

O V E R V I E W

OVERVIEW

IMPORTANT NOTE: This declassified report summarizes many important findings and judgments contained in the Select Committee's classified Report, issued January 3, 1999. U.S. intelligence and law enforcement agencies within the Clinton administration have determined that other significant findings and judgments contained in the Select Committee's classified Report cannot be publicly disclosed without affecting national security or ongoing criminal investigations.

1.

- **The People's Republic of China (PRC) has stolen design information on the United States' most advanced thermonuclear weapons.**
- **The Select Committee judges that the PRC's next generation of thermonuclear weapons, currently under development, will exploit elements of stolen U.S. design information.**
- **PRC penetration of our national weapons laboratories spans at least the past several decades and almost certainly continues today.**

A. The People's Republic of China (PRC) has stolen design information on the United States' most advanced thermonuclear weapons.

The People's Republic of China (PRC) has stolen classified design information on the United States' most advanced thermonuclear weapons. These thefts of nuclear secrets from our national weapons laboratories enabled the PRC to design, develop, and successfully test modern strategic nuclear weapons sooner than would otherwise have been possible. The stolen U.S. nuclear secrets give the PRC design information on thermonuclear weapons on a par with our own.



The PRC thefts from our National Laboratories began at least as early as the late 1970s. Significant secrets are known to have been stolen, from the laboratories or elsewhere, as recently as the mid-1990s. Such thefts almost certainly continue to the present.

- **The stolen information includes classified information on seven U.S. thermonuclear warheads, including every currently deployed thermonuclear warhead in the U.S. ballistic missile arsenal.**
- **The stolen information also includes classified design information for an enhanced radiation weapon (commonly known as the “neutron bomb”), which neither the United States, nor any other nation, has yet deployed.**
- **The PRC has obtained classified information on the following U.S. thermonuclear warheads, as well as a number of associated reentry vehicles (the hardened shell that protects the thermonuclear warhead during reentry).**

U.S. WARHEAD	U.S. NUCLEAR MISSILE	CURRENTLY DEPLOYED
W-88	Trident D-5 SLBM	Yes
W-87	Peacekeeper ICBM	Yes
W-78	Minuteman III (Mark 12A) ICBM	Yes
W-76	Trident C-4 SLBM	Yes
W-70	Lance SRBM	No
W-62	Minuteman III ICBM	Yes
W-56	Minuteman II ICBM	No



In addition, in the mid-1990s the PRC stole, possibly from a U.S. national weapons laboratory, classified thermonuclear weapons information that cannot be identified in this unclassified Report. Because this recent espionage case is currently under investigation and involves sensitive intelligence sources and methods, the Clinton administration has determined that further information cannot be made public without affecting national security or ongoing criminal investigations.

The W-88, a miniaturized, tapered warhead, is the most sophisticated nuclear weapon the United States has ever built. In the U.S. arsenal, it is mated to the D-5 submarine-launched ballistic missile carried aboard the Trident nuclear submarine. The United States learned about the theft of the W-88 Trident D-5 warhead information, as well as about the theft of information regarding several other nuclear weapons, in 1995.

The PRC has stolen U.S. design information and other classified information for neutron bomb warheads. The PRC stole classified U.S. information about the neutron bomb from a U.S. national weapons laboratory. The U.S. learned of the theft of this classified information on the neutron bomb in 1996.

In the late 1970s, the PRC stole design information on the U.S. W-70 warhead from the Lawrence Livermore Laboratory. The U.S. government first learned of this theft several months after it took place. The W-70 warhead contains elements that may be used either as a strategic thermonuclear weapon, or as an enhanced radiation weapon (“neutron bomb”). The PRC tested the neutron bomb in 1988.

The Select Committee is aware of other PRC thefts of U.S. thermonuclear weapons-related secrets. The Clinton administration has determined that further information about PRC thefts of U.S. thermonuclear weapons-related secrets cannot be publicly disclosed without affecting national security.

The PRC acquired this and other classified U.S. nuclear weapons information as the result of a 20-year intelligence collection program to develop modern thermonuclear weapons, continuing to this very day, that includes espionage, review of unclassified publications, and extensive interactions with scientists from the Department of Energy’s national weapons laboratories.

The Select Committee has found that the primary focus of this long-term, ongoing PRC intelligence collection effort has been on the following national weapons laboratories:



- Los Alamos
- Lawrence Livermore
- Oak Ridge
- Sandia

The Select Committee judges that the PRC will exploit elements of the stolen design information on the PRC's next generation of thermonuclear weapons. The PRC plans to supplement its silo-based CSS-4 ICBMs targeted on U.S. cities with mobile ICBMs, which are more survivable because they are more difficult to find than silo-based missiles.

The PRC has three mobile ICBM programs currently underway — two road-mobile and one submarine-launched program — all of which will be able to strike the United States.

The first of these new People's Liberation Army (PLA) mobile ICBMs, the DF-31, may be tested in 1999, and could be deployed as soon as 2002. These mobile missiles require small warhead designs, of which the stolen U.S. design information is the most advanced in the world.

In addition, the PRC could choose to use elements of the stolen nuclear weapons design information — including the neutron bomb — on intermediate- and short-range ballistic missiles, such as its CSS-6 missiles.

The PRC has the infrastructure and technical ability to use elements of the stolen U.S. warhead design information in the PLA's next generation of thermonuclear weapons. The Select Committee concludes that the production tools and processes required by the PRC to produce small thermonuclear warheads based on the stolen U.S. design information, including the stolen W-88 information, would be similar to those developed or available in a modern aerospace or precision-guided munitions industry. The Select Committee judges that the PRC has such infrastructure and is capable of such production.

The Select Committee judges that the PRC is likely to continue its work on advanced thermonuclear weapons based on the stolen U.S. design information. The PRC could begin serial production of such weapons during the next decade in connection with the development of its next generation of intercontinental ballistic missiles.



A series of PRC nuclear weapons test explosions from 1992 to 1996 began a debate in the U.S. Government about whether the PRC's designs for its new generation of nuclear warheads were in fact based on stolen U.S. classified information. The apparent purpose of these PRC tests was to develop smaller, lighter thermonuclear warheads, with an increased yield-to-weight ratio.

