reactor-grade material to weapons-grade, a difficult process.

7 U.S. officials believe Iran is pursuing nuclear material and technology. Iran has always complied fully with inspections by the International Atomic Energy Agency (IAEA), but doubts remain.

8 Iraq had a large nuclear weapons development program prior to the Gulf War, but the IAEA and the UN Special Commission (UNSCOM) succeeded in eliminating the program entirely. The end of the UNSCOM inspection regime in December 1998, however, may allow Iraq to resume its program, although from a minimal base.

The 1999 National Intelligence Estimate

In September 1999, the U.S. intelligence community, led by the Central Intelligence Agency (CIA), released the unclassified version of the National Intelligence Estimate (NIE), "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015." This Estimate, the latest in a series begun in 1993, assesses the missile threats to U.S. security over the next 15 years. Its primary conclusions are:

> We project that during the next 15 years the United States most likely will face ICBM threats from Russia, China, and North Korea, probably from Iran, and possibly from Iraq. The Russian threat, although significantly reduced, will continue to be the most robust and lethal, considerably more so than that posed by China, and orders of magnitude more than that potentially posed by other nations, whose missiles are likely to be fewer in number—probably a few to tens, constrained to smaller payloads, and less reliable and accurate than their Russian and Chinese counterparts.

Following the example set by the Rumsfeld report, the new NIE for the first time included discussion of what *could* happen, along with its traditional analysis of what was *likely*. (Members of the Rumsfeld Commission served as outside reviewers of the NIE.) However, the NIE authors expressed doubts on the utility of this approach: "Some analysts believe that the prominence given to missiles countries 'could' develop gives more credence than is warranted to developments that may prove implausible." While what *could* happen is relevant, it should not drive missile defense policy.

North Korea

Among states newly pursuing missile technology, North Korea has by far the most developed missile program. The NIE found that North Korea could convert the Taepo Dong-1 into a long-range missile that could deliver a biological or chemical weapon to the United States. The Taepo Dong-1 had one flight test, in 1998. It failed. The NIE went on to say that North Korea was "more likely to weaponize the larger Taepo Dong-2 as an ICBM that could deliver a several-hundred kilogram payload (sufficient for early generation nuclear weapons) to the United States." In the latter part of 1999, intelligence reports indicated North Korea was preparing the first test-launch of the Taepo Dong-2. However, as the NIE noted was possible, testing of the Taepo Dong-2 was "delayed for political reasons."

A U.S. negotiating team headed by former Secretary of Defense William Perry arranged this delay, and talks between the two countries continue. In his October 1999 report, "Review of United States Policy Toward North Korea: Findings and Recommendations," Perry calls for a two-path strategy of engagement. On one path, the United States, together with South Korea and Japan, would seek "complete and verifiable assurances" that North Korea had ended its nuclear weapons program; the "complete and verifiable cessation of testing, production and deployment" of medium and long-range missiles; and a halt to missile exports. In return, the U.S. and its allies would "normalize relations with North Korea, relax sanctions that have long constrained trade with North Korea, and take other positive steps that would provide opportunities for North Korea."

Both sides have now taken steps down that path. The North Korean government announced a halt to its missile flight test program while discussions with the United States continue; in return, President Clinton in June lifted some trade sanctions against the isolated country.

Other developments indicate increasing North Korean interest in joining the international community. In recent months, Italy and Australia have both opened diplomatic relations with the isolated country. Most significantly, in June, the first summit meeting took place between the presidents of North and South Korea. In an historic agreement, the two agreed to discuss reunification, a move that would dramatically reduce any threat from the North.

If, against these trends, North Korea resumes its weapons programs, the Perry report recommends a second path: seek to maintain the 1994 Agreed Framework, which Perry notes has successfully halted North Korea's production of fissile materials for nuclear weapons, and take "firm but measured steps to persuade North Korea that it should return to the first path."

North Korea has taken a number of provocative steps, including its missile flight tests. Although it agreed to halt any flight tests, a CIA official testified before Congress in February 2000 that North Korea has continued other aspects of its program, including exports. North Korea has, however, never undertaken the series of tests required to develop and deploy an effective and reliable long-range missile. Instead, it has used tests and threats of with-

drawal from the NPT and the Agreed Framework to pressure the West into activity.

In early February 2000, officials agreed to arrange a visit to the United States by a high-level North Korean delegation. These talks will address both North Korea's missile development programs and its missile and missile technology exports. Successful negotiations with the United States could mean the end of both North Korea's missile development and its exports.

Even if this analysis is incorrect and North Korea chooses to develop an arsenal capable of inflicting damage on the United States, the NIE assesses that at most North Korea could build a few or a few tens of inaccurate, unreliable missiles. On the other hand, any assessment of the long-term threat from North Korea should take into account the possibility that the government could collapse or unite with South Korea within the next decade.

Iran

The NIE states that with Russian technology and assistance, Iran "could deliver a several-hundred kilogram payload to many parts of the United States in the last half of the next decade." However, analysts differ on how soon Iran would be *likely* to test a long-range missile capable of threatening the United States. Some thought it possible by 2010, others thought it unlikely before 2015.

Recent press reports state that North Korea continues to assist Iran's missile program. The design of Iran's Shahab-3, a mid-range missile that can reach Turkey, is based on that of North Korea's No Dong missile. This collaboration highlights the need to stop not only North Korea's own missile programs, but its exports of missile technology and components as well.

At the same time, Iran's democratic institutions are taking hold, and its relations with the United States have thawed modestly during recent years.

Iraq

As the NIE notes, "the Gulf war and subsequent United Nations activities destroyed much of Iraq's missile infrastructure." It goes on to state, however, that given sufficient foreign assistance, "Iraq could test a North Korean-type ICBM that could deliver a several-hundred kilogram payload to the United States in the last half of the next decade." Again, analysts differed on how *likely* that was, with some calling such a weapon likely before 2015, others possible before 2010 with foreign assistance, and still others unlikely before 2015.

Iraq remains under international sanctions, which limit its ability to acquire missiles and missile technology.

Russia

As already described, Russia currently deploys roughly 6,000 strategic nuclear warheads that can hit the United States. Of those, roughly 4,500 are on long-range missiles, either submarine- or land-based, of which somewhat less than half are on high alert, ready for launch within minutes. Russia's arsenal is declining in size as a result of aging equipment and a lack of resources. According to the NIE, "Russia will maintain as many strategic missiles and associated nuclear warheads as it believes it can afford, but well short of START I or II limitations." If relations with the United States stabilize, the Russian arsenal is likely to fall to 1,500 strategic warheads or less in the next decade. If the U.S. violates the ABM Treaty, Russia could maintain an arsenal of 2,500 warheads or more, including multi-warhead missiles that would otherwise be prohibited under START II. Under any scenario, as the NIE states, the remaining Russian nuclear arsenal will be "orders of magnitude" more capable, robust and lethal than any other threat to the United States.

The proposed national missile defense is designed to handle a small accidental or unauthorized launch from Russia or China. For both countries, the NIE judges the threat of unauthorized or accidental launch of a strategic missile "highly unlikely." As described later, the U.S. could take steps with Russia that would further reduce the likelihood of accidental launch.

At present, Russia's relations with the U.S. are strained but not broken; however, the possibility of upheaval in Russia or in U.S.-Russian relations cannot be dismissed. NATO's eastward expansion and the alliance's bombing of Serbia have increased Russian concerns about Western intentions. The broad public support in Russia for the war in Chechnya highlights a shift toward a more nationalistic mood. American and European criticism of that war has increased hostility toward the West. (Putin recently approved a new military strategy that lowered the threshold for the use of nuclear weapons.) If the U.S. abrogates or withdraws from

the ABM Treaty, it may make matters worse. In sum, a renewed atmosphere of confrontation with Russia should not be ruled out.

China

As described earlier, China has perhaps 20 long-range ballistic missiles armed with nuclear warheads. The NIE states that: "By 2015, China will likely have tens of missiles targeted against the United States, having added a few tens of more survivable land- and sea-based mobile missiles with smaller nuclear warheads."

The NIE also notes that China has had the capacity to deploy multi-warhead missiles for years, but has not done so. As described earlier, China is already developing new and more capable long-range nuclear-tipped missiles, with plans for two new land-based mobile missiles and a submarine-launched version. It is unclear how rapid and how large an increase in its arsenal China will pursue. If China seeks to maintain its deterrent, however, U.S. deployment of national missile defenses will push the Chinese to increase their arsenal. Press accounts in October 1999 reported that China had added $9.7 billion to its defense budget to improve its nuclear arsenal.

