

# **The Declining Ballistic Missile Threat**

**Testimony of  
Joseph Cirincione  
President, Ploughshares Fund**

**United States House of Representatives  
Committee on Oversight and Government Reform  
Subcommittee on National Security and Foreign Affairs**

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Chairman Tierney and Members of the Committee, thank you for the opportunity to testify before you today on this critical issue.

The administration this year has submitted to Congress a request for over \$12.3 billion for anti-missile weapons programs, the largest for any weapon in the defense budget. This is an historic high for anti-ballistic missile systems and triple what the United States spent on such systems in 2000.

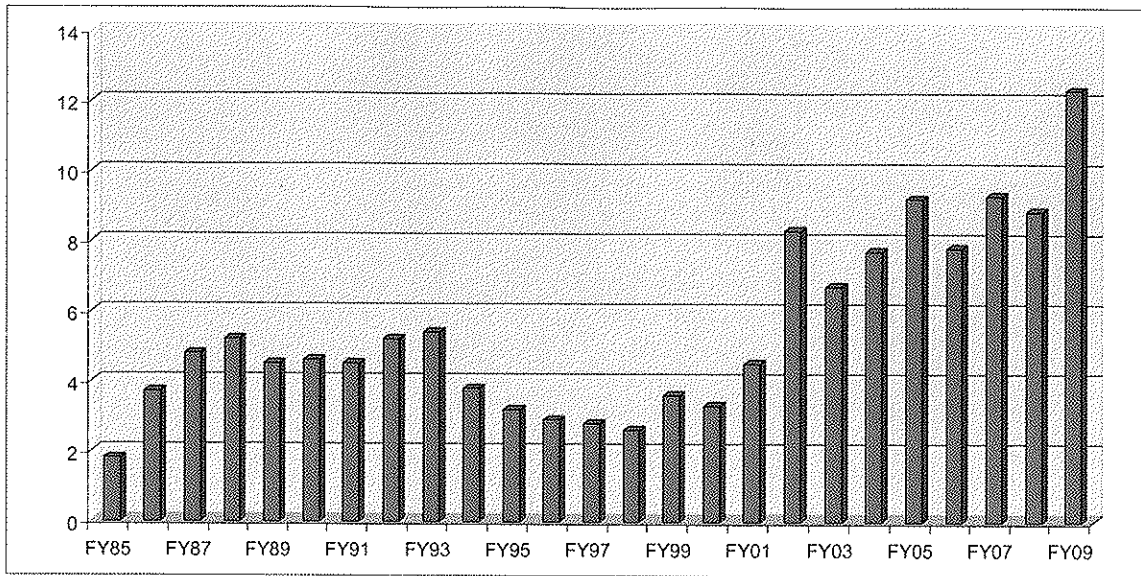
Before the Congress approves expenditures of this magnitude it deserves and should demand a comprehensive assessment of the current and projected ballistic missile threat confronting the United States and our allies. The current budget request does not contain such an assessment, nor have previous submissions in recent years provided this tool essential to any military budget. Instead the request is supported by the claim that “the threat can never be predicted with certainty,” and therefore the administration is pursuing a “capabilities-based strategy.”<sup>1</sup> This means that the administration will produce weapons independent of a concrete threat and deploy them irrespective of the weapon’s operational performance.

Such an approach, based on exaggerated threat estimates and optimistic expectations, wastes valuable defense resources needed for other pressing military needs. Central to the budget justification is the claim that the United States faces a growing threat from ballistic missiles. Yet, by most measures, the threat has steadily declined over the past 20 years. There are far fewer missiles in the world today than there were 20 years ago, fewer states with missile programs, and fewer hostile missiles aimed at the United States. Countries still pursuing long-range missile programs are fewer in number and less technically advanced than 20 years ago.

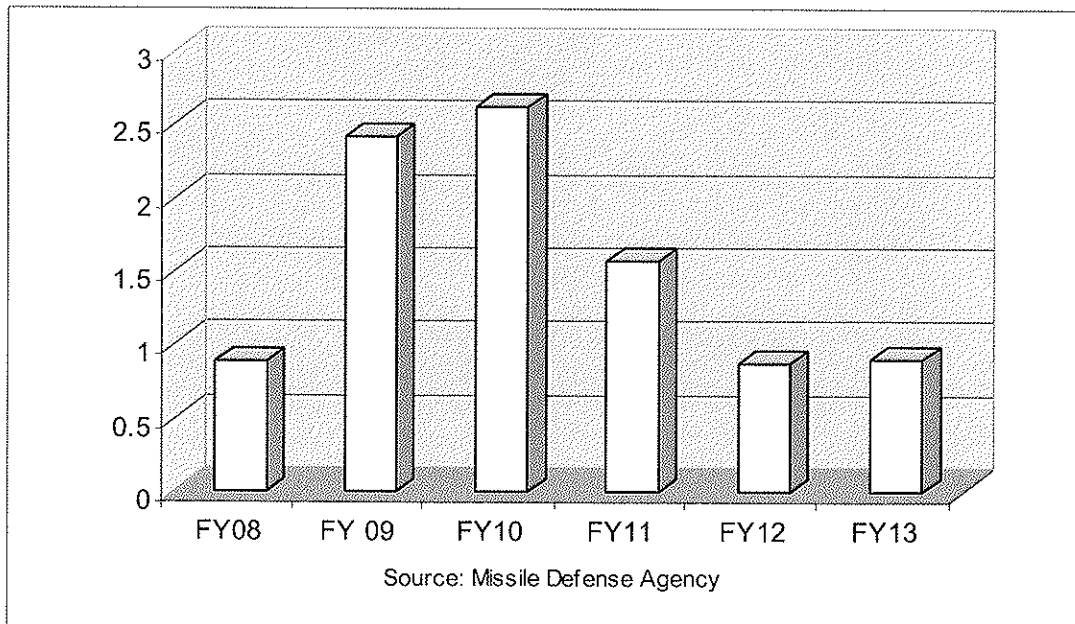
In short, the ballistic missile threat today is limited and changing relatively slowly. There is every reason to believe that it can be addressed through diplomacy and measured military preparedness. The most serious threats are the short-range missiles confronting our armed forces and some allies, not the long-range missiles that are the focus of the bulk of the anti-ballistic missile budget.

My testimony is an attempt to provide the kind of detailed threat analysis Congress requires. It is imperfect and likely contains small errors, but I believe my findings are a more accurate assessment of the ballistic missile threat than has heretofore been provided Congress by this administration.

**Graph 1. Presidential Budget Request for Missile Defense  
FY85-FY09 (in billions of dollars)<sup>2</sup>**



**Graph 2. Budget Requests to Counter Iranian Missile Programs  
FY08-FY13 (in billions of dollars)<sup>3</sup>**



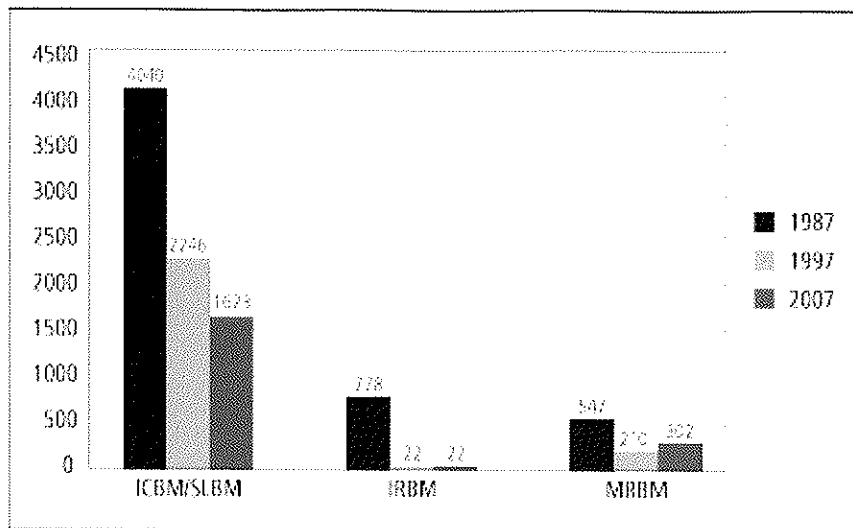
## Summary of Today's Ballistic Missile Threat

Slightly over two dozen countries have ballistic missiles today--but almost all these nations are friends of the United States, and almost all have only short-range missiles that threaten only their neighbors. China is the only potentially hostile nation that has a long-range missile that can reach central Europe or the United States from its territory.<sup>4</sup>

Here are the facts:

- There are currently far fewer intercontinental ballistic missiles and long-range submarine-launched ballistic missiles than there were during the Cold War. In 1987, the Soviet Union deployed 2,380 long-range missiles in its combined ICBM and SLBM arsenals with 9,847 warheads.<sup>5</sup> The United States deployed 1,640 long-range missiles with 8,331 warheads.<sup>6</sup> As of 2007, Russia has only 669 long-range missiles carrying 2,467 warheads,<sup>7</sup> and America has only 836 long-range missiles carrying 3,066 warheads.<sup>8</sup>
- The total number of long-range missiles potentially threatening the United States has declined from 2,400 fielded by the Soviet Union and China in 1987 to only 689 fielded by Russia and China today. This is a 71 percent decrease in the number of ICBMs that threaten U.S. territory.
- The ballistic missile threat to American forces and interests in Europe and Asia has gone from 915 medium- and intermediate-range Chinese and Soviet missiles in 1987 to about 70 Chinese missiles, about 90 North Korean *No Dong*s, and a small number of Iranian *Shahab III* missiles now.<sup>9</sup> This totals about 180 missiles that could threaten U.S. forces or allies, representing an 80 percent decrease in threatening systems. This threat could grow in the future if these three nations increase their missile production and deployment.
- Five new countries—India, Pakistan, China, North Korea, and Iran—have developed limited medium-range ballistic missile capabilities since the late 1980's. Yet there are still fewer medium-range missiles today than 20 years ago.
- The vast majority of nations with ballistic missiles have only short-range ballistic missiles with ranges under 1,000 km—a fact ignored in the oft-cited, ominous statements that “30 countries have ballistic missiles.”<sup>10</sup> Of these nations (actually 28), 17 only have Scud-B or similar missiles with approximate ranges of 300 km or less. Many of these missiles are quite old, have not been well maintained, and are consequently declining in military utility.

**Graph 3. Long and Medium Range Ballistic Missiles 1987-2007<sup>11</sup>**



This figure includes 382 US, 1130 Russian, 20 Chinese, 64 French, and 50 United Kingdom ICBMs and SLBMs. This figure includes 10 North Korean missiles, 110 Chinese missiles, 50 Israeli Jericho II, and 40 Saudi Arabian DF-3. This figure includes 90 North Korean missiles, 70 Chinese missiles, 40 Saudi Arabian DF-3s, 50 Israeli Jericho II, 70 Pakistan Ghauri missiles, 17 Indian Agni B missiles, and 20 Iranian Shahab B missiles.

### The Declining Threat

In 1987, the Soviet Union aimed thousands of nuclear-tipped missiles at America. President Ronald Reagan negotiated agreements that slashed these arsenals in half. The Intermediate Nuclear Forces treaty eliminated two entire classes of missiles (intermediate-range and medium-range) from both Soviet and U.S. forces. The Soviet collapse then shrank the ballistic missile threat by orders of magnitude.

As attention shifted to smaller, potentially hostile states, ballistic missiles still garnered the lion's share of attention from policy-makers, though they constitute only one—and the most difficult—delivery method for nuclear, biological, and chemical weapons.

Despite this, the administration plans to spend more than \$60 billion on anti-missile weapons over the next six years—more than during any similar period of the Cold War—with an estimated \$10 billion specifically budgeted for countering a still-hypothetical missile threat from Iran.