The United States did not become fully aware of the magnitude of the counter-intelligence problem at the Department of Energy national weapons laboratories until 1995. In 1995 the United States received a classified PRC document that demonstrated that the PRC had obtained U.S. design information on the W-88 warhead and technical information concerning approximately half a dozen other U.S. thermonuclear warheads and associated reentry vehicles.

The document was provided by a PRC national, unsolicited by the CIA — a “walk in.” This individual approached the CIA outside the PRC, and turned over a number of documents. Among these was an official PRC document classified “Secret” by the PRC.

This PRC document included, among other matters, stolen U.S. design information on the W-88 thermonuclear warhead used on the Trident D-5 missile, as well as U.S. technical information on several other strategic U.S. nuclear warheads. The document recognized that the U.S. weapons represented the state-of-the-art against which PRC nuclear weapons should be measured.

By mid-1996 the CIA had determined that the individual who provided the information was secretly under the direction of the PRC intelligence services. The CIA and other U.S. intelligence community analysts have nevertheless concluded that the classified PRC document contained U.S. thermonuclear warhead design information and other technical information on U.S. nuclear weapons.

The stolen U.S. nuclear secrets give the PRC design information on thermonuclear weapons on a par with our own. Currently deployed PRC ICBMs targeted on U.S. cities are based on 1950s-era nuclear weapons designs. With the stolen U.S. technology, the PRC has leaped, in a handful of years, from 1950s-era strategic nuclear capabilities to the more modern thermonuclear weapons designs. These modern thermonuclear weapons took the United States decades of effort, hundreds of millions of dollars, and numerous nuclear tests to achieve.



Such small, modern warheads are necessary for all of the elements of a modern intercontinental nuclear force, including:

- **Road-mobile ICBMs**
- **Submarine-launched ICBMs**
- **ICBMs with multiple warheads (MRVs or MIRVs)**

The PRC has an ongoing program to use these modern thermonuclear warheads on its next generation of ICBMs, currently in development. Without the nuclear secrets stolen from the United States, it would have been virtually impossible for the PRC to fabricate and test successfully small nuclear warheads prior to its 1996 pledge to adhere to the Comprehensive Test Ban Treaty.

B. The Select Committee judges that elements of the stolen information on U.S. thermonuclear warhead designs will assist the PRC in building its next generation of mobile ICBMs, which may be tested this year.

The stolen U.S. design information will assist the PRC in building smaller nuclear warheads — vital to the success of the PRC's ongoing efforts to develop survivable, mobile missiles. Current PRC ICBMs, which are silo-based, are more vulnerable to attack than mobile missiles.

The PRC has currently underway three intercontinental mobile missile programs — two road-mobile, and one submarine-launched. All of these missiles are capable of targeting the United States.

The first of these, the road-mobile solid-propellant DF-31, may be tested in 1999. Given a successful flight-test program, the DF-31 could be ready for deployment in 2002.

The Select Committee judges that the PRC will in fact use a small nuclear warhead on its new generation ICBMs. The small, mobile missiles that the PRC is developing require smaller warheads than the large, heavy, 1950s-era warheads developed for the PRC's silo-based missiles. The main purpose of a series of



nuclear tests conducted by the PRC between 1992 and 1996 was evidently to develop new smaller, lighter warheads with an increased yield-to-weight ratio for use with the PRC's new, mobile nuclear forces.

The Select Committee judges that the PRC will exploit elements of the stolen U.S. thermonuclear weapons designs on its new ICBMs currently under development. The advanced U.S. thermonuclear warheads for which the PRC has stolen U.S. design information are significantly smaller than those for which the PRC's silo-based missiles were designed. The U.S. designs, unlike those in the PRC's currently-deployed arsenal, can be used on smaller mobile missiles.

The Select Committee judges that:

- **The PRC is likely to continue to work on small thermonuclear warheads based on stolen U.S. design information**
- **The PRC has the infrastructure and ability to produce such warheads, including warheads based on elements of the stolen U.S. W-88 Trident D5 design information**
- **The PRC could begin serial production of small thermonuclear warheads during the next decade in conjunction with its new generation of road-mobile missiles**
- **The introduction of small warheads into PLA service could coincide with the initial operational capability of the DF-31, which could be ready for deployment in 2002**

These small warhead designs will make it possible for the PRC to develop and deploy missiles with multiple reentry vehicles (MRVs or independently targetable MIRVs).

Multiple reentry vehicles increase the effectiveness of a ballistic missile force by multiplying the number of warheads a single missile can carry as many as ten-fold.

Multiple reentry vehicles also can help to counter missile defenses. For example, multiple reentry vehicles make it easier for the PRC to deploy penetration aids with its ICBM warheads in order to defeat anti-missile defenses.



The Select Committee is aware of reports that the PRC has in the past undertaken efforts related to technology with MIRV applications. Experts agree that the PRC now has the capability to develop and deploy silo-based intercontinental ballistic missiles with multiple reentry vehicles (MIRVs or MRVs).

Experts also agree that the PRC could have this capability for its new mobile intercontinental ballistic missiles within a reasonable period of years that is consistent with its plans to deploy these new mobile missiles. The PRC could pursue one or more penetration aids in connection with its new nuclear missiles.

If the PRC violates the Comprehensive Test Ban Treaty by testing surreptitiously, it could further accelerate its nuclear development.

The Select Committee judges that, if the PRC were successful in stealing nuclear test codes, computer models, and data from the United States, it could further accelerate its nuclear development. By using such stolen codes and data in conjunction with High Performance Computers (HPCs) already acquired by the PRC, the PRC could diminish its need for further nuclear testing to evaluate weapons and proposed design changes.

The possession of the stolen U.S. test data could greatly reduce the level of HPC performance required for such tasks. For these reasons, the Select Committee judges that the PRC has and will continue to aggressively target for theft our nuclear test codes, computer models, and data.

Although the United States has been the victim of systematic espionage successfully targeted against our most advanced nuclear weapons designs — and although the Select Committee judges that the PRC will exploit elements of those designs for its new generation of ICBMs — the United States retains an overwhelming qualitative and quantitative advantage in deployed strategic nuclear forces. Nonetheless, in a crisis in which the United States confronts the PRC's conventional and nuclear forces at the regional level, a modernized PRC strategic nuclear ballistic missile force would pose a credible direct threat against the United States.

