The Political and Strategic Imperatives of National Missile Defense

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OVERVIEW

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by Joeseph Cirincione

Director, Non-Proliferation Prject
Carnegie Endowment for International Peace

SUMMARY

The drive to deploy a National Missile Defense System in the United States is not driven primarily by threats or technology, but by politics. The ballistic missile threat to the homeland of the United States has substantially decreased over the past 15 years. Despite years of effort and over $60 billion spent on research, there remain

major technological obstacles to effective ballistic missile defense. The push for a national missile defense is motivated primarily by deeply-held conservative political and strategic views on the nature of international conflict.

Conservative analysts see a dangerous world with mounting threats. They believe that American security cannot be safeguarded by international agreements but primarily by military might. If the United States is to continue to project its military power, it must have defenses to thwart any nation's potential nuclear-armed missiles. Some conservatives also see war with a rising China as possible, even inevitable, requiring robust missile defenses. The Clinton Administration has tried to "triangulate" the issue, hoping to deploy a limited system that would not overturn existing arms control arrangements or antagonize Russia or China. The Clinton strategy failed diplomatically and technologically, but succeeding politically in neutralizing missile defense as a issue in the 2000 presidential campaign (though it does not seem that defense would have been a significant issue, in any event.). The international consequences of this strategy, however, are still severe, and an presidential decision in the future to abrogate the Anti-Ballistic Missile Treaty would destabilizing the entire non-proliferation regime.

This paper outlines the decreasing missile threats to the United States, the technical weaknesses of proposed missile defense systems and details the political divide at the root of the missile defense debate

SECTION ONE: THE DECREASING BALLISTIC MISSILE THREAT

Official Estimates

The unclassified version of the 1999 National Intelligence Estimate (NIE), "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015," released on September 9, 1999 represents the official U.S. government view of the ballistic missile threat.

It presents a limited view of some of the ballistic missile threats to the United States. The estimate lowers the established intelligence agency standards for judging threats and thus presents known missile programs as more immediate threats than previous assessments. While some officials within the Administration may disagree with the assessment, they have not publicly expressed their views.

The NIE projects forward some current technological and development trends, but, by assessing "projected possible and likely missile developments by 2015 independent of significant political and economic changes," (emphasis added) it overestimates potential ballistic missile threats from still developing countries such as Iraq, Iran and North Korea, and poorly prepared policy-makers for the sharply deteriorated international security environment that would emerge should the non-proliferation regime weaken or collapse. The NIE

cautions that it tried to balance what could happen, with what is most likely to happen.

Every since the 1998 Rumsfeld Commission report asserted, somewhat hysterically, that a new nation could plausibly field an ICBM "with little or no warning,"(1) government analysts have struggled to cover all possibilities, while still preserving their value for policy-makers by reporting what is most likely to happen. This conflict is evident in the introduction to the NIE, which notes a dissenting opinion from one of the intelligence agencies involved in producing the consensus report:

"Some analysts believe that the prominence given to missiles countries 'could' develop gives more credence than is warranted to developments that may prove implausible."

This "could" issue is perhaps the most striking difference between the 1999 NIE and those published in 1993 and 1995. "Could" is a highly ambiguous word. For some it means "remotely possible," for others it means "will." The shift to the "could" standard represents one of the three major changes made to the assessment methodology from previous assessments. The other two shifts are:

(1) substantially reducing the range of missiles considered serious threats by shifting from threats to the 48 continental states to threats to any part of the land mass of the 50 states; and,

(2) changing the timeline from when a country would first deploy a long-range missile to when a country could first test a long-range missile.

The shift on potential US targets represents a range change of some 5,000 kilometers (the distance from Seattle to the western-most tip of the Aleutian island chain). It essentially means that an intermediate-range ballistic missile, such as the Taepo-dong II, could be considered in the same class as an intercontinental-range missile. The timeline shift represents a difference of five years (what previous estimates said was the difference between first test and likely deployment). The Indian experience with the Agni II missile provides some indication the original standard may be the more accurate. An Agni II was first tested in April 1999 with a potential range of 2,500 kilometers, but despite Indian declarations of intent to deploy, the missile has yet to enter production. The Agni program began in the mid-1980s.

These three changes account for almost all of the differences between the 1999 NIE and earlier estimates. Thus, the new estimate, rather than presenting a new, dramatic development in the ballistic missile threat, represents a lowering of the standards for judging when a system would be considered a threat. This NIE may lead some observers to conclude that there has been a significant technological leap forward in Third World missile programs, when, in fact there has been

only incremental development in programs well-known to analysts for years.

For example, the 1993 NIE said:

"Only China and the CIS strategic forces in several states of the former Soviet Union currently have the capability to strike the continental United States (CONUS) with land-based ballistic missiles. Analysis of available information shows the probability is low that any other country will acquire this capability during the next 15 years."

The 1995 NIE, as summarized by publicly by Richard Cooper, Chairman of the National Intelligence Council, found:

"Nearly a dozen countries other than Russia and China have ballistic missile development programs. In the view of the Intelligence Community, these programs are to serve regional goals. Making the change from a short or medium range missile—that may pose a threat to US troops located abroad—to a long range ICBM capable of threatening our citizens at home, is a major technological leap .The Intelligence Community judges that in the next 15 years no country other than the major declared nuclear powers will develop a ballistic missile that could threaten the continuous 48 states or Canada."

Several leading members of congress harshly attacked the 1995 and 1993 estimates. In December 1996, a congressionally-mandated panel headed by former Bush administration CIA director Robert Gates reviewed the 1995 NIE and agreed that the the continental United States was unlikely to face an ICBM threat from a third world country before 2010 "even taking into account the acquisition of foreign hardware and technical assistance, and that case is even stronger than was presented in the estimate."

With the three altered measurement standards and in the wake of the Rumsfeld Commision report, the new 1999 NIE finds that over the next 15 years the US:

"Post likely will face ICBM threats from Russia, China and North Korea probably from Iran, and possibly from Iraq, although the threats will consist of dramatically fewer weapons than today because of significant reductions we expect in Russian strategic forces."

By making the analysis so specific, the NIE does a real service. It highlights the very narrow nature of the missile proliferation threat, one confined to a few countries whose political evolution will be a determining factor in whether they remain threats to the United States. However, by projecting "possible and likely missile developments by 2015 independent of significant political and economic changes," the NIE limits its value as a risk assessment tool. The adoption of the "could standard" and the selective and partial inclusion of political factors in analyzing the threat are the two

greatest weaknesses of this NIE.