Non-Ballistic Missile Threats

The threat of missile attack should not be considered in isolation. There are other, more likely methods of attack available to potential aggressors. Should a country decide it wants to attack the United States with a nuclear, chemical, or biological weapon, it is likely to chose delivery methods that are more reliable, less expensive, more covertly deliverable, more accurate, and likely to be more effective than long-range ballistic missiles.

The NIE includes a substantial discussion of alternatives to long-range missile attack: "Several other means to deliver weapons of mass destruction to the United States have probably been devised, some more reliable than ICBMs that have not completed rigorous testing programs. For example, biological or chemical weapons could be prepared in the United States and used in large population centers, or short-range missiles could be deployed on surface ships." It goes on:

> [I]initial indigenous nuclear weapon designs are likely to be too large and heavy for a modest-sized ballistic missile but still suitable for delivery by ship, truck, or even airplane. Furthermore, a country (or non-state actor) is likely to have only a few nuclear weapons, at least during the next 15 years. Reliability of delivery would be a critical factor; covert delivery methods could offer reliability advantages over a missile. Not only would a country want the warhead to reach its target, it would want to avoid an accident with a WMD [weapons of mass destruction] warhead at the missile-launch area. On the other hand, a ship sailing into a port could provide secure delivery to limited locations, and a nuclear detonation, either in the ship or on the dock, could achieve the intended purpose. An airplane, either manned or unmanned, could also deliver a nuclear weapon before any local inspection, and perhaps before landing. Finally, a nuclear weapon might also be smuggled across a border or brought ashore covertly.

Robert Walpole, an analyst at the CIA who helped produce the NIE, was even more explicit in his February 2000 testimony before the Senate:

> In fact, we project that in the coming years, US territory is probably more likely to be attacked with weapons of mass destruction from non-missile delivery means (most likely from non-state entities) than by missiles, primarily because non-missile delivery means are less costly and more reliable and accurate. They can also be used without attribution.

Particularly for biological weapons, alternative methods of delivery offer clear advantages to any potential adversary. Their appeal over missiles makes long-range ballistic missile attack on the United States even less likely.

The Future

Over the next ten to 15 years, countries like North Korea, Iran and Iraq might develop a small arsenal of missiles capable of hitting the United States with nuclear, chemical or biological warheads. However, this is not a certainty, and whether they will depends on a variety of factors, including political and economic relations with the West and developments in each country's region and the international community. Even if they develop such weapons, their arsenals would be orders of magnitude smaller and substantially less lethal than Russia's, and the penalty for their use substantial.

WHITE HOUSE PHOTOGRAPH

On January 3, 1993, Presidents Bush and Yeltsin signed START II, commiting each country to reduce its deployed strategic nuclear arsenals to 3,000–3,500 or less. U.S. withdrawal from the ABM Treaty could end the verified reductions in Russia's nuclear arsenal taking place under the START process.

Responses to the Threat

The First Lines of Defense

The first lines of defense against the threat of missile attack continue to be a combination of coherent and active diplomacy, effective arms control regimes, crucial foreign assistance programs, and, finally, deterrence—the threat of retaliation. These efforts work to inhibit the threat before it develops and to respond to it if it does. Together, they have significantly reduced the missile threat to the United States, and can continue to do so in the future.

Active Diplomacy

Diplomatic negotiations can block weapons development. In 1994, in return for relaxation of its international isolation and some economic aid, North Korea willingly relinquished a reactor program that could have produced weapons-usable plutonium. Outside money also played a role in North Korea's decision; it was cheaper for a consortium of countries to finance substitute reactors and fuel oil for North Korea than for them to build defenses against North Korean nuclear weapons. That pattern has continued with North Korea agreeing to freeze its missile flight test program while discussions with the United States continue.

Diplomacy also helped dissuade other countries from developing nuclear weapons. Argentina and Brazil were competitively pursuing nuclear weapons technology in the 1980s and 90s. Under international pressure led by regional neighbors and the United States, both abandoned their programs and joined the NPT. Explicit or implicit security guarantees, for example to South Korea and Taiwan, helped persuade those countries to forego the pursuit of nuclear weapons.

In some cases, economic sanctions can curb weapons development. Continuing sanctions played a part in the Iraqi government's acceptance of outside inspections for years, an approach that was far more effective at reducing the threat from Iraq than was the Allied bombing campaign. The threat of UN economic sanctions was one factor prompting the North Korean government to drop its insistence on building new plutonium-producing reactors.

More importantly, there are ongoing efforts to reduce the risks of a nuclear attack by any means—from missile to truck bomb—by reducing existing nuclear arsenals and preventing the spread of weapons material and technology. The box on p. 39 describes the broad array of arms control agreements and arrangements actively reducing the spread of weapons of mass destruction and the threat to the United States. Further agreements could move us toward enhanced control over all nuclear weapons by reducing existing nuclear arsenals, ending the production of fissile material for nuclear weapons, inhibiting new nuclear threats by improving inspection regimes, and strengthening international action against missile proliferation by expanding and formalizing existing arrangements.

Perhaps the most important approach on this front is to reduce the demand for missiles and weapons of mass destruction. As the NIE indicates, it is very difficult to accurately predict how international relations will develop over the next decades. Fifteen years ago, the Soviet Union was the "enemy," and the U.S. had close military and economic relations with Iraq. It is possible that by pursuing an active foreign policy the United States may be able to reduce ballistic missile threats by eliminating the demand for the technology. In this respect, efforts to diminish regional tensions in the Middle

East and East Asia would go along way toward reducing the potential threat to the United States. U.S. efforts along these lines are already having an impact on North Korea.

This approach has been entirely successful with the former Warsaw Pact countries in eastern Europe since the end of the Cold War. For the first half of the 20th Century, war dominated all of Europe; now large-scale war on the continent is distinctly unlikely. Regional conflicts will continue, in Europe and around the globe, but the rewards of the international economic and security structure have greatly reduced the likelihood of state-to-state threats.

Reducing and Eliminating the Threat

The START process, though stalled at present, has substantially reduced the Russian nuclear threat to the United States. Because of START I, the INF Treaty, and unilateral nuclear arms cuts by both countries, the United States and Russia are each dismantling approximately 2,000 nuclear warheads every year. START II, if implemented, will cut arsenals to 3,500 or fewer deployed strategic weapons on each side. With Russian ratification of START II, its entry into force is now dependent on U.S. action to approve the 1997 protocols and maintain the ABM Treaty. At the same time, the United States and Russia are discussing START III, which could lead to further cuts. In that treaty, Russia and the United States may agree that warhead cuts will be accompanied by the verified dismantlement of the decommissioned weapons and the transfer of their fissile material to monitored storage to prevent reuse in other weapons. After START III, China, the United Kingdom and France, as well as India, Pakistan and Israel, may also be brought into the nuclear arms control process.

These are not the fanciful dreams of idealists. Far more missiles have been destroyed through diplomacy in recent years than any missile defense system could ever hope to intercept. For example, the INF Treaty eliminated an entire class of weapons, destroying hundreds of U.S. and Soviet surface-to-surface ballistic missiles. Along with weapons in Russia, START I has eliminated hundreds of Soviet-era missiles deployed in Ukraine, Kazakhstan and Belarus. START II will obliterate the entire class of SS-18 heavy Russian missiles.

To reduce further the threat from accidental or unauthorized attack, countries can lower the alert status of deployed weapons. As described earlier, China's current arsenal, with its missiles unfueled, is not susceptible to accidental launch. Russia, however, maintains approximately 2,000 warheads on high alert. The U.S. and Russia could pursue a series of mutual, verifiable, and reciprocal steps to reduce the alert status of their nuclear forces. By reducing the potential for unjustified, hair-trigger ballistic missile launch, this step would be far more effective than building missile defenses.

The U.S. and Russia are already pursuing steps to lessen the danger of accidental and unauthorized launches. At the June Clinton-Putin summit, the two signed an agreement to establish a joint early warning center in Moscow. Although this step does not reduce missile alert status, it is a useful cooperative security arrangement between the two countries. Similarly, Russia has proposed a global monitoring system that could provide launch notification and detection data to the international community. Pursuing this type of confidence-building measures could do more to increase U.S. security than building missile defenses.

Foreign Assistance and Trade

Rather than seeking to destroy missiles after launch, the United States could increase its focus on reducing current and potential threats, destroying missiles while they are on the ground or, in effect, before they are even built.

