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EXECUTIVE SUMMARY
of the
REPORT
of the
COMMISSION TO ASSESS
THE BALLISTIC MISSILE THREAT
TO THE UNITED STATES

July 15, 1998

Pursuant to Public Law 201
104th Congress

Members of
The Commission To Assess the Ballistic Missile Threat
to the United States were nominated by the
Speaker of the U.S. House of Representatives,
the Majority Leader of the U.S. Senate and the
Minority Leaders of the U.S. Senate and the
U.S. House of Representatives

The Honorable Donald H. Rumsfeld, Chairman
Dr. Barry M. Blechman
General Lee Butler, USAF (Ret.)
Dr. Richard L. Garwin
Dr. William R. Graham
Dr. William Schneider, Jr.
General Larry D. Welch, USAF (Ret.)
Dr. Paul D. Wolfowitz
The Honorable R. James Woolsey
and appointed by the
Director of Central Intelligence

I. Charter and Organization

A. Statutory Charter of the Commission

The Commission To Assess the Ballistic Missile Threat to the United States was established pursuant to Public Law 104-201, the National Defense Authorization Act for Fiscal Year 1997, Section 1321(g).

The mandate of the Commission was as follows:

"The Commission shall assess the nature and magnitude of the existing and emerging ballistic missile threat to the United States. In carrying out its duties, the Commission should receive the full and timely cooperation of the Secretary of Defense, the Director of Central Intelligence and any other United States Government official responsible for providing the Commission with analyses, briefings and other information necessary for the fulfillment of its responsibilities. The Commission shall, not later than six months after the date of its first meeting, submit to the Congress a report on its findings and conclusions."

The Commission examined the ballistic missile threat posed to the 50 states. Our assessment included threats posed by ballistic missiles:

- Deployed on the territory of a potentially hostile state.
- Launched from a surface vessel or submarine operating off the coasts of the United States or from an aircraft.
- Deployed by a potentially hostile nation on the territory of a third party to reduce the range required of its ballistic missiles to strike the United States.

The Commission examined the potential of both existing and emerging powers to arm ballistic missiles with weapons of mass destruction. The examination included the domestic design, development and production of nuclear material and nuclear weapons as well as the potential for states to acquire, through clandestine or covert sale, transfer or theft, either technology, material or weapons. The Commission examined biological and chemical weapons programs of the ballistic missile powers, as well as the potential means for delivering such agents by ballistic missiles.

The Commission reviewed U.S. collection and analysis capabilities to gain an appreciation for the capability of the U.S. Intelligence Community, today and into the future, to warn of the ballistic missile threat.

The Commission did not examine in detail the threat posed to U.S. territories or possessions or to U.S. forward deployed forces, allies and friends. Nevertheless, a short discussion of the threat to U.S. forward deployed forces, allies and friends is presented. The Commission did not assess the cruise missile threat. A detailed examination would have taken it beyond its charter. However, the Commission is of the view that cruise missiles have a number of characteristics which could be seen as increasingly valuable in fulfilling the aspirations of emerging ballistic missile states. The Commission did not address in detail the impact of ballistic missile threats on U.S. military strategy and doctrine, but noted the difficulty the U. S had in dealing with Iraqi missiles during the Persian Gulf War. Only a brief discussion of the relationship of ballistic missile threats to the ongoing revolution in military affairs is presented. A brief discussion is also presented of the possible impact of the Year 2000 (Y2K) problem on the ballistic missile threat.

The Commission was not asked to address the policy issues on which its assessment would bear. Responses to the threat as assessed by the Commission are matters of considerable public interest. Debate and agreement on the appropriate responses to the ballistic missile threat are needed. The Commission hopes that the following assessment will be helpful in that regard.

B. Organization of the Report

This is an unclassified Executive Summary of the 307-page classified Report of the Commission To Assess the Ballistic Missile Threat to the United States. The Report is accompanied by two classified appendices and an unclassified appendix.

The full Report includes discussions of a number of additional states, such as Libya and Syria, which are not included in this Executive Summary. The full Report includes as well a discussion of the full range of supplier states, particularly Western powers, including the United States.

II. Executive Summary
A. Conclusions of the Commissioners

The nine Commissioners are unanimous in concluding that:

- Concerted efforts by a number of overtly or potentially hostile nations to acquire ballistic missiles with biological or nuclear payloads pose a growing threat to the United States, its deployed forces and its friends and allies. These newer, developing threats in North Korea, Iran and Iraq are in addition to those still posed by the existing ballistic missile arsenals of Russia and China, nations with which we are not now in conflict but which remain in uncertain transitions. The newer ballistic missile-equipped nations' capabilities will not match those of U.S. systems for accuracy or reliability. However, they would be able to inflict major destruction on the U.S. within about five years of a decision to acquire such a capability (10 years in the case of Iraq). During several of those years, the U.S. might not be aware that such a decision had been made.
- The threat to the U.S. posed by these emerging capabilities is broader, more mature and evolving more rapidly than has been reported in estimates and reports by the Intelligence Community.
- The Intelligence Community's ability to provide timely and accurate estimates of ballistic missile threats to the U.S. is eroding. This erosion has roots both within and beyond the intelligence process itself. The Community's capabilities in this area need to be strengthened in terms of both resources and methodology.
- The warning times the U.S. can expect of new, threatening ballistic missile deployments are being reduced. Under some plausible scenarios-including re-basing or transfer of operational missiles, sea- and air-launch options, shortened development programs that might include testing in a third country, or some

combination of these-the U.S. might well have little or no warning before operational deployment.

Therefore, we unanimously recommend that U.S. analyses, practices and policies that depend on expectations of extended warning of deployment be reviewed and, as appropriate, revised to reflect the reality of an environment in which there may be little or no warning.

B. The Commission and Its Methods

The Commissioners brought to their task the perspectives of former senior policymakers from outside the Intelligence Community, who have decades of experience and a variety of views as users of the Intelligence Community's products. We shared an informed understanding of intelligence processes. In making our assessment, we took into account not only the hard data available, but also the often significant gaps in that data. We had access to both data and experts drawn from the full array of departments and agencies as well as from sources throughout the Intelligence Community. We also drew on experts from outside that Community and on studies sponsored by the Commission. Our aim was to ensure that we were exposed to a wide range of opinion and to the greatest possible depth and breadth of analysis.

We began this study with different views about how to respond to ballistic missile threats, and we continue to have differences. Nevertheless, as a result of our intensive study over the last six months we are unanimous in our assessment of the threat, an assessment which differs from published intelligence estimates.

This divergence between the Commission's findings and authoritative estimates by the Intelligence Community stems primarily from our use of a somewhat more comprehensive methodology in assessing ballistic missile development and deployment programs. We believe that our approach takes more fully into account three crucial factors now shaping new ballistic missile threats to the United States:

- Newer ballistic missile and weapons of mass destruction (WMD) development programs no longer follow the patterns initially set by the U.S. and the Soviet Union. These programs require neither high standards of missile accuracy, reliability and safety nor large numbers of missiles and therefore can move ahead more rapidly.

- A nation that wants to develop ballistic missiles and weapons of mass destruction can now obtain extensive technical assistance from outside sources. Foreign assistance is not a wild card. It is a fact.

Nations are increasingly able to conceal important elements of their ballistic missile and associated WMD programs and are highly motivated to do so.

C. New Threats in a Transformed Security Environment

The Commission did not assess nuclear, biological and chemical weapons programs on a global basis. We considered those countries about which we felt particular reason to be concerned and examined their capabilities to acquire ballistic missiles armed with weapons of mass destruction.

All of the nations whose programs we examined that are developing long range ballistic missiles have the option to arm these, as well as their shorter- range systems, with biological or chemical weapons. These weapons can take the form of bomblets as well as a single, large warhead.