Some might argue, for example, that the diplomatic developments in North Korea made the NIE obsolete two weeks after it was publicly released. If North Korea does not flight test the Taepo-dong II and if that nation can be further convinced not to export missiles or related technology, we would eliminate the greatest source of an additional ICBM threat to the United States. If North Korea were taken out of the equation, there would be very little left to this estimate. Commander-in-Chief of the Pacific Command Admiral Dennis Blair said "The North Korean development and the Taepo-Dong launch is clearly one of the key, if not the key factor, in determining the parameters and the deployment schedule and the capabilities of [the national missile defense system]."(2) So if the Korean problem were resolved, "it would have a very big effect" on the program schedule and direction. No mention was made in the report of these diplomatic efforts or their potential significance.

Similarly, under some other plausible scenarios, North Korea may collapse; democratizing trends in Iran could alter the direction of that nation's program; while a post-Saddam Iraq could restore friendly relations with the West. These, of course, are political risk assessments, not the kind of technology estimates the 1999 NIE details, although they were included in previous NIEs. The international political, diplomatic and legal environment is highly relevant to the prospects for global development of ballistic missiles.

Declining Global Arsenals

It has now become common wisdom and certainly common political usage to refer to the growing threat of ballistic missiles. But is this true? The threat is certainly changing, and is increasing by some measures. But by several other important criteria, the ballistic missile threat to the United States is significantly smaller than it was in the mid-1980s.

1. Decreasing ICBM Arsenals.

The number of intercontinental ballistic missiles has decreased dramatically since the height of the Cold War. During the 1980s, the Soviet Union deployed over 9,540 nuclear warheads on 2,318 long-range missiles aimed at the United States. Currently, Russia has fewer than 5,200 missile warheads deployed on approximately 1,100 missiles (a 52-percent decline).

2. Eliminated IRBM Arsenals.

There has been a near-100 percent decrease in the threat from intermediate-range ballistic missiles (with ranges of 3,000 to 5,500 kilometers) since the mid-1980s. President Ronald Reagan negotiated and implemented the Intermediate-Nuclear Forces Treaty. The Soviet

Union destroyed 1,846 missiles in this range, eliminating this entire class of missiles from U.S. and Soviet arsenals. China has some 20 missiles in this range, and no other nation has developed intermediate-range ballistic missiles (though the launch of North Korea's developmental Taepodong-2 would add a few missiles to this category).

3. More MRBM Programs.

Apart from China and Russia, a few countries have conducted tests of medium- range ballistic missiles (with ranges of 1,000 to 3,000 km) which do not threaten the territory of the United States. India intends to begin production of the Agni II, with a range of about 2,000 km and may be working on a longer- range "Surya" missile. The only other significant medium-range threats come from missiles derived from the North Korean No Dong: Pakistan's Ghauri (1,300-km range) and Ghauri II (2,000-km range) missiles and Iran's Shahab-3 (also 1,300-km range), all of which have been flight tested.

4. Aging Scud Inventories.

Almost all the other nations that possess ballistic missiles have only short-range missiles. For most, their best missiles are aging Scuds bought or inherited from the former Soviet Union and now declining in military utility over time.

5. Fewer, Poorer Programs.

The number of countries trying or threatening to develop long-range ballistic missiles has not changed greatly in 15 years, and is actually smaller than in the past. The nations now attempting to perfect long-range missiles are also smaller, poorer and less technologically advanced than were the nations with missile programs 15 years ago.

Only China and Russia have the capability to hit the United States with nuclear warheads on intercontinental ballistic missiles. This has not changed since Russia and China deployed their first ICBMs in 1959 and 1981 respectively. Confusion arises when policy-makers speak of threats from missiles to the United States or U.S. interests, such as forward-deployed troops or allied nations. This merges threats from very short-range missiles, of which there are many, with long-range missiles, of which there are few.

In short, the ballistic missile threat is confined, limited and changing relatively slowly.
Declining Ballistic Missile Arsenals

Threat
Status (1985 vs. 2000)
Trend
ICBM (>5500 km)

52 % decrease.

IRBM (3000-5500 km)
99 % decrease.

MRBM (1000-3000 km)
3 new national programs.

SRBM (<1000 km)
Static but declining as Scud inventories age.

Number of nations with ballistic missile programs of concern
Fewer, less advanced (8 in mid-1980s, 7 today).

Potentially hostile nations with ballistic missile programs
More (3 in mid-1980s, 5 today).

Potential damage to the United States from a missile attack
Vastly decreased.

By focusing on developments in a small number of missile programs in developing nations, current intelligence estimates neglect dramatic declines in global ballistic missile arsenals. As a result, official statements of the ballistic missile threat to the United States have been distorted by an exaggerated sense of the military dangers the nation faces from long-range missiles.

The missile threat is certainly changing, and is increasing by several important criteria. Globally, however, compared to the threats the United States confronted in the 1980s, there are far fewer intercontinental-range ballistic missiles, almost no intermediate-range ballistic missiles, fewer nations with missile programs (and those that exist are less technologically-advanced), and, compared to the threat of a global thermonuclear war that would have ended life on the planet, the potential damage from a missile attack is vastly decreased.

The United States is now legitimately concerned primarily about five nations, in addition to Russia and China: North Korea, Iran, Iraq, India and Pakistan. Fifteen years ago, North Korea was not a concern, but India, Brazil, Argentina, Egypt, South Africa and perhaps Libya were all involved in programs to develop long-range missiles. All but

India have since terminated such efforts. Israel retains the capability to develop long-range missiles, but is not considered a threat to the United States nor a likely exporter of missile technology.

The Carnegie Non-Proliferation Project maintains a comprehensive list of all nations with ballistic missiles of all ranges. The list is available at the Project web site at: www.ceip.org/npp.

SECTION TWO:
TECHNICAL OBSTACLES TO EFFECTIVE BALLISTIC MISSILE DEFENSE

None of the dozens of national missile defense systems proposed over the past 20 years has ever proven to be technical feasible. This includes the wide-range of systems researched and developed under the Strategic Defense Initiative (SDI) program and the current candidates proposed by the Ballistic Missile Defense Organization (BMDO) and missile defense advocates.

It is highly unlikely that any candidate system can be shown to be militarily effective during the next eight years. That is, during the next two presidential terms neither the technology nor our testing methods will provide an assured capability to defeat long-range ballistic missiles. It is possible that the next president may decide to proceed with deployment of a national missile defense system during that time, but that decision will be based on political considerations or the perception that the threat justifies early deployment, not on demonstrated ability to defeat the likely threats.