The United States is already pursuing this path, with substantial success. For example, in Russia alone, the U.S. Cooperative Threat Reduction Agency has helped eliminate over 275 long-range land- and submarine-based nuclear-tipped missiles, demolish 136 submarine-launched ballistic missile launchers, dismantle 50 long-range missile silos, and destroy 40 heavy, nuclear-capable bombers. The initiative, also known as the Nunn-Lugar program after its original Senate sponsors, has also assisted Russian efforts to control the vast Russian fissile material stockpile. These accomplishments have cost slightly more than $1 billion over seven years. The program also helped Kazakstan, Ukraine and Belarus—countries that inherited thousands of nuclear weapons when the Soviet Union dissolved—become non-nuclear states. In that process, hundreds more nuclear-tipped missiles and missile silos were destroyed. Efforts in these countries together cost less than another $1 billion. By reducing the number of warheads and missiles that could strike the United States, the Cooperative Threat Reduction program reduced the source of the most

International Efforts to Reduce Weapons of Mass Destruction

Treaty on the Non-Proliferation of Nuclear Weapons, NPT

opened for signature 1968, entered into force 1970

Otherwise known as the Non-Proliferation Treaty (NPT), its purpose is to prevent the spread of nuclear weapons while protecting peaceful nuclear activities. It commits five nuclear-weapon states (the countries that tested nuclear weapons before 1968) to nuclear disarmament and requires all other countries to forego nuclear weapons. The Treaty is the foundation of the non-proliferation regime. An NPT Review Conference will be held in April-May 2000.

Strategic Arms Reduction Treaty, START I

signed 1991, entered into force 1994

START I is reducing the number of U.S. and Russian land-based long-range missiles, submarine-launched ballistic missiles, heavy bombers, warheads for strategic land- and sea-based missiles, and heavy bombers. START I limits each country to 1,600 strategic offensive delivery systems and approximately 6,000 "accountable" deployed strategic warheads.

Strategic Arms Reduction Treaty II, START II

signed 1993, U.S. ratified in 1996, Russia in 2000, entry into force dependent on Senate action on 1997 protocol

Under START II, United States and Russia must reduce the number of their active strategic warheads to 3,500 each by 2003. Multi-warhead land-based long-range missiles are banned. No more than 1,750 warheads may be deployed on submarine-based missiles.

Strategic Arms Reduction Treaty III, START III

not yet negotiated

With Russian ratification of START II in April 2000, the United States and Russia have begun more intense discussions on a START III follow-on agreement. In 1997, the two countries agreed to a START III framework that would limit each country to no more than 2,000–2,500 deployed strategic nuclear warheads each by December 31, 2007. Russia has proposed lowering the figure to 1,500 a side. Negotiations on transparency, verified warhead elimination, and reductions in tactical nuclear arsenals are also a part of the agreed framework.

Chemical Weapons Convention, CWC

opened for signature 1993, entered into force 1997

The CWC prohibits the development, production, acquisition, stockpiling, retention or transfer of chemical weapons, and requires the destruction of current stocks and chemical weapon production facilities. Key signatories include: Russia (although it is unlikely to meet Treaty deadlines for arsenal destruction), China, United States, Japan, United Kingdom, Germany, France and India.

Biological Weapons Convention, BWC

opened for signature 1972, entered into force 1975

The BWC calls for the destruction of all members' biological weapon stockpiles and prohibits the development, production, acquisition or retention of biological agents, as well as the development of delivery systems of such agents. Member states are currently negotiating a stronger verification and compliance regime for the Treaty. Key signatories include: Russia, China, United States, Japan, United Kingdom, Germany, and France.

Missile Technology Control Regime, MTCR

formed by the U.S. with the G-7 nations 1987

The MTCR is not a treaty but rather a voluntary agreement among countries. It seeks to stop the transfer of the delivery systems of weapons of mass destruction (WMD). These systems include missiles, unmanned air vehicles, and related technology capable of carrying a 500 kilogram payload a distance of at least 300 kilometers. Currently 32 countries, including Russia and Ukraine, participate in the MTCR; other countries, including China, adhere to its principles (although not necessarily to its lists of material and technology not to be exported).

devastating military threat to the United States. Simultaneously, these steps reduced the number of targets for U.S. nuclear war-planners, allowing further reductions in the U.S. nuclear arsenal.

Similarly, ongoing discussions with North Korea may lead to its improved relations with the United States and the end of the Korean missile program. In exchange, the U.S. would lift economic sanctions, strengthen trade relations, and possibly provide some security guarantees to North Korea. This could not only end North Korea's ballistic missile capability, but also significantly reduce the missile proliferation threat by bringing a halt to its missile exports. North Korea already exports its short-range No Dong missile. It could provide longer-range ballistic missiles to Iran or Iraq, sharply reducing the time it takes these countries to acquire such a capability. The 1999 National Intelligence Estimate expressed concern about this possibility:

> If Iraq could buy a Taepo Dong-2 from North Korea, it could have a launch capability within months of the purchase; if it bought Taepo Dong engines, it could test an ICBM by the middle of the next decade. Iraq probably would take until the end of the next decade to develop the system domestically.

By reaching an agreement to end North Korea's missile development and export program, the United States could sharply reduce the missile threat.

Stopping Proliferation

The NPT came into force in 1970 and was made permanent in 1995. It is the foundation of the international non-proliferation regime, and has more members (187) than any other treaty and nearly as many as the United Nations itself. The International Atomic Energy Agency's safeguards regime—one of the means of verifying that non-nuclear states are not producing weapons—has been strengthened. It now mandates highly intrusive inspections for those countries that agree to new safeguards protocols. Many countries that considered building or actually had nuclear weapons have joined the NPT in recent years, most notably Algeria, Argentina, Belarus, Brazil, Kazakhstan, South Africa, and Ukraine.

All but a very few countries have stopped producing weapon-grade fissile material. Most countries able to export missile and nuclear technologies have agreed not to supply this equipment to states that do not adhere to non-proliferation norms. Countries that once had active ballistic missile programs, such as Argentina, Brazil, and South Africa, have now agreed to adhere to the guidelines of the Missile Technology Control Regime. (See box "International Effort to Reduce Weapons of Mass Destruction," on page 39.) While not perfect, the regime has created substantial international consensus against the export of missiles and missile technology.

In using these resources to deal with the problem states, the United States is not alone. Japan, South Korea and even China have contributed to joint policy on North Korea. The UN Security Council has repeatedly levied sanctions on Iraq to compel Iraqi compliance with disarmament requirements. The parties to the Non-Proliferation Treaty all have a common interest in fighting proliferation.

The Second Line of Defense: Deterrence, or the Threat of Devastating Retaliation

The Nature of the New Threat

The behavior of so-called "rogue" states, and whether they can be deterred, is critical to the justification missile defense supporters give for advocating early deployment of a national missile defense. The presumption is that these states are irrational. They will develop missiles capable of hitting the United States and use them, despite the almost certain devastating consequences, without warning, for unknown reasons or perhaps for no reason at all. A January 19, 2000 statement by U.S. Deputy Secretary of Defense John Hamre attempts to explain why North Korea is a threat:

> Hamre said North Korea is a legitimate source of worry about a surprise missile attack, since it has invested heavily in developing a long-range missile capability, even though no one is threatening it and even while many of its people are starving.
>
> "There is no rational reason why North Korea, with the economic straits that they are in, would choose such a provocative thing to do," Hamre said. "This is a country that doesn't care about the opinion of the international community," and therefore must be judged capable of attacking the United States unprovoked.[7]

In this view, states like North Korea cannot be deterred because they are irrational. To respond to this threat, the United States must deploy a national missile defense as soon as possible.

However, as the NIE states, there are rational reasons for a country to develop such capabilities:

> . . . [A]cquiring long-range ballistic missiles armed with WMD will enable weaker countries to do three things that they otherwise might not be able to do: deter, constrain, and harm the United States . . . In many ways, such weapons are not envisioned at the outset as operational weapons of war, but primarily as strategic weapons of deterrence and coercive diplomacy.

This is essentially why China originally developed nuclear weapons. For its part, North Korea has reason to want a deterrent. It is still officially at war with South Korea, a country in a military alliance with the United States. Approximately 37,000 U.S. troops remain in South Korea and, until 1991, U.S. nuclear weapons were deployed there.

