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China's Technology Acquisitions: Cox Committee's Report — Findings, Issues, and Recommendations

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ABSTRACT

On May 25, 1999, the House Select Committee on U.S. National Security and Military/Commercial Concerns with the People's Republic of China (Cox Committee) released the declassified version of its January 3, 1999 classified report on its investigation of U.S. technology transfers to China. The 3-volume, 871-page unclassified report discussed findings related to Chinese acquisition of U.S. nuclear weapon information, missile technology through satellite exports, high-performance computers, and other dual-use technology. The report made 38 recommendations. This CRS report summarizes the major findings of the Cox Committee's unclassified report, discusses some issues for further study, and summarizes the committee's recommendations. This CRS report will not be updated. (See also: CRS Report 98-485, *China: Possible Missile Technology Transfers from U.S. Satellite Export Policy — Background and Chronology;* CRS Report RL30143, *China: Suspected Acquisition of U.S. Nuclear Weapon Data*; and CRS Report RL30231, *Technology Transfer to China: an Overview of the Cox Committee Investigation Regarding Satellites, Computers, and DOE Laboratory Management*.)

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Summary

The House approved H.Res. 463 on June 18, 1998, to create the Select Committee on U.S. National Security and Military/Commercial Concerns with the People's Republic of China (PRC). The committee's six-month investigation looked beyond whether the satellite export policy resulted in missile technology transfers to China; it also examined other transfers, including high performance computers and nuclear weapon know-how. The committee made 38 recommendations for action by Congress or the Administration. On December 30, 1998, the bipartisan committee unanimously approved the final classified report (issued on January 3, 1999). The committee then released a 3-volume declassified version on May 25, 1999.

According to the committee, the PRC has "stolen" classified information on the most advanced U.S. thermonuclear weapons, giving the PRC design information on thermonuclear weapons "on a par with our own." The information includes classified information on seven warheads, including "every currently deployed thermonuclear warhead in the U.S. ballistic missile arsenal;" on the neutron bomb; and on "a number of" U.S. re-entry vehicles. The PRC acquired information on seven U.S. nuclear warheads, including the W88, the most advanced, miniature U.S. nuclear warhead deployed on the Trident D-5 submarine-launched ballistic missile. The committee reported that U.S. information accelerated PRC nuclear weapon modernization and helping its efforts "to fabricate and successfully test its next generation of nuclear weapons designs. These warheads give the PRC small, modern thermonuclear warheads roughly equivalent to current U.S. warhead yields."

The committee said that, after three failed satellite launches in 1992, 1995, and 1996, U.S. satellite makers (Hughes and Loral) transferred missile design information and know-how to China without required export licenses from the Department of State "in violation of the International Traffic in Arms Regulations." The firms gave technical information that has improved the "reliability" of Chinese rockets used to launch satellites with civilian and military purposes. The information is also useful for the design and improved reliability of "future PRC ballistic missiles."

There are a number of questions for possible further study raised by the report, including implications for U.S. national security arising from the status of Chinese nuclear weapons, missiles, intelligence, and military technology. The report noted that "the United States retains an overwhelming qualitative and quantitative advantage in deployed strategic nuclear forces" over the PRC's up to two dozen CSS-4 ICBMs. Nonetheless, the report stated that "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." The Cox report also noted that "assessing the extent to which design information losses accelerated the PRC's nuclear weapons development is complicated because so much is unknown." Representative Spratt of the Cox Committee said that "it is a reach to say that `stolen U.S. nuclear secrets give the PRC design information on thermonuclear weapons on a par with our own'." He also noted that the report "concludes that China's rockets and missiles may have gained reliability, but not range, payload, or accuracy."