Neither the United States nor the PRC has a national ballistic missile defense system.



In the near term, a PRC deployment of mobile thermonuclear weapons, or neutron bombs, based on stolen U.S. design information, could have a significant effect on the regional balance of power, particularly with respect to Taiwan. PRC deployments of advanced nuclear weapons based on stolen U.S. design information would pose greater risks to U.S. troops and interests in Asia and the Pacific.

In addition, the PRC's theft of information on our most modern nuclear weapons designs enables the PRC to deploy modern forces much sooner than would otherwise be possible.

At the beginning of the 1990s, the PRC had only one or two silo-based ICBMs capable of attacking the United States. Since then, the PRC has deployed up to two dozen additional silo-based ICBMs capable of attacking the United States; has upgraded its silo-based missiles; and has continued development of three mobile ICBM systems and associated modern thermonuclear warheads.

If the PRC is successful in developing modern nuclear forces, as seems likely, and chooses to deploy them in sufficient numbers, then the long-term balance of nuclear forces with the United States could be adversely affected.

C. Despite repeated PRC thefts of the most sophisticated U.S. nuclear weapons technology, security at our national nuclear weapons laboratories does not meet even minimal standards.

The PRC stole design information on the United States' most advanced thermonuclear weapons as a result of a sustained espionage effort targeted at the United States' nuclear weapons facilities, including our national weapons laboratories. The successful penetration by the PRC of our nuclear weapons laboratories has taken place over the last several decades, and almost certainly continues to the present.

More specifically, the Select Committee has concluded that the successful penetration of our National Laboratories by the PRC began as early as the late 1970s; the PRC had penetrated the Laboratories throughout the 1980s and 1990s; and our Laboratories almost certainly remain penetrated by the PRC today.

Our national weapons laboratories are responsible for, among other things, the design of thermonuclear warheads for our ballistic missiles. The information at our national weapons laboratories about our thermonuclear warheads is supposed to be among our nation's most closely guarded secrets.

Counterintelligence programs at the national weapons laboratories today fail to meet even minimal standards. Repeated efforts since the early 1980s have failed to solve the counterintelligence deficiencies at the National Laboratories. While one of the Laboratories has adopted better counterintelligence practices than the others, all remain inadequate.

Even though the United States discovered in 1995 that the PRC had stolen design information on the W-88 Trident D-5 warhead and technical information on a number of other U.S. thermonuclear warheads, the White House has informed the Select Committee, in response to specific interrogatories propounded by the Committee, that the President was not briefed about the counterintelligence failures until early 1998.

Moreover, given the great significance of the PRC thefts, the Select Committee is concerned that the appropriate committees of the Congress were not adequately briefed on the extent of the PRC's espionage efforts.

A counterintelligence and security plan adopted by the Department of Energy in late 1998 in response to Presidential Decision Directive 61 is a step toward establishing sound counterintelligence practices. However, according to the head of these efforts, significant time will be required to implement improved security procedures pursuant to the directive. Security at the national weapons laboratories will not be satisfactory until at least sometime in the year 2000.

See the chapters *PRC Acquisition of U.S. Technology*, *PRC Theft of U.S. Thermonuclear Warhead Design Information*, and *PRC Missile and Space Forces* for more detailed discussions of the Select Committee's investigation of these matters.



2.

The PRC has stolen or otherwise illegally obtained U.S. missile and space technology that improves the PRC's military and intelligence capabilities.

A. The PRC has stolen U.S. missile technology and exploited it for the PRC's own ballistic missile applications.

The PRC has proliferated such military technology to a number of other countries, including regimes hostile to the United States.

The Select Committee has found that the PRC has stolen a specific U.S. guidance technology used on current and past generations of U.S. weapons systems. The stolen guidance technology is currently used on a variety of U.S. missiles and military aircraft, including:

- **The U.S. Army Tactical Missile System (ATACMS)**
- **The U.S. Navy Stand-off Land Attack Missile-Extended Range (SLAM-ER)**
- **The U.S. Navy F-14**
- **The U.S. Air Force F-15, F-16, and F-117 fighter jets**

The stolen guidance technology has direct applicability to the PRC's intercontinental, medium- and short-range ballistic missiles, and its spacelift rockets.

The theft of U.S. ballistic missile-related technology is of great value to the PRC. In addition to ICBMs and military spacelift rockets, such technology is directly applicable to the medium- and short-range PLA missiles, such as the CSS-6 (also known as the M-9), the CSS-X-7 (also known as the M-11), and the CSS-8 that have been developed for, among other purposes, striking Taiwan.



CSS-6 missiles were, for example, fired in the Taiwan Strait and over Taiwan's main ports in the 1996 crisis and confrontation with the United States.

The Select Committee has uncovered instances of the PRC's use of this specific stolen U.S. technology that:

- **Enhance the PRC's military capabilities**
- **Jeopardize U.S. national security interests**
- **Pose a direct threat to the United States, our friends and allies, or our forces**

The Clinton administration has determined that particular uses by the PRC of this stolen U.S. technology cannot be disclosed publicly without affecting national security.

The PRC has proliferated weapons systems and components to other countries including Iran, Pakistan, Libya, Syria, and North Korea.

B. In the late 1990s, the PRC stole or illegally obtained U.S. developmental and research technology that, if taken to successful conclusion, could be used to attack U.S. satellites and submarines.

During the late 1990s, U.S. research and development work on electromagnetic weapons technology has been illegally obtained by the PRC as a result of successful espionage directed against the United States. Such technology, once developed, can be used for space-based weapons to attack satellites and missiles.

In 1997, the PRC stole classified U.S. developmental research concerning very sensitive detection techniques that, if successfully concluded, could be used to threaten U.S. submarines.



C. Currently-deployed PRC ICBMs targeted on the United States are based in significant part on U.S. technologies illegally obtained by the PRC in the 1950s.

This illustrates the potential long-term effects of technology loss.

Even in today's rapidly changing technological environment, technology losses can have long-term adverse effects. Currently-deployed PRC ICBMs targeted on the United States are based on U.S. and Russian technologies from the 1950s and 1960s.

In the 1950s, a U.S. military officer and associated members of the design team for a U.S. ICBM program (the "Titan" missile program) emigrated to the PRC and illegally gave U.S. missile and missile-related technology to the PRC.