North Korea is a dictatorship. It has a large army. Its missile development program is a serious concern and its missile exports a leading cause of proliferation. Its leadership is isolated and difficult to work with, at best. It has engaged in terrorist acts, and it frequently commits minor military provocations against South Korea. This does not mean that North Korea is irrational. To the contrary, the leadership has shown an intent to stay in power and refrains from taking steps it perceives would weaken its hold on the country or lead to outright hostilities with the United States. Similarly, in the Gulf War, Iraq had available missile warheads and gravity bombs loaded with chemical and biological weapons. It is clear from subsequent remarks by Iraqi leaders that they did not use these weapons because of their fear of the consequences, both from the United States and from nearby Israel, which had preemptively destroyed an Iraqi nuclear reactor more than a decade earlier.

DEFENSE THREAT REDUCTION AGENCY PHOTOGRAPH

With U.S. assistance, a Soviet-era SS-19 missile silo is destroyed as required under the terms of START I. Under the U.S.-funded Cooperative Threat Reduction program, hundreds of missile silos have been destroyed in Russia, Kazakhstan, and Ukraine.

Deterrence

As it has been for decades, the main insurance against any deliberate long-range missile attack on U.S. territory remains the fear of swift and certain retaliation by the United States' overwhelming nuclear and conventional forces.

The threat of retaliation remains a plausible deterrent against potential threats from states developing missiles for several reasons. First, an attack by such a state would not involve a massive nuclear assault that could completely destroy this country, but a limited attack with a few missiles, which would leave the United States and its armed forces largely intact. Even if the United States chose to "ride out" such an attack (rather than counterattacking as soon as a launch was detected), it would still be in a position to strike back at the attacker with devastating force. Second, given early-warning satellites that can pinpoint the origin of long-range ballistic missiles, the source of any land-based missile attack (the threat that missile defenses are supposed to respond to) would be known. Enemies would be suicidal to attack the United States with long-range ballistic missiles. Leaders of both the nuclear weapon states and potential enemy states know these facts and know that the United States, in response to a missile attack, could wipe out their regimes, if not their countries.

Most advocates of nationwide missile defense agree that actual attack by means of a long-range

missile is improbable. Still, some argue that missile defense is necessary as insurance against a remote contingency: a hostile state might master the very difficult technical challenges of developing nuclear warheads small and light enough to be carried by a long-range missile and developing reliable and accurate long-range missiles to carry them. The leaders of such a state would be fully aware of the certainty of retaliation if they actually launched their missiles against the United States, but they might bluff. In this scenario, such a state might paralyze the U.S. political leadership with threats to use its weapons against a U.S. city, blackmailing the United States into compliance with its demands. Supporters of missile defense ask whether, in the Gulf War, the U.S. (or its allies) would have attacked Iraq if Saddam Hussein had had a nuclear-tipped missile. To avoid this contingency, the argument goes, the United States should build a "limited" nationwide missile defense.

Contrary to this argument, it is improbable that U.S. leaders would hesitate to respond to a threat of this kind with overwhelming U.S. military force. In the Gulf War, it was Iraq that was deterred from using its chemical and biological weapons by superior U.S. forces, not the United States and its allies (many of which were directly threatened by Iraq) that were deterred from retaking Kuwait. Furthermore, the above scenario assumes that the United States and the international community would not have taken action ahead of time to counter such a threat or bluff. Finally, the potential blackmailers would have to consider the long-term costs and dangers both of international isolation and counteraction by the United States and its allies.

Security in the Larger Picture

Individual security issues should not be considered in isolation. Rather than focusing on particular threats, U.S. policy-makers must consider the broad spectrum of dangers. Which are the most likely threats? What threats pose the greatest potential for damage? What responses best address the greatest threats?

In this respect, the United States is an extremely fortunate country, with a natural territorial defense. Blessed with friendly neighbors and huge oceans along its borders, it faces few threats to its soil. This relative security is one of the reasons the missile threat draws such attention, as it is one of the few dangers that can reach American territory from abroad. As this country has already seen, however, with the bombings at the World Trade Center and in Oklahoma City, the United States is vulnerable to attack from within its borders by even a few individuals. There are a host of such threats, from truck bombs to boats drifting into harbors, from biological agents released into the water supply to chemical weapons dispersed by crop dusters.

At the same time, the United States has interests and allies around the globe, and U.S. security as a whole depends not only on military force, but on financial ties, trade relations and international cooperation. The United States is inextricably linked to the global economy.

A comprehensive security assessment is required. In terms of potential damage, the threat from long-range missiles is enormous. The Russian arsenal could destroy the United States many times over. Even a single missile, carrying a nuclear warhead, could destroy an entire American city. But how likely is that threat? What are the costs, financial and otherwise, of pursuing a missile defense in an attempt to intercept that warhead? How will it alter the calculations of allies, partners and potential enemies? Are there better ways to defend against that threat?

Seen in the terms of the total spectrum of security threats facing the United States, the new missile threat is worrisome but limited. Spending tens of billions of dollars on an unproven national missile defense to meet it—while undermining the diplomatic, verification and control mechanisms of the non-proliferation regime and diverting resources from the conventional military capacity that is a major part of our deterrent force—would be a mistake. It is like buying expensive insurance against meteors while shortchanging household fire protection.

The Politics of National Missile Defense

National security policy is not above politics. The decision on deployment of a national missile defense will be no exception. In addition to the four criteria that President Clinton has said he will consider, politics will play a role, perhaps a determining one, in his decision. The 2000 presidential election will loom over this decision, and President Clinton will consider what impact his choice will have on the campaign of Vice President Al Gore.

The issue is political primarily because the Republican Party has sought to make it so. From the "Contract with America" in 1994, many Republicans, including the leadership, have sought to make an issue of "protecting the homeland" from missile attack. Democrats who opposed missile defense or question the rush for deployment are accused of leaving the United States vulnerable to attack. Through the 1998 elections, the Republican campaign to build public support for national missile defense has been unsuccessful. Every Republican presidential candidate in the 2000 elections, however, has promised to deploy a national missile defense.

Public Skepticism

Despite Republican efforts, national missile defense is not a priority for the public. Among all issues, military priorities in general are far less important to the average voter than education, health care, or crime. Despite Republicans touting national missile defense as the critical security issue in the 1996 presidential campaign, it never played a role in the election. More recently, a July 1999 poll commissioned by the Council for a Livable World Education Fund shows that while a majority of Americans support missile defense in principle, it is not a high priority even among defense issues, which are themselves a low priority. For example, when asked which is more important to spend additional money on, 59 percent of Americans supported a funding increase for military training and pay, while only 24 percent called for additional money for national missile defense. Similarly, 56 percent thought it more important to develop a defense against terrorist attacks (in fact a more serious danger), as opposed to 28 percent who favored missile defense.

Those who call for a quick decision to build a missile defense are out of step with the strong majority of Americans. The above survey, conducted by The Mellman Group of 1,000 U.S. adults 18 or over, shows overwhelming public support for completing testing of a missile defense system before deciding to deploy it. Given a choice between going into production after only four tests, or waiting until at least 18 had been completed, 62 percent supported waiting, while only 11 percent thought the U.S. should decide to deploy after four tests. In fact, Republican voters (64 percent) are even more likely than Democrats (59 percent) to want all 18 tests completed prior to the decision to deploy.

Despite the voters' skepticism, Republican candidates in 2000 have again sought to make national missile defense an issue in the campaign for the presidency. For example, Governor George Bush has said that although he agrees the United States should pursue an agreement to change the ABM Treaty, he would abrogate the Treaty if Russia did not agree within months. On May 23, 2000, Bush provided further details on his views. First, he called for consideration of unilateral reductions in U.S. nuclear forces, and proposed reducing the alert status of remaining forces. Second, he advocated robust missile defenses, including sea-based systems. Although Bush said he would seek to work with Russia, his proposal overlooks the implications

of missiles defenses on Russian nuclear forces, as well as China's reaction.

Vice President Gore has said that he supports deployment of the limited national missile defense proposed by the Clinton Administration. He has, however, been slightly more cautious on the ABM Treaty. If Russia does not agree to amend the Treaty to allow deployment, Gore has said he would consider withdrawing from the ABM Treaty "if the United States was seriously threatened by a missile attack from a 'rogue' nation."