The knowledge needed to design and build a nuclear weapon is now widespread. The emerging ballistic missile powers have access to, or are pursuing the acquisition of, the needed fissile material both through domestic efforts and foreign channels.

As our work went forward, it became increasingly clear to us that nations about which the U. S. has reason to be concerned are exploiting a dramatically transformed international security environment. That environment provides an ever-widening access to technology, information and expertise that can be and is used to speed both the development and deployment of ballistic missiles and weapons of mass destruction. It can also be used to develop denial and deception techniques that seek to impede U.S. intelligence gathering about the development and deployment programs of those nations.

1. Geopolitical Change and Role for Ballistic Missiles

A number of countries with regional ambitions do not welcome the U.S. role as a stabilizing power in their regions and have not accepted it passively. Because of their ambitions, they want to place restraints on the U.S. capability to project power or influence into their regions. They see the acquisition of missile and WMD technology as a way of doing so.

Since the end of the Cold War, the geopolitical environment and the roles of ballistic missiles and weapons of mass destruction have both evolved. Ballistic missiles provide a cost-effective delivery system that can be used for both conventional and non-conventional weapons. For those seeking to thwart the projection of U.S. power, the capability to combine ballistic missiles with weapons of mass destruction provides a strategic counter to U.S. conventional and information-based military superiority. With such weapons, these nations can pose a serious threat to the United States, to its forward-based forces and their staging areas and to U.S. friends and allies.

Whether short or long range, a successfully launched ballistic missile has a high probability of delivering its payload to its target compared to other means of delivery. Emerging powers therefore see ballistic missiles as highly effective deterrent weapons and as an effective means of coercing or intimidating adversaries, including the United States.

2. Russia

With regard to Russia, the principal cloud over the future is lingering political uncertainty. Despite enormous changes since the break-up of the Soviet Union, Russia is in an uncertain, in some ways precarious, transition. It may succeed in establishing a stable democracy allied with the West in maintaining peace and extending freedom. Or it may not. Or it might be torn by internal struggles for an extended period. In its present situation, accurate U.S. intelligence estimates are difficult to make.

Russia continues to pose a ballistic missile threat to the United States, although of a different character than in the past. The number of missiles in its inventory is likely to decline further compared with Cold War levels in that large numbers of Soviet strategic missiles deployed in the 1970s and 1980s are scheduled to be retired. Still, Russian ballistic missile forces continue to be modernized and improved, although the pace of modernization has been slowed from planned schedules by economic constraints. The Russian ballistic missile early warning system and nuclear command and control system have also been affected by aging and delays in planned modernization. In the context of a crisis growing out of civil strife, present early warning and command and control (C^2) weaknesses could pose a risk of unauthorized or inadvertent launch of missiles against the United States.

With the Cold War ended, the likelihood of a deliberate missile attack on the U.S. from Russia has been greatly lessened but not entirely eliminated. However, Russia's leaders issued a new national security policy in 1993 that places greater reliance on nuclear deterrence, very likely in response to Russia's economic difficulties and decline in its conventional military capabilities. At the same time, the risk of an accident or of a loss of control over Russian ballistic missile forces-a risk which now appears small-could increase sharply and with little warning if the political situation in Russia were to deteriorate.

Also, quite apart from these risks, Russia poses a threat to the U.S. as a major exporter of enabling technologies, including ballistic missile technologies, to countries hostile to the United States. In particular, Russian assistance has greatly accelerated Iran's ballistic missile program.

3. China

As in the case of Russia, China's future is clouded by a range of uncertainties. China, too, is going through a transition, but one which has been going on for 20 years. The improvement in Sino-U.S. relations, interrupted in 1989, has resumed. Although the U.S. and China are developing a more cooperative relationship, significant potential conflicts remain, and China is less constrained today by fear of Russia than it once was by fear of the Soviet Union. Taiwan is an obvious potential flashpoint. Others could arise as China pursues its drive for greater influence in Asia and the Western Pacific. Even now China has conflicts with several of its neighbors, some of which could involve the U.S. in a confrontation.

China is modernizing its long range missiles and nuclear weapons in ways that will make it a more threatening power in the event of a crisis. China's 1996 missile firings in the Taiwan Strait, aimed at intimidating Taiwan in the lead-up to its presidential election, provoked a sharp confrontation with the United States. For example, during this crisis a pointed question was posed by Lt. Gen. Xiong Guang Kai, a frequent spokesman for Chinese policy, about U.S. willingness to trade Los Angeles for Taipei. This comment seemed designed to link China's ballistic missile capabilities with its regional priorities.

China also poses a threat to the U.S. as a significant proliferator of ballistic missiles, weapons of mass destruction and enabling technologies. It has carried out extensive transfers to Iran's solid-fueled ballistic missile program. It has supplied Pakistan with a design for a nuclear weapon and additional nuclear weapons assistance. It has even transferred complete ballistic missile systems to Saudi Arabia (the 3,100-km-range CSS-2) and Pakistan (the 350-km-range M-11).

The behavior thus far of Russia and China makes it appear unlikely, albeit for different reasons-strategic, political, economic or some combination of all three-that either government will soon effectively reduce its country's sizable transfer of critical technologies, experts or expertise to the emerging missile powers.

4. Countries With Scud-Based Missile Infrastructures

The basis of most missile developments by emerging ballistic missile powers is the Soviet Scud missile and its derivatives. The Scud is derived from the World War II-era German V-2 rocket. 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. Early production models would probably be limited in number. They would be unlikely to meet U.S. standards of safety, accuracy and reliability. But the purposes of these nations would not require such standards. A larger force armed with scores of missiles and warheads and meeting higher operational standards would take somewhat longer to test, produce and deploy. But meanwhile, even a few of the simpler missiles could be highly effective for the purposes of those countries.

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., its vital interests and its allies. While these nations' missile programs may presently be aimed primarily at regional adversaries, they inevitably and inescapably engage the vital interests of the U.S. as well. Their targeted adversaries include key U.S. friends and allies. U. S. deployed forces are already at risk from these nations' growing arsenals. 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.

a. North Korea

There is evidence that North Korea is working hard on the Taepo Dong 2 (TD-2) ballistic missile. The status of the system's development cannot be determined precisely. Nevertheless, the ballistic missile test infrastructure in North Korea is well developed. Once the system is assessed to be ready, a test flight could be conducted within six months of a decision to do so. If North Korea judged the test to be a success, the TD-2 could be deployed rapidly. It is unlikely the U.S. would know of such a decision much before the missile was launched. This missile could reach major cities and military bases in Alaska and the smaller, westernmost islands in the Hawaiian chain. Light-weight variations of the TD-2 could fly as far as 10,000 km, placing at risk western U.S. territory in an arc extending northwest from Phoenix, Arizona, to Madison, Wisconsin. These variants of the TD-2 would require additional time to develop and would likely require an additional flight test.

North Korea has developed and deployed the No Dong, a medium range ballistic missile (MRBM) using a scaled-up Scud engine, which is capable of flying 1,300 km. With this missile, North Korea can threaten Japan, South Korea, and US bases in the vicinity of the DPRK. North Korea has reportedly tested the No Dong only once, in 1993. The Commission judges that the No Dong was operationally deployed long before the U.S. Government recognized that fact. There is ample evidence that North Korea has created a sizable missile production infrastructure, and therefore it is highly likely that considerable numbers of No Dongs have been produced.

In light of the considerable difficulties the Intelligence Community encountered in assessing the pace and scope of the No Dong missile program, the U.S. may have very little warning prior to the deployment of the Taepo Dong 2.