Given the overwhelming advantage enjoyed by offensive nuclear forces, and the enormous technical difficulties inherent in any missile defense, this should not be surprising. It may be possible to someday construct a system that could provide at least some defense against intercontinental ballistic missiles. However, the United States is years away from conducting the kinds of realistic tests that could provide military and political leaders with the minimum confidence they must have before risking the lives of millions of citizens.

Understanding Ballistic Missile Defense Interceptor Tests

The past two decades of efforts to invent a viable national missile defense have been characterized by exaggerated claims of success and promises of performance that later proved false. It is difficult to recall a missile defense proponent who understated the actual performance of a system. The problems began with the false claims of proponents of the X-ray laser that helped launch the SDI program(3) and continue through claims today that Aegis destroyers and cruisers can quickly and inexpensively provide a highly-effective defense against both intermediate- and intercontinental-range ballistic missiles.

For example, many experts and officials believe that countermeasures will not be significant obstacles to effective ballistic missile defense because we have already solved the discrimination problem. This is not true, despite some misleading claims of success. The

national missile defense interceptor on 2 October 1999 contained a test element where the interceptor was to distinguish between the target and a decoy object. Ballistic Missile Defense officials provided important qualifying details of the test in briefings before the test that did not make it into their briefings after the test.

The official news release for the Assistant Secretary of Defense for Public Affairs on 2 October stated:

"The test successfully demonstrated 'hit to kill technology' to intercept and destroy the ballistic missile target. An exoatmospheric kill vehicle (EKV) weighing about 120 pounds, equipped with two infrared sensors, a visible sensor, and a small propulsion system, located and tracked the target, guiding the kill vehicle to a body-to-body impact with the target and resulting in the target destruction using only the kinetic energy of the collision. This "hit to kill' intercept demonstrates that a warhead carrying a weapon of mass destruction-nuclear, chemical or biological - will be totally destroyed and neutralized."

Hitting a small target at these distances and speeds is a remarkable technological achievement, but not an unprecedented one. Previous tests of similar interceptors have hit targets twice, in 1984 and in 1991. In both previous cases, as in this demonstration, the targets were significantly enhanced to ensure the likelihood of success. The October news release cited above neglected to mention four critical test enhancements:

1) The target followed a pre-programmed flight path to a designated position.

2) The interceptor missile also flew to a pre-programmed position.

3) A Global Positioning Satellite (GPS) receiver was placed on the target to send its position to ground control and the necessary target location information was downloaded to a computer in the kill vehicle.

4) The decoy released had a significantly different thermal signature than the target, making it easier for the sensors on the kill vehicle to distinguish between the objects.

5) Later analysis, disclosed by The New York Times, not by test officials, that the test had very nearly failed due to three other key problems:

6) Incorrect star maps loaded into the kill-vehicle's computer prevented the vehicle from ascertaining its position once it had separated from the booster

7) Back-up inertial guidance systems led to inaccuracies in pointing the sensors used to locate the target.

8) The sensors finally saw the large, bright balloon decoy, re-

oriented, continued searching and located the cooler warhead that it had been programmed to recognize as the correct target.

For test purposes, there is nothing wrong with minimizing the number of variables in order to test key elements of the weapon system. The GPS receiver, for example, was substituting for information that might be provided by future missile defense radars. It is vital, however, that test officials provide full disclosure of test limitations to policy-makers at every stage of the process, lest test results be interpreted to have greater significance than, in fact, they do. The October test was much more a demonstration of two missiles intercepting each other than it was a test of intercepting an enemy missile under combat conditions. It proved only that a kill vehicle can intercept a target if it can see it.

Some officials, such as Department of Defense Director of Operational Test and Evaluation Philip Coyle, have tried to caution lawmakers on the tests. Director Coyle warns that the test are "carefully scripted." In his latest annual report to Congress he notes that the test program for a national missile defense system:

"is building a target suite that, while an adequate representation of one or two re-entry vehicles, 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 (eg., discrimination requirements)."

Misinterpretation of test results is not an abstract concern. The last time the United States conducted a successful high-altitude, hit-to-kill intercept in the presence of decoys in 1991, the then-director of the Strategic Defense Initiative Office told Congress that the ERIS interceptor had determined on its own "which of the targets to go after, whether the decoy or the target." His annual report to Congress that year claimed that the ERIS test "validates the concept of performing mid-course intercepts using basic discrimination techniques" and had discriminated between decoy balloons and the target warhead.

These clams were false. The General Accounting Office in their report, "Strategic Defense Initiative: Some Claims Overstated for Early Flight Tests of Interceptors," (NSIAD-92-282) found that SDIO officials consistently overstated the success of interceptor flight tests. In particular, in the ERIS intercept of 1991:

"The interceptor was not capable of discriminating targets from decoys. A program official said that the interceptor was pre-programmed to hit the middle object in the target complex his if the target complex had not deployed as planned and one of the balloons had been positioned as the middle object instead of the re-entry vehicle, ERIS would have attempted to intercept the balloon, since it cannot discriminate a re-entry vehicle from a decoy on its own."

The 1991 test also placed a transponder of the target vehicle to guide the interceptor to the RV. None of this information was disclosed to Congress until an investigation by the Government Operations Committee revealed the limitations of the test and the misrepresentations of success. Similarly the only hit from four attempts during the Homing Overlay Experiment (HOE) in the early 1980s was made possible only after the target was heated to 100 degrees Fahrenheit to increase its visibility to the interceptor's infrared sensors. Still the HOE, ERIS and now EKV tests go down in the books as successes, usually unqualified.

The GAO report cited above found a pattern of misleading claims, forcing them to conclude that SDI officials had inaccurately portrayed four of five tests as successes, when they were not.

Equally relevant to the current debate, these inaccurate reports included claims that a space-based "Brilliant Pebbles" test was "a "90-percent success," and was ready to proceed to more advanced testing. GAO found that the "90-percent success" claim was based on a substantially downward revision of the original goals for the test to correspond with what the interceptor was able to achieve, not what was originally planned. Of the original four goals, none was fully met, including its complete inability to detect, acquire and track a target. Since the program's "accomplishments were significantly less than planned," GAO concluded, the first phase of the program's testing "was completed only in the sense that SDIO had decided to proceed into Phase II."(4)

This history is part of the reason why it is common to hear advocates of missile defense claim that their proposed system is ready to go, inexpensive to build and highly effective. But as former BMDO Director Air Force General Lester Lyles said, in directly rebutting before the Senate last year the claims of the Heritage Foundation that effective sea-based missile defenses could be rapidly deployed, "When it comes to missile defense, there is nothing quick, cheap and easy." President Clinton rediscovered this truth when, despite large funding increases by both Congress and the Administration over the past four years, the technical problems with the proposed National Missile Defense System proved overwhelming. He said on September 1, "I simply cannot conclude with the information I have today that we have enough confidence in the technology, and the operational effectiveness of the entire NMD system, to move forward to deployment."