The Money Pit

Another element of the political equation is the vast sums of money spent on missile defense. With $12.7 billion already committed if a decision to deploy is made and the likely expenditure of tens of billions more, defense contractors are lobbying for building the system. Their lobbying includes donations to the campaigns of candidates, both for the presidency and for Congress, which will provide funding for any system. According to data compiled by the non-partisan Center for Responsive Politics as of February 2000, Boeing, the lead contractor for the missile defense program, has already given over $290,000 to federal candidates. In the 1998 Congressional election campaign, Boeing gave over $660,000. Raytheon, which is building the kill vehicle, has already given over $140,000. Lockheed Martin is the lead contractor for SBIRS High, one of the proposed systems' satellite components. It has already given over $377,000 to election 2000 campaigns, making it the third largest corporate contributor in the country. In the last election cycle, it gave more than a million dollars.

The fiscal year 2001 budget will be the first to include production funding for national missile defense. Total funding for the program will increase as well. Under the Clinton Administration, with Congress regularly adding additional money, funding for national missile defense has averaged over $700 million per year for the last six years (and more than $4 billion for all forms of missile defense). National missile defense funding will more than triple if production begins, and could quickly rise even more once production is underway. Once production money begins to flow, an enormous constituency of subcontractors, labor unions, and chambers of commerce, not to mention members of Congress, will develop, all pressing to continue building the system.

Conclusion

The world has entered a new era. The threat of global nuclear annihilation looms less ominously. The world no longer revolves around two superpowers. The end of the Cold War sharply diminished many dangers, but the spread of technology is creating potential new threats.

It is the debate over the new threats and their relationship to the unfinished business from the Cold War that drives the national missile defense controversy. Missile defense supporters argue that the new threats justify a sharp change in policy, and say that the ability to intercept missiles is critical to security.

Opponents of current national ballistic missile defense hold a range of views. Some argue that national missile defense may be necessary at some point, but that time is not now, not before the technology has been shown to be effective, and not when deployment seems certain to exacerbate the threat from existing arsenals in Russia and China.

Others argue that the time for missile defense may never come. If deploying a national missile defense means Russia will insist—forever—on retaining a nuclear arsenal of a thousand or more warheads unconstrained by arms control agreements or verification, then perhaps the cost is too high. The world would be better off eliminating nuclear threats, and curbing missile proliferation before it happens, than building expensive and imperfect defenses against them.

Based on the four criteria set out by President Clinton—the readiness of the technology, the impact on arms control, the cost, and the threat—the case for deciding to deploy a national missile defense is weak at best:

- The technology will simply not be ready. At the cost of tens of billions of dollars and decades of research, it is now possible to "hit a bullet with a bullet." Doing so reliably, in a real-world situation with multiple attacks, is much more difficult. Under the current test program, the technology cannot be proven reliable this year or even by 2005.
- Even if Russia agrees to modify the ABM Treaty, Russia and China are both likely to increase efforts to maintain or build up their nuclear arsenals following U.S. deployment of a national missile defense. Deeper cuts in Russian and U.S. arsenals would be severely jeopardized, along with opportunities to bring China, India, and Pakistan into the arms control process.
- The U.S. has already spent $122 billion on missile defense. It will take tens of billions more to deploy and maintain the proposed system, which has not yet been shown to be effective. Given a range of national security priorities and considering its adverse strategic implications, spending vast sums to money to deploy a national missile defense cannot be justified.
- The low-probability threat from the states developing long-range missiles does not justify the potential costs to cooperative nuclear threat reductions, especially given the unproven nature of missile defense technology. Deterrence is still a more reliable defense, and engagement with the source of a potential threat a better way to reduce it.

U.S. ARMY PHOTOGRAPH CC100859

The Safeguard ballistic missile defense system, designed to protect missile silos in North Dakota, began operating on October 1, 1975, and was shut down on January 27, 1976. At a total cost of $23.1 billion in today's dollars, it cost $194 million per day it operated.

Some missile defense supporters act as if U.S. deployment will solve the ballistic missile problem. However, countries will react, taking steps to counter U.S. efforts. China is likely to increase its nuclear arsenal. North Korea, if it decides it needs to attack the U.S., could put weapons on a plane, boat or truck, rather than a missile.

The final question is: would overall U.S. security be enhanced or weakened by deployment of a national missile defense? If the technology worked, if the threat from North Korea developed, if Russia and China did not counter U.S. defenses by enlarging their arsenals, and if the cost did not drain money from other priorities, then perhaps building a national missile defense would be beneficial. But to build questionable defenses in response to a threat that may never materialize, at the risk of increasing other threats, makes little sense.

The security of the United States depends on a broad array of factors—from its unquestioned military superiority to its advantageous global position, from global trade and economic relations to international cooperation—to control the many threats around the world. National missile defense is an attempt to address a single threat, but its pursuit may undermine other elements of international security. Particularly when the technology for the defense is not yet reliable, and may never be, a precipitous decision by President Clinton—or his successor—to deploy a national missile defense can only be seen as a net loss for overall U.S. security.

NOTES:

1 Data on nuclear arsenals comes from the Natural Resources Defense Council (NRDC). See, for example, the NRDC report, "US and USSR/Russian Strategic Offensive Nuclear Forces, 1945–1996," which is available on the web at: http://www.nrdc.org/nrdcpro/nudb/dainx.html.

2 "BMDO: Only Three NMD Tests 'Likely' Before Next Year's NMD Review," by Michael Sirak, *Inside Missile Defense*, August 25, 1999, p. 13.

3 According to a recent *Washington Post* article, each interceptor is required to have a 90 percent chance of success. ("Missile Shield Still Drawing Friends, Fire: Verdict on Deployment Due in Political Climate," by Bradley Graham, *Washington Post*, January 17, 2000, p. 1.) According to *Inside Missile Defense*, "the system has operational requirements that mandate an extremely high confidence level in the probability of a successful kill. That confidence rate, as defined in the ORD [operational requirements document], is nearly 100 percent, far exceeding the operational requirements for other major defense acquisition programs, officials say." ("DOD, Industry: NMD Countermeasures Getting Attention," by Michael Sirak, *Inside Missile Defense*, May 19, 1999.)

4 See, for example, "Russian Nuclear Forces in Ten Years with and without START II," by Pavel Podvig, Moscow Institute of Physics and Technology, October 1999, published by the Program on New Approaches to Russian Security, in which the author argues Russia could maintain 3,000 strategic warheads.

5 "Cost Of Initial NMD To Rise 50 Percent," by John Donnelly, *Defense News*, December 20, 1999, p. 1.

6 North Korean and Iraqi military budgets are from the "The Military Balance 1998/99," International Institute for Strategic Studies, October 1998.

7 "U.S. Sees North Korea as Prime Reason for Building Missile Defenses," Associated Press, January 19, 2000.

ACRONYMS

ABM Treaty	Anti-Ballistic Missile Treaty
BMDO	Ballistic Missile Defense Organization
BWC	Biological and Toxin Weapons Convention
C-1	Capability-1, the initial phase of the Clinton Administration plan for NMD
C-2	Capability-2, the second phase
C-3	Capability-3, the third phase
CIA	Central Intelligence Agency
CTBT	Comprehensive Nuclear Test Ban Treaty
CWC	Chemical Weapons Convention
DIA	Defense Intelligence Agency
DOD	Department of Defense
DOT&E	Director, Operational Testing and Evaluation
DRR	Deployment Readiness Review
DSP	Defense Support Program, satellites providing early warning of missile launch
EKV	exoatmospheric kill vehicle
FY	Fiscal Year
GBI	ground-based interceptor
GPALS	Global Protection Against Limited Strikes
GPS	Global Positioning System
HTK	hit-to-kill
ICBMs	intercontinental ballistic missiles
INF Treaty	Intermediate-range Nuclear Forces Treaty
MTCR	Missile Technology Control Regime
NATO	North Atlantic Treaty Organization
NIE	National Intelligence Estimate
NMD	National Missile Defense
NPT	Treaty on the Non-Proliferation of Nuclear Weapons, also known as the Non-Proliferation Treaty
ORD	operational requirements document
RAM	radar absorbing material
RV	reentry vehicle
SBIRS High	Space-Based Infrared System High
SBIRS Low	Space-Based Infrared System Low
SDI	Strategic Defense Initiative
SDIO	Strategic Defense Initiative Organization
START	Strategic Arms Reduction Treaty
WMD	weapons of mass destruction

APPENDIX 1

The Decision on Deployment: Process and Players

The decision on whether to deploy a national missile defense will begin with a Pentagon-led assessment known as the **Deployment Readiness Review**, or DRR.