North Korea maintains an active WMD program, including a nuclear weapon program. It is known that North Korea diverted material in the late 1980s for at least one or possibly two weapons. North Korea's ongoing nuclear program activity raises the possibility that it could produce additional nuclear weapons. North Korea also possesses biological weapons production and dispensing technology, including the capability to deploy chemical or biological warheads on missiles.

North Korea also poses a major threat to American interests, and potentially to the United States itself, because it is a major proliferator of the ballistic missile capabilities it possesses-missiles, technology, technicians, transporter-erector-launchers (TELs) and underground facility expertise-to other countries of missile proliferation concern. These countries include Iran, Pakistan and others.

b. Iran

Iran is placing extraordinary emphasis on its ballistic missile and WMD development

programs. The ballistic missile infrastructure in Iran is now more sophisticated than that of North Korea, and has benefited from broad, essential, long-term assistance from Russia and important assistance from China as well. Iran is making very rapid progress in developing the Shahab-3 MRBM, which like the North Korean No Dong has a range of 1300 km. This missile may be flight tested at any time and deployed soon thereafter.

We judge that Iran now has the technical capability and resources to demonstrate an ICBM-range ballistic missile, similar to the TD-2 (based on scaled-up Scud technology) within five years of a decision to proceed-whether that decision has already been made or is yet to be made.

In addition to this Scud-based long range ballistic missile program, Iran has acquired and is seeking major, advanced missile components that can be combined to produce ballistic missiles with sufficient range to strike the United States. For example, Iran is reported to have acquired engines or engine designs for the RD-214 engine, which powered the Soviet SS-4 MRBM, and to have an interest in even more advanced engines. A 10,000 km-range Iranian missile could hold the U.S. at risk in an arc extending northeast of a line from Philadelphia, Pennsylvania, to St. Paul, Minnesota.

Iran has also developed a solid-fueled rocket infrastructure and produces short range rockets, and also is seeking long range missile technology from outside sources, purportedly for a space launch vehicle. Both contribute directly to Iran's ballistic missile technology base. Iran is known to rely heavily on imports of missile technology from foreign sources, particularly Russia and North Korea. These imports have allowed Iran's missile programs to proceed swiftly, and they can be incorporated into Iran's domestic infrastructure as well.

Iran is developing weapons of mass destruction. It has a nuclear energy and weapons program, which aims to design, develop, and as soon as possible produce nuclear weapons. The Commission judges that the only issue as to whether or not Iran may soon have or already has a nuclear weapon is the amount of fissile material available to it. Because of significant gaps in our knowledge, the U.S. is unlikely to know whether Iran possesses nuclear weapons until after the fact. While Iran's civil nuclear program is currently under International Atomic Energy Agency (IAEA) safeguards, it could be used as a source of sufficient fissile material to construct a small number of weapons within the next ten years if Iran were willing to violate safeguards. If Iran were to accumulate enough fissile material from foreign sources, it might be able to develop a nuclear weapon in only one to three years. Iran also has an active chemical weapon development and production program, and is conducting research into biological weapons.

c. Iraq

Iraq has maintained the skills and industrial capabilities needed to reconstitute its long range ballistic missile program. Its plant and equipment are less developed than those of North Korea or Iran as a result of actions forced by UN Resolutions and monitoring. However,

Iraq has actively continued work on the short range (under 150 km) liquid- and solid-fueled missile programs that are allowed by the Resolutions. Once UN-imposed controls are lifted, Iraq could mount a determined effort to acquire needed plant and equipment, whether directly or indirectly. Such an effort would allow Iraq to pose an ICBM threat to the United States within 10 years. Iraq could develop a shorter range, covert, ship-launched missile threat that could threaten the United States in a very short time.

Iraq had a large, intense ballistic missile development and production program prior to the Gulf War. The Iraqis produced Scuds, and then modified Scud missiles to produce the 600 km range Al Hussein and 900 km range Al Abbas missiles. The expertise, as well as some of the equipment and materials from this program remain in Iraq and provide a strong foundation for a revived ballistic missile program.

Prior to the invasion of Kuwait in 1990, Iraq could have had nuclear weapons in the 1993-1995 time frame, although it still had technical hurdles to overcome. After the invasion of Kuwait, Iraq began a crash program to produce a nuclear device in six to nine months based on highly enriched uranium removed from the safeguarded reactor at Tuwaitha. Iraq has the capability to reconstitute its nuclear weapon program; the speed at which it can do so depends on the availability of fissile material. It would take several years to build the required production facilities from scratch. It is possible that Iraq has hidden some material from U.N. Special Commission (UNSCOM) inspection, or that it could acquire fissile material abroad (e.g., from another "rogue" state.) Iraq also had large chemical and biological weapons programs prior to the war, and produced chemical and biological warheads for its missiles. Knowledge, personnel, and equipment related to WMD remain in Iraq, so that it could reconstitute these programs rapidly following the end of sanctions.

5. India

India is developing a number of ballistic missiles from short range to those with ICBM-class capabilities, along with a submarine-launched ballistic missile (SLBM) and a short range, surface ship-launched system. India has the infrastructure to develop and produce these missiles. It is aggressively seeking technology from other states, particularly Russia. While it develops its long range ballistic missiles, India's space-launch vehicles provide an option for an interim ICBM capability. India has detonated several nuclear devices and it is clear that it is developing warheads for its missile systems. India has biological and chemical weapons programs. Since the Pakistani nuclear tests, India has announced its intention to increase its spending on missiles and nuclear weapons.

India's program to develop ballistic missiles began in 1983 and grew out of its space-launch program, which was based on Scout rocket technology acquired from the United States. India currently has developed and deployed the Prithvi short range ballistic missile (SRBM), and is developing longer range, liquid- and solid-fueled missiles. They include the Prithvi II SRBM, the Agni, Agni-Plus and Agni-B IRBMs, a sea-launched ballistic missile and an SLBM, the Sagarika.

India detonated a nuclear device in 1974, conducted a test series in May 1998, and it is clear that it is developing warheads for its missile systems. Indian leaders recently declared that India has developed nuclear weapons for deployment on the Prithvi SRBM and the Agni Plus MRBM.

India has acquired and continues to seek Russian, U.S., and Western European technology for its missile programs. Technology and expertise acquired from other states, particularly from Russia, are helping India to accelerate the development and increase the sophistication of its missile systems. For example, Russian assistance is critical to the development of the Indian SLBM and its related submarine. But India is rapidly enhancing its own missile science and technology base as well. Many Indian nationals are educated and work in the U. S., Europe, and other advanced nations; some of the knowledge thereby acquired returns to the Indian missile program. While India continues to benefit from foreign technology and expertise, its programs and industrial base are now sufficiently advanced that supplier control regimes can affect only the rate of acceleration in India's programs. India is in a position to supply material and technical assistance to others.

6. Pakistan

Pakistan's ballistic missile infrastructure is now more advanced than that of North Korea. It will support development of a missile of 2,500-km range, which we believe Pakistan will seek in order to put all of India within range of Pakistani missiles. The development of a 2,500-km missile will give Pakistan the technical base for developing a much longer range missile system. Through foreign acquisition, and beginning without an extensive domestic science and technology base, Pakistan has acquired these missile capabilities quite rapidly. China and North Korea are Pakistan's major sources of ballistic missiles, production facilities and technology.

Pakistan currently possesses nuclear-capable M-11 SRBMs acquired from China, and it may produce its own missile, the Tarmuk, based on the M-11. In 1998, Pakistan tested the 1300 km Ghauri MRBM, a version of the North Korean No Dong, and we believe Pakistan has acquired production facilities for this missile as well.