MISPLACED FAITH

Some argue that when President Clinton assumed office in 1993, he sabotaged plans that, if allowed to continue, would have by now produced a working and affordable missile defense. The Global Protection Against Limited Strikes (GPALS) plan introduced by President George Bush and Defense Secretary Richard Cheney in January 1991 scaled-back the original SDI program. It proposed instead a space-, sea- and land-based system to destroy from 10 to 200 warheads "delivered by ballistic missiles launched from anywhere in the world to attack areas anywhere else in the world." The system relied heavily on the so-called "Brilliant Pebbles" space-based kinetic kill

weapons.
Some advocate a return to such a system today. But their confidence in the concept is based on faith, not fact.
The Congressional Budge Office at the time estimated that the 12-year cost of the GPALS plan would be at least $85 billion (in 1992 dollars).(5) Annual expenditures would have averaged $8 billion.
Since the system consisted largely of view graphs and concept studies, CBO pointed out that "the complexity of the Grand Forks and GPALS defenses suggests that total costs could exceed planned levels."(6)
The General Accounting Office, in a report to the Chairman of the Legislation and National Security Subcommittee in 1992, warned that the plan would have to "overcome tremendous technical challenges."(7)
This report was the last independent evaluation conducted of the GPALS program. It was not optimistic about the technical feasibility of the weapons proposed. "Such a system will push the cutting edge of technology," GAO warned, "SDIO must rely on some technologies that are as yet unproven and learn how to integrate them into a reliable system" For the system to work, the GAO advised, "significant advances must be made over the next several years in critical areas . . . if these advances are not achieved, schedule delays, escalating costs, and performance problems could occur."
Even if the technologies became available, the analysts said, there was still "the enormous challenge of integrating them into a cohesive system."
In short, space- and sea-based systems proposed in the waning days of the previous administration were hardly the ready-to-go weapons that advocates now fondly remember. Outside of those with a direct financial or career interest in the programs, few experts or military officers thought any of these programs could deliver real, near-term military benefit.

THE HISTORIC RECORD

Based on current schedules and all available evidence it is reasonable to assume that if proposed high-altitude, ballistic missile defense systems are used in combat they will fall far short of predicted effectiveness. It is unlikely that the systems will completely fail, but the evidence indicates that they will perform significantly below either tested or predicted kill rates. Military commanders, therefore, would be wise not to base troop deployments or engagement strategies on unrealistic expectations of the protection these defenses will offer.
The evidence available includes:
* the performance of the Patriot missile system in the Gulf War
* the performance of high-altitude missile defense systems in tests to-date
* current test plans for proposed systems prior to production and deployment

THE PATRIOT EXPERIENCE

In the United States, confusion over the Patriot's performance in the Gulf War still fuels overly optimistic estimates of the effectiveness of new, proposed defensive systems. During the war, many believed that the Patriot had achieved a near-perfect intercept rate, as was reported initially from the battlefield and Washington. Claims were revised downwards from 96 percent in testimony to Congress after the war, to 80 percent, 70 percent, and—after a investigation by the Government Operations Committee in 1992—to 52 percent, though the Army report notes that destruction of only 25 percent of the Scud warheads is supported by evidence with high confidence levels.(8)

Independent evaluations are more pessimistic, concluding that the Patriot hit few if any Scuds during the war. These include assessments conducted by the Israeli Defense Force, the Congressional Research Service, the General Accounting Office, and the Massachusetts Institute of Technology and staff of the Government Operations Committee.

The General Accounting Office review of the evidence in support of the Army claims revealed that, using the Army's own methodology and evidence, a strong case can be made that Patriots hit only 9 percent of the Scud warheads engaged, and there are serious questions about these few hits. The speed of the Scuds, the limitations of the Patriot missile system, and the confusion and targeting difficulties caused by the break-up of the Scud missile as it re-entered the atmosphere seem to have contributed to the high failure rate.

The Patriot missile, equipped with a new multi-mode seeker, failed in two out of three intercept tests conducted after the war. The Army declared it "operationally unacceptable." The new replacement interceptor missile for the PAC-3 configuration, the ERINT, will not initially deployed until 2001. Until then, US forces cannot reliably intercept even the short-range Scuds encountered in the Gulf War.

Whatever the kill ratio attributed to Patriot, the few unclassified hard figures released by the Army should serve as a sobering reminder of how combat conditions can wreck havoc even on systems that perform well on the test ranges, as the Patriot did.

A total of 158 Patriot missiles were fired at fewer than 47 Scuds during the war:

* 86 Patriots were launched at real Scud targets, but
* 30 per cent of the Patriots were launched as Scud debris mistaken for targets
* 15 per cent of the Patriots were launched against false targets caused by radar backlobe and sidelobe interference (including one launched by accident in Turkey.)

The fragmentation and EMC problems were known at the time (the Scud fragmentation had been observed during the Iran-Iraq war) but were not included in deployment and operational planning for the Patriot nor were they included in any tests of the system.

It is my personal evaluation, as the chief investigator for the Government Operation Committee's 1992 review and based on all available evidence, that the Patriot hit few, if any, Scud warheads. The Patriot was simple overmatched. It was never designed to hit a

target as complex as that presented by the Scud. As Raytheon executive Robert Stein explained after the war:

"Upon reentry, the resulting forces caused the missile to break apart into several pieces. These extra pieces looked to the Patriot software like targets that were diving at high speed and were going to impact in the areas that the defense design was laid out to defend. In effect, they became 'decoys' that were indistinguishable from TBMs to the Patriot radar, since no discrimination features had been implemented in anticipation of these types of targets.

"The anomalous behavior that the operators were seeing was created by the aerodynamic instability of the warhead section after the missile started to break up. It was spiraling, rather than travelling on an expected ballistic trajectory, because of changes in its center of gravity and center of aerodynamic pressure after breakup. In addition, its radar reflectivity had dropped significantly because of its smaller size. In effect, what Iraqi engineers had created, purely unintentionally and by poor workmanship and design, was a high-speed, low radar-cross-section, maneuvering reentry vehicle (RV0 accompanied by decoys..."(9)

This is the type of target that TMD and NMD systems should expect in combat and should be used extensively in all test programs now.