This information formed the basis for the up to two dozen PRC CSS-4 ICBMs that are currently targeted on the United States.

All but two of these missiles have been deployed by the PRC for the first time in this decade.

D. In the aftermath of three failed satellite launches since 1992, U.S. satellite manufacturers transferred missile design information and know-how to the PRC without obtaining the legally required licenses.

This information has improved the reliability of PRC rockets useful for civilian and military purposes.

The illegally transmitted information is useful for the design and improved reliability of future PRC ballistic missiles, as well.

U.S. satellite manufacturers analyzed the causes of three PRC launch failures and recommended improvements to the reliability of the PRC rockets. These launch failure reviews were conducted without required Department of State export licenses,

and communicated technical information to the PRC in violation of the International Traffic in Arms Regulations.

The Select Committee has concluded that the PRC implemented a number of the recommended improvements to rocket guidance and to the fairing (or nose cone), which protects a satellite during launch. These improvements increased the reliability of the PRC Long March rockets. It is almost certain that the U.S. satellite manufacturers' recommendations led to improvements in the PRC's rockets and that the improvements would not have been considered or implemented so soon without the U.S. assistance.

It is possible or even likely that, absent the U.S. satellite manufacturers' interventions on the problems associated with the defective fairing on the PRC's Long March 2E rocket and the defective guidance system on the PRC's Long March 3B rocket, one or more other PRC launches would have failed.

The PRC Long March rockets improved by the U.S. technology assistance are useful for both commercial and military purposes. The military uses include launching:

- **Military communications and reconnaissance satellites**
- **Space-based sensors**
- **Space-based weapons, if successfully developed**
- **Satellites for modern command and control and sophisticated intelligence collection**

The Select Committee judges that the PRC military has important needs in these areas, including notably space-based communications and reconnaissance capabilities.

In addition, design and testing know-how and procedures communicated during the launch failure reviews could be applied to the reliability of missiles or rockets generally. U.S. participants' comments during the failure investigations related to such matters as:



- **Missile design**
- **Design analysis**
- **Testing procedures**
- **The application of technical know-how to particular failure analyses**

To the extent any valuable information was transferred to the PRC's space program, such information would likely find its way into the PRC's ballistic missile program. The ballistic missile and space launch programs have long been intertwined and subordinate to the same ministry and state-owned corporation in the PRC.

For example, the PRC's Long March 2 rockets and their derivatives (including the Long March 2E, on which Hughes advised the PRC) were derived directly from the PRC's silo-based CSS-4 intercontinental ballistic missiles that are currently targeted on the United States.

The various institutes and academies in the PRC involved in ballistic missile and rocket design also share design and production responsibilities. Many of the PRC personnel in these organizations have responsibilities for both commercial rocket and military missile programs. Attendees at important failure review meetings included PRC personnel from such organizations.

In fact, information passed during each of the failure analyses has the potential to benefit the PRC's ballistic missile program. The independent experts retained by the Select Committee judge that information valuable to the PRC's ballistic missile and space programs was transferred to the PRC in the failure investigations.

The rocket guidance system on which Loral and Hughes provided advice in 1996 is judged by the Select Committee to be among the systems capable of being adapted for use as the guidance system for future PRC road-mobile intercontinental ballistic missiles, although if a better system is available, it is more likely to be chosen for that mission.

The Select Committee judges that information on rocket fairings (that is, nose cones) provided to the PRC by Hughes may assist the design and improved reliabili-



ty of future PRC MIRVed missiles, if the PRC decides to develop them, and of future submarine-launched ballistic missiles.

When Loral and Hughes assisted the PRC, they could not know whether the PRC would in fact use such information in their military programs.

i. In 1993 and 1995, Hughes showed the PRC how to improve the design and reliability of PRC rockets.

Hughes' advice may also be useful for design and improved reliability of future PRC ballistic missiles.

Hughes deliberately acted without seeking to obtain the legally required licenses.

In 1993 and 1995, Hughes showed the PRC how to improve the design and reliability of PRC Long March rockets with important military applications. The information provided by Hughes also may be useful for improving the reliability of future PRC ballistic missiles. Hughes deliberately acted without the legally required licenses.

In 1993 and 1995 Hughes analyzed the causes of PRC launch failures and, for both failures, illegally recommended to the PRC improvements to the fairing, a part of the rocket that protects the payload. The PRC changed the fairing of its Long March rocket to incorporate the Hughes recommendations.

Hughes also corrected deficiencies in the PRC's coupled loads analysis, a critical rocket design technology.

Hughes also identified changes needed in PRC launch operations.

The State Department's Office of Defense Trade Controls has concluded that Hughes significantly improved the PRC space launch program and contributed to the PRC goal of assured access to space. The State Department further concluded that the lessons learned by the PRC are inherently applicable to their missile program.

The State Department administers arms export licensing, and would have been the proper authority to license the Hughes failure investigations.



The State Department found that the PRC and Hughes personnel engaged in an extensive exchange of data and analyses, which, among other things, identified and corrected for the PRC deficiencies in a number of technical areas, including:

- **Anomaly analysis**
- **Accident investigation techniques**
- **Telemetry analysis**
- **Coupled loads analysis**
- **Hardware design and manufacture**
- **Testing**
- **Modeling**
- **Simulation**
- **Weather analysis**

The illegally transmitted information improved the PRC's military rockets and operations. The illegally transmitted information may assist the PRC in the design and improved reliability of future silo-based or mobile PRC ballistic missiles, including particularly missiles that require fairings (or nose cones). These would include missiles with advanced payloads (that is, multiple warheads, or certain penetration aids designed to defeat missile defenses), and submarine launched ballistic missiles.

The PRC has the capability to develop and deploy silo-based missiles with multiple reentry vehicles (MIRVs or MRVs). Within a reasonable period of years that is consistent with the PRC's possible deployment of new mobile missiles, the PRC could deploy multiple warheads on those mobile missiles, as well. The PRC also appears to have gained practical insight into U.S. coupled loads analysis, and insight into diagnostic and failure analysis techniques for identifying the causes of a launch failure. Such lessons could be applied to both rockets and missiles.

In both 1993 and 1995, Hughes failed to apply for or obtain the required Department of State licenses for its activities, because Hughes knew that the Department of State would be unlikely to grant the license and that the licensing process would in any case be lengthy.