Pakistan possesses nuclear weapons that employ highly-enriched uranium and in May 1998 conducted its first nuclear weapon test series. A new Pakistani nuclear reactor has been completed that could be used for the production of plutonium. In addition to its nuclear weapons, Pakistan has biological and chemical weapons programs. Chinese assistance has been crucial to Pakistan's nuclear weapons program.

India and Pakistan are not hostile to the United States. The prospect of U.S. military confrontation with either seems at present to be slight. However, beyond the possibility of nuclear war on the subcontinent, their aggressive, competitive development of ballistic missiles and weapons of mass destruction poses three concerns in particular. First, it enables

them to supply relevant technologies to other nations. Second, India and Pakistan may seek additional technical assistance through cooperation with their current major suppliers-India from North Korea, Iran and Russia; Pakistan from North Korea and China-because of the threats they perceive from one another and because of India's anxieties about China, combined with their mounting international isolation. Third, their growing missile and WMD capabilities have direct effects on U.S. policies, both regional and global, and could significantly affect U.S. capability to play a stabilizing role in Asia.

D. A New Non-Proliferation Environment

Since the end of the Cold War a number of developments have made ballistic missile and WMD technologies increasingly available. They include:

- A number of nations have chosen not to join non-proliferation agreements.
- Some participants in those agreements have cheated.
- As global trade has steadily expanded, access has increased to the information, technology and technicians needed for missile and WMD development.
- Access to technologies used in early generations of U.S. and Soviet missiles has eased. However rudimentary compared to present U.S. standards, these technologies serve the needs of emerging ballistic missile powers.
- Among those countries of concern to the U.S., commerce in ballistic missile and WMD technology and hardware has been growing, which may make proliferation self-sustaining among them and facilitate their ability to proliferate technology and hardware to others.

Some countries which could have readily acquired nuclear weapons and ballistic missiles-such as Germany, Japan and South Korea-have been successfully encouraged not to do so by U.S. security guarantees and by non-proliferation agreements. Even though they lack such security guarantees, other countries have also joined non-proliferation agreements and abandoned development programs and weapons systems. Some examples are Argentina, Brazil, South Africa and the former Soviet republics of Belarus, Kazakhstan and Ukraine.

1. Increased Competence of and Trade Among Emerging Ballistic Missile Powers

Conversely, there are other countries-some of which are themselves parties to various non-proliferation agreements and treaties-that either have acquired ballistic missile or WMD capabilities or are working hard to do so. North Korea, Iran and Iraq, as well as India and Pakistan, are at the forefront of this group. They now have increased incentives to cooperate with one another. They have extensive access to technology, information and expertise from developed countries such as Russia and China. They also have access through commercial and other channels in the West, including the United States. Through this trade and their own indigenous efforts, these second-tier powers are on the verge of being able to provide to one another, if they have not already done so, the capabilities needed to develop long range ballistic missiles.

2. U.S. as a Contributor to Proliferation

The U.S. is the world's leading developer and user of advanced technology. Once it is transferred by the U.S. or by another developed country, there is no way to ensure that the transferred technology will not be used for hostile purposes. The U.S. tries to limit technology transfers to hostile powers, but history teaches that such transfers cannot be stopped for long periods. They can only be slowed and made more costly, and even that requires the cooperation of other developed nations. The acquisition and use of transferred technologies in ballistic missile and WMD programs has been facilitated by foreign student training in the U.S., by wide dissemination of technical information, by the illegal acquisition of U.S. designs and equipment and by the relaxation of U.S. export control policies. As a result, the U.S. has been and is today a major, albeit unintentional, contributor to the proliferation of ballistic missiles and associated weapons of mass destruction.

3. Motives of Countries of Concern

Recent ballistic missile and nuclear tests in South Asia should not be viewed as merely a sharp but temporary setback in the expanding reach of nonproliferation regimes. While policymakers may try to reverse or at least contain the trends of which these tests are a part, the missile and WMD programs of these nations are clearly the results of fundamental political calculations of their vital interests. Those nations willing and able to supply dangerous technologies and systems to one another, including Russia, China and their quasi-governmental commercial entities, may be motivated by commercial, foreign policy or national security interests or by a combination thereof. As noted above, such countries are increasingly cooperating with one another, perhaps in some instances because they have reciprocal needs for what one has and the other lacks. The transfer of complete missile systems, such as China's transfer to Saudi Arabia, will continue to be available. Short of radical political change, there is every reason to assume that the nations engaged in these missile and WMD development activities will continue their programs as matters of high priority.

4. Readier Market Access to Technology

In today's increasingly market-driven, global economy, nations so motivated have faster, cheaper and more efficient access to modern technology. Commercial exchanges and technology transfers have multiplied the pathways to those technologies needed for ballistic missiles and weapons of mass destruction. These pathways reduce development times and costs, lowering both technical and budget obstacles to missile development and deployment.

Expanding world trade and the explosion in information technology have accelerated the global diffusion of scientific, technical and industrial information. The channels, both public and private, legal and illegal, through which technology, components and individual technicians can be moved among nations have increased exponentially.

5. Availability of Classified Information and Export-Controlled Technology

Those trends in the commercial sector have been accompanied, and in many ways accelerated, by an increased availability of classified information as a result of:

- Lax enforcement of export controls.
- Relaxation of U.S. and Western export controls.
- Growth in dual-use technologies.
- Economic incentives to sell ballistic missile components and systems.
- Extensive declassification of materials related to ballistic missiles and weapons of mass destruction.
- Continued, intense espionage facilitated by security measures increasingly inadequate for the new environment.

Extensive disclosure of classified information, including information compromising intelligence sources and methods. Damaging information appears almost daily in the national and international media and on the Internet.

E. Alternative Ballistic Missile Launch Modes

In evaluating present threats, it is misleading to use old patterns of development as guides. The history of U.S. and Soviet missile and WMD development has become irrelevant. Approaches that the U.S. considered and specifically rejected on grounds of safety, reliability, accuracy and requirements for high volume production are in many cases well suited to nations less concerned about safety and able to meet their needs with only a few, less accurate, less reliable weapons. Analytical approaches the Intelligence Community could realistically rely on in the past need to be restudied and reevaluated in light of this newer model.

The Commission believes the U.S. needs to pay attention to the possibility that complete, long range ballistic missile systems could be transferred from one nation to another, just as China transferred operational CSS-2s to Saudi Arabia in 1988. Such missiles could be equipped with weapons of mass destruction.

One nation's use of another nation's territory also needs to be considered. The U.S. did this during the Cold War, and the Soviet Union tried to do it in Cuba in the early 1960s. For example, if Iran were to deploy ballistic missiles in Libya, it could reduce the range required to threaten the U.S. as well as Europe. Given the existing patterns of cooperation we have already seen, both testing by one country on the territory of another and deriving data from other-country tests are also distinct possibilities.

Sea launch of shorter range ballistic missiles is another possibility. This could enable a country to pose a direct territorial threat to the U.S. sooner than it could by waiting to

develop an ICBM for launch from its own territory. Sea-launching could also permit it to target a larger area of the U.S. than would a missile fired from its home territory. India is working on a sea launch capability. Air launch is another possible mode of delivering a shorter range missile to U.S. territory.

The key importance of these approaches is that each would significantly shorten the warning time of deployment available to the United States.

F. Erosion of Warning

Precise forecasts of the growth in ballistic missile capabilities over the next two decades-tests by year, production rates, weapons deployed by year, weapon characteristics by system type and circular error probable (CEP)-cannot be provided with confidence. Deception and denial efforts are intense and often successful, and U.S. collection and analysis assets are limited. Together they create a high risk of continued surprise.

The question is not simply whether we will have warning of an emerging capability, but whether the nature and magnitude of a particular threat will be perceived with sufficient clarity in time to take appropriate action.

