

# Policy Analysis

No. 337

March 16, 1999

## ***NATIONAL MISSILE DEFENSE*** *Examining the Options*

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### **Executive Summary**

To date, the debate surrounding national missile defense (NMD) has been dominated by political rhetoric. Supporters (usually conservatives) often paint a “doom-and-gloom” picture, pointing out that the United States is vulnerable to an attack by ballistic missiles. Critics (usually liberals) defend the Anti-Ballistic Missile Treaty as the cornerstone of deterrence and stability and argue that any defensive deployment would upset the balance between the offensive strategic nuclear forces of the United States and Russia.

Opponents of NMD, who use the ABM treaty as an argument not to deploy a defense, need to acknowledge that the threat of attack by long-range ballistic missiles from rogue states may become real. They also need to recognize that the United States can build a limited NMD without disrupting the strategic nuclear balance. Supporters of NMD need to acknowledge that NMD is not a panacea for the full spectrum of threats from rogue states—that long-range ballistic missiles are only one of the options available to those states to strike America. NMD will not

provide protection against shorter-range ballistic missiles launched from ships, cruise missiles launched from aircraft or ships, or terrorist attacks. Supporters also need to recognize the daunting technological challenge that NMD poses.

A limited NMD, which would afford the United States protection against long-range ballistic missile threats from rogue states, is feasible and probably can be deployed at a reasonable cost. The elements of the Clinton administration’s NMD program can provide such a capability. The debate should not be whether or not to deploy defenses. It should be about the nature and capabilities of a limited NMD system that would accomplish cost-effectively the mission of protecting the nation against threats from rogue states.

No matter what the threat, however, the development of an NMD system should proceed at a measured pace because an excessively rapid development program could waste taxpayer dollars on an ineffective system.

**NMD sometimes resembles a theological, rather than a public policy, issue.**

## Introduction

My fellow Americans, tonight we're launching an effort which holds the promise of changing the course of human history. There will be risks, and results take time. But I believe we can do it. As we cross this threshold, I ask for your prayers and your support.

— Ronald Reagan  
Address to the Nation  
March 23, 1983

Ronald Reagan's introduction of the Strategic Defense Initiative (SDI) in 1983 sparked tremendous controversy. Although the national missile defense (NMD) program being considered today bears little resemblance to Reagan's "Star Wars" program—which sought to defend against a full-scale Soviet nuclear attack—the tenor of the debate is relatively unchanged 16 years later. Missile defense remains a contentious issue, with advocates and detractors so passionate in their convictions that NMD sometimes resembles a theological, rather than a public policy, issue. Unfortunately, devout ideologues on both sides of the issue often sacrifice reasoned dialogue in favor of demagoguery.

Proponents of missile defense, especially conservative activists, often portray NMD as a benchmark issue separating politicians who are serious about safeguarding U.S. national security from those who would undermine it. Senator James Inhofe (R-Okla.), for example, said of President Clinton: "We have a president that vetoed the DoD authorization bill because he doesn't want to spend more money on defending America against ballistic missile attack. And now you can come to only one conclusion. . . . We need a new president."<sup>1</sup>

Proponents of missile defense often paint a "doom-and-gloom" picture of the sit-

uation. According to Republican National Committee Chairman Jim Nicholson, not having the ability to defend against a missile attack could become the "most important [security] issue of the 2000 election . . . I don't think people in the country fully realize the enormity of the threat we're facing."<sup>2</sup> Radio ads in Nevada paid for by Empower America, to garner support for legislation to deploy a national missile defense as soon as possible, are another example: "We are only one vote shy of ensuring the safety of you and your family. But the people standing in the way are Nevada's own senators," according to Republican stalwarts William Bennett and Jack Kemp.<sup>3</sup>

Since the inception of the SDI program, the United States has spent at least \$45 billion over a 15-year period to develop a national missile defense system. Although the effort has yet to be successful, supporters believe that it is simply a question of money and political will. According to Senator Thad Cochran (R-Miss.), there has been no commitment from the White House and thus: "There's been no real incentive to push ahead, to use all the assets, resources and technology available."<sup>4</sup>

Opponents of missile defense, on the other hand, depict NMD as an outrageously expensive boondoggle that may destabilize the strategic nuclear balance. An *Atlanta Constitution* editorial posed the question: "Why waste billions on a system that will not work, to defend against a threat that does not exist?"<sup>5</sup> The *Oregon Statesman-Journal* has been even more caustic: "Some members of Congress apparently see outer space as a black hole, to be filled with your tax dollars."<sup>6</sup>

Why such ire on both sides of the issue? First, NMD—like SDI before it—has become something of a political and ideological litmus test. Virtually all conservatives support NMD and virtually all liberals oppose it.<sup>7</sup>

Second, even though NMD differs greatly from Reagan's original SDI proposal, many opponents of NMD intentionally blur the

distinctions between the two. The following comments by former Senator Paul Simon (D-Ill.) are typical of the refusal of most liberals to acknowledge that NMD and SDI are two different things:

The President and Congress . . . ought to acknowledge that SDI by any name remains nothing more than a 1990s version of the old French Maginot Line. The Maginot Line didn't work in World War II, and Star Wars can't work today, for reasons made clear over the past 10 years of congressional and public debate. Sadly, we are visiting an issue now that should have gone away in the late 1980s.<sup>8</sup>

The refusal of liberals to examine NMD on its own merits instead of on the merits of SDI is not conducive to constructive debate. Nor is the tendency of conservatives to automatically dismiss opposition to NMD as a signal of weakness on defense or as evidence of unfitness for public office.

Before rushing into a policy decision on whether the United States should acquire and deploy an NMD system, ideology and theology should be set aside to ask a few important and fundamental questions:

1. Against what threat is defense needed?
2. What are the defense objectives?
3. Is an effective NMD technically feasible?
4. What is the cost of an NMD system?

## **ABM Treaty Considerations**

Perhaps the biggest obstacle to NMD is the Anti-Ballistic Missile (ABM) Treaty. Almost by definition, any NMD system would be a violation of the ABM treaty. The

treaty specifically prohibits a system that could defend the national territory of a signatory, which is the purpose of NMD. Conversely, a system that is compliant with the treaty has essentially no value for NMD because it would provide only a limited capability to defend a specific area. That is, an ABM-compliant missile system (not now deployed) could have protected only one U.S. site—the intercontinental ballistic missile (ICBM) installations at Grand Forks, North Dakota—leaving the rest of the country unprotected.

### **Does the ABM Treaty Serve American Interests?**

Supporters of the ABM treaty argue that withdrawal would undermine the stability of the nuclear balance between Russia and the United States. They argue that the deployment of defenses against ballistic missiles could make the nuclear superpowers uneasy that their offensive nuclear deterrents (one nuclear superpower would be deterred from launching an offensive nuclear attack by the offensive nuclear forces of the other superpower) would be compromised, and that this unease could result in an offensive arms race to offset the new defenses. John Pike of the Federation of American Scientists makes the following argument:

Unfortunately, we're still stuck in a MAD [mutual assured destruction] world with the Russians. . . . There are a lot of people at Strategic Command who continue to believe that we need to have about 3,000 warheads to keep Russia in a deterred frame of mind. There are clearly a lot of their counterparts in Moscow who feel that they still need to have a very robust lay-down with high damage expectancies on a lot of targets in order to be able to sleep well at night. . . . As a result, we continue to be in a condition of

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**U.S. leaders should not permit the ABM treaty to be an insurmountable obstacle to NMD.**

mutual assured destruction, under which, for better or worse, the original logic of the ABM treaty continues to hold.<sup>9</sup>

On September 26, 1997, the Clinton administration declared its continued support for the ABM treaty when the White House signed a memorandum of understanding that named Belarus, Kazakhstan, Russia, and Ukraine as successor states to the Soviet Union for the purposes of the treaty.