At present, neither the United States nor Europe faces a serious new threat from nuclear-armed ballistic missiles. Russia still fields some 2,467 warheads on some 670 intercontinental and submarine-launched ballistic missiles,<sup>12</sup> but absent an accidental or unauthorized launch, it is unlikely these missiles would be used. Russia's forces will likely shrink dramatically over the next 10 years to about 1,000 warheads on a few hundred missiles. Negotiated agreements could reduce the force further and faster.

China still maintains its force of 20 warheads on 20 silo-based Dong Feng-5 (DF-5) intercontinental ballistic missiles, though it is trying to replace its aging force with a new generation of missiles it hopes to field by the end of the decade.<sup>13</sup> No other potentially hostile nation has a long-range, nuclear-armed missile that can reach central Europe or the United States from its territory.<sup>14</sup>

In sum, there is no imminent, new ballistic missile threat. The threat from a North Korean or Iranian long-range missile is still largely theoretical. Countries developing ballistic missile technology today are fewer in number, poorer, and less technologically advanced than the nations that were developing ballistic missile technology 20 years ago.

What, then, causes the concern over ballistic missiles?

### **A Brief History of Recent Assessments**

The current anti-ballistic missile weapons programs are still on a glide path determined early in the first years of the current administration and heavily influenced by the 1998 Commission to Assess the Ballistic Missile Threat to the United States (known as the Rumsfeld Commission for its chair, Donald Rumsfeld). The Commission concluded:

With the external help now readily available, a nation with a well-developed, Scud-based ballistic missile infrastructure would be able to achieve first flight of a long-range missile, up to and including intercontinental ballistic missile (ICBM) range (greater than 5,500 km), within about five years of deciding to do so. During several of those years the U.S. might not be aware that such a decision had been made.<sup>15</sup>

The Commission identified two countries as particularly dangerous: North Korea and Iran. The commissioners believed these states had made a decision to build an ICBM. Although neither the North Korean nor the Iranian ICBM programs have made significant progress since 1998, US policy is still guided by this out-dated and inflated assessment.

For example, both the 1993 and 1995 National Intelligence Estimates (NIE) of the ballistic missile threat had concluded that no new nation other than Russia and China was likely to field an ICBM in the next 15 years. Under heavy fire from anti-missile advocates in Congress, the intelligence community adopted the methodology of the Rumsfeld Commission for its 1999 NIE and the last publicly released NIE, submitted in December 2001 and released in unclassified form in January 2002.

Both these new estimates concluded that before 2015 the United States most likely will face ICBM threats from North Korea and Iran, and possibly Iraq – barring significant changes in their political orientations – in addition to the strategic forces of Russia and China. One agency disagreed in 2002, assessing that the United States was unlikely to face an ICBM threat from Iran before 2015.<sup>16</sup>

The 2002 estimate concluded ominously, “The probability that a missile with a weapon of mass destruction will be used against *U.S. forces or interests* is higher today than during most of the Cold War and it will continue to grow as the capabilities of potential adversaries mature.” (emphasis in original). This was not true then and is not true today.

The 2002 assessment does note, however, that

*U.S. territory* is more likely to be attacked with [chemical, biological, radiological and nuclear] materials from nonmissile delivery means—most likely from terrorists—than by missiles, primarily because nonmissile delivery means are less

costly, easier to acquire and more reliable and accurate. They can also be used without attribution.<sup>17</sup> (emphasis added).

These cautions and caveats are often brushed aside in the political discussions and program decisions concerning the ballistic missile threat. For example, the Quadrennial Defense Review presented by the Department of Defense to Congress on October 1, 2001, argued that “In particular, the pace and scale of recent ballistic missile proliferation has exceeded earlier intelligence estimates and suggests these challenges may grow at a faster pace than previously expected.”<sup>18</sup>

Then-Director of Central Intelligence George Tenet went beyond the official intelligence assessment and told the Senate Select Committee on Intelligence on February 6, 2002, “The proliferation of ICBM and cruise missile designs and technology has raised the threat to the U.S. from WMD delivery systems to a critical threshold.”

However, by February 2003, Director Tenet’s anxiety about the ballistic missile threat seemed to have been reduced. His testimony to Congress had only three short paragraphs on the missile threat:

The United States and its interests remain at risk from increasingly advanced and lethal ballistic and cruise missiles and UAVs. In addition to the longstanding threats from Russian and Chinese missile forces, the United States faces a near-term ICBM threat from North Korea. And over the next several years, we could face a similar threat from Iran and possibly Iraq.

Short- and medium-range missiles already pose a significant threat to U.S. interests, military forces and allies as emerging missile states increase the range, reliability and accuracy of the missile systems in their inventories.

And several countries of concern remain interested in acquiring a land-attack cruise missile (LACM) capability. By the end of the decade, LACMs could pose a serious threat to not only our deployed forces, but possibly even [to] the U.S. mainland.<sup>19</sup>

His 2004 assessment of the ballistic missile threat to the United States was confined to brief descriptions of the North Korean and Iranian programs, supplemented by quick glances at the Chinese, Indian, Pakistani and Syrian missile development efforts.

In prepared testimony delivered to the Senate Select Committee on Intelligence in January 2007, Central Intelligence Agency Director Michael Hayden used the word missile just once:

We focus on the WMD and missile programs of Russia and China, which are large enough to threaten US survival if their political leaderships decided to reverse themselves and assume a hostile stance.<sup>20</sup>

General Hayden did mention two other states as regional threats, and may have meant to include their missile programs in his assessment:

We focus on North Korea and Iran, two states with WMD programs that threaten regional balances, US interests, and international arms control mechanisms like the Nonproliferation Treaty.<sup>21</sup>

Despite the CIA's reduced emphasis on the ballistic missile threat, there remains within the U.S. Department of Defense and the budget a core belief that the threat is increasing.

But is this true? More precisely, is the risk to U.S. cities from ballistic missile attack greater now than in the past and will it get worse? It is not, as this testimony will demonstrate, below. But it is largely the perceived threat to the United States and Europe that drives the rush to deploy anti-missile systems.

### **Global Ballistic Missile Trends, 1987-2008**

The blurring of short, medium, intermediate and intercontinental ranges for the world's missile inventory often results in the misinterpretation of the oft-quoted assessment that some "30 nations have now deployed a ballistic missile capability" as the Missile Defense Agency says in this year's budget submission.<sup>22</sup> This statement is roughly true, but only the United States, China and Russia possess the ability to launch nuclear warheads on land-based intercontinental missiles. This has not changed since Russia and China deployed their first ICBMs in 1959 and 1981 respectively.<sup>23</sup>

- Analysis of global ballistic missile arsenals shows that there are far fewer ICBMs and long-range submarine-launched ballistic missiles (SLBMs) in the world today than there were during the Cold War.
- The number of intermediate-range ballistic missiles (IRBMs), i.e. missiles with a range of 3,000--5,000 km, has decreased in the past 20 years by an order of magnitude.
- The overall number of medium-range ballistic missiles (MRBMs), i.e. missiles with a range of 1,000-3,000 km, has also decreased. Five new countries, however, have developed or acquired MRBMs since the late 1980's.
- The number of countries trying to develop ballistic missiles has also decreased and the nations still attempting to do so are poorer and less technologically advanced than were the nations 20 years ago.
- The number of countries with short-range ballistic missiles (SRBMs), i.e. missiles with ranges up to 1,000 km, has remained fairly static over the past 20 years and is now decreasing as aging inventories are retired.
- Today, fewer nations potentially hostile to the United States and Europe are trying to develop MRBMs compared with 20 years ago (1980s: China, Iraq, Libya and the Soviet Union; 2007: China, Iran and North Korea).

- The damage from a ballistic missile attack carrying one or two nuclear warheads on U.S. territory, U.S. forces and European allies today is also lower by orders of magnitude than twenty years ago when thousands of warheads would have destroyed the country and possibly all human life on the planet.

**Table 1. Classes and Ranges of Ballistic Missiles**

| <b>Ballistic Missile</b>                    | <b>Range</b>         |
|---|----------------------|
| Intercontinental ballistic missile (ICBM)   | Greater than 5,500km |
| Intermediate-range ballistic missile (IRBM) | 3,000km to 5,500km   |
| Medium-range ballistic missile (MRBM)       | 1,000km to 3,000km   |
| Short-range ballistic missile (SRBM)        | Less than 1,000km    |
| Submarine-launched ballistic missile (SLBM) | Greater than 5,000km |

## **I. LONG-RANGE BALLISTIC MISSILES**

Force reductions in U.S. and Russian arsenals have dramatically decreased the number of long-range ballistic missiles in the world from their Cold War levels.

### **Decreases**

In 1987, the Soviet Union deployed 2,380 long-range missiles in its combined ICBM and SLBM arsenals.<sup>24</sup> The United States deployed 1,640 long-range missiles.<sup>25</sup> As of February 2007, Russia has 669 long-range missiles carrying 2,467 warheads<sup>26</sup> and the U.S. has 836 long-range missiles carrying 3,066 warheads.<sup>27</sup>

The United States retired 50 Minuteman III ICBMs at Malmstrom Air Force Base in 2007; decreasing the overall Minuteman III force from 500 to 450 missiles.<sup>28</sup>

The United Kingdom has also reduced its long-range missile arsenal, and is the only declared nuclear weapons state to abate its nuclear arsenal to a single deterrent system—the Trident II system. A White Paper presented to Parliament in December of 2006, “The Future of the United Kingdom’s Nuclear Deterrent,” stated Britain would reduce its “operationally available” arsenal from 200 to fewer than 160 nuclear warheads with a corresponding 20 percent decrease in their overall nuclear warhead stockpile.<sup>29</sup> With these changes, the United Kingdom will have reduced the explosive power of its nuclear arsenal (which is the smallest of declared nuclear weapons states,



comprising only 1 percent of the global stock of nuclear weapons) by 75% since the end of the Cold War.<sup>30</sup>

## **Increases**

China has been working on a new long-range ballistic missile, the mobile DF-31 (and the DF-31A variant with longer range), which would replace the range capabilities of the current array of DF-4 IRBMs.<sup>31</sup>

In early March 2007, US naval intelligence documents reported in the press claimed China was conducting sea-exercises with the new Type-094 nuclear powered ballistic missile submarine (SSBN). The Type-094 is equipped with 12 launch tubes designed to carry the long-range Julang-2 SLBM (JL-2), which can hit Hawaii and Alaska from Chinese territorial waters. It is believed that China is currently deploying two Type-094 submarines.<sup>32</sup>

Russia has recently developed and begun deploying the new Topol-M1 ICBM, which will gradually replace the SS-25 ICBM. An estimated six Topol-M1s were deployed in 2007, with a total of 50 by 2015.<sup>33</sup> Unlike the silo-based Topol-M (SS-27 NATO designation), the Topol-M1 is road-mobile, and reportedly could utilize an advanced maneuverable targeting system being designed to evade the most advanced anti-ballistic missile defense arrays.<sup>34</sup>

For the first time in 17 years, Russia constructed and launched a new SSBN, the *Yuri Dolgoruki*, one of four such SSBNs to be built.<sup>35</sup> The *Yuri Dolgoruki* is to be fitted with recently developed Bulava-M SLBMs.<sup>36</sup>

France has reduced its nuclear arsenal overall, but now fields 48 M-45 long-range SLBMs<sup>37</sup> that it began deploying at the end of 1987.<sup>38</sup> France is slated to begin deploying the longer-range M-51.1 SLBM on its final *Triomphant* class SSBN, *Le Terrible*, upon its completion in 2010.<sup>39</sup>

Similarly, the United Kingdom has reduced its arsenal but now fields 50 long-range Trident II SLBMs<sup>40</sup> on its *Vangaurd* class SSBN that it did not have in 1987.<sup>41</sup> Furthermore, the British Parliament voted on March 15 2007, in favor of extending the life span of its current Trident II System. Included in the vote, was the decision to allocate 15 to 20 million pounds towards developing a new SSBN fleet that would enter service in 17 years and last through 2050.<sup>42</sup>

The Nuclear Posture Review submitted to Congress December 31, 2001 calls for the development of a new ICBM to be operational in 2018, a new strategic submarine and a new submarine-launched ballistic missile to be operational in 2029, and a new heavy bomber to be deployed in 2040. The United States has also begun research on a new conventionally armed submarine-launched intermediate-range ballistic missile (SLIRBM) for use on converted *Ohio*-class nuclear powered cruise-missile submarines (SSGNs).<sup>43</sup> In addition, the administration has proposed a new nuclear warhead development Reliable Replacement Warhead (RRW) that would be retro-fitted onto existing missiles.