Hughes also engaged in deliberate efforts to circumvent the Department of State licensing requirement. To this end, Hughes sought the approval of a Department of Commerce official for its 1995 activities and claims to have sought the approval of a Department of Defense monitor for some of its 1993 activities, although Hughes knew that neither official was legally authorized to issue the required license.

Hughes had important commercial interests in the PRC at the time it engaged in the failure investigations. These interests included future sales of satellites to the PRC or to parties serving the PRC market, and reducing the cost and improving the safety of launching satellites in the PRC.

- ii. **In 1996, Loral and Hughes showed the PRC how to improve the design and reliability of the guidance system used in the PRC's newest Long March rocket.**

Loral's and Hughes' advice may also be useful for design and improved reliability of elements of future PRC ballistic missiles.

Loral and Hughes acted without the legally required license, although both corporations knew that a license was required.

Loral and Hughes analyzed for the PRC the potential causes of a 1996 PRC launch failure, identified for the PRC the true cause of the failure as a particular element within the Long March rocket's guidance unit, and provided the PRC with technical assistance that may be useful not only for the PRC's commercial and military space launch programs, but for ballistic missiles as well.

In so doing, Loral and Hughes deliberately acted without the legally required license, and violated U.S. export control laws.

Although Loral and Hughes were well aware that a State Department license was required to provide assistance related to the guidance system of a PRC rocket, neither company applied for or obtained the required license. Loral was warned of the need for a license at the time it agreed to participate in the investigation, but took no action.



Loral and Hughes also failed to properly brief participants in the failure investigation of U.S. export requirements, failed to monitor the investigation as it progressed, and failed to take adequate steps to ensure that no prohibited information was passed to the PRC.

Loral and Hughes submitted lengthy written materials analyzing the cause of the guidance system failure to the PRC and to other foreign nationals. In addition, Loral and Hughes engaged in technical discussions, including discussions about the details and causes of the guidance system failure, that were almost certainly recorded by the PRC.

While some aspects of these discussions have been identified by the Select Committee and reviewed by independent experts retained by the Select Committee, the full range and content of these discussions remains unknown. The Select Committee was unable to talk to several important participants in the failure investigation, and the PRC refused to agree to the Select Committee's request for interviews. Additional controlled information may have been received by the PRC.

The information and assistance conveyed by Loral and Hughes led to improvements to the guidance system of the PRC's Long March 3B rocket. While the launch that failed was commercial, the information transmitted by Loral and Hughes was useful, as well, for military space launch purposes.

Loral and Hughes provided valuable additional information that exposed the PRC to Western diagnostic processes that could lead to improvements in the reliability of all PRC ballistic missiles. Loral's and Hughes' advice could help reinforce or add vigor to the PRC's adherence to good design and test practices, which could be transferred to the ballistic missile program. The exposure to U.S. diagnostic and test processes outlined by Loral and Hughes has the potential to improve PRC pre- and post-flight failure analysis for the ballistic missile program.

The technology transferred by Loral and Hughes thus has the potential, if used by the PRC, to increase the reliability of future PRC ballistic missiles.

The independent experts retained by the Select Committee had access not just to the written report prepared by Loral with input from Hughes, but also to the comments of participants about meetings in Beijing. The independent experts conclude

that information valuable to the PRC's space and ballistic missile programs was transferred.

Neither Loral nor Hughes disclosed to export control officers of the U.S. Government their unlicensed activities until after they were contacted by U.S. Government licensing officials demanding an explanation for their conduct. The U.S. Government officials became aware of the improper activities through an article in a widely-read industry publication. This article also came to Loral's attention prior to Loral's disclosure to the U.S. Government.

Loral and Hughes had important commercial interests in the PRC when they engaged in the 1996 failure investigation. These interests included future sales of satellites to the PRC or to parties serving the PRC market, and reducing the cost and improving the safety of launching satellites in the PRC.

E. In light of the PRC's aggressive espionage campaign against U.S. technology, it would be surprising if the PRC has not exploited security lapses that have occurred in connection with launches of U.S. satellites in the PRC.

The original policy permitting U.S. manufactured satellites to be launched in the PRC envisioned strict compliance with requirements to prevent unauthorized technology transfers.

These requirements are encompassed in U.S. regulations and licenses. Pursuant to a bilateral agreement between the United States and the PRC, the requirements include U.S. control over access to the satellite while it is in the PRC. Many of these requirements imposed on exporters are to be closely monitored by U.S. Government officials provided by the Defense Department.

The Select Committee has found numerous lapses in the intended pre-launch technology safeguards. Defense Department monitors have reported numerous security infractions by exporters. Exporters often hire private security guards to assist



in the performance of their duties to prevent technology transfers, and these private guards have also reported security lapses.

In addition, it is likely that other security lapses have gone unreported. In the mid-1990s, three launches and associated pre-launch activities were not monitored by the Defense Department. Launches that were monitored have lacked proper staffing.

Because of the PRC's aggressive efforts to acquire U.S. technology, it would be surprising if the PRC has not exploited security lapses while U.S.-built satellites and associated equipment and documents were in the PRC. Prior to launch, the satellite, associated test equipment, and controlled documents are transported to the PRC and may remain in the PRC for periods as short as a couple of weeks or as long as two months. The PRC would likely exploit opportunities to gain information while the U.S. satellite and associated equipment are in the PRC before launch.

Unrestricted access to a satellite for as little as two hours could provide the PRC with valuable, non-public information about major satellite subsystems, as well as the design and manufacture of such subsystems.

There are numerous reasons for security infractions, some of which may be addressed through changes in procedures:

- **Defense Department monitors on occasion have found poor attitudes toward security among both company management and private guards**
- **Private security guards hired by satellite exporters may have an inherent conflict of interest when reporting on their current and prospective employers**
- **Both Defense Department monitors and private security guards may lack sufficient training**
- **Defense Department monitors sometimes lack continuity with a given launch**
- **Often, only one Defense Department monitor may have been present on a project**

F. Foreign brokers and underwriters of satellite and space launch insurance have obtained controlled U.S. space and missile-related technology outside of the system of export controls that applies to U.S. satellite manufacturers.