Concealment, denial and deception efforts by key target countries are intended to delay the discovery of strategically significant activities until well after they had been carried out successfully. The fact that some of these secret activities are discovered over time is to the credit of the U.S. Intelligence Community. However, the fact that there are delays in discovery of those activities provides a sharp warning that a great deal of activity goes undetected.

Both technical and human intelligence are inherently more difficult to collect in those countries where the United States has limited access, which includes most of the ballistic missile countries of concern. The U.S. is not able to predict and anticipate with confidence the behavior and actions of emerging ballistic missile powers and their related political decision-making.

Their ballistic missile programs often do not follow a single, known pattern or model, and they use unexpected development patterns. These are not models of development the U.S. follows or that intelligence analysts expect to see. For example, Pakistan's test launch in April 1998 of its Ghauri medium range ballistic missile (MRBM)-its version of the North Korean No Dong-could not be predicted on the basis of any known pattern of technical development either for MRBMs generally or Pakistan in particular. Similarly, North Korea's decision to deploy the No Dong after what is believed to be a single successful test flight is another example. Based on U.S. and Russian experience, the Intelligence Community had expected that a regular test series would be required to provide the confidence needed before any country would produce and deploy a ballistic missile system. Yet North Korea deployed the No Dong.

The Commission believes that the technical means of collection now employed will not meet emerging requirements, and considerable uncertainty persists whether planned collection and analysis systems will do so.

G. Methodology

In analyzing the ballistic missile threat, the Commission used an expanded methodology. We used it as a complement to the traditional analysis in which a country's known program status is used to establish estimates of its current missile capabilities. We believe this expanded approach provides insights into emerging threats that the prevailing approaches used by the Intelligence Community may not bring to the surface.

To guide our assessment of the ballistic missile threat to the United States we posed three questions:

- What is known about the ballistic missile threat, including the domestic infrastructure of a ballistic missile power; the efforts of a power to acquire foreign technology, materials and expertise; and the scale, pace and progress of its programs?
- What is not known about the threat in each of those three categories?
- Can a power intent on posing a ballistic missile threat to any part of the United States, including the use of but not limited to ICBM-range missiles, use the open market, the black market and/or espionage to secure the needed technology and expertise and then carry out its program in ways that will minimize the interval between the time the U.S. becomes aware of the threat and the fielding of that capability?

In seeking answers to these questions, the Commission familiarized itself with the current state of knowledge as well as the depth of analytic capability within the Intelligence Community related to ballistic missile and WMD threats. The Commission used its broad access to individuals, special compartmented intelligence and special access programs. It consulted with experts in the broader government and private analytic and policy communities. It reviewed the strengths, weaknesses and vulnerabilities of current and planned human and technical collection efforts and capabilities, especially in light of the increasingly sophisticated means and methods available to target countries to hide from U.S. intelligence collection. It reviewed with scientists, engineers and program managers from the public and private sectors the technical issues associated with the design, development and testing of ballistic missiles and the means and methods available to the emerging ballistic missile powers to meet the challenges associated with long range ballistic missile development and testing.

The Commission analyzed the available information in order to develop an understanding of the threat from three perspectives:

- We examined the known size and quality of the deployed forces, the doctrine and the command and control systems that govern the forces and the availability of weapons of mass destruction to arm the forces. We reviewed the infrastructure supporting the programs and the extent of past and present foreign assistance available to those programs from Russia, China and other countries, including the West.
- We examined the ways in which the programs of emerging ballistic missile powers compared with one another. For example, we traced the development histories of the related programs of North Korea, Iran, Iraq and Pakistan and the relationships among them. This comparison helped in identifying the similarities between programs, the extent to which each had aided one another in overcoming critical development hurdles and, importantly, the pace at which a determined country can progress in its program development.
- We reviewed the resources ("inputs") available and the ways in which they provide indicators of the prospects for successful missile development.

By integrating these perspectives, we were able to partially bridge a significant number of intelligence gaps. Emphasizing inputs makes two important contributions to the analysis. Inputs include domestic opportunity costs, the foreign technology and expertise sought and obtained, the urgency with which facilities are constructed both above and below ground and the willingness to absorb cost and time penalties in order to hide activities from detection by U.S. intelligence. Attention to inputs across all elements of a program helps develop an understanding of the scale and scope of a program before traditional output indicators, such as testing and production rates, can be observed and evaluated. When combined with observed outputs and the application of engineering judgments, the understanding of the scale and scope of a program that this provided helped us to measure the probable pace and magnitude of a program and its potential products. We were then able to make what we believe to be reasonably confident estimates of what the various programs can achieve.

Rather than measuring how far a program had progressed from a known starting point, the Commission sought to measure how close a program might be to demonstrating the first flight of a long range ballistic missile. This approach requires that analysts extrapolate a program's scope, scale, pace and direction beyond what the hard evidence at hand unequivocally supports. It is in sharp contrast to a narrow focus on the certain that obscures the almost-certain. The approach helps reduce the effects of denial and deception efforts. When strategically significant programs were assessed by narrowly focusing on what is known, the assessments lagged the actual state of the programs by two to eight years and in some cases completely missed significant programs.

We chose to focus on what is left to be accomplished in the programs of potentially threatening ballistic missile powers and alternative paths they can follow to attain their goals. We reviewed program histories and current activities, including foreign assistance, to

determine whether a ballistic missile program acquired the means to overcome its identified problems. We considered the multiple pathways available for completing its development given the combination of expertise and technology available to it and the circumstances in which it is operating. This approach accepts as a basic premise that a power determined to possess a long range missile, knowing that the U.S. is trying to track its every action but aware of American intelligence methods and sources, will do its best to deny information and to deceive the U.S. about its actual progress.

Because of these options available to emerging ballistic missile powers, the Commission, unanimously recognizing that missile development and deployment now follows new models, strongly urges the use of an expanded approach to intelligence that assesses both inputs and outputs in other countries' ballistic missile programs. We believe this approach is needed in order to capture both sooner and more accurately the speed and magnitude of potential ballistic missile proliferation in the post-Cold War world and to assess, in time, the various threats this proliferation poses to the United States.

The Commission's key judgments are derived from applying this methodology and examining the evidence in light of the individual and collective experience of the nine Commissioners.

H. Summary

Ballistic missiles armed with WMD payloads pose a strategic threat to the United States. This is not a distant threat. Characterizing foreign assistance as a wild card is both incorrect and misleading. Foreign assistance is pervasive, enabling and often the preferred path to ballistic missile and WMD capability.

A new strategic environment now gives emerging ballistic missile powers the capacity, through a combination of domestic development and foreign assistance, to acquire the means to strike the U.S. within about five years of a decision to acquire such a capability (10 years in the case of Iraq). During several of those years, the U.S. might not be aware that such a decision had been made. Available alternative means of delivery can shorten the warning time of deployment nearly to zero.

The threat is exacerbated by the ability of both existing and emerging ballistic missile powers to hide their activities from the U.S. and to deceive the U.S. about the pace, scope and direction of their development and proliferation programs. Therefore, we unanimously recommend that U.S. analyses, practices and policies that depend on expectations of extended warning of deployment be reviewed and, as appropriate, revised to reflect the reality of an environment in which there may be little or no warning.

Attachment 1.
A. Year 2000 (Y2K) Computer Problem

The widely-discussed Year 2000 (Y2K) problem concerns computer hardware with embedded clocks and software with date recognition functions that still designate years with only two digits and are programmed to interpret "00" as the year 1900 rather than 2000. The tasks of reprogramming are immense and complex, and uncertainties surrounding their pace and outcome plague many aspects of life and commerce. The Commission judges that military and intelligence operations are not immune to the effects of the Y2K problem.