## **Status Quo**

During the past twenty years, China has maintained a force of about 20 DF-5 ICBMs.<sup>44</sup> Since the 1980s, China has worked to upgrade the DF-5s to DF-5As—a variant with longer range and greater payload capacity.<sup>45</sup> No other country potentially hostile to the United States has successfully developed an ICBM or long-range SLBM during this time period.

## **Net Decrease**

By 2007, the total number of long-range ballistic missiles in the world (including those of the United States, the United Kingdom and France) has decreased 60 percent to 1,623<sup>46</sup> from the 4,040 deployed in 1987.<sup>47</sup>

More significantly, the total number of long-range missiles potentially threatening the United States has declined from 2,400 fielded by the Soviet Union and China in 1987 to 689 fielded by Russia and China today. This is a 71 percent decrease in the number of ICBMs that threaten U.S. territory.

## **II. INTERMEDIATE- RANGE BALLISTIC MISSILES**

Intermediate Range Ballistic Missile arsenals have undergone even more dramatic reductions. The Intermediate-Range Nuclear Forces (INF) Treaty eliminated this entire class of ground-based missiles (with ranges from 3,000 to 5,500 km) from the Soviet/Russian arsenal over a three-year period.<sup>48</sup> Changes in the structure of both the French and British nuclear forces have resulted in the elimination of intermediate-range SLBMs from these countries' arsenals as well.

## **Decreases**

Final INF inspections took place on May 31, 2001, verifying the destruction of 660 intermediate-range Soviet ballistic missiles.<sup>49</sup> France has replaced the 16 M4A intermediate-range SLBMs it possessed in 1987 with long-range systems.<sup>50</sup> France also deactivated its limited arsenal of 18 land-based IRBMs in 1996 and has since destroyed them.<sup>51</sup> The United Kingdom has also replaced the 64 Polaris A-3T and Chevaline intermediate-range SLBMs it possessed with the long-range Trident system. The United States did not then and does not now field IRBMs.

## **Status Quo**

China maintains approximately 22 DF-4 missiles of this range.<sup>52</sup> No other nation has deployed an IRBM during this time period, though North Korea has been pursuing the Taepo Dong II, with a theoretical range of 3,500 to 6,000 km.<sup>53</sup> During a series of missile tests on July 4, 2006, a test-flight of a missile that could have been a Taepo Dong II failed after less than a minute of flight time.

India continues to develop the Agni III (with a potential range greater than 3,000km)<sup>54</sup> despite its unsuccessful maiden test-flight on July 9, 2006 when, after

12km of flight, it plunged into the ocean missing its designated target.<sup>55</sup> Its second and most recent test-flight on April 12, 2007 proved successful.<sup>56</sup>

### **Net Decrease**

Overall, IRBM arsenals have declined from a global total of 778 in 1987 to 22 today. The decrease from 680 IRBMs potentially threatening the United States, its forces and European allies in the 1980s to 22 today represents a 97 percent reduction from Cold War levels.

## **III. MEDIUM-RANGE BALLISTIC MISSILES**

The broad scope of the INF Treaty also covered ground-based medium-range ballistic missiles (MRBMs). Thus, the treaty resulted in the elimination of this class of missiles (with ranges between 1,000 and 3,000 km) from Soviet/Russian and U.S. ballistic missile arsenals. Changes in the French nuclear forces resulted in the elimination of MRBMs from its arsenal as well.

### **Decreases**

A total of 149 Russian SS-4 and 234 U.S. Pershing II missiles were destroyed under the INF treaty. France possessed 64 medium-range M20 SLBMs in 1987 that it had replaced with longer-range systems by 1991.<sup>57</sup>

### **Increases Geographically**

The most significant proliferation threat comes from the slow but steady increase in the number of states possessing medium-range ballistic missiles, even as Russia, France and the United States eliminated their arsenals. This development has attracted a great amount of attention and is often cited as evidence of a larger proliferation threat. China, India, Iran, Israel, Pakistan, North Korea and Saudi Arabia now possess land-based MRBMs. China also possesses a medium-range SLBM capability, though its operational status is in question.<sup>58</sup>

Only India, Iran, North Korea, Pakistan and Saudi Arabia have developed or obtained their missiles since the late 1980's, and of these countries all but India's missiles are based primarily on assistance or technology received from North Korea or China.

### **Status Quo**

China has been gradually retiring its DF-3 MRBM force, which now stands at approximately 16 missiles with half as many launchers.<sup>59</sup> Concurrently, China's arsenal of DF-21 MRBMs has diminished to 21 missiles with approximately 36 launchers while its number of sea-launched JL-1 (CSS NX-3 NATO designation) MRBMs has remained static at 12.<sup>60</sup>

### **Net Decrease Numerically**

Numerically speaking, even though MRBMs are now in the hands of more countries, the total number of MRBMs in existence in 2007 is smaller than the 547 MRBMs in

the combined U.S., French, Russian and Chinese forces in 1987.<sup>61</sup> Since then, Israel is believed to have deployed 50 operational Jericho II MRBMs<sup>62</sup> while Saudi Arabia has approximately 40 CSS-2 MRBMs that it purchased from China.<sup>63</sup> North Korea is believed to have deployed close to 100 No Dong MRBMs, but it may have produced at least 150 missiles of this type.<sup>64</sup> At least five Iranian Shahab III missiles were deployed in July 2003.<sup>65</sup> According to a March 2006 report by the National Air and Space Intelligence Center, Iran has fewer than 20 Shahab III launchers, however, it notes there might be several missiles for each launcher.<sup>66</sup> MRBMs in India and Pakistan and North Korea's Taepo Dong I are still in operational testing.<sup>67</sup> Assuming that each of these countries could deploy one to five missiles in a crisis during the next five years, the global total of MRBMs today is no more than 417 and likely as low as 285.<sup>68</sup> This represents a 24 and 48 percent decrease, respectively, in global MRBM arsenals from the 1987 level.

In terms of missiles potentially threatening American forces or interests, the threat has gone from 249 Chinese and Soviet missiles in 1987 to 49 Chinese, an estimated 100 North Korean No Dong, and 5 Iranian Shahab III missiles.<sup>69</sup> This tabulates to a total of about 154 missiles that could threaten U.S. forces or Europe, representing a 38 percent decrease in threatening systems. This threat could grow in the future if these three nations increase their missile production and deployment.

#### **IV. SHORT-RANGE BALLISTIC MISSILES**

##### **Aging Scud Arsenals**

In addition to the five recognized nuclear-weapon states, there are 25 nations with ballistic missiles. Of these nations, the vast majority has only missiles with ranges less than 1,000 km. Seventeen of the twenty-five nations only have Scud-B or similar missiles with approximate ranges of 300 km or less. Furthermore, many of these missiles are quite old, have not been well maintained, and are consequently declining in military utility. For the past nine years, the number of nations with these missiles has been decreasing as they abandon aging systems. Nevertheless, new production by some nations, such as Syria and North Korea, could replace or increase inventories in nations wishing to retain short-range missile capabilities.

#### **V. NUMBER OF COUNTRIES WITH BALLISTIC MISSILE PROGRAMS**

Another factor by which proliferation can be measured is the number of states with missile development programs. The number of countries with ballistic missile development programs has also decreased from the number of countries pursuing missile programs during the Cold War. In addition to the five recognized nuclear-weapon states, countries such as Argentina, Brazil, Egypt, India, Iraq, Israel, Libya and South Africa had programs to develop long-range or medium-range missiles in 1987. By 2005, Argentina, Brazil, Egypt and South Africa had abandoned their programs. Libya's remains largely defunct. Furthermore, Iraq's threat has been eliminated (although we still count this country as possessing short-range ballistic missiles).

**Table 2. Countries with active intermediate-range or long-range ballistic missile development programs (apart from Five NPT Nuclear-Weapons States)**

| 1987         | 2007        |
|--------------|-------------|
| Argentina    | India       |
| Brazil       | Iran        |
| Egypt        | Israel      |
| India        | North Korea |
| Israel       | Pakistan    |
| Iraq         |             |
| Libya        |             |
| South Africa |             |

Today, the nations pursuing long-range missile development programs are smaller, poorer and less technologically advanced than were the nations with missile programs 20 years ago. U.S. threat assessments such as the 2001 National Intelligence Estimate on the Ballistic Missile Threat note that Iran and North Korea currently possess active programs. Syria and South Korea have active short-range ballistic missile programs, but have not yet demonstrated interest in or the capability to produce MRBMs. Thus, even with the inclusion of U.S. allies India and Pakistan, the NIEs highlight the limited nature of the missile proliferation threat, one that is confined to a few countries whose political evolution will be a determining factor in whether they remain threats to global security.

Nor have these programs advanced as quickly as predicted by the worst-case assessments that came to dominate U.S. policy on missile proliferation and anti-missile systems. The 1998 Rumsfeld Commission report asserted that “Scud-based ballistic missile infrastructures would be able to achieve first flight of a long-range missile, up to and including intercontinental ballistic missile (ICBM) ranges, within about five years of deciding to do so.” The report concluded that Iran and North Korea had decided to do so: “The extraordinary level of resources North Korea and Iran are now devoting to developing their own ballistic missile capabilities poses a substantial and immediate danger to the U.S.” The commissioner said, “Each of these nations places a high priority on threatening U.S. territory, and each is even now pursuing advanced ballistic missile capabilities to pose a direct threat to U.S. territory.”<sup>70</sup> However, today, nine years later, neither country has achieved a successful flight of an ICBM.

Nevertheless, according to the Missile Defense Agency, “the proliferation of increasingly sophisticated ballistic missile systems and associated technologies and expertise continues to pose a danger to our national security. In 2006, more than sixty foreign ballistic missiles were launched around the world.”<sup>71</sup> The report concluded, “ballistic missiles will remain the weapon of choice among our potential adversaries for the foreseeable future.”<sup>72</sup> The current 2008 report notes, “foreign ballistic missiles were launched more than 100 times around the world in 2007.”<sup>73</sup>

## VII. COUNTRY BALLISTIC MISSILE PROGRAMS OF CONCERN

### *Iran*

Iran's "Shahab III" program (a missile largely based on and perhaps nothing more than a North Korean No Dong missile) has progressed in fits and starts. U.S. officials (and security officials in other countries) have repeatedly raised the alarm about Iran's programs. The 2001 NIE noted, "All agencies agree that Iran *could* attempt to launch an ICBM/SLV about mid-decade, although most agencies believe Iran is *likely* to take until the last half of the decade to do so. One agency further judges that Iran is unlikely to achieve a successful test of an ICBM before 2015."<sup>74</sup> In his 2004 Worldwide Threat Assessment, DCI George Tenet asserted that Iran could begin flight-testing SLVs in the "mid- to latter-part of the decade."<sup>75</sup>

The Shahab program has fallen far short of these estimates. The Shahab III missile blew up in two of its three tests in 1998 and 2000 and failed again in July 2002. It enjoyed more success, though, in tests in May 2002 and July 2003. On August 11, 2004, Iranian officials claimed the test-flight of a Shahab III was a success, despite a skeptical response from the international press.<sup>76</sup> Iran tested a modified Shahab III missile officials claimed was a space-launch vehicle on February 4, 2008, though it appeared successful, video footage from the test clearly showed debris flying from the missile shortly into the flight, suggesting that Iran still faces technical hurdles (specifically in graphic jet vanes that may effect accuracy).<sup>77</sup> The vehicle seems to have only reached an altitude of 70 to 100 miles, far short of the capability required.