While existing laws address such exports, U.S. export control authorities may not be adequately enforcing these laws in the space insurance industry context, nor paying sufficient attention to these practices.

Satellite and space insurance is underwritten by overseas and multinational organizations to which U.S. technical information is always passed to assess insurance risks. This is particularly true where the insurers have particular reasons to be concerned about launch failures.

These insurers have, on occasion, received controlled U.S. technical information. It is not clear that manufacturers and purchasers of satellites are transmitting satellite information to such foreign brokers and underwriters in compliance with U.S. export control rules and regulations.

As insurance is critical to commercial space launches, the insurance role cannot be eliminated. Existing laws address exports to brokers and insurers. The administration of these laws must be applied to exports of sensitive U.S. technology to the space launch and satellite insurance industry.

G. The Strom Thurmond National Defense Authorization Act took important steps to correct deficiencies in the administration of U.S. export controls on commercial space launches in the PRC.

But the aggressive implementation of this law is vital, and other problems with launches in the PRC that the Act does not address require immediate attention.



The Fiscal 1999 Department of Defense Authorization Act sought to increase safeguards on technology transfer during foreign launches of U.S. satellites.

The measures set forth in the Act include transferring licensing jurisdiction to the Department of State, and increased support for the Defense Department's efforts to prevent technology loss.

However, additional measures — including better training for Defense Department monitors and improved procedures for hiring professional security personnel — will be needed.

H. It is in the national security interest of the United States to increase U.S. domestic launch capacity.

While U.S. policy since 1988 has permitted launching satellites in the PRC, U.S. national security interests would be advanced by avoiding the need for foreign launches through increased domestic launch capability.

The Reagan administration's decision to permit launches in the PRC was affected by two factors: insufficient domestic launch options in the aftermath of the *Challenger* disaster, and the perception of the PRC as a strategic balance against the Soviet Union in the context of the Cold War. These factors are no longer applicable today.

Launching Western satellites has provided the PRC with additional experience that has improved its space launch capabilities. Even in the absence of any loss of U.S. technology, such experience benefits a potential long-run competitor of the United States.

See the chapters *PRC Missile and Space Forces*, *Satellite Launches in the PRC: Hughes*, and *Satellite Launches in the PRC: Loral* for more detailed discussion of the Select Committee's investigation of these matters.

3.

United States and international export control policies and practices have facilitated the PRC's efforts to obtain militarily useful technology.

- A. Recent changes in international and domestic export control regimes have reduced the ability to control transfers of militarily useful technology.**
 - i. The dissolution of COCOM in 1994 left the United States without an effective, multilateral means to control exports of militarily useful goods and technology.**
-

The Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies (Wassenaar) leaves international controls over the transfer of military technologies to national discretion.

The dissolution of the Coordinating Committee for Multilateral Export Controls (COCOM) in March 1994 left the United States without an effective international mechanism to control the transfer of important military technologies. Other multilateral control regimes set guidelines for particular kinds of transfers (for example, certain transfers related to missiles or weapons of mass destruction).

In the post-COCOM period, the United States dramatically liberalized export controls.

A new COCOM-like agreement, under which national exports of certain militarily useful goods and technologies are subject to international agreement, would enhance efforts to restrict technology transfers. The United States should seek to negotiate such a new arrangement.



- ii. **The expiration of the Export Administration Act in 1994 has left export controls under different legislative authority that, among other things, carries lesser penalties for export violations than those that can be imposed under the Act.**
-

Following the expiration of the Export Administration Act in 1994, export controls on dual-use items have been continued under the provisions of the International Emergency Economic Powers Act. This law carries significantly lesser penalties for criminal and civil violations of export controls than those that applied under the Export Administration Act.

While the general criminal penalties of Title 18 of the U.S. Code may be imposed under either scheme, administration of export controls would be enhanced by a reauthorization of the Export Administration Act that would restore more significant penalties for export control violations.

- iii. **U.S. policy changes announced in 1995 that reduced the time available for national security agencies to consider export licenses need to be reexamined in light of the volume and complexity of licensing activities.**
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New procedures and deadlines for processing Commerce Department export license applications instituted in late 1995 placed national security agencies under significant time pressures.

Commerce officials alone are less likely to have the expertise for identifying national security implications of exports of militarily useful technologies. While national security agencies may be informed of applications, due time is needed for their consideration.

However, the time frame for consideration is not always sufficient for the Department of Defense to determine whether a license should be granted, or if conditions should be imposed.

In addition, the Intelligence Community has sought a role earlier in the licensing process in order to evaluate the technology and end user.

B. Dividing the licensing responsibilities for satellites between the Departments of Commerce and State permitted the loss of U.S. technology to the PRC.

The 1996 decision to give Commerce the lead role in satellite exporting was properly reversed by the Congress.

Divided jurisdiction between Commerce and State over satellite export licensing has facilitated the loss of U.S. technology to the PRC.

While licensing authority regarding rockets has always remained with the State Department, in 1992 certain aspects of satellite licensing were transferred to Commerce.

For nearly a three-year period thereafter, Commerce licenses did not require Department of Defense monitors for launch campaigns. Accordingly, U.S. Government officials did not monitor several launches and launch campaigns. Given the PRC's efforts at technology acquisition, it would be surprising if the PRC did not attempt to exploit this situation.

In 1995, a Commerce Department official improperly authorized the transfer, in the context of a launch failure investigation, of information regarding rocket design that would almost certainly have been prevented had the Department of State been consulted.

In October 1996, all remaining authority for commercial satellite licensing was transferred to Commerce.

Legislation passed by Congress in 1998 eliminated the split jurisdiction and assigned all licensing of satellite exports to the Department of State.



C. U.S. policies relying on corporate self-policing to prevent technology loss have not worked.

Corporate self-policing does not sufficiently account for the risks posed by inherent conflicts of interest, and the lack of priority placed on security in comparison to other corporate objectives.

To protect the national security interests of the United States, the U.S. Government imposes substantial requirements on U.S. businesses exporting technology to the PRC. These can include obtaining a license, satisfying additional conditions imposed in the license, paying for U.S. Government monitors, and providing security guards.

Under current policies, whether U.S. national security is in fact protected from the loss of export-controlled information thus depends in large part on the vigilance, good will, and efforts dedicated by business to comply with lawful requirements.