Contents

Origins and Scope of the Investigation 1

Major Findings 3
- Nuclear Weapons 3
- Missile and Space Technology 4
- PRC Intelligence 6
- Violations of Technology Safeguards and Nonproliferation Agreements . . . 6
- Dual-use Export Controls 7

Some Questions for Further Study 8
- Nuclear Weapons 8
- Missile and Space Technology 11
- PRC Intelligence 12
- Violations of Technology Safeguards and Nonproliferation Agreements . . 14
- Dual-Use Export Controls 14

Recommendations 15
- Nuclear Weapons 15
- International Actions 16
- Satellite Launches 17
- High Performance Computers (HPCs) 18
- Export Legislation and Other Technology Controls 18
- Intelligence/Counterintelligence Issues 19

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Origins and Scope of the Investigation

The *New York Times* reported in April 1998 on the Justice Department's ongoing criminal investigation into whether Loral Space and Communications Ltd. and Hughes Electronics Corporation violated export control laws by helping China improve its rockets in reviewing an explosion that destroyed a Loral-built satellite in February 1996. The *Times* also said that, in February 1998, President Clinton had waived sanctions (imposed after the Tiananmen crackdown) in order to allow Loral to export a satellite, despite the ongoing Department of Justice criminal investigation of Loral's alleged earlier unauthorized transfer of missile guidance technology to the People's Republic of China (PRC). The reports further said that Bernard Schwartz, chairman of Loral, was the largest individual donor to the Democratic Party during the 1996

election cycle.[1] Loral acknowledged that contrary to its policies, a Loral-led review committee "provided a report to the Chinese before consulting with the State Department export licensing authorities," but says that it did not violate the law nor damaged national security. Loral said that Schwartz "was not personally involved," and "no political favors or benefits of any kind were requested or extended. . . "[2]

In addition to hearings held by a number of committees in the 105th Congress, the House and Senate began separate investigations in mid-1998. Those in the Senate were led by Senator Shelby, chairman of the Intelligence Committee, which released its unclassified report on May 7, 1999.[3]

House Speaker Gingrich announced on May 19, 1998, that he would establish a select committee, headed by Representative Cox, to investigate the various allegations on technology transfers to China. The House approved H. Res. 463 on June 18, 1998, to create the Select Committee on U.S. National Security and Military/Commercial Concerns with the People's Republic of China (hereafter, the Cox Committee or committee) and authorized it $2.5 million. The committee had five Republicans (Representatives Cox, Goss, Hansen, Bereuter, and Weldon) and four Democrats (Representatives Dicks, Spratt, Roybal-Allard, and Scott).

The committee carried out a six-month investigation that included 34 meetings to conduct business or hear briefings from June 25 to December 30, 1998. The investigation looked beyond whether the satellite export policy resulted in technology transfers to China; it also examined other transfers, including high performance computers (HPCs), machine tools, and nuclear weapon know-how.[4] On December 30, 1998, the bipartisan committee unanimously approved the final 700-page classified (Top Secret) report (H. Rept. 105-851) that was issued on January 3, 1999. The committee then worked with the Clinton Administration on a declassified version (released on May 25, 1999), on which this CRS Report is based.[5] A general outline of the Cox report follows:

All-Volume Overview
Volume I
    Chapter 1: PRC Acquisition of U.S. Technology
    Chapter 2: PRC Theft of U.S. Thermonuclear Warhead Design Information

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[1]Gerth, Jeff, "Companies Are Investigated For Aid to China On Rockets," and "Aerospace Firms' Ties with China Raise Questions," *New York Times*, April 4 and 13, 1998.

[2]Loral Space and Communications Ltd., "Space System/Loral China Issues - Fact Sheet," May 18, 1998.

[3]Senate Select Committee on Intelligence, "Report On Impacts To U.S. National Security Of Advanced Satellite Technology Exports to the People's Republic of China (PRC), and Report on the PRC's Efforts to Influence U.S. Policy," May 1999.

[4]For background, see: CRS Report 98-485, *China: Possible Missile Technology Transfers from U.S. Satellite Export Policy — Background and Chronology*, and CRS Report RL30143, *China: Suspected Acquisition of U.S. Nuclear Weapon Data*, by (name redacted).

[5]U.S. House of Representatives, Select Committee, Report 105-851, *U.S. National Security and Military/Commercial Concerns with the People's Republic of China*, classified report issued on January 3, 1999; declassified version issued on May 25, 1999.