Critics of the ABM treaty argue that the treaty is no longer binding because the Soviet Union no longer exists and because the Soviets were, and the Russians continue to be, in violation of the treaty. They contend that the Russians have more than the one ABM system permitted by the treaty. Joseph Arminio, chairman of the National Coalition for Defense, states:

Not only did the U.S.S.R., unlike the U.S., deploy the one missile defense permitted by the treaty, ringing Moscow with the 100 interceptors sanctioned by law. It also littered about Soviet territory with another 10,000 to 12,000 interceptors, and 18 battle-management radars. Together the Moscow defense and the vast homeland defense formed an interlocking system—nearly all of it illicit.<sup>10</sup>

The “10,000 to 12,000 interceptors” to which Arminio refers are SA-5, SA-10, and SA-12 anti-aircraft missiles that some ABM treaty opponents argue have an anti-ballistic missile capability.<sup>11</sup>

Although supporters of the ABM treaty view the treaty as a cornerstone of nuclear stability and deterrence, the treaty’s critics believe that it upsets stability. William T. Lee, a former Defense Intelligence Agency officer, argues: “Given the relatively small number of U.S. missile and bomber warheads likely to survive a Russian preemptive strike under

START II, if Russia can maintain its Triad of strategic offensive and defensive forces, it will become the preeminent nuclear superpower.”<sup>12</sup> (START II is the Strategic Arms Reduction Talks II Treaty, which limits the number of strategic offensive warheads that Russia and the United States possess to between 3,000 and 3,500 each.)

**Renegotiate or Abrogate the ABM treaty**

In the final analysis, U.S. leaders should not permit the ABM treaty to be an insurmountable obstacle to NMD, if such a system can be shown to be in the best interest of U.S. security and to be cost-effective. Unlike the Constitution, the ABM treaty—or any treaty—should not be considered a cornerstone of America’s political institutions and way of life. A treaty should be retained only as long as it serves the security interests of the American people. As Ted Galen Carpenter, the Cato Institute’s vice president for foreign policy studies, stated: “Such commitments may make sense at the time they’re created, but make little sense—and may even undermine important American interests—when conditions change.”<sup>13</sup>

Concerns about stability and deterrence vis-à-vis Russia are legitimate and cannot be ignored. But those concerns could be addressed by negotiation of a new version of the ABM treaty, or mutual abrogation of the treaty, rather than by a unilateral withdrawal by the United States. In fact, the Clinton administration recently asked Russia to renegotiate the treaty to allow a limited NMD system.<sup>14</sup>

Before the Bush administration’s electoral defeat in 1992, it was making substantial progress in renegotiating the ABM treaty to win Russian acceptance of its Global Protection Against Limited Strikes (GPALS) system (space-based anti-ballistic missile sensors and weapons and ground-based interceptors). Any renegotiation would have retained the basic aim of the ABM treaty—limiting defenses so that neither the U.S. nor the

Russian strategic arsenal would have been undermined—while permitting systems to protect against threats from rogue states and accidental or unauthorized launches by the major nuclear powers.<sup>15</sup> The Russian receptivity to renegotiation was especially interesting because GPALS was a more ambitious defense than anything the Clinton administration has proposed.

A reasonable argument can be made that a limited NMD system (for example, a hundred or a few hundred ground-based interceptors) designed to defend against limited threats from rogue states would not enable the United States to undermine nuclear stability by threatening Russia's second-strike capability. That is, the United States would not be able to launch a preemptive nuclear first strike and have sufficient defensive capability to negate a Russian retaliatory strike. Even at the lower levels of offensive weapons under START II, a few hundred NMD interceptors that could only intercept tens of warheads are unlikely to be able to significantly degrade a Russian attack consisting of hundreds or thousands of warheads. And Russia's financial problems make it unlikely that it could augment its arsenal of offensive weapons to offset U.S. deployment of a limited NMD.

Furthermore, the option of negotiated, mutual deployments of NMD by both the United States and Russia could allow any perceived advantages of ballistic missile defense to be mutual. That option might also involve the sharing of U.S. missile defense technology with Russia. If the Russians resolutely refused to negotiate a new version of the ABM treaty, the United States would need to abrogate it.

## **The Ballistic Missile Threat to the United States**

During the Cold War, the threat to the United States from ballistic missiles was well defined and well understood: Soviet land-based ICBMs—especially those that carried up to 14 multiple independently targeted reentry vehicles (MIRVs)—and sea-based submarine-

launched ballistic missiles (SLBMs). That threat was massive in size (in numbers of both launchers and warheads), technological sophistication (MIRVs and decoys), and operational complexity (times of flight, ranges, and trajectories).

### **The Flawed 1995 National Intelligence Estimate**

The current threat arising from the proliferation of missile technology to rogue states is more uncertain. According to the November 1995 National Intelligence Estimate (NIE), "No country, other than the major declared nuclear powers, will develop or otherwise acquire a ballistic missile in the next 15 years that could threaten the contiguous 48 states and Canada."<sup>16</sup> Interestingly, however, the NIE acknowledges that the Taepo Dong 2 missile being developed by North Korea will have sufficient range to strike "portions of Alaska and the far western portion of the Hawaiian Island chain."<sup>17</sup>

The NIE has been the target of severe criticism. The General Accounting Office (GAO) noted that the NIE's main conclusion—that no additional country will acquire a ballistic missile in the next 15 years that could threaten the continental United States—"was worded with clear (100 percent) certainty."<sup>18</sup> GAO criticized that conclusion as "overstated."<sup>19</sup>

Similarly, former Central Intelligence Agency (CIA) director James Woolsey has argued that formulating U.S. defense policy based on the NIE conclusions would be "a serious error."<sup>20</sup> In particular, he criticized the NIE's focus on the continental United States to the exclusion of Alaska and Hawaii. He contended that this frame of reference "can lead to a badly distorted and minimized perception of the serious threats that we face from ballistic missiles now and in the near future."<sup>21</sup>

### **The Rumsfeld Commission Critique**

The Rumsfeld Commission, a congressionally mandated panel chaired by former Secretary of Defense Donald Rumsfeld that independently assessed the threat to the

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**A large and sophisticated NMD system could doom any chances of cordial renegotiation of the ABM treaty.**

United States from ballistic missile attacks, concluded:

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.

The threat to the U.S. posed by these emerging capabilities is broader, more mature and evolving more rapidly than has been reported in estimates and reports by the Intelligence Community.<sup>22</sup>

Although the administration has not renounced the NIE or formally endorsed the Rumsfeld Commission report, the Secretary of Defense recently acknowledged the contribution of the commission and seemed to admit that the threat was more acute than the NIE posited:

We are affirming that there is a threat, and the threat is growing, and that we expect it will soon pose a danger not only to our troops overseas but also to Americans here at home.

Last spring the commission that was chaired by former Secretary of

Defense Donald Rumsfeld provided a sobering analysis of the nature of the threat and the limitations of our ability to predict how rapidly it will change.<sup>23</sup>

Therefore, it seems unwise to dismiss the ballistic missile threat to the United States as nonexistent and assume that NMD is not needed.<sup>24</sup>

**Accidental and Unauthorized Launch by Major Nuclear Powers**

*Russian ICBMs and SLBMs.* Despite the end of the Cold War, limited-scale accidental or unauthorized launches from Russia or China are still possible. In terms of quantity and technological sophistication, the most severe threat to the United States remains Russian ICBMs and SLBMs. Table 1 illustrates the size and capability of the Russian strategic arsenal. Although the end of the Cold War has greatly reduced tensions between the United States and Russia, there is no guarantee that the threat of a deliberate Russian large-scale ballistic missile attack has completely passed. Nevertheless, unlike SDI, NMD will not address the threat of a large-scale attack, which is significantly less likely in the post-Cold War world.