Over the past ten years there have been repeated claims of the imminent appearance of longer-range Shahab IVs and Vs. These continue today in the media and from some foreign officials. It is possible Iran is making progress, but there is no publicly available evidence to support these claims. If Iran does demonstrate the ability to build and launch a three-stage missile or space-launch vehicle, this would be a major leap in their capability and a cause of concern.

### *North Korea*

Until July of 2006, North Korea had only two publicly-known missile flight-tests in the past twelve years, one of a No Dong in 1993 and one of a Taepo Dong I in 1998. Without official notification, on July 4 and 5, 2006, North Korea lifted its self-imposed missile flight-test moratorium when it test-launched six or seven ballistic missiles. Among the missiles tested was one some claimed was a Taepodong-II, which might be able to fly over 3000km. The test missile, however, never got close to that range. It failed after 42 seconds of flight according to U.S. officials. The other launches were of the medium-range Nodong missile and a Scud-type missile with a range of 300 to 500 miles.<sup>78</sup>

North Korea is the most serious case of a potential new threat. It may be able to test a Taepo Dong II missile that could approach ICBM ranges, but it would require a third stage to be able to deliver a payload to the continental United States. The capability, reliability and payload of such a missile are highly speculative. Furthermore, unclassified photos of the North Korean test facilities revealed what many analysts

have long concluded: the missile program is primitive by world standards and of limited military utility. North Korea, hoping to open normal trade relations with its neighbors and the West, and desirous of food and energy assistance, seems willing to suspend a dubious program for real material gain.

North Korea's short-range ballistic missile capabilities already pose a threat to US interests and allies throughout the East Asian theatre. North Korea currently deploys the Hwasong-5 (SCUD-B variant) and Hwasong-6 (SCUD-C variant) that could strike targets throughout South Korea.<sup>79</sup> Furthermore, North Korea's No Dong-1 MRBM could threaten targets throughout Japan (including US forces stationed in the region). The missile's significant inaccuracy, however, has led some experts to view the "No-Dong 1 as a "terror weapon" for threatening population centers rather than a significant military-system—unless armed with a nuclear warhead."<sup>80</sup>

According to General B.B. Bell, commander of United Nations command and U.S. forces in South Korea, North Korea possesses over 800 ballistic missiles, comprised of over 600 Scud missiles of various types and as many as 200 medium-range Nodong missiles.<sup>81</sup>

The NIEs and the Rumsfeld Commission assumed an optimistic and fairly straightforward path for North Korea to scale up its existing missiles to true intercontinental range. Only the United States, Russia and China have been able to build missiles in this range thus far. One cannot completely rule out the possibility that North Korea could eventually develop a missile with enough range to reach the continental United States.

The obstacles, however, are formidable. As previous intelligence estimates have reported, the Taepo Dong II, III or IV would have to make remarkable progress in propulsion, guidance and reentry vehicle technology. Moreover, as the size of the missile increases, it requires a difficult manufacturing and engineering shift from the steel bodies employed by Scuds to low-weight, high-strength alloys.

Finally, for a nuclear-capable delivery system, North Korea would have to manufacture a nuclear warhead small enough and sturdy enough to fit on the tip of the missile. There is no evidence that North Korea has mastered these techniques, only speculation that it might be possible. As former commander-in-chief of the U.S. Strategic Command, General Eugene Habiger says, even if they were to successfully test an ICBM, North Korea would still face enormous challenges:

There's a big leap of faith between developing a nuclear device—a weapon that operates in a laboratory kind of environment, in a concrete tunnel, no G-loading, no vibration, no temperature extremes—and to miniaturize something that's going to go in the nose cone of an ICBM, that is going to experience the kinds of things that I've just described. That takes a lot of technology, it takes a lot of work, and it takes a lot of time. I would submit that the miniaturization of a nuclear warhead is probably the most significant challenge that any proliferant would have to face.<sup>82</sup>

Habiger goes on to point out that it took the United States "six to eight years of very intensive engineering development and aggressive testing" to reduce its first ICBM

warheads from 5,000 kg to 1,000 kg. "The leap of faith is that the North Koreans would be able to go from a pristine laboratory weapon to 300 kg."<sup>83</sup>

Above all, if the 6-party talks with North Korea succeed, this entire program could be eliminated through mutual agreement.

### ***Pakistan***

Pakistan has developed its ballistic missile capability largely due to its close proximity and tense relationship with India. Despite the existence of a peace process, the two countries regularly test missiles. Pakistan's ballistic missile arsenal consists largely of SRBMs, while testing of medium- and intermediate-range ballistic missiles continues. After conducting several tests in 2007 using missiles like the Hatf VI (also known as Shaheen II MRBM) and the Hatf-II Abdali SRBM<sup>84</sup>, the Pakistanis accelerated the test schedule in 2008. They have already conducted three tests in the first three months of the year with the Shaheen-1 SRBM and Ghauri MRBM and the Ghaznavi (Hatf III) SRBM.<sup>85</sup>

The most recent test involved the Ghaznavi, which has a range of 290 kilometers and believed capable of carrying a nuclear warhead. President Pervez Musharraf maintains that missile testing is essential to the nation's deterrence capability.<sup>86</sup>

### ***India***

India has responded tit-for-tat with Pakistan's missile development program. India currently fields the Prithvi I and Prithvi II SRBMs, while research continues on a Prithvi III.<sup>87</sup> Press reports indicate that India has deployed the short-range Agni I as well as the medium-range Agni II.<sup>88</sup> Development of the Agni III IRBM (with a potential range greater than 3,000km<sup>89</sup>) continues despite its unsuccessful maiden test-flight on July 9, 2006 when, after 12km of flight, it plunged into the ocean missing its designated target.<sup>90</sup> The missile was tested again successfully April 12, 2007, putting China within its range of attack.<sup>91</sup>

Some reports suggest India is also planning to develop an ICBM sometime in the next decade. While the existence of a long-range missile program is unclear, India has expanded its delivery vehicle options. On February 26, 2008, the Indians successfully tested a variant of the Agni III called the "Sagarika" launched from an underwater platform. This missile would eventually be used in submarines as a "second-strike option."<sup>92</sup> In response, Pakistani naval chief Admiral Muhammad Afzal Tahir warned that the action will trigger an arms race between the two nuclear nations.<sup>93</sup>

### **Net Assessment**

Missile proliferation remains primarily a regional problem, though with global implications.

In South Asia and the Middle East, strategic interest and political dynamics have fueled continued development of ballistic missile technology as both a means of gaining international prestige as well as of obtaining strategic advantage vis-à-vis regional rivals and outside powers. Though relatively limited, the proliferation and



the transfer of ballistic missile technology originating in North Korea does continue to destabilize regional, and therefore global, security.

Overall, the development of the ballistic missile threat over the past 10 years has confirmed the correctness of the 1993 NIE that was so disparaged by anti-ballistic missile proponents.

It also confirms the common-sense judgment of the Joint Chiefs of Staff, who rejected the conclusions of the Rumsfeld Commission in 1998. Then-Chairman of the Joint Chiefs General Henry Shelton wrote:

“While the Chiefs and I, along with the Intelligence Community, agree with many of the Commission's findings, we have some different perspectives on the likely developmental timelines and associated warning times.”

“After carefully considering the portions of the report available to us, we remain confident that the Intelligence Community can provide the necessary warning of the indigenous development and deployment by a rogue state of an ICBM threat to the United States.”

“For example:

- “We believe that North Korea continues moving closer to the initiation of a Taepo Dong I Medium Range Ballistic Missile (MRBM) testing program. That program has been predicted and considered in the current examination.”
- “The Commission points out that through unconventional, high-risk development programs and foreign assistance, rogue nations could acquire an ICBM capability in a short time, and that the Intelligence Community may not detect it. We view this as an unlikely development.”
- “I would also point out that these rogue nations currently pose a threat to the United States, including a threat by weapons of mass destruction, through unconventional, terrorist-style delivery means. The Chiefs and I believe all these threats must be addressed consistent with a balanced judgment of risks and resources.”<sup>94</sup>

The Chiefs' judgments were overturned by political decisions, but in hindsight their assessment and the intelligence estimates provided in 1993 and 1995 have proven sounder than the assessments subsequently produced by the Rumsfeld Commission and the intelligence agencies in 1999 and the early part of this decade.

Finally, those debating the urgency of the ballistic missile threat often lose sight of the vastly different scale of possible destruction that we face today compared to the threat we feared less than twenty years ago. Then the threat was a global thermonuclear war. A first strike of some 5,000 Soviet warheads would have delivered 2.75 million kilotons of destructive force on the United States.<sup>95</sup> On several occasions, the world seemed very close to that war.

Today, we fear that a few missiles carrying warheads of some 10 to 40 kilotons might destroy part of a city or at least impact somewhere in Europe or the United States.<sup>96</sup> Though still a catastrophe, this is less of a threat by several orders of magnitude. In terms of destructive power, in no way can one say that the threat today is worse than that of the Cold War years.

Thus, the most accurate way to summarize the existing global ballistic missile threat is:

1. There is a widespread capability to launch short-range missiles.
2. There is a slowly growing, but still limited, capability to launch medium-range missiles.
3. Most importantly, there are a decreasing number of long-range missiles from the levels of the Cold War and this number will continue to decline dramatically over the next fifteen years.
4. There is some possibility that one or two new nations could acquire a limited capability to launch long-range missiles over the next two decades.
5. The likelihood of any nation attacking the United States or Europe with a ballistic missile is exceptionally low.

In short, the ballistic missile threat today is limited and changing relatively slowly. There is every reason to believe that it can be addressed through diplomacy, deterrence and measured military preparedness. Officials during any year of the Cold War would have gladly traded the dangers they confronted then for today's limited threat.

If missile defenses prove feasible, particularly those designed to counter the more prevalent short-range missiles, they can be an important part of these efforts. But they should never dominate policy. The sooner the balance the Joint Chiefs called for ten years ago is restored to our assessments, budgets, and diplomacy, the better prepared the country will be for the genuine threats we face.