CURRENT PLANS

All the proposed new missile defense systems except for the Navy Area-Wide system, employ hit-to-kill interceptors. That is, unlike the Patriot interceptors, which used a proximity fuse and an explosive warhead to scatter pellet-size fragment in the path of the intended target, the new interceptors will attempt to hit the target head-on using the kinetic energy of the encounter to destroy the target.

The track record for test of exo-atmospheric hit-to-kill interceptors should indicate caution in projections of future capabilities. There have only been 15 intercept attempts outside the atmosphere conducted by the Department of Defense since 1982. Of these, only 4, or 26 per cent, actually hit their targets.(10) The low number of past tests and the weak success rate warrant deep skepticism for much success in the near future with the proposed systems.

LOWER-TIER SYSTEMS

The most promising new system, the improved Patriot system, or PAC-3, is designed to intercept Scud-type missiles of the type now deployed by potential Third World adversaries. These 300- to 1000-kilometer-range missiles will represent a challenge, but one which the PAC-3 should be capable of intercepting. The new ERINT missile for the system successfully intercepted two targets (although at relatively short ranges) in a shoot-off with the Patriot multi-mode missile in 1993, but its has since undergone some design changes. It has enjoyed five successful intercepts over the past two years; three against short-range Hera targets and two against cruise missile targets The Navy Area-Wide (Lower Tier) system (an upgrade to the AEGIS radar

system and Standard missile) and the multi-national MEADS program are also aimed at these lower-range threats, but have yet to have any intercept tests.

Some experts still voice concern, however. David Eshel, a retired career officer in the Israeli Defense Force, writes in the September Janes' Intelligence Review, "Although this system [the PAC-3] has an increased range and an onboard terminal radar guidance system it is doubtful that this could overcome the unique corkscrewing effect of the Iraqi Al-Hussayin Scud missile."

Without realistic tests it is impossible to predict performance, but these lower-tier systems appear to hold out the best possibility of successfully intercepting the existing Third World missile threats armed with single warheads. (Missiles armed with submunitions released after the boost phase would defeat any known kinetic energy missile defense system.) They rely on previously developed radar and hardware systems and, because they intercept their targets within the atmosphere after any decoys deployed would have been stripped away, they do not encounter the difficult discrimination problems facing higher, outside the atmosphere interceptors. Countermeasures remain one of the major unsolved technical barriers to effective missile defense despite decades of effort.

HIGHER-TIER SYSTEMS

Potentially more threatening than Scuds are medium-range missiles that travel from 1000 to 3,500 kilometers. No nation hostile to the United States currently fields such missiles, except for several Nodong missiles deployed by North Korea with a range of 1000 km. But this is the threat represented by systems reportedly under development in North Korea and Iran. Both the Administration and Congress favor developing systems to intercept these missiles, with Congress urging a faster development and deployment schedule. To-date, tests of the most promising candidates, the Army's Theater High-Altitude Area Defense system (THAAD) and the Navy Theater-Wide (Upper Tier) system, have been disappointing. While both systems may be technically feasible, THAAD has failed in six of its eight test intercept attempts, and the Navy has gone zero for four in tests of the LEAP kill vehicle (Lightweight Exo-Atmospheric Projectile).

These were tests against specially designed targets, with known trajectories and characteristics, well within the expected performance range of the systems. The THAAD tests were against Storm and Hera targets, which have a maximum range of about 750 and 1,100 kilometers, respectively. A suitable long-range target of 2,000 kilometers or more, does not yet exist. The Navy plans to use surplus Terrier missiles as targets for the Theater-Wide tests.

NATIONAL MISSILE DEFENSE SYSTEM

Noting that the NMD schedule is shorter than most other major system acquisition programs, the General Accounting Office warned in 1997 of the high risks inherent in the program:

"Because of the compressed development schedule, only a limited amount of flight test data will be available for the system deployment decision in fiscal year 2000. By that time, BMDO will have conducted only one system-level flight test, and that test may not include all system elements or involve stressing conditions such as targets that employ sophisticated countermeasure or multiple warheads. As a result, not all technical issues, such as discrimination, will be resolved by the time of the deployment review. Also the current schedule will permit only a single test of the integrated ground-based interceptor before production of the interceptor's booster element must begin. If subsequent tests reveal problems, costly redesign or modification of already produced hardware may be required."(11)
By comparison, the only other U.S.-based ballistic missile defense system, the Safeguard, had an acquisition schedule twice as long as planned for the NMD program. Safeguard also had 111 flight tests, compared to only three intercept tests and one system-level flight test before a fiscal year 2000 deployment decision. The GAO noted that even this system-level test will not be comprehensive because it will not include all system elements, and:
"The single integrated system test will not assess the NMD system's capabilities against stressing threats such as those that use sophisticated countermeasures or multiple warheads. The test is to be conducted against a single target with only simple countermeasures such as decoys. No test against multiple warheads is planned."
In June 1998, the GAO reaffirmed its findings, concluding that even with increased funding technical and schedule risks are high.

THE BOTTOM LINE

There are no current plans to test the THAAD, the Navy Theater-Wide or the NMD system against realistic threats such as multiple warhead missiles that deploy warheads with realistic decoys or jammers. Department of Defense Director of Operation Test and Evaluation Phil Coyle concluded in a August 11 memorandum (reported by Bloomberg News on August 23) that "test results so far do not support a recommendation at this time to deploy in 20005." President Clinton apparently agreed.

Director Coyle also warned:

"Deployment means the fielding of an operational system with some military utility which is effective under realist combat conditions, against realist threats and countermeasures when operated by military personnel at all times of day or night and in all weather. Such a capability is yet to be shown to be practicable for NMD."
The same, of course, is true of the higher altitude TMD systems. This should give military commanders and policy-makers low confidence in the ability of these systems, if deployed, to provide their troops, the nation or US allies any appreciable degree of protection against longer-range ballistic missile threats. Defense planner should consider whether more realistic schedules and elimination of

duplicative programs could reduce the approximately $20 billion planned for missile defense efforts over the next five years and the savings allocated to more pressing defense needs.Section Three: The Political Divide
The debate over the wisdom of deploying a national missile defense system has been determined in large part, by the struggle between two main schools of thought: those that favor maintaining the current global treaty regime and those who seek to replace it with a new conservative defense paradigm.