*Chinese ICBMs and SLBMs.* China is the only potential adversary other than Russia that currently has the capability to strike the United States with land-based intercontinental ballistic missiles (as illustrated by Table 2 and Figure 1 ). According to the Department of Defense (DoD): "China's missile force is designed to serve as a strategic deterrent against Russia and the United States." And, "China increasingly sees ballistic missiles as important weapons for a regional conflict or use as psychological weapons."<sup>25</sup>

However, according to the Natural Resources Defense Council, "China has only a handful of missiles able to go intercontinental distances with about 100 other missiles with ranges from 1800 to 4750 kilometers."<sup>26</sup> But the council also acknowledges that "[m]ore advanced systems have long been

Table 1  
The Russian Strategic Nuclear Arsenal

	Number	Range (km)	Warheads x yield	Warheads
<b>ICBMs</b>				
SS-18	180	11,000	10 x 550/750 kt (MIRV)	1,800
SS-19	165	10,000	6 x 550 kt (MIRV)	990
SS-24 (silo)	10	10,000	10 x 550 kt (MIRV)	100
SS-24 (rail)	36	10,000	10 x 550 kt (MIRV)	360
SS-25	360	10,500	1 x 550 kt	360
<b>Total ICBMs</b>	<b>751</b>			<b>3,610</b>
<b>SLBMs</b>				
SS-N-18	192	6,500	3 x 500 kt (MIRV)	576
SS-N-20	80	8,300	10 x 200 kt (MIRV)	800
SS-N-23	112	9,000	4 x 100 kt	448
<b>Total SLBMs</b>	<b>385</b>			<b>1,824</b>
<b>TOTAL</b>	<b>1,136</b>			<b>5,434</b>

Source: William M. Arkin, Robert S. Norris, and Joshua Handler, *Taking Stock: Worldwide Nuclear Deployments 1998* (Washington: Natural Resources Defense Council, 1998), p. 27.

Table 2  
Chinese Strategic Nuclear Arsenal

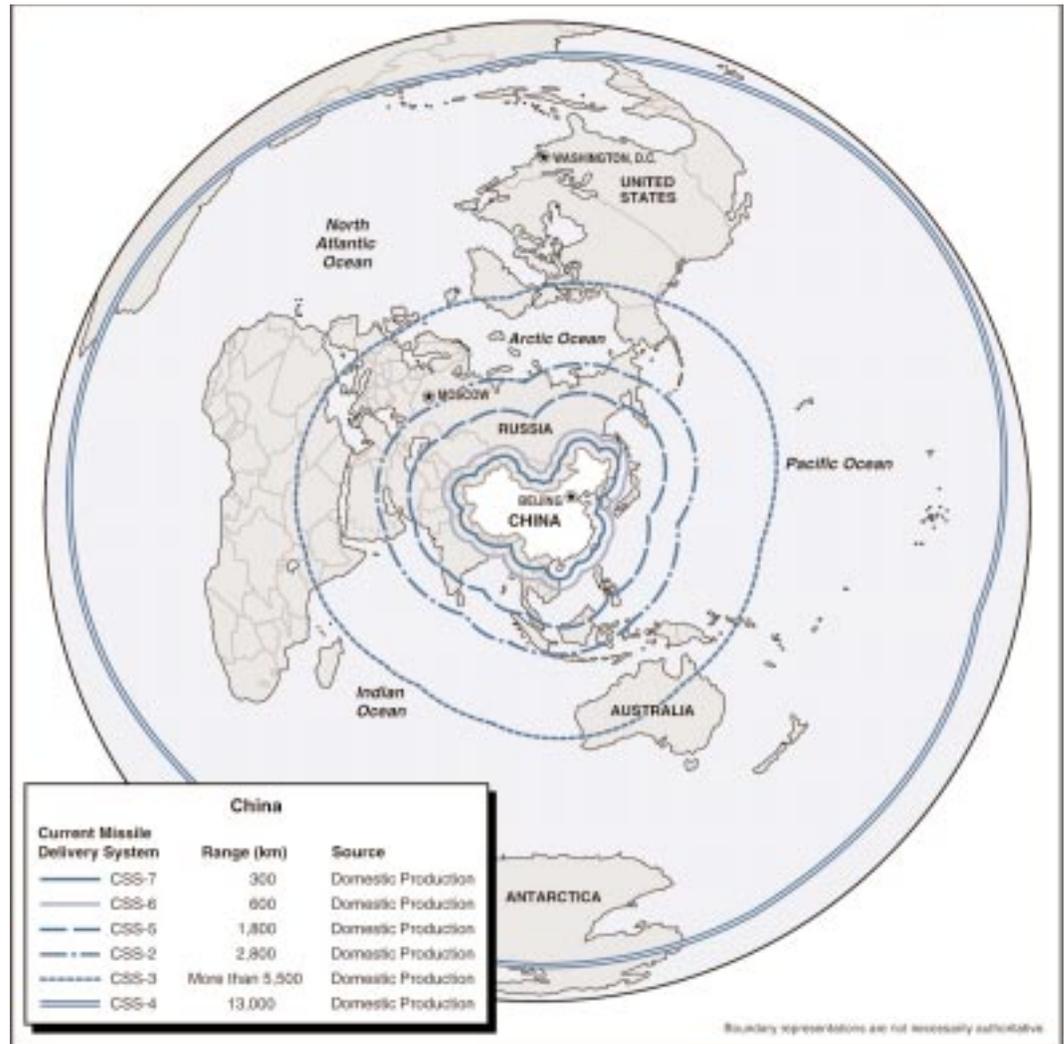
	Number	Range (km)	Warheads x yield	Warheads
<b>ICBMs</b>				
CSS-4	7	13,000+	1 x 4-5 Mt	7
CSS-?*	0	8,000	1 x 200-300 kt	0
CSS-?*	0	12,000	MIRV	0
<b>Total ICBMs<sup>a</sup></b>	<b>7</b>			<b>7</b>
<b>SLBMs</b>				
CSS-N-3	12	1,500	1 x 200-300 kt	12
CSS-N-4*	0	8,000	1 x 200-300 kt	0
<b>Total SLBMs</b>	<b>12</b>			<b>12</b>
<b>TOTAL</b>	<b>19</b>			<b>19</b>

Source: Arkin, Norris, and Handler, p. 45.

\*Projected. Not currently deployed.

<sup>a</sup> Higher estimates of the number of Chinese ICBMs exist. John Schulz estimates that China has 12 to 17 ICBMs. See John J. Schulz, "China as a Strategic Threat: Myths and Verities," *Strategic Review* 26, no. 1 (Winter 1998), p. 11. *The Military Balance* maintains that the Chinese have in excess of 17 ICBMs. See International Institute for Strategic Studies, *The Military Balance* (Washington: IISS, 1998), p. 178. The National Defense University estimates China's ICBM force at more than 20 missiles. See National Defense University, *1997 Strategic Assessment: Flashpoints and Force Structure* (Washington: NDU, 1997), pp. 49-50.

Figure 1  
Chinese Ballistic Missile Capability



Source: Office of the Secretary of Defense, Proliferation: Threat and Response (Washington: Department of Defense, 1997), p. 11.

under development with emphasis on improved accuracy and guidance, increased range, mobile launch platforms, solid fuel technology, and multiple warheads.”<sup>27</sup>

*Accidental or Unauthorized Launches.* Although a deliberate full-scale Russian or Chinese attack is unlikely, the possibility of an unauthorized or accidental Russian launch still exists. The NIE discounts the threat—calling the risk of such a launch “remote.”<sup>28</sup>

However, according to the Center for Defense Information:

On January 25, 1995, Russian early warning radar detected the launch of a U.S. scientific rocket off the Norwegian coast. Although the Russian government had been notified of the launch weeks before, the news never reached the Strategic Rocket Forces.

Two mistakes happened in rapid succession. First, Russian operators mistakenly believed the scientific rocket was a missile heading for Russian territory. Second, Russian radars misinterpreted the separation of the multiple rocket stages for an attack by several missiles. This error immediately raised the specter that much of Moscow could be obliterated in an American first strike.