Not only at the millennium but for some undetermined time before and after it the Y2K problem can affect U.S. and Russian ballistic missile forces and, to a lesser extent, those of China, the United Kingdom (U.K.) and France. The U.S. particularly and Russia somewhat less so depend on computer-based and computer-aided intelligence and surveillance and on automated processes to assure that their ballistic missile forces will function under all conceivable circumstances. The Y2K problem can potentially upset some of those calculations by interfering with the capacity of the U.S. and Russia to:

- Monitor the activities of each other at the strategic level, including the disposition and posture of their conventional military forces.
- Provide tactical warning of military operations, particularly ballistic missile operations, through collection of data from space, air and ground based sensors.
- Process and fuse the data received from sensors in the command and control nets.
- Maintain positive control over ballistic missile forces and, if automated responses to false data and warnings are triggered, retain or regain control by the national military and political leadership.

Y2K problems are complex and not easy to deal with. Efforts are underway to isolate critical systems from the problem, but they may not totally eliminate vulnerabilities for two reasons:

- No system is completely isolated. Command centers may have new software installed, but if the support services-electric, water, gas and communications, for example-are not self-contained the center may fail. Even if support services are self-contained, the need for the center to function via computer or by computer-dependent communication systems makes it vulnerable to Y2K problems up or downstream from it.
- Efforts to correct the problem provide their own attractive opportunities for unfriendly agents and powers to tamper with mission-critical software. Errors can be programmed which are designed to appear only much later and in circumstances that cannot be anticipated. The Commission is troubled by the amount of Y2K software work being performed in foreign countries, particularly India, for U.S. industry and for the U.S. Government-including elements of the Intelligence Community.

B. Revolution in Military Affairs and Information Warfare

The term "Revolution in Military Affairs" (RMA) is used to describe the impact of leading-edge military technologies and information warfare on the conduct of military operations from the tactical to the strategic level. Key RMA technologies include precision-guided munitions, stealth technology and the use of space-based assets for command, control, communications, intelligence, surveillance and reconnaissance, as well as modern computational capabilities to integrate these functions.

The U.S. military is adopting new weapon systems and tactical, operational and strategic concepts based on the elements of the RMA. The objective is to make U.S. forces lighter but more lethal, so that fewer personnel with less equipment can strike over longer distances and with a far more powerful effect. This gives prospective adversaries greater incentives to find new ways of offsetting the new RMA-based capabilities of the U.S. and in particular to come up with new "asymmetric" strategies-that is, strategies that can cripple U.S. ability to use its forces without the adversary having to confront those forces directly.

These asymmetric strategies of potential adversaries of the U.S. could well include ballistic missile operations against ports, airfields, communications centers or urban and industrial areas. Attacking ports and airfields the U.S. might use could severely hamper operations and could undercut the military advantages U.S. technological superiority provides. Interrupting communications channels would make it more difficult to plan, organize and conduct operations. Strikes by an adversary on urban and industrial centers could change the nature of the conflict from what the U.S. prefers-one confined to precision attacks against military forces in the field and point targets in urban and industrial settings-to one of indiscriminate damage to civilians and the infrastructure supporting them.

In the 1991 Persian Gulf War Iraqi ballistic missiles threatened to undermine the coalition's political strategy, and the coalition's military responses failed to halt Iraqi ballistic missile attacks. Doctrinal shifts in Russia and China have placed added emphasis on ballistic missile operations. Together, these highlight the vulnerability to such operations of the U.S., its forces and its allies, whether conducted by Russia, China or emerging ballistic missile powers. A number of other nations are incorporating technical features of the RMA into their forces. These include space-based surveillance, reconnaissance and communications by way of both space and land-based fiber-optic networks (perhaps using civilian assets), guidance from the space-based global positioning system/global navigation satellite system (GPS/GLONASS) to increase the accuracy of missiles and the computational capabilities needed to plan, organize and conduct operations. Their capacity to conduct asymmetric operations with ballistic missiles, including attacks on RMA sites in the U.S., will increase.

Attachment 2. Unclassified Working Papers

Table of Contents for Appendix III: Unclassified Working Papers

Stephen J. Blank, "Nuclear Strategy and Nuclear Proliferation in Russian Strategy"

W. Seth Carus, "Ballistic Missiles in Iran and Iraq: 1988-1998"

W. Seth Carus, "Israeli Ballistic Missile Developments"

Richard T. Cupitt, "Export Controls and Missile Technology Transfer"

Michael Eisenstadt, "Missiles and Weapons of Mass Destruction (WMDs) in Iraq and Iran: Current Developments and Potential for Future Surprises"

Gerrit W. Gong, "Assessing the Ballistic Missile Threat: China-Japan-Korea-Taiwan Issues"

Dennis M. Gormley, "Transfer Pathways for Cruise Missiles"

Daniel Goure, "The Evolution of Russian Nuclear Forces: Working to a Plan"

Daniel Goure, "WMD and Ballistic Missiles in South Asia"

Kurt Guthe and Keith Payne, "The Unique Value of Ballistic Missiles for Deterrence and Coercion: The Chinese Case"

Selig S. Harrison, "Missile Capabilities in Northeast Asia: Japan, South Korea and North Korea"

David C. Isby, "Barriers to Proliferation and Pathways to Transfer: Building Ballistic Missile Capabilities Under MTCR"

Aaron Karp, "Technology Pathways to Ballistic Missiles in Iran"

Kenneth Katzman, "Iran's Long Range Missile Capabilities"

Kenneth Katzman, "Iraq's Long Range Missile Capabilities"

Michael Krepon, "India, Pakistan and the Ballistic Missile Threat"

Robbin Laird, "Rethinking the Role of Western States as Supplier Nations"

Robert A. Manning, "Missile Proliferation Threats in Northeast Asia"

John M. Myrah, "The Proliferation of Ballistic Missiles: What Should We Do to Stop It?"

Keith Payne, "The Missile Technology Control Regime: European Involvement and Compliance Issues"

Keith Payne and Robert Rudney, "The Unique Value of Ballistic Missiles for Deterrence and Coercion"

Nadia Schadlow, "Patterns of Ukrainian Conduct"

Gilbert Siegert, "The Chinese Space Program"

Gilbert Siegert, "Potential Threats from Global Commercial Space Capabilities"

David J. Smith, "Friendly Countries and Missile Proliferation: Dealing With Different Perceptions"

Henry Sokolski, "Space Technology Transfers and Missile Proliferation"

SPC Summary of Roundtable with W. Seth Carus, Michael Eisenstadt, Ken Katzman and Ken Timmerman, "Iran/Iraq"

SPC Summary of Roundtable with Bruce Blair, Stephen Blank, Daniel Goure and Nadia Schadlow, "Russia/Ukraine"

SPC Summary of Roundtable with Gerrit W. Gong, Selig Harrison, Robert Manning and David Wright, "China/Japan/Korea"

SPC Summary of Roundtable with Daniel Goure, Michael Krepon and David Tanks, "India/ Pakistan"

SPC Summary of Roundtable with W. Seth Carus and Dov Zakheim, "North Africa/Israel"

SPC Summary of Roundtable with David C. Isby, John M. Myrah and Henry Sokolski , "Transfers"

SPC Summary of Roundtable with Dennis M., Aaron Karp, Richard T. Cupitt, "Pathways for Transfer"

SPC Summary of Roundtable with Robbin Laird, Tim McCarthy, Keith Payne and David Smith, "Supplier Nations"

System Planning Corporation, "An Unclassified Assessment of France"

System Planning Corporation, "An Unclassified Assessment of Great Britain"

System Planning Corporation, "An Unclassified Assessment of Germany"

System Planning Corporation, "An Unclassified Assessment of Japan"

System Planning Corporation, "An Unclassified Assessment of South Korea"

David R. Tanks, "Ballistic Missiles in South Asia: Are ICBMs a Future Possibility?"