Corporations may often face inherent conflicts of interest in complying with U.S. export laws. Corporate interests that may conflict with restricting exports as required by U.S. law include:

- **Corporate goals to expand overseas markets and to satisfy current or prospective customers**
- **Urgent business priorities that compete for the attention of corporate management**
- **An unwillingness to devote the financial resources necessary for effective security**

Protecting the national security interest simply may not be related to improving a corporation's "bottom line."

In cases discussed later in this Report, two U.S. satellite manufacturers, Hughes and Loral, failed to live by the requirements of U.S. law. The failure of Hughes to obtain legally required licenses, for example, reflects a deliberate decision to assist the

PRC immediately, rather than risk the possibility that a license application would be delayed or rejected.

Such pressures may be great where important commercial opportunities or relationships may seem to a corporation to be at stake.

U.S. policies relying on corporate self-policing to prevent technology loss have not sufficiently accounted for the risks posed by inherent conflicts of interest, and by the lack of priority placed on dedicating resources to security in comparison to other corporate objectives.

D. The PRC requires high performance computers (HPCs) for the design, modeling, testing, and maintenance of advanced nuclear weapons based on the nuclear weapons design information stolen from the United States.

The United States relaxed restrictions on HPC sales in 1996; and the United States has no effective way to verify that HPC purchases reportedly made for commercial purposes are not diverted to military uses.

The Select Committee judges that the PRC has in fact used HPCs to perform nuclear weapons applications.

PRC research institutes with connections to PLA military industries have access to numerous U.S.-built HPCs that could be used for unlawful military applications. HPCs are important for many military applications, and essential for some.

One key concern is diversion of U.S. HPCs to the PRC's nuclear weapons program. If the PRC complies with the Comprehensive Test Ban Treaty, then its need for HPCs to design, weaponize, deploy, and maintain nuclear weapons will be greater than that of any other nation possessing nuclear weapons, according to the Department of Energy.



HPCs are useful for two-dimensional and critical to three-dimensional computer modeling that would be necessary for the PRC to develop, modify, and maintain its nuclear weapons in the absence of physical testing.

The utility of nuclear weapons computer modeling depends on the amount of data available from actual nuclear weapons tests, the computing capacity that is available, and programmer expertise. For this reason, in the judgment of the Select Committee, the PRC has targeted U.S. nuclear test data for espionage collection, which, if successful, would reduce its HPC performance requirements.

Complete three-dimensional models, critical to stockpile maintenance and assessment of the effect of major warhead modifications in the absence of physical testing, require HPCs of one million MTOPS (millions of theoretical operations-per-second, a measure of computer performance and speed) or more. Assessing the effects of a new warhead without testing would require three-dimensional modeling.

Although the precise utility of HPCs in the 2,000 to 10,000 MTOPS range for two-dimensional modeling is unclear, these HPCs may be powerful enough to help the PRC incorporate nuclear weapons design information that it stole from the U.S. into delivery systems without further testing.

In fact, the Select Committee judges that the PRC has been using HPCs for nuclear weapons applications. The illegal diversion of HPCs for the benefit of the PRC military is facilitated by the lack of effective post-sale verifications of the locations and purposes for which the computers are being used. HPC diversion for PRC military use is also facilitated by the steady relaxation of U.S. export controls over sales of HPCs.

Until 1998, there was no verification of the end uses of HPCs in the PRC. Modest verification procedures were announced in June 1998, but even if these are implemented fully, they will be insufficient.

Over the past several years, U.S. export controls on the sale of HPCs to the PRC have been steadily relaxed. As a result, while the PRC had virtually no HPCs in 1996, the PRC had over 600 U.S.-origin HPCs at the end of 1998.

The PRC has demonstrated the capability to assemble an HPC using U.S.-origin microprocessors. The Select Committee has concluded, however, that the PRC has virtually no indigenous high-end computer production capability. Moreover, while the PRC might attempt to perform some HPC functions by other means, these computer work-arounds remain difficult and imperfect.

Data from the Commerce Department and Defense Department indicate that HPCs from the United States have been obtained by PRC organizations involved in the research and development of:

- **Missiles**
- **Satellites**
- **Spacecraft**
- **Submarines**
- **Aircraft**
- **Military systems components**
- **Command and control**
- **Communications**
- **Microwave and laser sensors**

Given the lack of an effective verification regime, it is possible that these HPCs have been diverted for military uses, which could include the following:

- **Incorporating or adapting nuclear weapons designs**
- **Upgrading and maintaining nuclear and chemical weapons**
- **Equipping mobile forces with high-technology weapons**
- **Building a modern fleet of combat and combat support aircraft and submarines**
- **Conducting anti-submarine warfare**
- **Developing a reliable, accurate ballistic and cruise missile force**



- **Equalizing a battlefield with electronic or information warfare**
- **Improving command, control, communications, and intelligence capabilities**

Finally, the Select Committee judges that nuclear testing data and related computer codes are a target of PRC espionage, and that the PRC's nuclear weapons programs would benefit from the illegal acquisition of such information.

In conjunction with such data and codes, HPCs can be used to improve nuclear weapons designs, performance, modeling, and nuclear stockpile maintenance that would otherwise be extremely difficult or impossible given the restrictions imposed by the Comprehensive Test Ban Treaty.

E. The PRC has attempted to obtain U.S. machine tools and jet engine technologies through fraud and diversions from commercial end uses.

In one 1991 case studied by the Select Committee, the Department of Commerce decontrolled jet engines without consulting either the Defense Department or the State Department.

i. In 1994 and 1995 the PRC attempted to divert an export of machine tools by McDonnell Douglas to military uses.

The Select Committee's classified Report includes significantly more detail on this subject than this unclassified version. The Justice Department has requested that the Select Committee not disclose the details of much of its investigation into these matters to protect the Justice Department's prosecution of the China National Aero-Technology Import/Export Corporation (CATIC) and McDonnell Douglas.

ii. In 1991 the Commerce Department decontrolled Garrett jet engines without consulting either the Defense Department or the State Department.



This led to a PRC effort to acquire related jet engine production technology. The Commerce Department was prepared to approve this transfer, which was only thwarted when the Defense Department was alerted by the U.S. Embassy in Beijing.

See the chapters *High Performance Computers*, *U.S. Export Policy Toward the PRC*, and *Manufacturing Processes* for a more detailed discussion of the Select Committee's investigation of these matters.