The radar operators sent a message through their chain of command warning of a possible U.S. nuclear attack that could strike Moscow within 15 minutes. When the message finally reached Russian President Boris Yeltsin, he responded by activating his “nuclear briefcase” for the first time ever in an emergency.<sup>29</sup>

That incident was not the only near-accidental launch by the Russians resulting from problems with their nuclear command-and-control system. A similar incident occurred in 1983. The Russian early-warning system is now in worse shape than it was then.<sup>30</sup>

Compounding the problem is that both U.S. and Russian arsenals remain on high alert. According to Bruce Blair from the Brookings Institution:

The close coupling of two arsenals geared for rapid response carries the inherent danger of producing a mistaken launch and an escalating volley of missiles in return. The possibility of such an apocalyptic accident cannot be ruled out even under normal conditions.<sup>31</sup>

Fortunately, the prospect of a Russian accidental launch may now be made less likely. According to *Jane's Defence Weekly*, Presidents Bill Clinton and Boris Yeltsin

formally agreed to share early-warning data on missile launches to reduce the chance of miscalculation or the accidental launch of nuclear weapons.

. . . By sharing such data, the USA wants to avoid incidents such as when Russia in 1995 mistook a Norwegian rocket launch for a possible missile attack and put its nuclear forces on alert.<sup>32</sup>

Although the agreement—if effectively implemented—will reduce the chances of an accidental launch from Russia, an unauthorized launch is still possible. For example, a coup could result in the splintering of the Russian government or general staff, or a regional leader could seize control of strategic nuclear weapons on the territory of a particular region. The threat arising from such turbulence should not be overstated, however. Leaders of splinter factions would have little incentive to launch a nuclear attack against the United States. Moreover, the potent U.S. nuclear arsenal, poised for retaliation, is likely to dissuade even a rabidly anti-American renegade leader from such an attack.

Given the current state of the Chinese ballistic missile forces, the prospect of a Chinese accidental or unauthorized launch is also relatively unlikely. Not only is there less political instability in China, but Chinese missile fuel and warheads are stored separately from their missiles.<sup>33</sup> That safeguard makes an accidental launch virtually impossible.

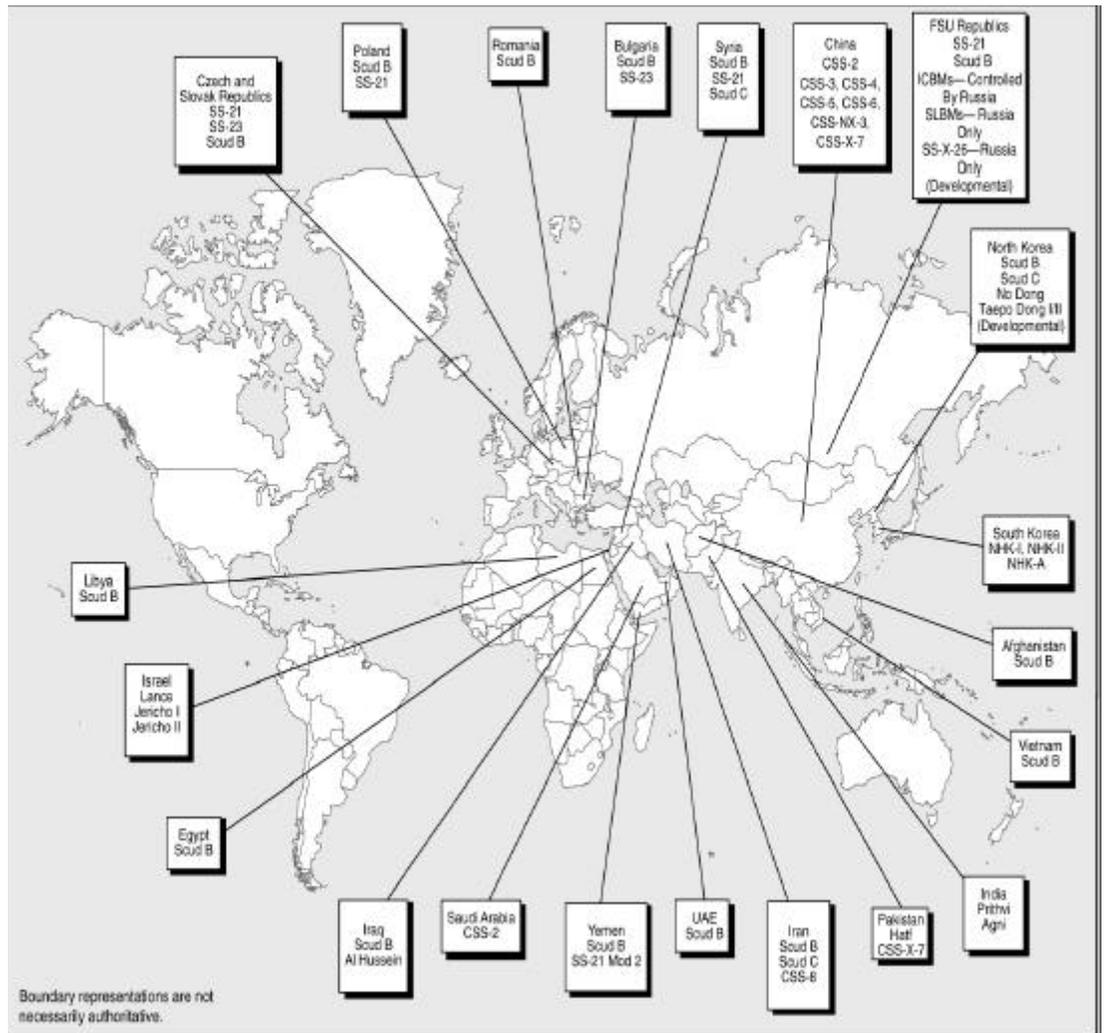
Therefore, because accidental or unauthorized launches from either Russia or China seem to pose an unlikely threat and because developing a more sophisticated NMD system to counter larger launches of that genre is very expensive, such scenarios should not weigh heavily in the design and deployment of an NMD system. Also, planning to build a large and sophisticated NMD system to counter larger accidental or unauthorized launches could doom any chances of a cordial renegotiation of the ABM treaty and might even jeopardize nuclear stability between the United States and Russia.

### **Missile Threat from Rogue States**

The threat that seems to be driving the hurried campaign to deploy an NMD system is the ballistic missile threat from “irrational”