Chapter 3: High Performance Computers
Chapter 4: PRC Missile and Space Forces
Volume II
Chapter 5: Satellite Launches in the PRC: Hughes
Chapter 6: Satellite Launches in the PRC: Loral
Chapter 7: Protecting Sensitive Information at PRC Launch Sites
Chapter 8: The Role of Commercial Space Insurance in Technology Transfer to the PRC
Volume III
Chapter 9: Statutory and Regulatory Controls: The Export of Our Militarily Sensitive Technology
Chapter 10: Manufacturing Processes: PRC Efforts to Acquire Machine Tool and Jet Engine Technologies
Chapter 11: Recommendations
Appendices

Major Findings

The original focus of the investigation was on whether U.S. satellite firms transferred technology useful for China's missile program and on related policies of the Clinton Administration. The committee broadened its examination to include events in the last two decades and subsequently turned its attention in a crucial direction to examine whether China acquired nuclear weapon secrets, after Donald Rumsfeld indicated a problem in that area on October 15, 1998. The committee then took testimony on two days, November 12 and December 16, 1998, from the Department of Energy (DOE), the Central Intelligence Agency (CIA), and the Federal Bureau of Investigation (FBI) on China's suspected acquisition of U.S. nuclear weapon information.[6] In early 1999, news media began to report on those more controversial concerns. The following is a summary of the report's major findings, with the committee's judgments of benefits for the Chinese military, the People's Liberation Army (PLA). Questions for possible further study are discussed later.

Nuclear Weapons

According to the committee, since the late 1970s and "almost certainly" continuing today, the PRC has pursued intelligence collection that includes not only espionage, but also review of unclassified publications and interaction with U.S. scientists at the DOE's national laboratories, including Los Alamos, Lawrence Livermore, Oak Ridge, and Sandia. The PRC has "stolen" classified information on the most advanced U.S. thermonuclear weapons, giving the PRC design information on thermonuclear weapons "on a par with our own." The information includes classified information on seven warheads, including "every currently deployed thermonuclear warhead in the U.S. ballistic missile arsenal;" on the neutron bomb; and on "a number of" reentry vehicles of U.S. missiles. The PRC acquired information

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[6]Former Secretary of Defense Donald Rumsfeld led a commission to study missile threats. Jeff Gerth and Tim Weiner, "Tracking The Suspicions Of China's Nuclear Spying," *New York Times*, May 23, 1999; Statement of Representative Spratt: Release of the Select Committee Report on Technology Transfers to China, May 25, 1999.

on seven U.S. nuclear warheads, including the W88, the most advanced, miniature U.S. nuclear warhead deployed on the Trident D-5 submarine-launched ballistic missile (SLBM):

W88: deployed on the Trident D-5 submarine-launched ballistic missile (SLBM)
W87: deployed on the Peackeeper intercontinental ballistic missile (ICBM)
W78: deployed on the Minuteman III ICBM
W76: deployed on the Trident C-4 SLBM
W70: previously deployed on the Lance short-range ballistic missile (SRBM)
W62: deployed on the Minuteman III ICBM
W56: previously deployed on the Minuteman II ICBM

The committee focused on potential implications for U.S. national security, judging "that the PRC will exploit elements of the U.S. design information on the PRC's next generation of thermonuclear weapons." The PRC successfully tested smaller thermonuclear warheads in 1992 to 1996[7] (prior to its July 1996 announcement of a nuclear testing moratorium and its September 1996 signing of the Comprehensive Test Ban Treaty (CTBT)). The committee reported that information lost from the DOE labs accelerated Chinese nuclear weapon modernization and "helped the PRC in its efforts to fabricate and successfully test its next generation of nuclear weapons designs. These warheads give the PRC small, modern thermonuclear warheads roughly equivalent to current U.S. warhead yields." The PRC "could begin serial production" of such weapons during the next decade in connection with the development of its next generation of solid-fuel mobile ICBMs, including the DF-31 that "may be tested in 1999" and "could be deployed as soon as 2002." Although the PRC currently deploys nuclear-armed ICBMs, "with 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." Regarding whether the PRC's nuclear program continues to require testing, the committee judged that if the PRC successfully steals U.S. nuclear test codes, computer models, and data, and uses them with the U.S. HPCs already imported, the PRC "could diminish its need for further nuclear testing to evaluate weapons and proposed design changes."

As for the strategic balance, the report noted that "the United States retains an overwhelming qualitative and quantitative advantage in deployed strategic nuclear forces" over the PRC's up to two dozen CSS-4 ICBMs. Nonetheless, the report stated that "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."