**Table 3. The 17 Countries with Only Short-Range Ballistic Missiles Deployed (ranges 1000km or less)<sup>97</sup>**

| COUNTRY                            | SYSTEM NAME                | STATUS           | RANGE (KILOMETERS) | PAYLOAD (KILOGRAMS) | ORIGIN     | NOTES   |
|------------------------------------|----------------------------|------------------|--------------------|---------------------|------------|---|
| AFGHANISTAN                        | Scud-B                     | O                | 300                | 1,000               | USSR       | Operational status questionable.  |
| ARMENIA <sup>1</sup>               | Scud-B                     | O                | 300                | 1,000               | USSR       |   |
| BAHRAIN                            | MGM-140 (ATACMS)           | O                | 165                | 560                 | USA        | Missiles manufactured by Lockheed-Martin.   |
| BELARUS <sup>2</sup>               | SS-21                      | O                | 120                | 480                 | USSR       |   |
|                                    | Scud-B                     | O                | 300                | 1,000               | USSR       |   |
| EGYPT                              | Scud-B                     | O/U              | 300                | 1,000               | USSR/ DPRK |   |
|                                    | Project T                  | O                | 450                | 1,000               | I / DPRK   | Improved Scud.  |
|                                    | Scud-C                     | O?               | 500                | 600-700             | DPRK       |   |
| GREECE                             | MGM-140 (ATACMS)           | O                | 165                | 560                 | USA        | Purchased 160 ATACMS between 1995 and 1996.   |
| IRAQ                               | Al Samoud II               | O/U              | 180-200            | 300                 | I          | Liquid-fuel missile. From Scud B.   |
|                                    | Ababil-100/ Al Fatah       | O                | 160                | 200-300             | I          | Solid-fuel missile from Scud B.   |
| KAZAKHSTAN <sup>3</sup>            | Scud-B                     | O                | 300                | 1,000               | USSR       |   |
|                                    | Torchka-U (modified SS-21) | O                | 120                | 480                 | USSR       |   |
| LIBYA <sup>3</sup>                 | Scud-B                     | E                | 300                | 480                 | USSR/ DPRK |   |
| SLOVAKIA                           | SS-21                      | O                | 120                | 480                 | USSR       |   |
| SOUTH KOREA                        | Nike-Hercules RA           | O                | 180                | 500                 | I/USA      | Modified SAM.   |
|                                    | Nike-Hercules II           | O/T              | 260-300            | 450-500             | USA        | Modified SAM, Tested at reduced range in 1999. <sup>3</sup>   |
| SYRIA                              | SS-12                      | O                | 120                | 480                 | USSR       | Transferred 1983.   |
|                                    | Scud-B                     | O                | 300                | 1,000               | USSR       |   |
|                                    | Scud-C <sup>3</sup>        | O                | 500-600            | 600-700             | DPRK       | Syria can now produce its own Scud-Cs. <sup>3</sup>   |
|                                    | Scud-D                     | T                | 700                | 500                 | DPRK       | Based on the No Dong; last tested September 2000; Syria may now be capable of producing its own Scud-Ds. <sup>3</sup> |
| TAIWAN                             | Ching Feng                 | O <sup>4</sup>   | 130                | 270                 | Israel     | From Lance.   |
|                                    | Tien Chi <sup>10</sup>     | O? <sup>11</sup> | 300                | 500                 | I          | Modified SAM Tested in 1997.  |
| TURKEY                             | MGM-140 (ATACMS)           | O                | 165                | 560                 | USA        | Purchased 120 ATACMS in 1996.   |
|                                    | Project J <sup>12</sup>    | O                | 150                | 150                 | I/PRC      | Based on Chinese WS-1.  |
| TURKMENISTAN                       | Scud-B                     | O                | 300                | 1,000               | USSR       |   |
| UKRAINE                            | SS-21                      | O                | 120                | 480                 | USSR       |   |
|                                    | Scud-B                     | O                | 300                | 1,000               | USSR       |   |
| UNITED ARAB EMIRATES <sup>13</sup> | Scud-B                     | O                | 300                | 1,000               | Russia?    |   |

<sup>1</sup> In 1997 it was confirmed by an investigatory committee that Russia shipped 8 Scud launchers and 24 missiles to Armenia between 1992 and 1996. See Nikolai Novichkov, "Russia Details Illegal Deliveries to Armenia," Jane's Defense Weekly, April 16, 1997, p. 15.

<sup>2</sup> Belarus announced that they will acquire the Iskander-E from Russia by 2010. "Belarus to Acquire Russian Multi-Warhead Missiles by 2010," Financial Times, 12 November 2004.

<sup>3</sup> In December 2003, Libya privately pledged to the United States that it would eliminate all Missile Technology Control Regime (MTCR) - class missiles, that is, missiles that can travel over 300 kilometers with a payload of at least 500 kilograms. It was agreed, at the time, that the Scud-B missiles would be modified and kept for defensive purposes. See Paul Kerr, "Libya to Keep Limited Missile Force," Arms

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Control Today, May 2004, p. 28. However, in September 2004, Paula DeSutter, assistant secretary of state for verification and compliance, testified before the House Subcommittee on International Terrorism, Nonproliferation, and Human Rights, saying, "Libya...has agreed to destroy its Scud-B missiles." See "Completion of Verification Work in Libya," Testimony of Assistant Secretary of State for Verification and Compliance Paula DeSutter before the Subcommittee on International Terrorism, Nonproliferation, and Human Rights, September 22, 2004. There have also been unconfirmed reports that Libya attempted to purchase No Dongs from North Korea prior to its December 2003 decisions to cease its pursuit of unconventional weapons.

<sup>4</sup> In December 2003, Libya privately pledged to the United States that it would eliminate all missiles covered by the Missile Technology Control Regime (MTCR), that is, missiles that can travel over 300 kilometers with a payload of at least 500 kilograms. It was agreed, at the time, that the Scud-B missiles would be modified and kept for defensive purposes. See Paul Kerr, "Libya to Keep Limited Missile Force," Arms Control Today, May 2004, p. 28. However, in September 2004, Paula DeSutter, assistant secretary of state for verification and compliance, testified before the House Subcommittee on International Terrorism, Nonproliferation, and Human Rights, saying, "Libya...has agreed to destroy its Scud-B missiles." See "Completion of Verification Work in Libya," Testimony of Assistant Secretary of State for Verification and Compliance Paula DeSutter before the Subcommittee on International Terrorism, Nonproliferation, and Human Rights, September 22, 2004. There have also been unconfirmed reports that Libya attempted to purchase No Dongs from North Korea prior to its December 2003 decisions to cease its pursuit of unconventional weapons.

<sup>5</sup> An unidentified missile traveled 62 kilometers in a test firing on November 22, 2001. See Don Kirk, "South Korea Launches Missile In Its First Test Since Las Year," The New York Times, November 23, 2001.

<sup>6</sup> The Jerusalem Post reported the development of an advanced Syrian modification of the Scud-C (which could possibly be the Scud-D tested in September of 2000), but this report has not been confirmed by Western sources. See Arie O'Sullivan, "Syrian Super Scud Ready Soon—Source," Jerusalem Post, September 16, 1999.

<sup>7</sup> Nuclear Threat Initiative, "Syria: Missile Capabilities."

<sup>8</sup> Ibid.

<sup>9</sup> International Institute for Strategic Studies, Military Balance 2007, p.373.

<sup>10</sup> This program was reportedly initiated in autumn 1995 and is based on the Sky Bow II SAM.

<sup>11</sup> Jane's Defense Weekly reported March 26, 2001, that Taiwan had deployed up to 50 Tien Chi missiles on Tungyin Island and at an undisclosed second location.

<sup>13</sup> In 1989, the United Arab Emirates reportedly attempted to purchase 25 Hwasong-5 (Scud-B variant) missiles from North Korea. According to the Center for Nonproliferation Studies, the UAE was not happy with the missiles and they were never operationalized. There is no publicly available evidence to confirm these reports, however. See the Monterey Institute's Center for Nonproliferation Studies "A History of Ballistic Missile Development in the DPRK."

**Table 4. The Six Countries With Only Short-Range and Medium-Range Ballistic Missiles Deployed (ranges 3000km or less)<sup>98</sup>**

| COUNTRY             | SYSTEM NAME                                    | STATUS        | RANGE (KILOMETERS) | PAYLOAD (KILOGRAMS) | ORIGIN   | NOTES  |
|---------------------|--|---------------|--------------------|---------------------|--|--|
| INDIA               | Prithvi-I (Prithvi-150)                        | O             | 150                | 800-1,000           | USSR   | From Russian SA-2 Army Missile.  |
|                     | Prithvi-II (Prithvi-250)                       | O             | 250                | 500-750             | USSR   | From Russian SA-2 Air Force Missile.   |
|                     | Dhanush  | D/T           | 250-350            | 500-700             | I  | From Prithvi. Ship-launched. Last tested March 31, 2007.   |
|                     | Sagarika SLBM                                  | D             | 250-350            | 500                 | I  | From Prithvi. Expected to be operational after 2010.   |
|                     | Prithvi-II (Prithvi-350)                       | D             | 350                | 500-1,000           | USSR   | From Russian SA-2.   |
|                     | Agni-I   | O             | 600-750            | 1,000               | USA/<br>France   | From Scout; tested July 4, 2004.   |
|                     | Agni-II  | O/P           | 2,000-2,500        | 1,000               | USA/<br>France   | Last tested August 29, 2004. India says limited production has begun.  |
|                     | Agni-III                                       | D/T           | 3,000              | 1,500 <sup>99</sup> | I  | First test on July 9, 2006 failed. Second/most recent test April 12, 2007 successful.                              |
| Surya 1/2           | D?   | 9,000-12,000? | 2,500+?            | I                   | Based on Agni. Three-stage; first and second phase solid-fueled, third liquid. Possible test by 2008. <sup>100</sup> |  |
| IRAN <sup>101</sup> | Mushak-120                                     | O             | 120                | 190                 | I  |  |
|                     | Mushak-160                                     | O             | 160                | 190                 | I  |  |
|                     | Fateh-110 (NP-110/ Guided variant of Zolzal-2) | O/P           | 200                | 800                 | IPRC?  | Possibly tested during series of missile tests January 2007. Last confirmed test September 6, 2002. <sup>102</sup> |
|                     | M-7 (CSS-8)                                    | O             | 150                | 190                 | PRC  | Modified SA-2  |
|                     | Scud-B   | O/U           | 300                | 1,000               | I/ DPRK  |  |
|                     | Scud-C   | O             | 500-600            | 500-700             | I/ DPRK  |  |
|                     | Shahab III                                     | O/T/P?        | 1,300              | 750-800             | I/ DPRK  | From No Dong. Last confirmed test May 23, 2006. <sup>103</sup>   |
| Shahab IV           | D/T?   | 1,800-2,000   | 1,000              | I/ Russia           | Based on Russian SS-4  |  |
| ISRAEL              | Lance  | O/S           | 130                | 450                 | USA  |  |
|                     | Jericho-I                                      | O             | 500                | 750-1,000           | France   | Road-mobile. An aging arsenal as missile was first tested in 1968.   |
|                     | Jericho-II                                     | O             | 1,500              | 1,000               | France   | Road-mobile.   |
|                     | Jericho-III                                    | D?            | 3,000-6,500?       | 1,000?              | I  | Reportedly based on the Shavit SIV. <sup>104</sup>   |
| NORTH KOREA         | Scud-B   | O/P           | 300                | 1,000               | USSR/<br>Egypt?  |  |
|                     | Scud-C Variant                                 | O/P           | 500                | 600-700             | I  |  |
|                     | No Dong  | D             | 1,300              | 700-1,000           | I  | Single-stage, liquid fuel missile. Derived from Scud technology. Last tested July 4, 2006.                         |
|                     | Taepo-dong I                                   | T             | 1,500-2,000?       | 1,000?              | I  | Combined No Dong and Scud; tested August 31, 1998.   |
|                     | Taepo-dong II                                  | D             | 3,500-5,500?       | 1,000?              | I  | Reportedly, a Taepodong II was tested July 4 2006; failed after 42 seconds of flight. <sup>105</sup>               |
| PAKISTAN            | Hatf-I   | O             | 80                 | 500                 | I  |  |
|                     | Hatf-IB/IIA (Ab-dali)                          | D/T           | 180/280            | 500                 | IPRC?  | First test-fired in 2002. Last tested March 4, 2007. <sup>106</sup>  |
|                     | Hatf-III (Ghaznavi M-11)                       | O             | 280-300            | 500                 | IPRC   | 2001 NIE lists the Hatf-III to be an M-11. Last tested Dec. 6, 2006. <sup>107</sup>                                |
|                     | Shaheen-I (Hatf-IV)                            | O/P           | 700-750            | 500                 | IPRC   | Solid-fueled. Thought to be an M-9 derivative. Last tested November 29, 2006. <sup>108</sup>                       |
|                     | Ghauri-I (Hatf-V)                              | O             | 1,300              | 500-750             | DPRK   | 2001 NIE lists the Ghauri to be a No Dong; last tested November 16, 2006. <sup>109</sup>                           |
|                     | Ghauri II                                      | D/T           | 1,500-2,300        | 700                 | I/DPRK   | From No Dong; last tested April 14, 1999.  |
|                     | Shaheen II (Hatf-VI)                           | D/P           | 2,000-2,500        | 750-1,000           | IPRC?  | Road-mobile, two stage. Last tested successfully May 6, 2006. <sup>110</sup>                                       |
|                     | Ghauri III                                     | D/T           | 2,500?             | ?                   | I/DPRK   | Thought to be based on the Taepodong-1. Engines tested, but flight test planned for June 2004 never occurred.      |
| SAUDI ARABIA        | Dong Feng-3 (CSS-2)                            | O             | 2,800              | 2,150               | PRC  | Purchased from China in 1987. <sup>111</sup>   |

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<sup>1</sup> See "Ballistic and Cruise Missile Threat" March 2006, Page 20. See also, "Dhanush Missile Test-Fired," The Hindu, 31 March 2007.