**Accidental or unauthorized launches from either Russia or China seem to pose an unlikely threat.**

Figure 2  
Ballistic Missile Capabilities of Selected Nations



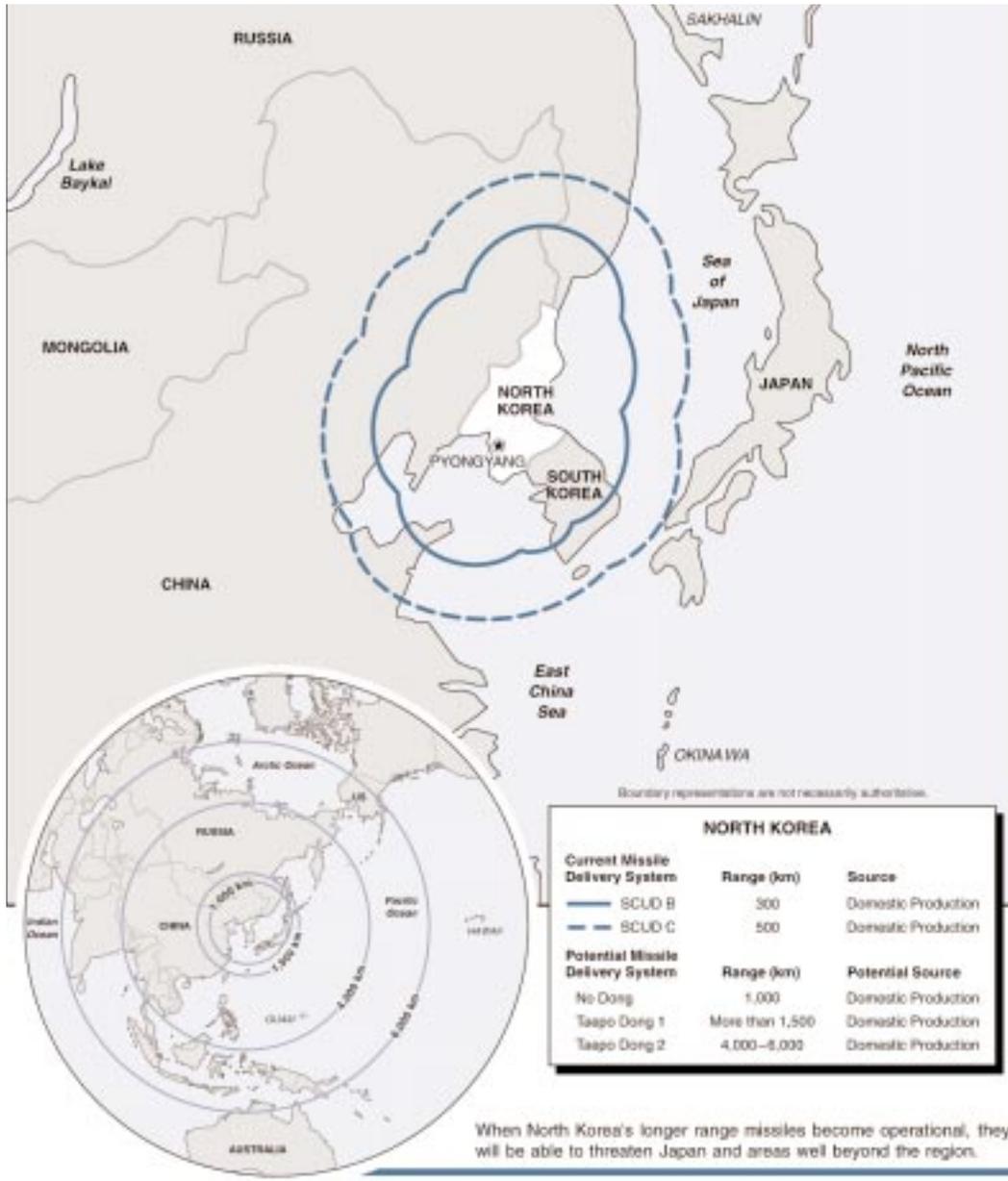
Source: William Cohen, *Annual Report to the President and Congress* (Washington: Department of Defense, 1997), p. 215.

rogue states. As illustrated in Figure 2, ballistic missiles and ballistic missile technology have proliferated throughout the world.

North Korea is often cited as a prime example of the threat posed by rogue states. Currently, North Korea has only short-range Scud B and Scud C ballistic missiles with ranges of 300 and 500 kilometers, respectively. With hundreds of Scuds in its inventory

and available for use by its forces, North Korea can now threaten South Korea.<sup>34</sup> The No Dong (1,000-kilometer range) and the Taepo Dong 1 (1,500-kilometer range) would at least give North Korea the ability to strike Japan. The Taepo Dong 2, with a maximum range of 6,000 kilometers, would allow North Korea to strike Alaska, which is the concern raised by the Rumsfeld Commission. Figure 3

Figure 3  
 North Korea: Current and Future Ballistic Missile Capability



Source: Office of the Secretary of Defense, *Proliferation: Threat and Response* (Washington: Department of Defense, 1997), p. 7.

illustrates the growing potential threat from North Korea.

The specter of the North Korean threat became more real with the test-firing of a Taepo Dong 1 missile in August 1998. *Inside Missile Defense* reported: "According to the

Korean Central Broadcasting Network (the official news agency of North Korea), . . . the . . . launch was a three-stage rocket that placed a satellite into orbit."<sup>35</sup> Robert D. Walpole, the senior intelligence officer for strategic intelligence programs at the CIA, stated:

## **It would be foolish and premature to dismiss the threat from rogue states out of hand.**

“Although the launch of the Taepo Dong I as a missile was expected for some time, its use as a space launch vehicle with a third stage was not.”<sup>36</sup> Walpole also noted that “a three-stage configuration, with a light enough payload, could well give North Korea the ability to send warheads across the Pacific.”<sup>37</sup>

Clearly, it would be foolish and premature to dismiss the threat from rogue states out of hand. The amount of time required by potentially hostile nations to develop and deploy long-range ballistic missiles capable of striking the United States may have been overestimated.

### **Limitations of NMD**

Of course, rogue states have or will have options other than long-range ballistic missiles for striking the United States. Such countries already possess short- and medium-range ballistic missiles that could be launched from ships operating in international waters off the U.S. coast. Rogue states also may possess, or could acquire, cruise missiles, which could be launched from ships or possibly aircraft. Finally, terrorist attacks are an attractive option available to rogue states (or groups they sponsor), especially given the open nature of American society.

Such threats to the American homeland may be more acute than that posed by ICBMs launched from rogue states. Even the most hostile rogue state is likely to hesitate to launch an ICBM against the United States from its territory; U.S. satellites can detect the origin of such missile launches, and the world’s most powerful nuclear force would almost certainly retaliate in response to such an attack. In contrast, the origin of terrorist attacks or missile launches from ships or aircraft may be harder to determine, which makes U.S. retaliation—and therefore deterrence—more difficult. The existence of the other threats does not, of course, refute the argument that long-range ballistic missiles

also pose a threat. But we must understand that long-range ballistic missiles will be just one of several possible threats.

None of the proposed NMD systems will have a defensive capability against either short-range ballistic missiles or cruise missiles—delivery systems that rogue states or others already possess. Although hostile (and potentially future hostile) nations are likely to acquire long-range ICBMs that could be launched against the United States from their territories, those same nations probably already possess the means to strike the United States in some other manner.

The multiplicity of threats does not mean that an NMD system must be able to defend against virtually all threats—that is, long-range ballistic missiles, short- or medium-range ballistic missiles, and cruise missiles. It would not be fair to require an NMD system to be “one size fits all.” The reality, however, is that any NMD system will still leave the United States vulnerable to other attacks.

If the U.S. government is serious about providing protection for the United States against rogue states and other menaces, it must be willing to look beyond NMD to provide that protection. Otherwise, it must be willing to accept continuing vulnerability to those other threats.

### **Countermeasures**

Countermeasures adopted by an adversary (sometimes also referred to as decoys or penetration aids) also affect the potential efficacy of NMD. Critics of NMD are usually quick to argue that the system could be easily fooled by countermeasures, which would be cheap and relatively easy to deploy. They contend that NMD interceptors would mistakenly attack the decoys instead of the incoming enemy warheads (reentry vehicles). Richard Garwin, a member of the Rumsfeld Commission, argues that “the NMD system under development would be unable to successfully engage

reentry vehicles with penetration aids as rudimentary as enclosing a balloon around a warhead.”<sup>38</sup>

In contrast, John Peller, Boeing’s Vice President and Program Manager for the NMD system, is of the opinion that only sophisticated reentry vehicles using advanced penetration aids could defeat the NMD system. “It will not be a simple penetration aid that gets through the system.”<sup>39</sup> Peller contends that the optical discrimination of the NMD’s interceptor will allow it to combat a threat that

encompasses the kind of capabilities that Third World countries or rogue states will be capable of when the initial NMD architecture is deployed. . . . This includes simple reentry vehicles with little or no penetration aids. It also includes some of the simpler threats out of China.<sup>40</sup>

But Peller also acknowledges that the initial NMD system will not be capable against “a more advanced threat with more sophisticated penetration aids”—that is, Russian ICBMs and SLBMs.<sup>41</sup>

The subject of countermeasures is very technical, usually classified in nature, and beyond the scope of this analysis.<sup>42</sup> There are, however, some important facts to understand about countermeasures. First, any NMD system will probably have at least two different media for the detection and discrimination of incoming warheads—radar and infrared (IR). For the NMD system to be fooled, effective countermeasures would have to successfully simulate both the radar and IR signatures of a real warhead. Such sophisticated countermeasures are unlikely to be easily deployed by rogue states of the Third World.