The Ballistic Missile Defense Organization, its Joint Program Office for National Missile Defense, U.S. Space Command and the military services will be involved in the initial round of the DRR. They will consider the results of the testing program up to that point, including the effectiveness of the interceptor, and the development of radars, sensors, battle management programs and communications systems. (The first test that integrates all these elements will be the third, scheduled for July 7, 2000.) Development and life-long program costs may also be examined at this point.

Along with the technical assessment, the DRR will make two recommendations in terms of the missile defense system itself:

1. Determining the location of the first deployment of ground-based interceptors, whether in Alaska, the current front-runner, or North Dakota.
2. Awarding long-lead-time contracts for construction of the system at the proposed site.

These are the only decisions that must be made this year to allow construction to begin in the spring of 2001. (According to the Pentagon, construction must begin in 2001 to make possible an initial operating capability by 2005.)

Following the initial assessment, the DRR's findings will be passed on to the Defense Acquisition Board, which includes representatives of the Pentagon's Office of the Undersecretary for Acquisition and Office of the Undersecretary for Policy, the Defense Intelligence Agency (DIA), and the Joint Chiefs of Staff. Inclusion of those last three groups seems to indicate that more will be reviewed than the technology. The DIA, for example, will have information primarily on the threat to the United States. Officials from the Ballistic Missile Defense Organization have said that this step will review all four criteria set out by President Clinton.

The Defense Authorization Board will review the initial recommendations and pass on their views to Secretary of Defense William Cohen. Secretary Cohen will perform a final review and send the recommendations to the National Security Council.

The **National Security Council** will perform a national threat and policy assessment. The NSC will present the President with an assessment of the four criteria. In December 1999, a White House publication, "A National Security Strategy for a New Century," set out the criteria:

> The Administration's decision will be based on an assessment of the four factors that must be taken into account in deciding whether to field this system: (1) whether the threat is materializing; (2) the status of the technology based on an initial series of rigorous flight tests, and the proposed system's operational effectiveness; (3) whether the system is affordable; and (4) the implications that going forward with NMD deployment would hold for the overall strategic environment and our arms control objectives, including efforts to achieve further reductions in strategic nuclear arms under START II and START III.

The assessment is expected to give the President a set of options, which might include:

1. Deferring a decision to deploy, or deciding not to deploy at this time;
2. Making a provisional decision to deploy, but delaying construction, now set for April 2001, so a violation of ABM Treaty does not occur (in all cases, construction will actually be up to the next president);
3. Beginning construction in 2001 with initial operating capability by 2005;
4. Beginning deployment now, with a goal of a capability by 2003 ("emergency deployment").

APPENDIX 2

A Chronology of Ballistic Missile Defense

Mid-14th Century: The first wartime use of a multi-stage missile, in China.

September 8, 1944: German V2 rockets strike London in the first ballistic missile attack of the modern era.

1945: U.S. companies study the feasibility of missile defense, and conclude that they could not design an effective system with then-current technology.

1957: U.S. begins work on the Nike Zeus system, the first major U.S. ballistic missile defense effort.

October 4, 1957: The Soviet Union launches the Sputnik satellite into orbit, beginning the era of long-range missiles.

1962: Acknowledging the flaws in the Nike Zeus, the U.S. begins work on the Nike X ballistic missile defense system, which uses two kinds of nuclear-tipped interceptors and new "phased-array" radars.

September 1967: President Johnson endorses plans to deploy the Sentinel missile defense system (renamed from Nike X). The Sentinel system is designed to defend selected American cities against a limited attack from China.

July 1, 1968: At the Non-Proliferation Treaty signing, President Johnson announces that the U.S. and the Soviet Union have agreed to discuss limiting both strategic nuclear arsenals and ballistic missile defenses. Two months later, the Soviet invasion of Czechoslovakia scuttles the planned talks.

March 14, 1969: President Nixon reconfigures Sentinel into the Safeguard missile defense system, designed to defend U.S. missile silos. In August, the Senate approves deployment, with Vice President Agnew breaking a tie vote.

May 26, 1972: President Nixon and Soviet General Secretary Brezhnev sign the ABM Treaty, which prohibits nationwide missile defense capabilities and limits each side to two missile defense sites and no more than 100 interceptors at each site.

July 3, 1974: The two countries amend the ABM Treaty to allow only one missile defense site per side.

October 1, 1975: The Safeguard ballistic missile defense system begins operating near missile silos in Grand Forks, North Dakota.

October 2, 1975: The U.S. House of Representatives votes to shut down the Safeguard system.

January 27, 1976: The U.S. Congress approves shutting down Safeguard, and Secretary of Defense Rumsfeld announces the system's termination.

March 23, 1983: President Reagan launches the Strategic Defense Initiative (SDI) to, in his words, make nuclear weapons "impotent and obsolete."

April 24, 1984: Secretary of Defense Weinberger signs a charter formally creating the Strategic Defense Initiative Organization (SDIO).

October 12, 1986: Soviet General Secretary Gorbachev proposes a 50 percent reduction in U.S. and Russian nuclear arsenals by 1991 and elimination by 1996 if the U.S. confines SDI to laboratory research. President Reagan rejects the offer.

July 31, 1989: Presidents Bush and Gorbachev sign START I, reducing U.S. and Soviet strategic nuclear forces by 40 percent, to 6,000 deployed warheads each.

January 29, 1991: President Bush refocuses SDI to deal with unauthorized, accidental or limited attacks. The program is named Global Protection Against Limited Strikes (GPALS).

February 1991: In the Persian Gulf War, U.S. Patriot theater—or short-range—missile defenses attempt to defend Israel and Saudi Arabia against Iraqi SCUD missiles. Contrary to initial reports of 90 percent or more effectiveness, only 9 percent of the Patriot intercept attempts are successful, according to General Accounting Office estimates.

January 3, 1993: Presidents Bush and Russian President Boris Yeltsin sign START II to reduce deployed U.S. and Russian strategic nuclear forces to 3,000–3,500 warheads per side.

May 1993: Secretary of Defense Aspin renames SDIO the Ballistic Missile Defense Organization (BMDO) and prioritizes theater missile defenses.

February 15, 1995: The section of the Republican "Contract with America" requiring deployment of a nationwide missile defense system "as soon as practical" is defeated in the House of Representatives, by a vote of 218–212.

January 26, 1996: The U.S. Senate consents to ratification of START II.

March 1996: Senate Majority Leader Dole and House Speaker Gingrich introduce the "Defend America Act," which would declare it U.S. policy to build a limited missile defense by 2003. The Congressional Budget Office estimates it would cost $31–60 billion to deploy. The resulting "sticker shock" halts a vote.

January 21, 1997: Senate Majority Leader Lott introduces his version of the "Defend America Act," but it never comes up for a vote.

March 20–21, 1997: A Clinton-Yeltsin Summit leads to a START III framework agreement, which would reduce U.S. and Russian nuclear arsenals to 2,000–2,500 deployed strategic warheads each.

September 26, 1997: The United States and Russia conclude three agreements designed to facilitate the Russian Duma's ratification of START II. They call for shifting the final implementation of START II back five years; banning testing of theater missile defense systems against ballistic missile targets above certain speeds or ranges; and "multilateralizing" the ABM Treaty to include Belarus, Kazakhstan and Ukraine.

February 1998: A Pentagon-appointed panel chaired by former Air Force Chief of Staff General Welch issues a report strongly critical of all missile defense programs, finding what the panel called a "rush to failure" approach.

April 30, 1998: The Pentagon selects Boeing as lead contractor for the national missile defense system.

May 13, 1998: Senator Cochran's "American Missile Protection Act of 1998" is defeated when it gets 59 votes, one less than the 60 required to begin debate. The bill declared it " . . .U.S. policy to deploy, as soon as technologically possible, a National Missile Defense system."

July 15, 1998: A commission chaired by former Secretary of Defense Rumsfeld asserts that new ballistic missile threats could emerge earlier than had been estimated, and with little warning.

August 31, 1998: North Korea launches a Taepo Dong-1 missile—the first time that the country demonstrates multiple stage separation—but the third stage fails.

September 9, 1998: The Cochran bill again fails by one vote.

January 20, 1999: Defense Secretary Cohen requests more funding for national missile defense, pushes back the goal for its initial operating capability from 2003 to 2005, and announces that a deployment decision could come in June 2000.

March 17, 1999: The U.S. Senate passes the "National Missile Defense Act of 1999," making it U.S. policy "to deploy as soon as is technologically possible an effective National Missile Defense system . . . ." Democrats agree to support the bill only after amendments are added that make it U.S. policy to seek reductions in Russia's nuclear arsenal and that require authorization of funding.