4.

- **The PRC seeks advanced U.S. military technology to achieve its long-term goals.**
- **To acquire U.S. technology the PRC uses a variety of techniques, including espionage, controlled commercial entities, and a network of individuals and organizations that engage in a vast array of contacts with scientists, business people, and academics.**

The PRC has vigorously pursued over the last two decades the acquisition of foreign military technologies. These efforts represent the official policy of the PRC and its Chinese Communist Party leadership. The PRC seeks foreign military technology as part of its efforts to place the PRC at the forefront of nations and to enable the PRC to fulfill its international agenda. The PRC's long-run geopolitical goals include incorporating Taiwan into the PRC and becoming the primary power in Asia.

The PRC has not ruled out using force against Taiwan, and its thefts of U.S. technology have enhanced its military capabilities for any such use of force.

The PRC has also asserted territorial claims against other Southeast Asian nations and Japan, and has used its military forces as leverage in asserting these claims.



These PRC goals conflict with current U.S. interests in Asia and the Pacific, and the possibility of a U.S.-PRC confrontation cannot be dismissed.

A. The PRC has mounted a widespread effort to obtain U.S. military technologies by any means — legal or illegal.

These pervasive efforts pose a particularly significant threat to U.S. export control and counterintelligence efforts.

The PRC seeks military-related technology through a broad range of activities that complicate U.S. counterintelligence efforts.

Many of these efforts are less centralized than was the case with those of the Soviet Union. The number of PRC nationals who seek access to U.S. technology is much greater than the number of persons who sought similar kinds of information for the Soviet Union.

The Select Committee has determined that the Intelligence Community is insufficiently focused on the threat posed by PRC intelligence and the targeted effort to obtain militarily useful technology from the United States. Due to our sustained focus on the Soviet Union during the Cold War, intelligence collection against the PRC was not a top priority for our intelligence agencies in those years.

For the last several years, the U.S. Intelligence Community has begun to place a greater priority on the PRC. Nonetheless, the Intelligence Community lacks sufficient Chinese linguists and needs increased resources to address the challenge posed by the PRC's intelligence collection efforts.

The FBI has inadequate resources in light of the extensive numbers of PRC visitors, students, diplomats, business representatives, and others who may be involved in intelligence and military-related technology transfer operations in the United States.

B. Efforts to deny the PRC access to U.S. military technology are complicated by the broad range of items in which the PRC is interested, and by transfers to the PRC of Russian military and dual-use technologies, which may make the consequences of the PRC's thefts of U.S. technology more severe.

The PRC seeks and has acquired from the United States and elsewhere a broad range of military and related technologies.

Russia, for example, has provided the PRC with extensive military assistance and related technologies, including a number of complete military systems. The Select Committee has been advised that the sheer number of transfers of military equipment and technology to the PRC from Russia, most of which have been a product of dramatically increased PRC-Russian military cooperation since 1992, is vastly greater than the number of transfers from the United States, most of which are the result of PRC espionage.

Together, the added capabilities that the PRC has gained and continues to gain from foreign sources makes it difficult to assess how quickly the PRC will be able to make full use of any systems or technologies stolen from the United States. For example, the PRC's reported acquisition of solid-fuel and mobile missile launcher technologies, if successfully combined with stolen U.S. nuclear design information, will enable the PRC to field a robust road-mobile, intercontinental ballistic missile threat to the United States sooner than would otherwise have been possible.

C. The PRC uses commercial and political contacts to advance its efforts to obtain U.S. military, as well as commercial, technology.

The PRC has adopted policies in recent years aimed at increasing its influence within the United States in order to increase access to U.S. military, as well as commercial, technology.



To this end, the PRC has used access to its markets to induce U.S. business interests to provide military-related technology.

The PRC also uses access to its markets to induce U.S. businesses to lobby in behalf of common goals, such as liberalized export standards and practices.

Agents tied to the PRC's military industries who have illegally provided political contributions may have used these contributions to gain access to U.S. military and commercial technology.

D. The PRC has proliferated nuclear, missile, and space-related technologies to a number of countries.

The PRC is one of the leading proliferators of complete ballistic missile systems and missile components in the world.

The PRC has sold complete ballistic missile systems, for example, to Saudi Arabia and Pakistan, and missile components to a number of countries including Iran and Pakistan. The PRC has proliferated military technology to Iran, Pakistan, and North Korea.

In 1991, the PRC agreed to adhere to the April 1987 Missile Technology Control Regime (MTCR) guidelines, but the PRC has not accepted the revisions to those guidelines issued in 1993. The 1993 MTCR guidelines increase the kinds of missile systems subject to controls and call for a “strong presumption to deny” both sales of complete missile systems and components that could be used in ballistic missiles.

The PRC has provided, or is providing, assistance to the missile and space programs of a number of countries according to the Congressional Research Service. These countries include, but are not limited to:

- **Iran.** The PRC has provided Iran with ballistic missile technology, including guidance components and the recent transfer of telemetry equipment. The PRC reportedly is providing Iran with solid-propellant missile technology. Additionally,



the PRC provided Iran with the 95-mile range CSS-8 ballistic missile. Since the mid-1980s, the PRC has transferred C-802 anti-ship cruise missiles to Iran. The PRC has also provided assistance to Iran's nuclear programs.

- **Pakistan.** The PRC has provided Pakistan with a wide range of assistance. The PRC reportedly supplied Pakistan with CSS-X-7/M-11 mobile missile launchers and reportedly has provided Pakistan with the facilities necessary to produce M-11 missiles. The PRC provides Pakistan with assistance on uranium enrichment, ring magnets, and other technologies that could be used in Pakistan's nuclear weapons program.
- **Saudi Arabia.** The PRC provided a complete CSS-2 missile system to Saudi Arabia in 1987. The conventionally-armed missile has a range of 1,200 to 1,900 miles.
- **North Korea.** The Select Committee judges that the PRC has assisted weapons and military-related programs in North Korea.

The Select Committee is aware of information of further PRC proliferation of missile and space technology that the Clinton administration has determined cannot be publicly disclosed without affecting national security.

See the chapter *PRC Acquisition of U.S. Technology* for more detailed discussion of the Select Committee's investigation of these matters.