Second, the ability to deploy countermeasures is highly dependent on the size (payload and throw weight) of the missile. There has to be space to accommodate both warhead(s) and countermeasures. Thus, offensive missile systems must be designed with countermeasures in mind—they cannot be added as an

afterthought. And the additional weight of any countermeasures may reduce the range of the missile. The missiles that rogue states might develop are unlikely to have both the capacity to carry countermeasures and the range to strike the United States.

The effective use of countermeasures therefore will present significant technical and operational obstacles for rogue states to overcome. And although more countries are acquiring ballistic missiles (particularly long-range missiles), it is not clear that they are pursuing or integrating countermeasure technology into the missiles.

## NMD Options

At a minimum, an NMD system would include (1) sensors—which can be space- and/or ground-based—to provide early-warning of attacking missiles; (2) ground-based radars to identify and track warheads; (3) ground-based interceptor missiles to destroy incoming warheads; and (4) a battle management and command, control, and communications (BM/C3) system to control the system. Figure 4 depicts a representative NMD system. Space-based interceptors and tracking sensors could also be part of an NMD system to intercept enemy missiles earlier in their trajectory (in the boost phase, post-boost phase, and midcourse phases). The advantage of intercepting missiles in those phases rather than the terminal phase is that debris and radiation from an exploding nuclear warhead would not land on U.S. territory.

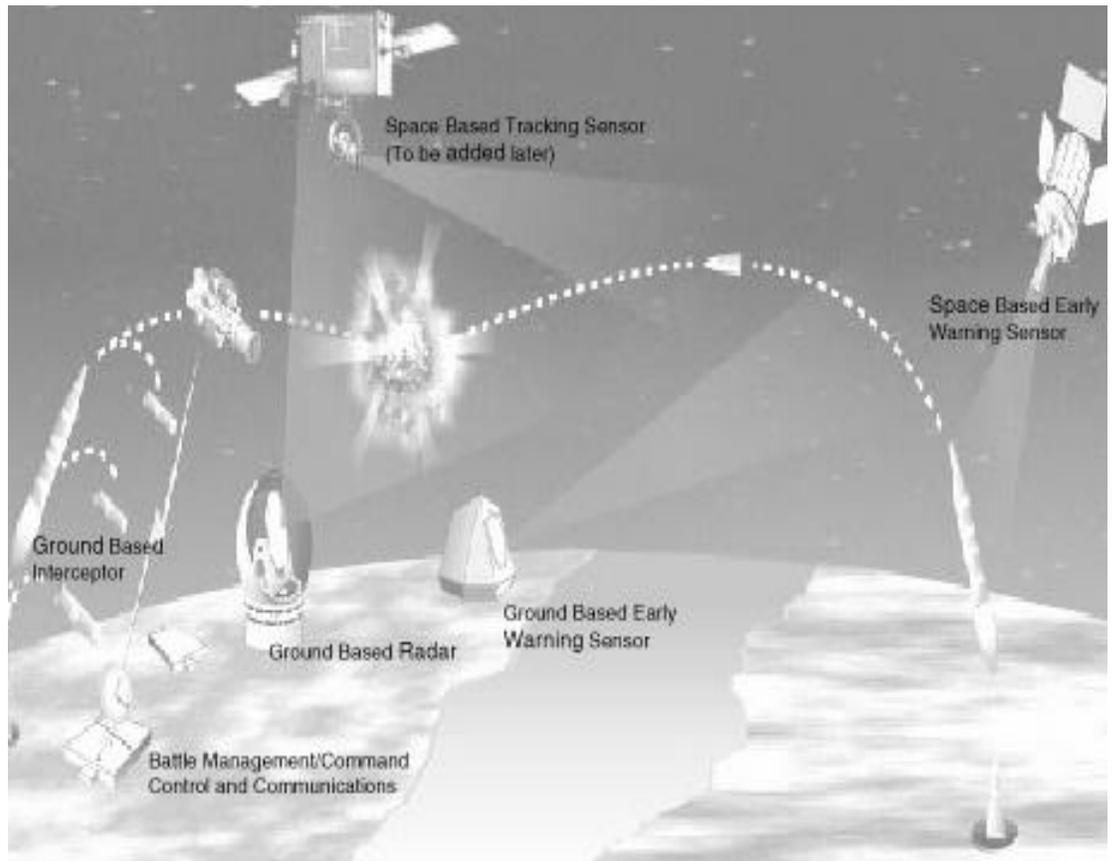
### Clinton Administration NMD Program

According to the Ballistic Missile Defense Organization (BMDO), which oversees the NMD program, the administration’s program known as the “3 plus 3” program is

designed to conduct three years of development and test activities, leading up to an integrated system test of the NMD elements in Fiscal Year 1999. If the threat at the time warrants, a decision to deploy could be

**None of the proposed NMD systems will be effective against some delivery systems that rogue states already possess.**

Figure 4  
Representative NMD System



Source: U.S. General Accounting Office, *National Missile Defense: Even with Increased Funding Technical and Schedule Risks Are High* (Washington: GAO, June 1998), p. 3.

made in 2000 to achieve operational capability in another three years (by the end of 2003). . . . The overarching goal of the “3 plus 3” program is to remain within a three year window of deployment so that we can effectively respond to an emerging threat.<sup>43</sup>

The Clinton administration recently inched closer to making a decision to deploy an NMD system. Although the administration will not decide whether or not to deploy such a system until June 2000, it has added funding for procuring the system (\$6.6 billion over the next six years) to its FY 2000 Future Years Defense Plan. The administration has also asked the Russian government to renegotiate the ABM treaty to make such a deployment possible.<sup>44</sup> But, to lessen the technological risk to the NMD program, the Secretary of Defense pushed back the date of deployment to as much as two years beyond the scheduled 2003 date.<sup>45</sup> This effectively stretched the “3 plus 3” program into a “3 plus 5” program.

The administration’s program consists of the following elements:

The administration’s program consists of the following elements:

The Ground Based Interceptor (GBI); Upgraded Early Warning Radars (UEWR); Forward Deployed and/or U.S.-based X-band Radars (XBR); and Battle Management/Command, Control and Communications (BM/C3). The Space-Based Infrared System

(SBIRS) in low earth orbit is another component of the mature NMD system, likely to be available after 2004.<sup>46</sup>

The GBI is a hit-to-kill system (the interceptors physically smash into the incoming warheads) designed to intercept incoming warheads in the midcourse (or exoatmospheric) phase of their trajectories. The GBI consists of a rocket booster and exoatmospheric kill vehicle (EKV), which has its own set of sensors, propulsion, communications, and guidance to complete the intercept.

To support NMD, the UEWR is an upgrade to the existing large, fixed, phased array early-warning radar network. According to BMDO, "Prior to deployment of the SBIRS (Low) early-warning satellites, the UEWRs will be used to detect and track objects during their midcourse phase, primarily to cue the more precise X-Band Radars."<sup>47</sup> Cueing is when less precise long-range sensors tell more precise shorter-range sensors where to search for the target as it gets closer.

SBIRS is being developed by the Air Force as part of an upgrade to the early-warning system that will eventually replace the current Defense Support Program (DSP) satellites. SBIRS will provide "over-the-horizon" acquisition and tracking of ballistic missiles throughout their flight trajectories. Both DSP and SBIRS satellites use infrared sensors to detect the exhaust plumes of missile launches.