Kenneth R. Timmerman, "Rogue States and Ballistic Missiles: Lessons and Prospects"

David C. Wright, "An Analysis of the North Korean Missile Program"Attachment 3

A. Résumés of Commission Members

The Honorable Donald H. Rumsfeld, Chairman

Mr. Rumsfeld is Chairman of the Board of Directors of Gilead Sciences, Inc. Previously he served in a variety of government posts, including: Naval Aviator (1954-57), Member of Congress (1963-69), U.S. Ambassador to NATO (1972-74), White House Chief of Staff (1974-75), Secretary of Defense (1975-77) and Presidential Envoy to the Middle East (1983-84). He also served as Chairman of the Rand Corporation (1981-86; 1995-96) and as Chairman and CEO of G. D. Searle & Co. (1977-85) and of General Instrument Corporation (1990-93). He received the Presidential Medal of Freedom in 1977.

Dr. Barry M. Blechman

Dr. Blechman is the president and founder of DFI International (in 1984) and chairman and co-founder of the Henry L. Stimson Center beginning in 1989. He served as Assistant Director of the U.S. Arms Control and Disarmament Agency (1977-80). He was previously affiliated with the U.S. Army (1964-66), the Center for Naval Analyses (1966-71) and Brookings Institution (1971-77). He also was affiliated with the Carnegie Endowment (1980-82) and the Center for Strategic and International Studies (1982-84). He is the author of Face Without War and The Politics of National Security, among others. Dr. Blechman has a Ph.D. in international relations.

General Lee Butler, USAF (Ret.)

General Butler served as the Commander-in-Chief of the U.S. Strategic Command and Strategic Air Command (1992-94) and as the Director of Strategic Plans and Policy on the

Joint Chiefs of Staff (1989-91). In 1987, he was the Director of Operations at USAF Headquarters and served as the Inspector General of the Strategic Air Command (1984-86). From 1982 to 1984, he was the Commander of the 96th and 320th Bomb Wings. General Butler was an Olmsted Scholar.

Dr. Richard L. Garwin

Dr. Garwin is a Senior Fellow for Science and Technology with the Council on Foreign Relations. He has been an IBM Fellow Emeritus at the Thomas J. Watson Research Center since 1993 and was a Fellow from 1952 to 1993. He has served as a member of the President's Science Advisory Committee twice, from 1962 to 1965 and from 1969 to 1972, and he served on the Defense Science Board (1966-69). In 1996, the U.S. Foreign Intelligence Community awarded him the R.V. Jones Award for Scientific Intelligence, and the President and the Department of Energy awarded him the Enrico Fermi Award. Dr. Garwin has a Ph.D. in physics.

Dr. William R. Graham

Dr. Graham is the Chairman of the Board and President of National Security Research (1996 to present). He previously was the Director of the White House Office of Science & Technology Policy (1986-89) and the Deputy Administrator of NASA (1985-86). He has a Ph.D. in electrical engineering.

Dr. William Schneider, Jr.

Dr. Schneider is the President of International Planning Services, Inc. (1986 to present). He previously served as the Under Secretary of State for Security Assistance (1982-86) and the Chairman of the President's General Advisory Committee on Arms Control and Disarmament (1987-93). He has a Ph.D. in economics.

General Larry D. Welch, USAF (Ret.)

General Welch is the President and CEO of the Institute for Defense Analyses (1990 to present). He previously served as the Chief of Staff of the U.S. Air Force (1986-90) and the Commander in Chief of the U.S. Strategic Air Command (1985-86).

Dr. Paul D. Wolfowitz

Dr. Wolfowitz is Dean of the Paul H. Nitze School of Advanced International Studies at Johns Hopkins University (1994 to present). He previously served as the Under Secretary of Defense for Policy (1989-93), the U.S. Ambassador to Indonesia (1986-89), the Assistant Secretary of State for East Asian and Pacific Affairs (1982-86) and Director of the State Department Policy Planning Staff (1981-82). He was a member of the Commission on the Roles and Capabilities of the United States Intelligence Community (1995-95). He has a Ph. D. in political science.

The Honorable R. James Woolsey

Mr. Woolsey is a partner in the law firm of Shea & Gardner (1995 to present, 1991-93, 1979-89). He previously served as Director of Central Intelligence (1993-95), Ambassador and U.S. Representative to the Negotiation on Conventional Armed Forces in Europe (1989-91) and Under Secretary of the Navy (1977-79). He was a Delegate-at-Large to the U.S.-Soviet START and Nuclear and Space Arms Talks (1983-85). He served as a member of the Scowcroft Commission (Presidential Commission on Strategic Forces, 1983) and the Packard Commission (Presidential Blue Ribbon Commission on Defense Management, 1985-86).

Core Staff

Dr. Stephen A. Cambone, Staff Director. Senior Fellow, Center for Strategic and International Studies (1993 to present). Director, Strategic Defense Policy, Office of the Secretary of Defense (1990-93); Deputy Director of Strategic Analysis, SRS Technologies (1986-90); Staff Analyst, Los Alamos National Laboratory (1982-86). Ph.D. in political science.

Dr. Steven A. Maaranen. Policy Planning Staff, Los Alamos National Laboratory (1980 to present). Chief, Defense and Space Division, U.S. Arms Control and Disarmament Agency (1987-88); Assistant Professor, Claremont McKenna College (1976-80). Ph.D. in political science.

Eric Desautels. Member of Technical Staff of TASC, Inc. (1994-98). Masters in international security.

David H. Dunham. National security analyst, TASC, Inc. (1994-98); Assistant Director of the Eisenhower World Affairs Institute (1994); Special Assistant, Safe and Secure Dismantlement Delegation, Deputy Executive Director, General Advisory Committee, U.S. Arms Control and Disarmament Agency (1991-94).

Jason W. Roback. Analyst with the National Institute for Public Policy and National Security Research, Inc. (1997 to present). M.S. in defense and strategic studies.

Bernard C. Victory. Analyst at the National Institute for Public Policy (1988 to present). Congressional Research Service (1987-88). M.A. in international affairs.

Delonnie Henry. Administrative Assistant, National Defense University (1993-98). M.Ed.

DCI Liaison

Richard Haver. Chief of Staff of the National Intelligence Council. Formerly: National

Intelligence Officer for Special Activities, Executive Director for Intelligence Community Affairs, Assistant to the Secretary of Defense for Intelligence Policy and Deputy Director for Naval Intelligence.