<sup>2</sup> "Ballistic and Cruise Missile Threat." National Air and Space Intelligence Center (NASIC), Wright-Patterson Air Force Base, Ohio. March 2006. Page 20. The Indian government first acknowledged the existence of the Sagrika in October 1998, identifying it as a 250-350-kilometer sea-launched cruise missile derived from the Pithvi. Other sources maintained that the Sagrika program also contained a ballistic missile division. US reports have classified it as an SLBM.

<sup>3</sup> Press Information Bureau. Government of India.

<sup>4</sup> See Siddharth Srivastava, "India Has China in its Range." Asia Times Online, 14 April 2007. The Agni III is cited as having payload capacity of 1.5 tons, which converts to 1,361 kg.

<sup>5</sup> See "Surya" at Global Security.org. Available: <http://www.globalsecurity.org/wmd/world/india/surya.htm>. See also, "India to Develop Intercontinental Ballistic Missile." Deccan Herald, 25 August 2005.

<sup>6</sup> DOD reported that Iran also produces a 200-kilometer "Zeal" missile and a 150 kilometer "Nazeat" missile, which may be variations of its "Mushak" series. Iran has also tried to acquire a complete North Korean No Dong system and the Chinese M-9 and M-11 missiles.

<sup>7</sup> Ali Akbar Dareni, "Iran Successfully Test-Fires Missile," Associated Press, 6 September 2002.

<sup>8</sup> "Iran Test-Fires Long Range Missile." Associated Press, reproduced in The Jerusalem Post. 23 May 2006. Reports on later Shahab III tests are conflicting, possible Shahab-III test in November 2006. See Nasser Karimi, "Iran Test-Fires Longer Range Missile." Associated Press, 2 November 2006.

<sup>9</sup> See the Monterey Institute's Center for Nonproliferation Studies "Weapons of Mass Destruction in the Middle East: Israel"

<sup>10</sup> See "North Korea Tests Long Range Missile." BBC News.

<sup>11</sup> See "Pakistan tests Hatf-II missile." The Hindu, 4 March 2007.

<sup>12</sup> See "Pakistan Tests Short-Range Hatf III." Reported by BBC and reproduced on Claremont Institute's Missile Threat.com.

<sup>13</sup> Agence France-Press, "Pakistan Test-Fires Nuclear-Capable Missile." Pakistan announced "serial production" of this missile in October 2000

<sup>14</sup> Associated Press, "Pakistan test-fires medium-range missile." Posted on MSNBC website, 16 Nov 2006.

<sup>15</sup> Seiff, Martin, "Pakistan Tests Shaheen Missile." United Press International, 10 May 2006. The Shaheen II was tested two weeks prior to the May launch, on April 29 2006. See "Pakistan Stages New Missile Test." BBC News, 29 April 2007.

<sup>16</sup> Missiles were purchased from China in 1987. The Missiles were operationally deployed only once, and are likely no longer operational as the arsenal is aging and would take substantial efforts to maintain.

**Table 5. The Five Countries With Long-Range Ballistic Missiles Deployed (ranges greater than 5,500km)<sup>99</sup>**

| COUNTRY  | SYSTEM NAME                   | STATUS       | RANGE (KILOMETERS)    | PAYLOAD (KILOGRAMS) | ORIGIN  | NOTES  |
|--|-------------------------------|--------------|-----------------------|---------------------|---|--|
| CHINA  | CSS-8                         | O            | 150-230               | 190                 | I   | Two stage, first solid, second liquid. Road Mobile.  |
|  | CSS-X-7 (DF-11/M-11)          | O            | 300                   | 500                 | I   | Solid-fueled. Road Mobile.   |
|  | CSS-6 (DF-15/M-9)             | O            | 600                   | 500                 | I   | Solid-fueled. Road Mobile.   |
|  | CSS-2 (DF-3/3A)               | O/E          | 2,650/2,900           | 2,150               | I   | Liquid-fueled, gradually being retired. <sup>1</sup>   |
|  | CSS-3 (DF-4)                  | O            | 5,500 (maximum range) | 2,200               | I   | CSS-3's range will be covered by new DF-31 once operational. <sup>2</sup>                                  |
|  | CSS-4 (DF-5/5A)               | O            | 12,500/13,000         |                     | I   | Silo-based. DF-5A has greater range and payload capacity than DF-5.  |
|  | CSS-5 (DF-21/21A)             | O            | 1,800                 | 600                 | I   |  |
|  | DF-25                         | D?           | 1,700                 | 2,000               | I   | May just be the first two stages of the DF-31.   |
|  | CSS-X-10 (DF-31)              | D/T          | 8,000                 | 700                 | I   | Deployment expected this decade.   |
|  | DF-31A                        | D            | 12,000                | 800                 | I   | Road Mobile. Possible deployment by end of decade. <sup>3</sup>  |
|  | CSS-NX-3 (Jiangling-1) SLBM   | O?           | 1,700                 | 600                 | I   | The JL-1 has been deployed, but never fully operational.   |
| CSS-NX-4 (Jiangling-2) SLBM                            | D/T                           | 7,200-8,000  | 700?                  | I                   | Expected to be deployed on Type 094 SSBN sometime this decade. <sup>4</sup>   |  |
| FRANCE   | M-45 SLBM                     | O            | 6,000                 | 1,000               | I   | Scheduled to be replaced by M-51.1 in 2010.  |
|  | M-51.1 SLBM                   | D/T          | 8,000                 | 6 MRV               | I   | Tested November 2006. M-51 renamed M-51.1. Scheduled deployment 2010. <sup>5</sup>                         |
|  | M-51.2 SLBM                   | D            | 6,000+?               | ?                   | I   | Upgraded M51.1. Scheduled deployment 2013. <sup>6</sup>  |
| RUSSIA   | Scud-B (SS-1c Mod 1)          | O            | 300                   | 1,000               | I   | Liquid fuel.   |
|  | SS-21                         | O            | 120                   | 480                 | I   | Solid fuel.  |
|  | SS-18 (Satan)                 | O            | 9,000-11,000          | 8,000               | I   | Liquid fuel. Last tested December 23, 2006. <sup>7</sup>   |
|  | SS-19 (Stiletto)              | O            | 10,000                | 4,350               | I   | Liquid fuel.   |
|  | SS-24 (Scalpel)               | O            | 10,000                | 4,050               | I   | Solid fuel. Rail mobile.   |
|  | SS-25 (Sickle)                | O            | 10,500                | 1,000               | I   | Solid fuel. Road-mobile. Last tested August 3 2006. <sup>8</sup>   |
|  | SS-27 (Topol-M)               | O/P          | 10,500                | 1,000-1,200         | I   | 6 road-mobile SS-27 (the Topol-M-1) scheduled to be deployed over 2007. <sup>9</sup>                       |
|  | SS-X-26 (Iskander)            | D/T          | 300                   | 480                 | I   | Solid fuel. Testing has been completed.  |
|  | Iskander-E                    | D/T          | 280                   | 480                 | I   | For export. Solid fuel. Belarus, Iran, and Syria interested in this missile.                               |
|  | SS-N-18 SLBM                  | O            | 6,500-8,000           | 1,650               | I   | Last tested September 10, 2006. <sup>10</sup>  |
|  | SS-N-20 SLBM                  | R            | 8,300                 | 2,2550              | I   | No longer in service.  |
| SS-N-23 (upgraded version is known as the Sineva) SLBM | O                             | 8,300        | 2,800                 | I                   | Last tested September 9, 2006. <sup>11</sup>  |  |
| SS-N-27 (Bulava-M/Bulava-30) SLBM                      | D/T                           | 8,000-10,000 | 1,000-2,000           | I                   | SLBM version of the SS-27; last tested December 2006. Scheduled to be deployed on Borey class SSBN by 2008. <sup>12</sup> |  |
| UNITED KINGDOM   | Trident II D-5                | O            | 7,400+                | 2,800               | USA   | The UK bought 58 missiles in 1998, tested 8 missiles. D-5s deployed on Vanguard class SSBN. <sup>13</sup>  |
| UNITED STATES  | MGM-140 (ATACMS Block IIIA/B) | O            | 165/300/140           | 560/160/270         | I   | All three versions have different ranges and payloads; all three versions have been delivered to the Army. |
|  | Minute Man III (MK-12/12A)    | O            | 9,650+ <sup>14</sup>  | 1,150               | I   | Last confirmed test July 20, 2006. <sup>15</sup> service lives being extended until at least 2020.         |
|  | MX Peace-Keeper               | R/S          | 9,650+                | 1,500               | I   | Deactivated as of 2005. Although neither silos nor missiles will be destroyed.                             |
|  | Trident I C-4 SLBM            | R            | 7,400                 | 1,500               | I   | Retired in 2005. SSBNs that carried C-4s refitted with D-5s.   |
|  | Trident II D-5                | O            | 7,400+                | 2,800               | I   | Last confirmed test Nov. 21, 2006. <sup>16</sup>   |

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- <sup>1</sup> Robert S. Norris and Hans M. Kristensen, "Chinese Nuclear Forces, 2006." Prepared by the Natural Resources Defense Council.
- <sup>2</sup> Ibid.
- <sup>3</sup> Ibid.
- <sup>4</sup> Ibid. See also Jim Manion, "[China Ballistic Missile Submarine Force Growing.](#)" AFP, 2 March 2007.
- <sup>5</sup> Robert S. Norris and Hans M. Kristensen, "French Nuclear Forces, 2005." Prepared by the Natural Resources Defense Council.
- <sup>6</sup> Ibid.
- <sup>7</sup> "[Russia's Missile Forces Successfully Launch SS-18 ICBM Satan.](#)" RIA Novosti. 21 December 2006.
- <sup>8</sup> "[Nuclear Missile Testing Galore,](#)" Federation of Atomic Scientists. 30 January 2007.
- <sup>9</sup> Robert S. Norris and Hans M. Kristensen, "Russian Nuclear Forces, 2007." Prepared by the Natural Resources Defense Council.
- <sup>10</sup> "Nuclear Missile Testing Galore," FAS, 30 January 2007.
- <sup>11</sup> Ibid.
- <sup>12</sup> Recent tests of the Bulava have been failures, and the deployment date has been pushed back several times. The Bulava failed in tests on September 7, 2006, October 25, 2006, and again on December 24, 2006. See Richard Weitz, "[Russian Missile Test failure Increases Fears of Nuclear 'Hair-Trigger.'](#)" World Politics Watch, 10 November 2006. See also "[Nuclear Missile Testing Galore,](#)" FAS.
- <sup>13</sup> Hans M. Kristensen, "[Britain's Next Nuclear Era,](#)" Strategic Security Blog, 7 December 2006.
- <sup>14</sup> The Minute Man III missile may have a range of up to 13,000 kilometers, but the U.S. Strategic Command officially lists its range at "[greater than](#)" 9,650 kilometers.
- <sup>15</sup> See "[Nuclear Missile Testing Galore,](#)" FAS.
- <sup>16</sup> Ibid. The Trident II D-5 may have a range greater than 7,400 kilometers, but this is the U.S. Strategic Command's [officially listed range.](#)