The XBR (also referred to as GBR or ground-based radar) is a forward-deployed radar designed to acquire incoming warheads, track them, distinguish them from decoys, and assess whether they have been destroyed. According to BMDO, "XBRs use high frequency and advanced radar signal processing technology to improve target resolution, which permits the radar to perform more effectively against closely-spaced warheads, debris and penetration aids."<sup>48</sup>

BM/C3 is the "brains" of the NMD system. It provides the capability to plan, coordinate, direct, and control NMD weapons and sen-

sors. Developing software for BM/C3 is more of a challenge than is developing hardware. According to BMDO:

All elements of the NMD system will work together to respond to a ballistic missile directed against the United States. The U.S. Early Warning System, consisting of Defense Support Program (DSP) satellites, and its follow-on capability, the Space Based Infrared System (SBIRS) satellites, will detect the launch of enemy missiles and will subsequently track these missiles while also gathering information on them. After confirmation, this information will be passed to the Battle Management/Command, Control, and Communications (BM/C3) system while groundbased radars acquire and begin to track the missile. After defense engagement authority is granted, one or more interceptors will be launched on command to engage the threat. The BM/C3 system will continue to process radar and other system data in order to provide more information to the interceptor so it, in turn, can better discriminate between debris, false objects (penetration aids), and real warheads.

The interceptor will use its on-board sensor to acquire the threat, select the target warhead, and guide to a direct, high-speed collision using on-board computers and divert propulsion systems. During and after the engagement, the radars continue to collect data, and observe the intercept results in order to provide "kill assessment" information which evaluate[s] the interceptor's success or failure.<sup>49</sup>

#### **Ground-Based NMD**

In 1996, the Congressional Budget Office (CBO) estimated that an initial defense con-

**Sophisticated countermeasures are unlikely to be easily deployed by rogue states.**

## The high cost of a layered system is not warranted.

sisting of 100 interceptors based at Grand Forks, North Dakota, would entail \$14 billion in acquisition costs.<sup>50</sup> That estimate includes the cost of the interceptors (using the Army's EKV), four new phased-array radars (one each in Grand Forks, Alaska, Hawaii, and New England) to track incoming warheads, and the Space and Missile Tracking System (SMTS)—that is, SBIRS—space-based sensors. CBO noted that the system would cost roughly \$4 billion less if the Air Force's proposal for an interceptor based on the existing Minuteman ICBM were adopted. This system would be able to defend against an unsophisticated attack of up to 20 warheads.

CBO estimated that a system of 300 interceptors deployed at three sites would entail \$18 billion in acquisition costs (including SMTS).<sup>51</sup> The larger system might provide increased effectiveness (the ability to launch more interceptors at an incoming warhead to increase the probability of killing it) or the ability to defend against larger attacks (more than 20 warheads).

After the release of the CBO report, questions were raised about whether basing interceptors at Grand Forks could provide coverage of the entire country (instead of just the lower 48 states). *Defense Week* reported: "The Pentagon has determined that interceptor rockets for an initial, limited national missile defense would best be located in central Alaska."<sup>52</sup> According to BMDO:

Shooting down what may be the most likely near-term ICBM threats—a handful of relatively unsophisticated missiles, perhaps from North Korea, Iraq or Iran—can most effectively be done from Alaska. . . . Alaska is the "optimum" spot to fire interceptors at such a limited, "simple" threat . . . no matter where in the world the missiles are launched from or where in the U.S. they are targeted.<sup>53</sup>

In 1998, DoD—on the basis of data supplied by the contractor—estimated that acquisition of a 20-interceptor deployment would

cost \$11 billion if based in Alaska and \$9 billion if based at Grand Forks.<sup>54</sup> That estimate was later increased to \$13 billion.<sup>55</sup> All of DoD's more recent estimates are much higher than the CBO estimate of \$14 billion for 100 interceptors based at Grand Forks and DoD's previous estimate of \$10 billion for 100 interceptors at an unspecified location (both estimates were done in 1996).<sup>56</sup> At least 100 interceptors may be needed for protection against even small attacks.

### Layered (Ground- and Space-Based) NMD

According to CBO, acquisition costs for an initial layered defense—consisting of 100 ground-based interceptors, 500 space-based interceptors, and SMTS satellites—would be about \$31 billion (including \$3 billion to hedge against technical risk).<sup>57</sup> Such a layered defense would be capable of protecting the United States from a more sophisticated attack of up to 60 warheads accompanied by countermeasures.

A "high-end" layered defense—consisting of 300 ground-based interceptors, 500 space-based interceptors, 20 space-based lasers, and SMTS satellites—would entail \$60 billion in acquisition costs (again, including \$3 billion to hedge against technical risk).<sup>58</sup> Such a system might be able to protect the United States against a more sophisticated threat—for example, up to 200 warheads accompanied by sophisticated countermeasures.

CBO later revised its estimate for a layered defense to include the cost of operating and supporting the system, which had been purposefully excluded earlier. According to CBO, operations and support (O&S) costs "would be about \$2 billion annually for the low-end system and about \$4 billion annually for the high-end system." Assuming a 20-year life for an NMD system, the total cost of the low-end system would be \$71 billion and the total cost of the high-end system would be \$140 billion.<sup>59</sup>

Clearly, a layered system including space-based weapons is expensive. Against rogue-state ballistic missiles that do not have multi-

ple warheads or countermeasures, such expense is neither required nor warranted. To provide meaningful protection from a large accidental or unauthorized launch of Russian missiles with multiple warheads and countermeasures, a layered system is probably required. But the high cost of such a system is not warranted because the threat has a low probability. And planning to build a sophisticated NMD system might adversely affect the cordial renegotiation of the ABM treaty and the stability of the nuclear balance between the United States and Russia.

Another impediment to deploying space-based weapons is the requirement for heavy lift capability to launch all the requisite systems into orbit, to both deploy and replenish the satellite constellation. Sufficient heavy lift capacity does not presently exist and would cost substantial sums to acquire.

### **Sea-Based NMD**

There have also been proposals to develop a sea-based NMD capability. For example, the Heritage Foundation has proposed using the Navy Theater Wide (NTW) missile defense system (also known as Navy Upper Tier) for NMD.<sup>60</sup> (In contrast to NMD, which is designed to defend the American homeland from long-range ballistic missiles, theater missile defense (TMD) systems are designed to protect allied nations and U.S. forces in an overseas theater of war from enemy shorter-range ballistic missiles.) Former Reagan administration officials Frank Gaffney and Sven Kraemer have also advocated using Navy TMD systems for national missile defense.<sup>61</sup>

There seems to be substantial doubt, even among knowledgeable military leaders, about whether the Navy's proposed Theater Wide TMD system can provide NMD capability. Rear Admiral Rod Rempt, deputy assistant secretary of the Navy for theater combat systems, stated that the NTW block I system "cannot deliver strategic deterrence (i.e., NMD capability) even if the Navy wanted it to."<sup>62</sup> However, Admiral Rempt has also stated that "NTW block II will have [NMD] capabil-

ity"<sup>63</sup> and that "there is no reason why a sea-based NMD system could not work."<sup>64</sup>

Those comments must be put into context. To begin with, there is no Navy program to develop a sea-based NMD capability. Admiral Rempt's comments are primarily about the physical ability of the interceptor missile to engage a long-range missile. In all likelihood, the limiting factor—or "Achilles' heel"—would not be the interceptor but the Navy Aegis SPY-1B radar's ability to detect and track missiles and/or warheads. That is, even if the interceptor has the capability to fly out to long range and high altitude, the radar that supports that interceptor must also be able to see out to that range and altitude to acquire, discriminate, track, and engage the intended target. In other words, the system cannot hit what it cannot see. Because ballistic missiles travel so fast, the target must be seen soon enough to successfully engage it.

According to BMDO Director Lt. Gen. Lester Lyles, "[t]here are limitations on the SPY radar on the Aegis ship. . . . [The radar] does not give you the kind of range we need to have to do an NMD mission."<sup>65</sup> General Lyles also cites "insufficient burnout velocity and the inability of the Navy's Light Exo-Atmospheric Projectile [LEAP] seeker to discriminate adequately between debris, decoys, and actual reentry vehicles" as reasons why a sea-based system does not meet the mission requirements for NMD.<sup>66</sup> "Insufficient burnout velocity" means that the interceptor has insufficient velocity to hit ICBMs, which travel faster and at higher trajectories than theater missiles.