On the question of whether having smaller nuclear warheads would facilitate Chinese development of multiple independently targetable reentry vehicles (MIRVs) for its nuclear missile force, the committee reported that it had "no information on whether the PRC currently intends to develop and deploy" MIRVs.

Missile and Space Technology

[7]For information, see CRS Report 97-1022, *Chinese Nuclear Testing and Warhead Development*, by Jonathan Medalia.

According to the committee, "the PRC has stolen or otherwise illegally obtained U.S. missile and space technology that improves the PRC's military and intelligence capabilities." After three failed satellite launches in 1992, 1995, and 1996, U.S. satellite makers (Hughes and Loral) transferred missile design information and know-how to China without required export licenses from the Department of State "in violation of the International Traffic in Arms Regulations." The U.S. firms gave technical information that has improved the "reliability" of Chinese rockets used to launch satellites with civilian and military purposes. The information is also useful for the design and improved reliability of "future PRC ballistic missiles." Specifically, the committee found that in 1993 and 1995, Hughes "illegally" recommended to the PRC improvements to the fairing (nose cone that protects the payload), and in 1996, Loral and Hughes helped the Chinese improve the guidance of a failed Chinese rocket, and in so doing, "deliberately acted without the legally required license and violated U.S. export control laws."

Regarding Hughes, the committee's report printed an unclassified assessment completed on December 18, 1998, by the State Department's Office of Defense Trade Controls. That office concluded that, in reviewing the Chinese launch failure of January 1995 that involved a LM-2E space launch vehicle (SLV) and the Apstar II satellite, Hughes engaged in technical discussions with the Chinese, without U.S. government monitors, that resulted in "significant improvement to the Chinese spacelift program and contributed to China's goal of assured access to space." Moreover, "the lessons learned by the Chinese are inherently applicable to their missile programs as well, since SLVs and ICBMs share many common technologies."

As for Loral and Hughes' activities in 1996, the committee reported that a 1998 interagency review determined that the "technical issue of greatest concern was the exposure of the PRC to Western diagnostic processes, which could lead to improvements in reliability for all PRC missile and rocket programs." The improvements to China's missile program could come from "increased production efficiency, and improved reliability through adoption of improved quality control and reliability-enhancing measures in design and manufacturing that were introduced after the accident investigation, including some that the [Loral-led] Independent Review Committee advocated." The committee judged that the guidance system of the Long March 3B rocket, reviewed by Loral and Hughes in 1996, is "among the systems capable of being adapted for use in the PRC's planned road-mobile intercontinental ballistic missiles" (i.e., the DF-31).

There were previous concerns that after the explosion that destroyed the Loral-built Intelsat 708 satellite in 1996, classified U.S. encryption boards were lost to China. The committee reported that while the two FAC-3R encryption boards were not recovered from the crash site by Loral, they "most likely were destroyed in the explosion." While it is not known whether the Chinese recovered the boards, even if they did, "it would be difficult for the PRC to determine the cryptographic algorithm that was imprinted on them," and "reverse-engineering of a damaged board would be even more difficult." Thus, "the National Security Agency remains convinced that there is no risk to other satellite systems, now or in the future, resulting from having not recovering the FAC-3R boards from the PRC."

Contrary to earlier allegations of U.S. assistance for China's development of multiple satellite dispensers and MIRVs, the committee determined that "Motorola

did not provide the PRC with information on how to design the Smart Dispenser; rather, the PRC built the Smart Dispenser indigenously to Motorola's specifications."

The Cox report agreed with earlier public assessments of the Administration that, in the 1990s, the PRC has deployed a total of approximately 20 CSS-4 ICBMs in silos, but contrary to the White House's June 1998 announcement of a detargeting agreement with China, "most" of those ICBMs remain targeted on the United States. Nonetheless, the report noted previous statements by U.S. intelligence that the "CSS-4s are deployed in their silos without warheads and without propellants during day-to-day operations." The committee judged that "within 15 years," China's missile modernization program could result in the deployment of up to 100 ICBMs. Moreover, if China aggressively developed MIRVs, it could deploy "upwards of 1,000 thermonuclear warheads on ICBMs by 2015."