**Table 6. The Decreasing Global Ballistic Missile Threat**

| <b>Threat</b>  | <b>Status (1987 vs. 2008)</b>   | <b>Trends</b> |
|--|---|---------------|
| <b>ICBM &amp; SLBM (&gt; 5,500 km)</b>   | <b>60 % Decrease</b>  | <b>↓</b>      |
| <b>IRBM (3,000-5,500 km)</b>   | <b>97% Decrease</b>   | <b>↓</b>      |
| <b>MRBM ( 1,000-3,000 km)</b>  | <b>4 new national programs<sup>A</sup></b>  | <b>↑</b>      |
| <b>SRBM (&lt;1,000 km)</b>   | <b>Declining as Scud inventories age.</b>   | <b>↓</b>      |
| <b>Number of nations with ballistic missile programs of concern</b>            | <b>Fewer, less advanced<sup>B</sup><br/>(11 in mid-1980s, 6 today)</b>              | <b>↓</b>      |
| <b>Potentially hostile nations with ballistic missile development programs</b> | <b>Fewer and smaller overall arsenals<sup>C</sup><br/>(4 in mid-1980s, 3 today)</b> | <b>↓</b>      |
| <b>Potential damage to the United states from a missile attack</b>             | <b>Vastly decreased.</b>  | <b>↓</b>      |

A India, Iran, North Korea and Pakistan.

B 1980s: Argentina, Brazil, China, Egypt, India, Iraq, Libya, Pakistan, the Soviet Union and South Africa.  
2007: China, India, Iran, Israel, North Korea and Pakistan.

C 1980s: China, Iraq, Libya and the Soviet Union; 2007: China, Iran and North Korea.

## End Notes

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- <sup>1</sup> *Missile Defense Agency, Fiscal Year (FY) 2009 Budget Estimates, Overview*, Missile Defense Agency, Department of Defense, February 2008, p. 3.
- <sup>2</sup> Official figures as reported by the Missile Defense Agency. MDA budget estimates do not include all anti-missile weapons spending as some systems, such as the Space-based Infrared System satellite network or the Patriot missile defense system, are not included.
- <sup>3</sup> These numbers are from Block 3 and Block 4 funding in the MDA budget estimates, entitled “Expand Defense of the U.S. to Include Limited Iranian Long-Range Threats” (Block 3, p. 27 of budget submission) which is \$4.5 billion FY-08-FY13, plus “Defend Allies & Deployed Forces in Europe from Limited Iranian Long-Range Threats, Expand Protection of U.S. Homeland” (Block 4, p. 29) which is \$4.7 billion, plus \$1 billion in military construction. Department of Defense Fiscal Year (FY) 2009 Budget Estimates, Research, Development, Test, and Evaluation, Defense,” Volume 2, Missile Defense Agency (MDA), February 2008.
- <sup>4</sup> Iran has short-range missiles that could hit Turkey and southern Russia.
- <sup>5</sup> Robert S. Norris and Thomas B. Cochran, *Nuclear Weapons Databook: U.S.-U.S.S.R/Russian Strategic Offensive Nuclear Forces, 1945-1996*, Natural Resources Defense Council, January 1997, p. 13
- <sup>6</sup> Norris and Cochran, *Nuclear Weapons Databook: U.S.-U.S.S.R/Russian Strategic Offensive Nuclear Forces*, p. 12
- <sup>7</sup> Robert S. Norris and Hans M. Kristensen, “NRDC Nuclear Notebook: Russian Nuclear Forces, 2007: *Bulletin of Atomic Scientists*, March/April 2007.
- <sup>8</sup> Robert S. Norris and Hans M. Kristensen, “NRDC Nuclear Notebook: US Nuclear Forces, 2007: *Bulletin of Atomic Scientists*, January/February 2007.
- <sup>9</sup> The *Shahab* is adapted from the *No Dong*. Independent estimates range from ten to 25 *Shahabs* deployed; this analysis takes a middle estimate of 20. This estimate also does not count the *Taepo Dong* missile, which has failed in two tests to travel more than 1320 km and is not deployed.
- <sup>10</sup> *Missile Defense Agency, Fiscal Year (FY) 2009 Budget Estimates, Overview*, Missile Defense Agency, Department of Defense, February 2008, p. 5.
- <sup>11</sup> Joseph Cirincione and Andrew Wade, “Get Smart on Ballistic Missiles,” *Center for American Progress*, May 2007.
- <sup>12</sup> Robert S. Norris and Hans M. Kristensen, “NRDC Nuclear Notebook: Russian Nuclear Forces, 2007: *Bulletin of Atomic Scientists*, January/ February 2007.
- <sup>13</sup> Robert S. Norris and Hans M. Kristensen, “NRDC Nuclear Notebook: Chinese Nuclear Forces, 2006. *Bulletin of Atomic Scientists*, June 2006.
- <sup>14</sup> Iran has short-range missiles that could hit Turkey and southern Russia.
- <sup>15</sup> Commission to Assess the Ballistic Missile Threat to the United States, “Executive Summary of the Report of the Commission to Assess the Ballistic Missile Threat to the United States” July 15, 1998, p 5.
- <sup>16</sup> National Intelligence Council, “Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015” December 2001, p. 6
- <sup>17</sup> National Intelligence Council “Foreign Missile Developments”, p. 8
- <sup>18</sup> Department of Defense, “Quadrennial Defense Review Report” Washington, D.C., September 30, 2002, pp. 6–7.
- <sup>19</sup> George Tenet, “The Worldwide Threat in 2003: Evolving Dangers of a Complex World,” Testimony before Senate Select Intelligence Committee, 11 February 2003.
- <sup>20</sup> Statement for the Record: Senate Select Committee on Intelligence. General Michael V. Hayden, Director Central Intelligence Agency (as prepared for delivery). 11 January 2007.
- <sup>21</sup> *Ibid.*
- <sup>22</sup> *Missile Defense Agency, Fiscal Year (FY) 2009 Budget Estimates, Overview*, Missile Defense Agency, Department of Defense, February 2008, p. 5.
- <sup>23</sup> France and the United Kingdom acquired intercontinental-range submarine-launched ballistic missiles in 1987 and 1995, respectively.
- <sup>24</sup> Robert S. Norris and Thomas B. Cochran, *Nuclear Weapons Databook: U.S.-U.S.S.R/Russian Strategic Offensive Nuclear Forces, 1945-1996*, Natural Resources Defense Council, January 1997, p. 13
- <sup>25</sup> Norris and Cochran, *Nuclear Weapons Databook: U.S.-U.S.S.R/Russian Strategic Offensive Nuclear Forces* p. 12
- <sup>26</sup> Robert S. Norris and Hans M. Kristensen, “NRDC Nuclear Notebook: Russian Nuclear Forces, 2007” *Bulletin of Atomic Scientists*, March/April 2007.

- <sup>27</sup> Robert S. Norris and Hans M. Kristensen, "NRDC Nuclear Notebook: US Nuclear Forces, 2007" *Bulletin of Atomic Scientists*, January/February 2007.
- <sup>28</sup> "Commander Announces Deactivation" Malstrom Air Force Base.
- <sup>29</sup> "The Future of the United Kingdom's Nuclear Deterrent." Presented to Parliament by The Secretary of State for Defence and The Secretary of State for Foreign and Commonwealth Affairs by command of Her Majesty. Crown Copyright 2006: p.12.
- <sup>30</sup> Ibid.
- <sup>31</sup> Robert S. Norris and Hans M. Kristensen, "NRDC Nuclear Notebook: Chinese Nuclear Forces, 2006." *Bulletin of Atomic Scientists*, May/June 2006.
- <sup>32</sup> "Chinese Submarine Patrols Rebound in 2007, but Remain Limited." Federation of American Scientists Strategic Security Blog.
- <sup>33</sup> Robert S. Norris and Hans M. Kristensen, "NRDC Nuclear Notebook: Russian Nuclear Forces, 2007" *Bulletin of Atomic Scientists*, March/April 2007.
- <sup>34</sup> Ibid.
- <sup>35</sup> "Russia to Launch New Strategic Submarine-Deputy PM." *MOSNEWS*, April 10, 2007.
- <sup>36</sup> Ibid.
- <sup>37</sup> *IJSS*, "The Military Balance: 2007." France's Strategic Nuclear Weapons: p.111.
- <sup>38</sup> France first deployed the 6,000 km range M-4B SLBM on 9 December 1987 when the SSBN *Le Tonnant* departed on its first patrol, carrying 16 of these long-range missiles. Previously, the *Le Tonnant* had carried M-4A SLBMs, which had a range of only 4,600 km and therefore qualify only as an intermediate-range system. See Robert Norris, Andrew S. Burrow, and Richard W. Fieldhouse, *Nuclear Weapons Databook Volume V: British, French, and Chinese Nuclear Weapons*. Boulder: Westview Press, 1994 p.257. France currently deploys only M-45 SLBMs on 4 SSBN's, three of the *Triumphant* class and one of the *L'Inflexible* class. All of its M-4B SLBMs have been retired.
- <sup>39</sup> Robert S. Norris and Hans M. Kristensen, "NRDC Nuclear Notebook: French Nuclear Forces, 2005": *Bulletin of Atomic Scientists*, 2003. In addition, once the *Le Terrible* is fitted with the M-51.1 SLBM, the rest of the *Triumphant* class is to be refitted with the M-51.1.
- <sup>40</sup> Hans M. Kristensen, "Britain Nuclear Era." Posted on *Strategic Security Blog*. December 7, 2006. Of the original 58 D-5 Trident IIs purchased in 1998, 8 were tested, leaving 50 missiles in the arsenal.
- <sup>41</sup> Robert Norris and William Arkin. "NRDC Nuclear Notebook: British Nuclear Forces, 2001" *Bulletin of the Atomic Scientists*, November/December 2001, Vol. 57, No. 6, pp. 78-79.
- <sup>42</sup> "Trident Plan Wins Popular Support." March 15, 2007. *BBC News*.
- <sup>43</sup> On 12 July 2005 Alliant Techsystems and Lockheed Martin were awarded a \$9.2 million contract by the U.S. Navy's Strategic Systems Program (SSP) office to "demonstrate and validate solid rocket motor technologies suitable for a Submarine Launched Intermediate Range Ballistic Missile (SLIRBM). SLIRBM is designed to precisely deliver a conventional payload on target at ranges in excess of 1100 miles within 10-15 minutes of launch. It is a 16month contract, and ATK will lead the Ground Demonstration Integrated Product Team (IPT) while Lockheed Martin will serve as overall systems integrator and lead a Missile System Trade Study IPT. After completing ground demonstrations, ATK and Lockheed Martin will work to transition the program to the flight demonstration phase in the 2008 timeframe." See also Norris and Kristensen, "US Nuclear Forces, 2007." 4 Ohio class SSBNs are to be converted to SSGNs, all of which are scheduled to be operational by 2008.
- <sup>44</sup> This makes the generous assumption that China fielded all 20 DF-5 of its current missiles in 1987. The International Institute for Strategic Studies gives credit for only 2 systems. See *The Military Balance 1987-88* (Letchworth: Garden City Press p. 208. Others give credit for only 4 systems. See Norris et. al *Nuclear Weapons Databook Volume V* p. 359. See also Robert Norris and Hans M. Kristensen "NRDC Nuclear Notebook: Chinese Nuclear Forces:" *Bulletin of Atomic Scientists*, November/December 2003 Vol. 59, No. 6, pp. 77-80.
- <sup>45</sup> Robert S. Norris and Hans M. Kristensen, "Chinese Nuclear Forces, 2006."
- <sup>46</sup> Assuming 48 French SLBMs; 50 British SLBMs; 20 Chinese ICBMs; 669 Russian SLBMs and ICBMs; 836 US SLBMs and ICBMs.
- <sup>47</sup> In 1987, there were 2380 Soviet, 1640 U.S., and 20 Chinese long-range missiles for a total of 4040 long-range missiles in global arsenals. As of February 2007 there are 669 Russian, 836 U.S., 22 Chinese, 50 United Kingdom and 48 French long-range missiles for a global total of 1,623.
- <sup>48</sup> The U.S. IRBM arsenal had long been eliminated by the time the INF Treaty entered into force. The United States deployed Thor IRBMs on UK territory in a joint agreement with the British government from 1958 to 1963. These missiles were retired in 1963 following improvements in the U.S. ICBM arsenal, and no further IRBMs were produced or deployed.
- <sup>49</sup> U.S. Department of State, *Fact Sheet on 1987 INF Missile Treaty*, May 16, 2001.
- <sup>50</sup> Norris, et. al *Nuclear Weapons Databook Volume V*, p. 257. Also, phone conversation with Hans M.