President Clinton has tried to bridge the gap by advocating deployment of a missile defense system that is compliant with an amended Anti-Ballistic Missile Treaty. However, when the U.S. administration failed to overcome the deep misgiving of the NATO members, they lost any chance of winning Russian support for sweeping treaty amendments. Test failures undercut domestic support for rushing to an early deployment decision and reinforced European, Russian and Chinese opposition. President Clinton abandoned the effort on September 1.

The debate over missile defense, however, is certain to continue. It can best be understood in terms of this larger clash of world views.

DEFENDERS OF THE REGIME

The establishment view seeks to preserve the existing framework of interlocking treaties and agreements that has, with some noticeable failures, prevented the spread of weapons of mass destruction from a few to many nations and has helped prevent wars involving these weapons among the nations that still possess them. The treaty regime has been painstakingly assembled oven the past fifty years through the efforts of many nations, but most often with the leadership of the United States under both Republican and Democratic presidents.

This view is similar if not identical to the views of European leaders and publics. Most leaders of the NATO nations have summarized the current situation in words similar to those of President Jacques Chirac:

"Worrying events have occurred in the last two years with renewed tests of nuclear and ballistic weapons, the fact that three nuclear-weapon States failed to ratify the CTBT [Comprehensive Test Ban Treaty], and that the fundamental provisions of the ABM [Anti-Ballistic Missile] Treaty were challenged yet again. The 21st century should not only seek to safeguard the valuable achievements generated over the pas fifty years by multilateral treaties, but also enable the international community to regain the momentum it appears to have lost today." (12)

The basic strategy for preventing further proliferation and for thwarting missile attacks on the United States was summed up by then-Secretary of Defense William Perry in 1996. The United States, he said, has three lines of defense against proliferation. The first and

strongest is to prevent and reduce the threat through the non-proliferation regime. But some nations will cheat on the treaties or remain outside the regime. Therefore the second line of defense is a strong military to deter any attack and to seek out and destroy mass destruction weapons before they can be used. If this line fails, a third line of defense is provided by active defenses, including ballistic missile defense systems.

President Clinton referenced these three lines of defense in his speech announcing a delay in the national missile defense program on September 1.

"We have carried out a comprehensive strategy to reduce and secure nuclear arsenals, to strengthen the international regime against biological weapons and nuclear testing and to stop the flow of dangerous technology to nations that might wish us harm. At the same time, we have pursued new technologies that could strengthen our defenses against a possible attack, including a terrorist attack here at home. None of these elements of our national security strategy can be pursued in isolation. Each is important, and we have made progress in each area."

Within this camp, there are differences over how serious are the threats from new ballistic missile programs and how effective and reliable missile defenses can be. In general, however, if forced to choose between deploying a limited national missile defense system and preserving the treaty regime, they would choose the regime.

THE ASSAULT ON THE REGIME

For proponents of the new defense paradigm, this is precisely the problem. Hundreds of articles and speeches by conservatives have used the South Asian tests and the Korean and Iranian missile launches as proof that future threats are inherently unpredictable, our intelligence estimates are consistently unreliable, the proliferation of weapons of mass destruction fundamentally unstoppable and, thus, the only truly effective response is reliance on American defense technology. This requires substantial defense budget increases and the deployment of new weapons systems, including new types of nuclear weapons and, most prominently, missile defense systems. Conservatives have skillfully deployed expert commissions and congressional investigations to endorse this view.

The reports of the Commission on the Ballistic Missile Threat to the United States in 1998 (the Rumsfeld Commission) and the Committee on U.S. National Security and the People's Republic of China in 1999 (the Cox Committee) were particularly influential in shaping media and political elite opinion. The Administration's response was been to cede ground, embracing missile defense and budget increases while husbanding the political and personal capital usually devoted to the first line of defense. With the most conservative elements of the Republican Party in control of congressional committees, treaty

ratifications and diplomatic appointments were been delayed for years. The impact has been global. A regime in need of repair and revitalization remains in a state of suspended anticipation.

It is difficult for many in Europe and Asia to fathom this rather cavalier disregard for existing treaties and threat reduction arrangements. But the now dominant side in this debate forcefully rejects the very idea of negotiated arms reductions as a Cold War relic, unsuited for the current period.

Many conservatives see a world, in Governor George W. Bush's phrase, "of terror and missiles and madmen." Paul Wolfowitz, one of Bush's key advisers and a former deputy secretary of defense, compares the 1990s to the 1890s. Then, too, he says, Americans thought the great wars were behind them and the coming century would be characterized by an internationalizing economy, the spread of wonderful new technologies, and the resolution of national disputes through arbitration. Instead, he says, the twentieth century brought us the two most horrific wars in human history. These wars were started by two nations no one in the 1890s thought of as great powers: Germany, just united as a nation; and Japan, only then emerging from centuries of feudalism. Today, says Wolfowitz, China presents "the obvious and disturbing analogy."(13)

Other defense hawks go further, arguing that a U.S.-China clash is almost inevitable. "China is building up its military with high-tech weapons that can threaten neighbors and the United States," warns Arthur Waldron, director of Asian studies at the American Enterprise Institute.(14) "China's territorial claims would likely lead to regional war if they were consistently enforced." Such a war, he fears, could start as much by miscalculation as by design.

Several years ago, Samuel P. Huntington offered a broader vision in his article and book, The Clash of Civilizations. "The fault lines between civilizations will be the battle lines of the future," he says, noting in particular what he calls the "Confucian-Islamic alliance" he sees forming against the West.(15)

Former Secretary of the Navy James Webb is one of several who still echo this view. Webb warned nearly two years ago that "China has been developing a strategic axis with the Muslim world . . . evidenced most clearly by its continuing military assistance to Iran and . . . Pakistan."(16)

Modern day arms control treaties, in this view, are worse than no treaties at all. They promote complacency, lulling America into a false sense of security. Meanwhile, several non-Western nations (columnist Charles Krauthammer calls them "weapon states") are busily acquiring and deploying nuclear, chemical, and biological weapons and ballistic missiles.

The West naively "promotes nonproliferation as a universal norm and

nonproliferation treaties and inspections as means of realizing that norm," says Huntington. The non-Western nations, on the other hand, "assert their right to acquire and to deploy whatever weapons they think necessary for their security," seeing weapons of mass destruction "as the potential equalizer of superior Western conventional power."

Worse still are multilateral arrangements. These weaken America, like "Gulliver in the land of Lilliputians, stretched out, unable to move, because he has been tied down by a whole host of threads," as Senator Jeff Sessions (R.-Al.) warned his colleagues during the debate over the Comprehensive Test Ban.(17) The Senate defeat of the test ban crystallized the new attitude popular among conservatives: mistrust treaties, increase defenses, assert American authority.