The projected radius for the area that NTW can defend is several hundred kilometers, which is largely a function of the capabilities of the SPY-1B radar. Cueing from space-based sensors would extend the radar's effective range and thus the range of the interceptor. But there is not likely to be a quantum leap in the effective range. Therefore, for intercepts of missiles in their terminal phase of descent, an Aegis cruiser/destroyer with an NTW capability would have to be positioned

**A system including space-based weapons is neither required nor warranted.**

**In addition to technical and cost considerations, sea-based NMD raises some important operational questions.**

within a few hundred kilometers of the defended target, which means that targets relatively close to the coasts could be protected but targets in the middle of the country would remain vulnerable. If a U.S. Navy ship in an overseas theater tried to destroy a missile in the ascent phase before it hit the United States, the ship would need to be within several hundred kilometers of the launch point or along the axis of flight, which means being in the right place at the right time.

If the SPY-1B radar is the limiting factor for sea-based NMD, the obvious solution would be to replace the SPY-1B with a more powerful radar. The issue is whether a radar with similar qualities and capabilities to the Army's proposed Ground Based Radar (GBR) for NMD can be packaged to fit on an Aegis cruiser/destroyer, and the cost of doing so. The estimated program cost for the Army's GBR is \$9 billion to \$10 billion.<sup>67</sup> Although no Navy program to develop and produce a shipborne GBR capability currently exists, it is probably safe to assume that the costs would be at least as much as the costs for the GBR. Building and integrating a shipborne GBR into existing ships might be even more expensive than simply building the GBR.

Another possibility is to rely almost entirely on space-based sensors for sea-based NMD. According to CBO analyst David Mosher:

This system would require that Space and Missile Tracking System (SMTS) infrared tracking satellites be deployed to ensure that missiles were intercepted shortly after they left the atmosphere. Setting up such a system would cost about \$5 billion, and deploying SMTS as part of it would cost another \$5 billion.<sup>68</sup>

Mosher further states: "Preliminary estimates of the cost of this system, *which as yet exists only on paper*, run to about \$10 billion, not including the use of SMTS and a few of the other supporting systems that the Navy thinks it would need."<sup>69</sup> Therefore, even if a sea-based NMD system were technically and opera-

tionally feasible, it would probably cost at least \$20 billion to acquire.

But relying only on space-based sensors for sea-based NMD seems questionable when both space- and ground-based sensors are used for ground-based NMD. The ground-based radar is presumed to be more precise than the space-based sensor and can more accurately guide the interceptor to the predicted intercept point. The space-based sensor's "volume" of coverage for any intercept will most likely be relatively large, and relying solely on it could place undue stress on the interceptor's on-board seeker to make the final engagement.

In addition to technical and cost considerations, sea-based NMD also raises some important operational questions. A certain number of multimissile Aegis cruisers/destroyers would probably need to be dedicated exclusively to the NMD mission. The Navy at one time estimated that between 7 ships (2 overseas) and 15 ships (5 overseas) would be required for sea-based NMD.<sup>70</sup> Dedicating those ships would reduce the number of Aegis ships available for other missions, including theater missile defense. Also, if sea-based NMD required a constant forward deployment of ships to patrol all potential enemy launch areas and missile flight paths, it would be inconsistent with a more rational, restrained military strategy that would reduce the U.S. naval presence overseas.<sup>71</sup> As noted in a previous Cato Institute study on TMD:

With a more restrained military strategy, the United States would not need forward-deployed forces or prepositioned equipment in various theaters of operations. And *we should expect only a limited overseas naval presence in any given region at any given time.*<sup>72</sup>

## Conclusion

Table 3 summarizes a variety of options for NMD that have been discussed in this paper. Obviously, the comparison in the table is not strictly "apples to apples"—the cost estimates

were done by different organizations at different times (presumably with somewhat different methodologies and assumptions). However, it does provide some idea of the vast differences among NMD options. No assessment of the options can be made if the NMD debate continues to be driven by overheated political rhetoric. But the number of viable options can be reduced significantly by defining the proper mission for an NMD system.

Clearly, we do not need to build an NMD system to defend against a Russian preemptive first strike. And although an accidental or

unauthorized launch from Russia is a possibility, it does not present a sufficient threat to warrant building an expensive layered defensive system. The chances of an accidental launch from Russia have been reduced by a recent agreement by the United States and Russia to share early-warning data on missile launches. In addition, planning to build a layered NMD system that could destroy larger numbers of warheads might destroy the attempt to renegotiate the ABM treaty with the Russians and imperil nuclear stability between the United States and Russia. As

Table 3  
Comparison of NMD Options

<b><u>NMD Option</u></b>	<b><u>Comments</u></b>
20 ground-based interceptors	Latest DoD cost estimate: \$13 billion in acquisition costs. Larger deployment required (at least 100 interceptors) for protection against even small attacks.
100 ground-based interceptors	CBO cost estimate: \$14 billion in acquisition costs. Provides protection against small attacks (up to 20 warheads). Prior DoD estimate was \$10 billion.
300 ground-based interceptors	CBO estimate: \$18 billion in acquisition costs (3 sites). Protection against larger attacks (more than 20 warheads) or increased effectiveness against small attacks.
100 ground-based interceptors plus 500 space-based interceptors	CBO estimate: \$31 billion in acquisition costs (\$71 billion when operational and support costs are included). Protection against more sophisticated attacks (up to 60 warheads), including countermeasures.
300 ground-based interceptors plus 500 space-based interceptors and 20 space-based lasers	CBO estimate: \$60 billion in acquisition costs (\$140 billion when operational and support costs are included). Protection against large attacks (up to 200 warheads), including sophisticated countermeasures.
Sea-based NMD	Acquisition costs are uncertain, but probably at least \$20 billion. Sea-based TMD is not NMD-capable—that is, SPY-1B radar and LEAP seeker on interceptor are not NMD-capable. Relying solely on space-based sensors to guide interceptor is questionable. Probably cannot provide complete coverage of the United States (that is, targets in the middle of the United States are vulnerable).

**The elements in the Clinton administration's NMD program can provide the requisite capability to protect against the threat from rogue states.**

noted earlier, an accidental or unauthorized launch from China is even more unlikely—in part, because Chinese warheads and propellant are stored separately from the missiles.

But the threat from rogue states does represent a real danger that could justify a limited NMD deployment. That deployment does not have to be extensive or expensive. The threat from rogue states is likely to be relatively modest (a few ICBMs) and unsophisticated (their missiles are unlikely to have multiple warheads or sophisticated countermeasures), requiring an equally modest response. A limited ground-based NMD system of 100–300 interceptors should provide sufficient defensive capability against threats from rogue states. (A sea-based NMD system is a poor substitute for a land-based NMD for technical and operational reasons and takes away scarce resources needed to field such a ground-based system.) A limited ground-based system would have some inherent, limited capability against a Russian accidental or unauthorized launch but would not be designed to counter that scenario.

Deploying a limited ground-based NMD system would not upset nuclear deterrence or stability between the United States and Russia. Even if the NMD system went beyond the bounds of the ABM treaty (as is likely), it would not pose a direct threat to Russia. If the NMD system were designed to protect against relatively small attacks (for example, 20 warheads), it would hardly represent a defensive capability sufficient to allow the United States to launch a nuclear first strike against Russia with the expectation that it could successfully defend against a Russian retaliatory strike.

Therefore, the debate should not be about whether or not to build missile defenses. A limited ground-based NMD should be built when the technology is ready. The elements in the Clinton administration's NMD program

can provide the requisite capability to protect against the threat from rogue states. Instead, the debate should be about the nature and capabilities of a limited NMD system that will accomplish the mission of protecting the nation against threats from rogue states, and do it cost-effectively. Only then can an informed decision be made about NMD.

## Notes

The authors wish to acknowledge and thank Michael Sirak and Inside Washington Publishers for providing access to their internal database of articles published in *Inside Missile Defense*. The authors also wish to thank the staff of the Ballistic Missile Defense Technical Information Center for providing access to their library of research materials.

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