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Kristensen of the Natural Resources Defense Council, January 21, 2005.

<sup>51</sup> Robert S. Norris and William M. Arkin "NRDC Nuclear Notebook: French Nuclear Forces, 2002" *Bulletin of the Atomic Scientists*, vol. 57, No. 4 pp. 70-71.

<sup>52</sup> Some sources, (including some U.S. government analysis at the time) classified the DF-4 as a "limited-range intercontinental ballistic missile" in part because its initial target was likely the U.S. military base in Guam. Though the range of the DF-4 has improved over time, it is believed that in 1987 the DF-4 likely only had a range of 4,750 km, making it an IRBM. See John Lewis and Xue Litai, *China Builds the Bomb* (Stanford: Stanford University Press, 1988), p.213 Current estimates credit the DF-4 with a range of 5,500 km, putting it on the cusp of ICBM status. The number of 20 DF-4 systems also is at the upper end of the 15-20 total DF-4s China may have had at the time. See Norris, et al *Nuclear Weapons Databook Volume V*, p. 363 and Norris and Kristensen, "Chinese Nuclear Forces 2006."

<sup>53</sup> Robert S. Norris, Hans M. Kristensen, and Joshua Handler, "NRDC Nuclear Notebook: North Korea's Nuclear Program, 2003" *Bulletin of the Atomic Scientists*, March/April 2003, Vol. 59, No. 2, pp. 74-77.

<sup>23</sup> Robert S. Norris and William M. Arkin, "NRDC Nuclear Notebook: India's Nuclear Forces, 2002" *Bulletin of the Atomic Scientists*, March/April 2002, Vol. 58, No. 2, pp.70-72.

<sup>54</sup> U.S. Department of State, Fact Sheet on 1987 INF Missile Treaty.

<sup>55</sup> "India to Test Longer Range Missile in 2007." Staff Writers of New Delhi (AFP) Nov 9 2006.

<sup>56</sup> Siddharth Srivastava, "India Has China In Its Range," *Asia Times Online*, April 14, 2007.

<sup>57</sup> France actually possessed 5 SSBNs capable of carrying 16 M20 medium-range SLBMs. One of these submarines was always in refit, and therefore the actual operational stockpile is estimated to be 64. During 1987, the *Le Tonnant* was being refitted with the M4A intermediate-range SLBM system, which marked the beginning of the phase-out of the M20 SLBM. Norris et. al, *Nuclear Weapons Databook Volume V*, p.253. Also, phone conversation with Hans M. Kristensen of the Natural Resources Defense Council, January 21, 2005.

<sup>58</sup> The most recent National Intelligence Estimate notes that China possesses this capability but the NRDC states that as of November 2003, China's lone Xia class submarine is not fully operational. See National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015" December 2001, p. 9 and Robert Norris and Hans M. Kristensen, "NRDC Nuclear Notebook: Chinese Nuclear Forces, 2003" *Bulletin of the Atomic Scientists*, November/December 2003, Vol. 59, No. 6, pp.77-80.

<sup>59</sup> Norris and Kristensen "Chinese Nuclear Forces, 2006."

<sup>60</sup> Ibid.

<sup>61</sup> In 1987 at the time of the signing of the INF Treaty the United States possessed 234 Pershing II MRBMs, and the Soviet Union possessed 149 SS-4 Sandal MRBMs. (See U.S. Department of State, *Fact Sheet on 1987 INF Missile Treaty*.) Precise Chinese figures for the time are difficult to determine and these figures assume a force structure similar to that which China fields today, including 40 DF-3 MRBMs, 48 DF-21 MRBMs and 12 CSS N-3 sea-launched MRBMs, See Norris et. al, *Nuclear Weapons Databook Volume V*, p 359 and Norris and Arkin "NRDC Nuclear Notebook: Chinese Nuclear Forces" p 71-72.

<sup>62</sup> This is an estimate, as reliable sources vary. Israel's missile arsenal is listed as 50 each of Jericho I and Jericho II missiles in CNS, *Nonproliferation Review* (Winter 1996), p. 201. There are "some" Jericho I and II missiles according to International Institute for Strategic Studies (IISS), *The Military Balance, 2004-2005*, p. 126. The "NRDC Nuclear Notebook" of September/October 2002 also lists 50 Jericho II missiles, and adds that the Jericho I is probably deployed in "approximately equal numbers."

<sup>63</sup> IISS, *The Military Balance: 2001-2002* p. 146. Congressional Research Service Missile Survey: Ballistic and Cruise Missiles of Foreign Countries, updated March 5, 2004, p. 38.

<sup>64</sup> Robert S. Norris, Hans M. Kristensen, and Joshua Handler. "NRDC Nuclear Notebook: North Korea's Nuclear Program, 2003," *Bulletin of the Atomic Scientists*, March/April 2003, Vol. 59, No. 2, pp. 74-77.

<sup>65</sup> Najmeh Bozorgmehr. "Iran's Ballistic Missile Goes Into Service." *Financial Times*, July 21, 2003.

"Russian Expert: Iran May Field Up to 20 Shahab-3 Missiles By 2005." *World News Connection/Itar-Tass*, July 21, 2003.

<sup>66</sup> "Ballistic and Cruise Missile Threat." National Air and Space Intelligence Center, Wright Patterson Air Force Base, Ohio, IL. March 2006.

<sup>67</sup> According to a January 9, 2003 CNN report, the Pakistani Ghauri MRBM was handed over from a research facility to the military. Little is known about how many Ghauri missiles have been produced and whether or not they have been fully deployed. The Ghauri was most recently tested on May 29, 2004.

<sup>68</sup> The 285 number assumes the lowest estimate of Saudi CSS-2/DF3A's (40), Israeli Jericho II's (50), North Korean No Dong's (90), Chinese DF-3's, DF-21's, and CSS-N-3/JL I's (100), Indian Agni II's (0), Pakistani Ghauri's, Ghauri II's, and Shaheen II's (0), and Iranian Shahab III's (5). The 417 number assumes the highest estimate of each of these missiles (40 Saudi CSS-2/DF3A's, 50 Israeli Jericho II's, 100 North Korean No Dong's, 104 Chinese DF-3's, DF-21's, and CSS-N-3/JL-1's, and 20 Iranian Shahab III's,

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plus an additional five missiles for North Korea (Taepo Dong I), India (Agni II), and Pakistan (Ghauri, Ghauri II, or Shaheen II).

<sup>69</sup> This takes a skeptical view of the range of the Taepo Dong missile, which in its lone test traveled only 1320 km.

<sup>70</sup> Commission to Assess the Ballistic Missile Threat to the United States, "Executive Summary of the Report of the Commission to Assess the Ballistic Missile Threat to the United States" p 10-11

<sup>71</sup> Missile Defense Agency FY2008 Budget Estimates Overview. Page 3.

<sup>72</sup> Missile Defense Agency FY 2008 Budget Estimates Overview. Page 4.

<sup>73</sup> Missile Defense Agency, Fiscal Year (FY) 2009 Budget Estimates, Overview, p. 5

<sup>74</sup> National Intelligence Council, "Foreign Missile Developments", p. 12.

<sup>75</sup> The Worldwide Threat 2004: Challenges in a Changing Global Context Testimony of Director of Central Intelligence George J. Tenet before the Senate Armed Services Committee, March 9, 2004.

<sup>76</sup> The Guardian. "UK Sets Iran Deadline To End Nuclear Work." September 9, 2004.

<sup>77</sup> "Ford on the Shahab 3" Arms Control Wonk.

<sup>78</sup> Gertz, Bill, "North Korea Puts On Missile Show." *The Washington Times*. July 5, 2006

<sup>79</sup> CNS Special Report. "North Korean Ballistic Missile Capabilities." March 22, 2006, Center for Nonproliferation Studies Monterey Institute of International Studies.

<sup>80</sup> Ibid.

<sup>81</sup> Statement of General B. B. Bell before the Senate Armed Services Committee. March 7, 2006 (p.7).

<sup>82</sup> Remarks by General Eugene Habiger, "Alaska Missile Interceptor Site Has No Credibility," Carnegie Non-Proliferation Issue Brief, Vol. VII, No. 14, September 29, 2004. Carnegie Endowment for International Peace 16.

<sup>83</sup> Ibid.

<sup>84</sup> Joshi, Sharad, "Pakistan's Missile Tests Highlight Growing South Asia Nuclear Arms Race, Despite New Confidence Building Measures." April 2007. *James Martin Center for Nonproliferation Studies*.

<sup>85</sup> "Pakistan tests ballistic missile." February 13, 2008. *BBC*.

<sup>86</sup> "Pakistan tests nuclear-capable missile." February 1, 2008. *Reuters*.

<sup>87</sup> "Prithvi." *Federation of Atomic Scientists*.

<sup>88</sup> "India Begins Deploying Agni Missiles," August 31, 2004.

<sup>89</sup> U.S. Department of State, Fact Sheet on 1987 INF Missile Treaty.

<sup>90</sup> "India to Test Longer Range Missile in 2007." November 9, 2006. Staff Writers of New Delhi (*AFP*).

<sup>91</sup> Siddharth Srivastava, "India Has China In Its Range," *Asia Times Online*.

<sup>92</sup> "India Tests Underwater Missile." February 26, 2008. *Associated Press*.

<sup>93</sup> "India missile test to start arms race: Pakistan." February 27, 2008. *Reuters*.

<sup>94</sup> Henry H. Shelton, Chairman of the Joint Chiefs of Staff, letter to The Honorable James M. Inhofe, United States Senate, August 24, 1998. The author has modified the formatting of the letter to highlight the enumerated disagreements.

<sup>95</sup> Calculation based on the first-strike power of the Soviet Union in 1987.

<sup>96</sup> Calculation based on first-generation nuclear weapons on one or two missiles from Iran, Iraq, or North Korea.

<sup>97</sup> Wade, Andrew. "Global Ballistic Missile Arsenals, 2007." Center for American Progress.

<sup>98</sup> Ibid.

<sup>99</sup> Ibid.