July 23, 1999: President Clinton signs the National Missile Defense Act of 1999 and states his criteria for deciding whether to deploy.

September 1999: The Welch panel, reconvened to assess the reconfigured national missile defense program, once again finds the Pentagon's approach extremely high-risk, stating that the planned June 2000 technical assessment for deployment "should be regarded more as a feasibility decision with some long-term deployment actions rather than a readiness decision."

October 2, 1999: The first intercept test of the proposed national missile defense system hits its target. The "kill vehicle" that slammed into the target, however, only found it by first homing in on a much larger decoy balloon, making the true success of the test difficult to judge.

January 18, 2000: The second intercept test fails when sensors on the kill vehicle malfunction.

PROJECTED SCHEDULE

(Subject to change)

June 20, 2000: Beginning of the Pentagon's Deployment Readiness Review (DRR), its assessment of the technical readiness for deployment of the proposed national missile defense.

July 7, 2000: The next intercept test. Originally scheduled for late April, following the failure of the second test it was first delayed until late June, then again to July.

Late July 2000: Current goal for the Pentagon conclusion of the DRR. This goal was set, however, before the latest postponement of the next intercept test.

Summer/Fall 2000: When Clinton would decide to deploy a national missile defense.

November 2000: If pouring concrete for proposed system is considered a Treaty violation (See "Withdrawing from the ABM Treaty," p. 23), the point when the Clinton Administration would consider announcing it will withdraw from the ABM Treaty, giving the required six months notice.

April/May 2001: Scheduled ground-breaking and initial concrete pouring for the national missile defense sites in Alaska.

2001–2005: The fifth through 19th intercept tests. The 13th test, in 2003, would be the first to use the production-quality ground-based interceptor, with both the kill vehicle and the booster.

Late 2005: Initial operating capability for the proposed national missile defense, with 20 interceptors based in Alaska.

APPENDIX 3

National Missile Defense Review Committee Report
(Welch Panel report)

published in September 1999
released to the public in November 1999

For a brief explanation of the Welch panel, and selected extracts, see "Welch Panel: Planned Deployment Decision Premature" on p. 12. Extracted below are the complete set of recommendations produced in the Welch panel report.

National Missile Defense Review
Findings and Recommendations

- The program has been restructured from the earlier 3 + 3 with a DRR [Deployment Readiness Review] for all elements of the system in July 2000 to a series of phased deployment readiness decisions leading to a most likely capability to deploy in 2005. This restructure significantly reduced program risk.
- However, key event slips have compressed the planned restructured schedule.
- **RECOMMENDATION: Do not allow further compression of the schedule. If there are additional slips in key events, adjust the DRR date as needed to avoid regressing to a very high risk schedule.**

- Several key program issues had not been adequately addressed at the time of this review.
  - **— RECOMMENDATION: LSI [Lead System Integrator] contract should be updated to reflect clearly LSI responsibility and accountability.**
  - **— RECOMMENDATION: An updated TEMP [Test and Evaluation Master Plan] should be approved and implemented.**
- The information from the events planned up to the DRR could provide confidence that deployment in the planned time frame (2005) is feasible and that the nation could continue on the path to deployment. Readiness to deploy will be determined in phases, based upon events following the DRR. Key components are to be tested just before each phased milestone decision and are the decision drivers.
  - **— RECOMMENDATION: Consider DRR event as a system development feasibility review rather than a deployment readiness review.**

- High concurrency exists in the requirements, program definition, and system engineering planning—driven by the DRR date.
  - **— RECOMMENDATION: Recognize that the first DRR milestone is a deployment feasibility milestone since the decision process is phased over decision milestones through 2003.**
- The LSI-described system for risk assessment and mitigation is extensive and detailed but seems to focus primarily on the higher level integration issues.
  - **— RECOMMENDATION: In addition to the current emphasis, the LSI should penetrate more deeply Into the element technical performance risks to identify those risks that can be most damaging to cost, schedule, and performance. Specific actions for mitigating these risks should also be identified.**

- The IFTs [Integrated Flight Tests] are essential events, but the IGTs [Integrated Ground Tests] and the LIDS [LSI Integrated Distributed Simulation] will be the principal sources of comprehensive information and understanding needed for program development and milestone decisions. IGT and LIDS development are behind schedule and do not appear to be resourced adequately to ensure timely support.
  - **— RECOMMENDATION: Increase the priority given to resourcing IGTs and LIDS development.**
- The ISTC [Integrated System Test Capability] is overscheduled, and the IFTs will inevitably outprioritize the IGTs for ISTC resources. Full ISTC support for the IGTs is essential.
  - **— RECOMMENDATION: Consider expanding the ISTC capability now.**

- LSI penetration into the details of the EKV [Exo-atmospheric Kill Vehicle] program seemed inadequate.

— **RECOMMENDATION: LSI should audit all EKV ground test results to ensure that EKV meets all flight environments—with the PLV [Payload Launch Vehicle] and the operational booster—with substantial margins.**

- The flight test envelope is small relative to that of the operational system.

  — **RECOMMENDATION: Consider using additional target platforms (air-dropped or sea-launched) to gather expanded operational testing data on the XBR [X-Band Radar] and variations in terminal conditions.**

- The lack of representative targets and single end-game geometry raises questions about the ability of the flight-test program to verify system performance.

  — **RECOMMENDATION: Accelerate the development of a HWIL [Hardware-In-The-Loop] facility to allow credible testing of the EKV In a variety of end-game geometries against a variety of threats. Strongly consider either KHILS [Kinetic Kill Vehicle Hardware-In-The-Loop Simulations] with the 1,000-Hz rate table or expanded capabilities at AEDC [Arnold Engineering Development Center].**

- The panel believes added long-term focus is needed for this long-term evolutionary system.

  — **RECOMMENDATION: Allocate resources for the short term and the long term. For the longer term:**

- Ensure GBR-P [Ground-Based Radar surrogate] will maintain performance

  - **Erect a second launcher at KMR [Kwajalein Missile Range] to allow dual-salvo testing immediately design and invest in an adequate HWIL test facility**
  - **Aggressively pursue technology development for upgrades and follow-ons**
  - **Determine the need to invest in a second or expanded ISTC now**
  - **Develop facilities and/or capabilities to evaluate C2-level threats now**
  - **Procure sufficient EKV hardware to support needed facility development, ground testing, and flight test backups.**

APPENDIX 4

Extracts from the National Intelligence Council Report, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015"

September 1999

Key Points

We project that during the next 15 years the United States most likely will face ICBM threats from Russia, China, and North Korea, probably from Iran, and possibly from Iraq. The Russian threat, although significantly reduced, will continue to be the most robust and lethal, considerably more so than that posed by China, and orders of magnitude more than that potentially posed by other nations, whose missiles are likely to be fewer in number—probably a few to tens, constrained to smaller payloads, and less reliable and accurate than their Russian and Chinese counterparts. We judge that North Korea, Iran, and Iraq would view their ICBMs more as strategic weapons of deterrence and coercive diplomacy than as weapons of war. We assess that:

- North Korea could convert its Taepo Dong-1 space launch vehicle (SLV) into an ICBM that could deliver a light payload (sufficient for a biological or chemical weapon) to the United States, albeit with inaccuracies that would make hitting large urban targets improbable. North Korea is more likely to weaponize the larger Taepo Dong-2 as an ICBM that could deliver a several-hundred kilogram payload (sufficient for early generation nuclear weapons) to the United States. Most analysts believe it could be tested at any time, probably initially as an SLV, unless it is delayed for political reasons.
- Iran could test an ICBM that could deliver a several-hundred kilogram payload to many parts of the United States in the last half of the next decade using Russian technology and assistance. Most analysts believe it could test an ICBM capable of delivering a lighter payload to the United States in the next few years following the North Korean pattern.
  - — Analysts differ on the likely timing of Iran's first test of an ICBM that could threaten the United States—assessments range from likely before 2010 and very likely before 2015 (although an SLV with ICBM capability probably will be tested in the next few years) to less than an even chance of an ICBM test by 2015.
- Iraq could test a North Korean-type ICBM that could deliver a several-hundred kilogram payload to the United States in the last half of the next decade depending on the level of foreign assistance. Although less likely, most analysts believe it could test an ICBM that could deliver a lighter payload to the United States in a few years based on its failed SLV or the Taepo Dong-1, if it began development now.
  - — Analysts differ on the likely timing of Iraq's first test of an ICBM that could threaten the United States—assessments range from likely before 2015, possibly before 2010 (foreign assistance would affect capability and timing) to unlikely before 2015.
- By 2015, Russia will maintain as many nuclear weapons on ballistic missiles as its economy will allow but well short of START I or II limitations.
- By 2015, China is likely to have tens of missiles capable of targeting the United States, including a few tens of more survivable, land- and sea-based mobile missiles with smaller nuclear warheads—in part influenced by US technology gained through espionage. China tested its first mobile ICBM in August 1999.
- Sales of ICBMs or SLVs, which have inherent ICBM capabilities and could be converted relatively quickly with little or no warning, could increase the number of countries able to threaten the United States. North Korea continues to demonstrate a willingness to sell its missiles. Although we judge that Russia or China are unlikely to sell an ICBM or SLV in the next fifteen years, the consequences of even one sale would be extremely serious.
- Several other means to deliver weapons of mass destruction to the United States have probably been devised, some more reliable than ICBMs that have not completed rigorous testing programs. For example, biological or chemical weapons could be prepared in the United States and used in large population centers, or short-range missiles could be deployed on surface ships. However, these means do not provide a nation the same prestige and degree of deterrence or coercive diplomacy associated with ICBMs.