Many conservative experts believe that they can pick and chose among the treaties. In reference to President Chirac's statement cited above, they would see only the first item as one of concern and rate the others as progress (some, in fact, view India's nuclear status as a welcome counter-weight to China). START treaties are no longer necessary, in this view. The United States, they say, does not negotiate with the British and the French on force levels, why should we with the Russians? The nuclear test ban and ABM treaty should be jettisoned because they restrain US force options. The Non-Proliferation Treaty, on the other hand, can restrain others and should be kept as long as no one takes the Article IV commitment to eventual nuclear disarmament seriously. Better still are export restraint agreements such as the Missile Technology Control Regime and the Australia Group, which are agreements among the weapon-states to keep technology out of the hands of states of concern.

THE CHINA SYNDROME

Conservative concerns about China are central to the drive to deploy missile defense systems. These concerns reached a fevered pitch in mid-1999. That spring hundreds of news stories, led by an aggressive series of The New York Times investigative reports, trumpeted the alleged transfer of U.S. nuclear secrets to China by a traitorous scientist at Los Alamos National Laboratory. In May, a Congressional report concluded that China was using stolen U.S. data to modernize its nuclear arsenal.

In the weeks after the publication of the Times stories, the press depicted Los Alamos scientist Dr. Wen Ho Lee as a Chinese superspy, responsible for the "transfer of huge amounts of secret data from a computer system at a Government laboratory, compromising virtually every nuclear weapon in the United States arsenal..."(18) Conservatives claimed that U.S. nuclear labs were riddled with spies. Senator Richard C. Shelby (R – Al.) stood at the gates of Los Alamos in April and demanded that something be done about the "hemorrhaging" of U.S. nuclear secrets to foreign countries.(19) Conservatives proclaimed that stolen secrets from Los Alamos represented, in the

words of Senator Don Nickles (R – OK.) "the most serious case of espionage"(20) in U.S. history and "could advance Chinese nuclear weapons programs by decades."(21) Department of Energy official Notra Trulock (the main source for the Times stories) went on NBC's "Meet the Press" in May and compared the possible loss of nuclear secrets at Los Alamos to "the Rosenbergs -Fuchs compromise of the Manhattan Project information" at the end of World War II.(22) A Justice Department spokesman said "what Lee stole was the crown jewels."(23) A report issued by Sen. Arlen Specter said "it would be hard, realistically impossible, to pose more severe risks to U.S. national security."(24) Specter's report noted that at Lee's December 13 bail hearing, Assistant Laboratory Director for Nuclear Weapons Dr. Stephen Younger said the Lee data "combined with someone that knew how to use them, could, in my opinion, in the wrong hands, change the global strategic balance."

Conservatives also used the case to attack the Clinton administration, charging that it had long overlooked glaring evidence of Chinese spy activities at the nuclear labs to pursue a policy of engagement with Beijing. Columnist William Safire's charged: "During President Clinton's watch, America's most vital nuclear secrets – guarded intensely for five decades – have been allowed to spill out all over the world."(25) Republican presidential candidates Pat Buchanan and Steve Forbes called for the resignation of National Security Advisor Sandy Berger.

The Cox Committee report on "U.S. National Security and Military/Commercial concerns with the People's Republic of China" seemed to validate these serious charges. Prepared in just over three weeks and after the questioning of only three witnesses (primarily Notra Trulock), the report (named for chairman Christopher Cox (R-Ca.)) claimed to detaile widespread Chinese theft and implementation of U.S. nuclear weapons designs. The report charged that Chinese spy activities in the U.S. had "helped the PRC to fabricate and successfully test modern strategic thermonuclear weapons." House Majority Leader Dick Armey said "It's very scary, and basically what it says is the Chinese now have the capability of threatening us with our own nuclear technology."

Lost in the hyperbole, was that, as Committee member Norm Dicks (D-Wa.) admitted afterwards, the report represented a "worst case assessment." Indeed, just a few weeks before the publication of the Cox report (and with little fanfare) the Senate Select Committee on Intelligence released its own report on the topic. The Senate report criticized the Clinton administration but did not conclude that China was close to altering strategic nuclear balance. Furthermore, an interagency "Damage Assessment" team created at the behest of the Cox Committee to report on the implications of Chinese nuclear espionage concluded that "significant deficiencies remain in the Chinese weapons program to date, the aggressive Chinese collection effort has not resulted in any apparent modernization of their deployed strategic

force or any nuclear weapons deployment." China's 20 ICBMs remain dwarfed by the 12,000 weapons in the U.S. nuclear triad.

A year later, there is no evidence that Wen Ho Lee actually passed information to China. In an opinion released August 31, 2000, New Mexico District Court Judge James Parker wrote that, while he "remain(ed) seriously concerned about evidence of several deceptions as to which innocuous explanations have not yet been provided"(26) the prosecution "has never presented direct evidence that Dr. Lee intended to harm the United States or secure an advantage for a foreign nation" Furthermore, new evidence presented by the defense indicated that the alleged stolen data "is in large part available in the 'open' literature in the public domain and that many of the individual files Dr. Lee took are unclassified." Although he faced 59 counts regarding the mishandling of classified information, Lee was never charged with acts of espionage and is now a free man.

But conservatives continue to raise the specter of a Chinese military gearing up to challenge the conventional and strategic superiority of the American armed forces.

Below is an extensive quote from Representaive Dan Burton, a Republican congressman from California and chairman of the Government Oversight and Reform Committee in the U.S. House of Representatives. At a September 8, 2000 hearing on the technical prospects for national missile defense, Rep. Burton made clear that his interest in missile defense was directly linked to his view of China.

"One of the things that's concerned me, as chairman of the committee and as a member of Congress -- and, I think, my colleagues as well -- has been the theft of nuclear secrets at Los Alamos and Livermore. And a lot of people have said that the theft of those secrets could be analogous to what happened with the Rosenbergs back in the '50s. I mean, it's a major, major problem".

"As I understand it, the W-88 warhead technology is now in the possession of the Chinese Communist government, and they also have other technology, through their connections with Loral and Hughes and other companies, regarding their space satellite technology. They now have the ability to build an ICBM, and they also have the ability to put multiple warheads on one missile, and they also have the technology to put that on a mobile launch vehicle that could be hidden in woods or someplace else, which would be very difficult for our spy satellites to pick up.

"And the question I have is that how long will it be before they have a mobile-launched ICBM or a permanently-fixed ICBM in silos with multiple warheads such as the W-88 warhead, where they could put eight to 10 on one missile? And what does that mean for the United States security? And do we have any way -- right now, or in the foreseeable future--to intercept and shoot down the multiple warhead missile if it's launched at the United States?