B. Commission Meetings and Agendas

Date	Subject or Activity	Visitor
Jan. 14	Organization of Commission	
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	Simulation, Imagery Intelligence (IMINT), Signals Intelligence (SIGINT)	
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	Measures and Signature Intelligence (MASINT)	
Jan. 29	Russia	
	Changing Political and Economic Circumstances	
	Military Changes	
	Nuclear Doctrine	
	Strategic Force Projections	
	Warning, Inadvertent Launch, Anti-Ballistic Missile Status	
	C3I, Unauthorized and Accidental Launch	
Jan. 30	China	
	Political Overview	
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	Economic Overview	
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	Force Structure and Projections	
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Feb. 4	Deception and Denial	

	Analytic Depth: China	
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	Hard Target	
	Missile Program and Russian Assistance	
	Infrastructure and Government Oversight	
Feb. 9	Nuclear Programs	
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	Hard Target	
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Date	Subject or Activity	Visitor
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	Collection Challenges	
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Mar. 5	North Korea	
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	Forces and Doctrine	
	Chemical Weapons	
	Biological Weapons	
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Mar. 19	The Honorable George Tenet	Director of Central Intelligence
	Ambassador Rolf Ekéus	Swedish Ambassador to the U.S.
	The Honorable Andrew Marshall	Office of Net Assessment, Office of the Secretary of Defense
	David Osias	Defense Intelligence Officer
	David Ivry	Director-General, Israeli Ministry of Defense (Ret.)
Mar. 24	Saudi Arabia	
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Mar. 30	Iraq	
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	Missile Program	
	Chemical Weapons	
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	Missile Systems: Capabilities and Production	
	India's Naval Development	
	India's Space Program	
	Foreign Proliferation Assistance	

	Missile Forces in 2015	
	Chemical & Biological Weapons	
	Nuclear Programs	
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	Collection Overview	
Apr. 7	Intelligence Process	
	The Honorable "Pete" Aldridge	President and CEO, Aerospace Corporation
	Project West Wing	
	Iranian and North Korean Ballistic Missile Program	
	Ballistic Missile Technical Hurdles and Work-a-Rounds	
Apr. 8	Deception and Denial	
	Yamantau and Russian Underground Activity	
Apr. 16	Admiral William Studeman	Former DDCI
	Hurdles of Long Range Ballistic Missiles and Work-a-Rounds: 1. Liquid Rocket Propulsion 2. Solid Rocket Propulsion 3. Aerodynamics, Reentry Vehicle Design and Missile Materials	
	Russian Command and Control Modernization	
Apr. 20	Lt. Gen. Lester Lyles	Director, Ballistic Missile Defense Organization
	Lt. Gen. Patrick Hughes	Director, Defense Intelligence Agency
	Dr. Fred Iklé	Former Under Secretary of Defense (Policy)
Apr. 20 (cont.)	Analysis of Pakistan's Ghauri/No Dong Launch	

Apr. 21	Emerging Long Range Threat to the U. S.	Boeing Corporation
	Ambassador Frank Wisner	Former Ambassador to India and Special Ambassador to Russia
	Counterintelligence Brief	
Apr. 27	Industrial Espionage	
	Legal Snooping	
	1993 No Dong flight	
	Foreign Missile Threats	
	Scope of Ballistic Missile Proliferation Activities	
	Nonproliferation Methodologies	
	Dr. Sidney Drell	Deputy Director, Stanford Linear Accelerator Center
May 7	Foreign Missile Assessment	
	Payload Fabrication and Delivery	
	Commercial Space Launch Vehicles, Peacekeeper Conversion	
	Contemporaneous History of Iran's Missile Programs	
May 8	Gordon Oehler	Former Director, CIA Nonproliferation Center
	The Honorable William Reinsch	Undersecretary of Commerce for Export Administration
May 18	Naval Intelligence Briefing	
	Contemporaneous History of North Korea's Missile Program, Taepo Dong III Assessment	
	Dr. William J. Perry	Former Secretary of Defense
	Lt. General William Odom, U.S. Army (Ret.)	Former Director of NSA
May 19	Drafting of Final Report	
May 27	Dr. James Schlesinger	Former Secretary of Defense and Director of Central Intelligence
	Drafting of Final Report	

Jun. 3	Drafting of Final Report	
Jun. 4	Dr. Harold Brown	Former Secretary of Defense
	Drafting of Final Report	
Jun. 11	Drafting of Final Report	
Jun. 16	The Honorable Caspar Weinberger	Former Secretary of Defense
	Drafting of Final Report	
Jun. 17	Office Call with the Honorable William S. Cohen	Secretary of Defense The Pentagon
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Jun. 23	Information Warfare	
	Dr. John Deutch	Former DCI
	Brief on Israel	
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Jun. 24	General Colin Powell, U.S. Army (Ret.)	Former Chairman, Joint Chiefs of Staff
	General Brent Scowcroft, U.S. Air Force (Ret.)	Former National Security Advisor to the President
	Cruise Missiles	
	Drafting of Final Report	
Jun. 29	Office Call with General Shelton	Chairman, Joint Chief of Staff The Pentagon
	Drafting of Final Report	
Jun. 30	Drafting of Final Report	
Jul. 7	Office Call with the Honorable Sandy Berger	Assistant to the President for National Security The White House
	Foreign Students in the United States	
Jul. 8	Information Warfare	
	Space Reconnaissance	
	Y2K Problem in Russia	
	Collection Capabilities	

Jul. 15	Deliver Report to Congress	Senior Leadership of the U.S. Senate and U.S. House of Representatives The Capitol

C. Site Visits

March 6: National Air Intelligence Center Wright Patterson Air Force Base Dayton, Ohio
March 10: Sandia National Laboratories Kirtland Air Force Base Albuquerque, New Mexico
March 16: Aerospace Corporation Los Angeles, California
March 25: National Security Agency Fort Meade, Maryland
April 3: Center for International Security Affairs Los Alamos, New Mexico
April 22: National Reconnaissance Office Sterling, Virginia
May 6: Defense Intelligence Agency Briefing Andrews Air Force Base, Maryland
May 15: Missile and Space Intelligence Center Redstone Arsenal, Alabama
June 5: U.S. Space Command Colorado Springs, Colorado

D. Interviews

Dr. Edward C. "Pete" Aldridge, Jr., former Secretary of the Air Force and Director of the National Reconnaissance Office

The Honorable Samuel A. "Sandy" Berger, Assistant to the President for National Security Affairs

The Honorable Dr. Harold Brown, former Secretary of Defense

The Honorable William S. Cohen, Secretary of Defense

The Honorable Dr. John Deutch, former Director of Central Intelligence and Deputy Secretary of Defense

Dr. Sidney Drell, Deputy Director, Stanford Linear Accelerator Center

Ambassador Rolf Ekéus, Swedish Ambassador to the United States

Lieutenant General Patrick Hughes, U.S. Army, Director, Defense Intelligence Agency

David Ivry, former Director-General of the Ministry of Defense of Israel

Dr. Frederick Iklé, former Undersecretary of Defense

Lieutenant General Lester Lyles, U.S. Air Force, Director, Ballistic Missile Defense Organization

The Honorable Andrew Marshall, Director of Net Assessment, Office of the Secretary of Defense

Lieutenant General William Odom, U.S. Army (Ret.), former Director of the National Security Agency

Gordon Oehler, former Director, Nonproliferation Center, CIA

David Osias, Defense Intelligence Officer for Acquisition Support, Counter-proliferation and Arms Conrol

The Honorable Dr. William J. Perry, former Secretary of Defense

General Colin A. Powell, former Chairman of the Joint Chiefs of Staff and National Security Advisor to the President

The Honorable William A. Reinsch, Undersecretary of Commerce

The Honorable Dr. James Schlesinger, former Secretary of Defense, Director of Central Intelligence and Secretary of Energy

General Brent Scowcroft, former National Security Advisor to the President

General Henry H. Shelton, USA, Chairman, Joint Chiefs of Staff

Admiral William Studeman, former Deputy Director of Central Intelligence and Director, National Security Agency

The Honorable George Tenet, Director of Central Intelligence

The Honorable Caspar Weinberger, former Secretary of Defense

Ambassador Frank Wisner, former U.S. Ambassador to India

E. Acknowledgments

The Commissioners wish to express their appreciation to the men and women of the U.S.

Intelligence Community. Over 300 of them took time to meet with the Commissioners on the subject of the ballistic missile threat to the United States.

In particular, the Commissioners express their thanks to the Honorable George Tenet, Director, Central Intelligence, and to the directors of the Defense Intelligence Agency, National Security Agency, National Reconnaissance Office, National Imagery and Mapping Agency and the Office of Naval Intelligence for making the time of their analysts available to the Commission and for providing a level of access to information infrequently granted.

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