The proliferation of medium-range ballistic missiles (MRBMs)—driven primarily by North Korean No Dong sales—has created an immediate, serious, and growing threat to US forces, interests, and allies, and has significantly altered the strategic balances in the Middle East and Asia. We judge that countries developing missiles view their regional concerns as one of the primary factors in tailoring their programs. They see their short- and medium-range missiles not only as deterrents but also as force-multiplying weapons of war, primarily with conventional weapons, but with options for delivering biological, chemical, and eventually nuclear weapons. South Asia provides one of the most telling examples of regional ballistic missile and nuclear proliferation:

- Pakistan has Chinese-supplied M-11 short-range ballistic missiles (SRBMs) and Ghauri MRBMs from North Korea.
- India has Prithvi I SRBMs and recently began testing the Agni II MRBM.
- We assess these missiles may have nuclear roles.

Foreign assistance continues to have demonstrable effects on missile advances around the world, particularly from Russia and North Korea. Moreover, some countries that have traditionally been recipients of foreign missile technology are now sharing more amongst themselves and are pursuing cooperative missile ventures.

We assess that countries developing missiles also will respond to US theater and national missile defenses by deploying larger forces, penetration aids, and countermeasures. Russia and China each have developed numerous countermeasures and probably will sell some related technologies.

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Alternative Threats to the United States

Several other means to deliver WMD to the United States have probably been devised, some more reliable than ICBMs that have not completed rigorous testing and validation programs. The goal of an adversary would be to move the weapon within striking distance without a long-range ICBM. Most of these means, however, do not provide the same prestige and degree of deterrence or coercive diplomacy associated with long-range missiles, but they might be the means of choice for terrorists.

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Non-Missile WMD Threats to the United States. Although non-missile means of delivering WMD do not provide the same prestige or degree of deterrence and coercive diplomacy associated with an ICBM, such options are of significant concern. Countries or non-state actors could pursue non-missile delivery options, most of which:

- Are less expensive than developing and producing ICBMs.
- Can be covertly developed and employed; the source of the weapon could be masked in an attempt to evade retaliation.
- Probably would be more reliable than ICBMs that have not completed rigorous testing and validation programs.
- Probably would be more accurate than emerging ICBMs over the next 15 years.
- Probably would be more effective for disseminating biological warfare agent than a ballistic missile.
- Would avoid missile defenses.

The requirements for missile delivery of WMD impose additional, stringent design requirements on the already difficult technical problem of designing such weapons. For example, initial indigenous nuclear weapon designs are likely to be too large and heavy for a modest-sized ballistic missile but still suitable for delivery by ship, truck, or even airplane.

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Penetration Aids and Countermeasures

We assess that countries developing ballistic missiles would also develop various responses to US theater and national defenses. Russia and China each have developed numerous countermeasures and probably are willing to sell the requisite technologies.

- Many countries, such as North Korea, Iran, and Iraq probably would rely initially on readily available technology—including separating RVs, spin-stabilized RVs, RV reorientation, radar absorbing material (RAM), booster fragmentation, low-power jammers, chaff, and simple (balloon) decoys—to develop penetration aids and countermeasures.
- These countries could develop countermeasures based on these technologies by the time they flight test their missiles.

Foreign espionage and other collection efforts are likely to increase. China, for example, has been able to obtain significant nuclear weapons information from espionage, contact with scientists from the United States and other countries, publications and conferences, unauthorized media disclosures, and declassified US weapons information. We assess that China, Iran, and others are targeting US missile information as well.

APPENDIX 5

Statement Announcing the President's Signature of the National Missile Defense Act of 1999

White House Press Release
July 23, 1999

THE WHITE HOUSE
Office of the Press Secretary
July 23, 1999

STATEMENT BY THE PRESIDENT

I have signed into law H.R. 4, the "National Missile Defense Act of 1999." My Administration is committed to addressing the growing danger that rogue nations may develop and field long-range missiles capable of delivering weapons of mass destruction against the United States and our allies.

Section 2 of this Act states that it is the policy of the United States to deploy as soon as technologically possible an effective National Missile Defense (NMD) system with funding subject to the annual authorization of appropriations and the annual appropriation of funds for NMD. By specifying that any NMD deployment must be subject to the authorization and appropriations process, the legislation makes clear that no decision on deployment has been made. This interpretation, which is confirmed by the legislative record taken as a whole, is also required to avoid any possible impairment of my constitutional authorities.

Section 3 of the Act states that it is the policy of the United States to seek continued negotiated reductions in Russian nuclear forces. Thus, section 3 puts the Congress on record as continuing to support negotiated reductions in strategic nuclear arms, reaffirming my Administration's position that our missile defense policy must take into account our arms control and nuclear nonproliferation objectives.

Next year, we will, for the first time, determine whether to deploy a limited National Missile Defense, when we review the results of flight tests and other developmental efforts, consider cost estimates, and evaluate the threat. Any NMD system we deploy must be operationally effective, cost-effective, and enhance our security. In making our determination, we will also review progress in achieving our arms control objectives, including negotiating any amendments to the ABM Treaty that may be required to accommodate a possible NMD deployment.

THE COALITION TO REDUCE NUCLEAR DANGERS

Founded in 1995, the Coalition is an alliance of 17 of the largest and most active nuclear disarmament and non-proliferation non-governmental organizations. The Coalition helps coordinate and support the efforts of major Washington and London-based non-proliferation and disarmament NGOs to strengthen national and international security by reducing and eliminating the threats posed by nuclear weapons.

The members of the Coalition are: Arms Control Association; British American Security Information Council; Center for Defense Information; Council for a Livable World Education Fund; Federation of American Scientists; Henry L. Stimson Center; International Center; Institute for Science and International Security; Lawyers Alliance for World Security; Natural Resources Defense Council; Peace Action Education Fund; Physicians for Social Responsibility; Plutonium Challenge; Public Education Center; Union of Concerned Scientists; 20/20 Vision Education Fund; and Women's Action for New Directions. Not every member of the Coalition necessarily agrees with every statement in this report.

COUNCIL FOR A LIVABLE WORLD EDUCATION FUND

The Council for a Livable World Education Fund is a non-profit corporation established in 1980 to educate the public about the dangers of nuclear weapons, the rising Pentagon budget, excessive arms exports, and the options open to those who search for peaceful alternatives to war. The Education Fund coordinates three major projects: Weapons of Mass Destruction, promoting nuclear non-proliferation and seeking the elimination of nuclear weapons; Conventional Arms Transfers, seeking restrictions on arms sales to unelected governments, human rights abusers, and unstable regions; and Target 2000, supporting reductions in excessive military spending and an end to military waste.

THE COALITION AND THE EDUCATION FUND ONLINE

This report is available online through the Web Sites of both the Coalition and the Education Fund. Both also provide information, analysis, and hundreds of links to nuclear arms control treaty texts, nuclear weapons data, congressional debates, government statements, and more.

The Coalition's site: http://www.crnd.org
The Education Fund's site: http://www.clw.org/ef/index.html

For more information on national missile defense, the ABM Treaty, related congressional legislation, and official documents, see both organization's Ballistic Missile Defense sections:

The Coalition's: http://www.clw.org/coalition/libbmd.htm
The Education Fund's: http://www.clw.org/bmd.html

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