"Once it's perfected, if they launch it at the United States, do we have any defense for it? And also, because of the MIRV-ing, because they've got up to as many as 10 warheads on it, once those split apart in the outer atmosphere, could we shoot down all 10 of those smaller missiles with the W-88 warhead, or would we just lose a bunch of cities in the United States?"

THE DANGERS AHEAD

The arms control a la carte approach now favored by many conservatives echoes the embryonic U.S. strategy of the 1950s, where a few nations thought they could stop the spread of weapons of mass destruction by forming supplier groups to contain key technologies, while developing nuclear, biological, chemical and missile arsenals for themselves. It was precisely the failure of this piece-meal method that brought about the current non-proliferation regime.

The regime only works as an integrated whole. Without the test ban treaty and serous reduction in U.S and Russian arsenals, the Non-Proliferation Treaty will lose credibility, suffering a death by disinterest if not outright defection. Proliferation of missile defenses could weaken the Missile Technology Control Regime, encourage the proliferation of missiles and defense counter-measures. For those without nuclear production capabilities, chemical and biological weapons will hold new appeal. As legal, diplomatic and political deterrents weaken, it becomes easier for a nation to shatter the barriers, triggering a global crisis.

This is not an abstract debate. If the United States disassembles diplomatic restraints, shatters carefully crafted threat reduction arrangements and moves from builder to destroyer of the non-proliferation regime, there will be little to prevent new nations from concluding that their national security requires nuclear arms. Nor will it be just a matter of diplomatic emergency meetings. Nuclear insecurities and regional tensions could freeze foreign investments, strangling economic growth both regionally and globally.

The two years after the U.S. presidential election will be critical to determining which side in this debate will dominate U.S. policy.

The fate of the regime is at stake.

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(1) The Report of the Commission to Assess the Ballistic Missile Threat to the United States, July 15, 1998. The panel, known as the Rumsfeld Commission after its chairman, former secretary of defense Donald Rumsfeld, was appointed by the Congress to provide an independent assessment of the ballistic missile threat.

(2) Presentation of Admiral Dennis Blair to the Carnegie International Non-Proliferation Conference, March 16, 2000. See Proliferation Brief, "Pacific Command Chief Assesses Asian Security at Carnegie Conference," March 23, 200 at www.ceip.org/npp.

(3) In February 1981, Aviation Week and Space Technology reported,

based on briefings by Lawrence Livermore National Laboratory scientists Lowell Wood and Edward Teller, "X-ray lasers based on the successful Dauphin test are so small that a single payload bay on the space shuttle could carry to orbit a number sufficient to stop a Soviet nuclear weapons attack." (cited by William Broad in Teller's War, p. 92, (New York: Simon & Schuster, 1992).

(4) United States General Accounting Office, "Strategic Defense Initiative: Some Claims Overstated for Early Flight Tests of Interceptors," September 1992, GAO/NSIAD-92-282.

(5) Congressional Budget Office, "Costs of Alternative Approaches to SDI," May 1992, p. 20.

(6) Ibid.

(7) United States General Accounting Office, Report to the Chairman, "Strategic Defense Initiative: Changing Design and Technological Uncertainties Create Significant Risk," February 1992 (GAO/IMTEC-92-18).

(8) See Hearings before the Legislation and National Security Subcommittee of the Committee on Government Operations, House of Representatives, 102nd Congress, Second Session, "Performance of the Patriot Missile in the Gulf War." April 7, 1992, summarized in Activities of the House Committee on Government Operations, 102nd Congress, First and Second Sessions, 1991-1992, December 31, 1992, pp. 179-185.

(9) Robert M. Stein, "Correspondence: Patriot Experience in the Gulf War," International Security, Summer 1992, at p. 199.

(10) The four hits were by the Homing Overlay Experiment (HOE) in 1984, the Exoatmospheric Reentry-Vehicle Interceptor Subsystem (ERIS) in 1991, the National Missile Defense system interceptor in 1999 and one of the two THAAD intercepts which can be considered outside the atmosphere in June 1999 (THAAD hit two out of eight targets flying at various altitudes).

(11) United States General Accounting Office, "National Missile Defense: Schedule and Technical Risks Represent Significant Development Challenges," December 12, 1997 , GAO/NSIAD-98-28.

(12) ("L'Action de La France: Ma rise des armements, disarmement et non-proliferation, La Documentation Francaise, Paris, 2000)

(13) Paul Wolfowitz, "Bridging Centuries: Fin de Siecle All Over Again," National Interest, Spring 1997.

(14) Arthur Waldron, "Why China Could Be Dangerous," American Enterprise, July/August 1998, p.40.

(15) Samuel P. Huntington, "The Clash of Civilizations?," Foreign Affairs, vol. 72 (Summer 1993), p. 22.

(16) James Webb, "Warily Watching China," New York Times, February 23, 1999, p. A23.

(17) "Out Maneuvered, Out Gunned, and Out of View," Stephen Schwartz, The Bulletin of the Atomic Scientists, January/February 2000, p. 31

(18) Risen, James and Jeff Garth. "U.S. Says Suspect Put Code in Bombs in Unsecure Files." New York Times 28 April 1999: A1.

(19) Brooke, James. "Senator Tells Nuclear Bomb Labs to End Foreign Scientist's Visits." New York Times 13 April 1999: A14.

(20) Mesler, Bill. "The Spy Who Wasn't." The Nation 9 August 1999.
(21) Pincus, Walter and Vernon Loeb "U.S. Bungled Spy Probes, Senators Say." Washington Post 6 May 1999: A2.
(22) Pincus, Walter and Vernon Loeb "Espionage Whistleblower Resigns." Washington Post 24 August 1999: A1.
(23) Broad, William J. "Files in Question in Los Alamos Were Reclassified." 15 April 2000: A1.
(24) Specter, Arlen. "Report on the Investigation of Espionage Allegations Against Dr. Wen Ho Lee" Available at: http://www.senate.gov/~specter/reportp.htm
(25) Safire, William. "The Deadliest Download." New York Times 29 April 1999: A29.
(26) Parker, Hon. James "Memorandum Opinion." 31 August 2000. Available at: http://www.cnn.com/2000/LAW/09/04/scientistsecrets.ap/index.html

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Nautilus Institute
608 San Miguel Ave., Berkeley, CA 94707-1535 | Phone: (510) 423-0372 | Email: nautilus@nautilus.org