Confirming suspicions of problems in China's SLBM force, the committee reported that while China developed a JL-1 SLBM to be launched from the PLA's Xia-class nuclear-powered submarine, the PRC has not yet deployed the JL-1 SLBM.

PRC Intelligence

China's "pervasive efforts" to obtain U.S. military technology "by any means" pose challenges to the U.S. counterintelligence and law-enforcement agencies. The committee reported that Johnny Chung, a U.S. businessman and Democratic fundraiser, told federal prosecutors that, in 1996, he received $300,000 from Liu Chaoying (a PLA colonel, aerospace executive, and daughter of retired General Liu Huaqing) and General Ji Shengde (head of PLA intelligence). The committee "determined that Col. Liu's payment to Johnny Chung was an attempt to better position her in the United States to acquire computer, missile, and satellite technologies."

On the question of Chinese front companies, the committee concluded that government and non-governmental estimates of PLA companies in the United States (ranging from 2 to 30) have been "far below the true figure," and "there are more than 3,000 PRC corporations operating in the United States, some with links to the PLA, a State intelligence service, or with technology targeting and acquisition roles."

The committee revealed that, in 1995, the CIA obtained, someplace outside of the PRC a secret PRC document containing "design information" on the W88 and "technical information" on another five U.S. thermonuclear warheads from a "walk-in" directed by PRC intelligence. The "walk-in" volunteered various materials to the CIA.

Violations of Technology Safeguards and Nonproliferation Agreements

In addition to alleged violations of U.S. export control laws by U.S. firms, the Cox report raised instances of violations by U.S. firms and the Chinese of the U.S.-China Technology Safeguards Agreement (first signed on December 17, 1988, with a new agreement signed on February 11, 1993), including numerous lapses in security at the Chinese launch sites.

The committee noted that there have been reports of additional possible Chinese violations of the missile technology control provisions of U.S. laws, "no additional sanctions, however, have been imposed as a result." While some reports have raised possible Chinese missile or space assistance for North Korea, the committee alleged that China may have helped North Korea to build a satellite that it claimed was launched on August 31, 1998, but did not discuss Chinese missile technology transfers to North Korea.

Dual-use Export Controls

The committee noted that China's chief source of military equipment is Russia and that "until recently the United States has lawfully transferred little [military technology] to the PLA," in part because of sanctions imposed after the Tiananmen crackdown of 1989. However, "illegal transfers" of U.S. technology have been "significant." "Significant transfers" of U.S. military technology included those "through the re-export by Israel of advanced technology transferred to it by the United States. . ." The committee looked at dual-use (both civilian and military) technology and reported that U.S. and multilateral export control policies and practices "have facilitated the PRC's efforts to obtain militarily useful technology."

During the Bush Administration, the transfer of licensing authority over some commercial communication satellites from the State Department to the Commerce Department in 1992 resulted in "divided jurisdiction between Commerce and State over satellite export licensing" that "facilitated the loss of U.S. technology to the PRC." While remaining licensing authority over commercial communication satellites was transferred to Commerce in 1996 during the Clinton Administration, legislation passed by Congress in 1998 "properly reversed" that decision. U.S. policies on satellite exports that rely on "corporate self-policing to prevent technology loss have not worked" because of the "inherent conflicts of interest" and "lack of priority placed on security in comparison with other corporation objectives."

The United States has relaxed export control restrictions on HPCs since 1996, but "the United States has no effective way to verify that HPC purchases reportedly made for commercial purposes are not diverted to military uses." The committee judged that China "has in fact used HPCs to perform nuclear weapons applications." HPCs could be useful for production of China's next generation nuclear weapons and for maintaining the current Chinese nuclear weapon stockpile for which test data exists, "although the exact MTOPS (millions of theoretical operations per second) range needed is unclear." In addition to nuclear weapon applications, the committee reported that "the PRC's use of HPCs for its military modernization poses risks to U.S. national security."

The committee raised concerns about diversions of militarily sensitive technology from Hong Kong to China. The Cox report stated that with the reversion of Hong Kong to Chinese sovereignty, "export controls on the PRC were effectively liberalized on July 1, 1997, permitting the transfer of many additional technologies of potential use to the PLA without prior review by the Department of Commerce." The committee said that "U.S. trade officials report that no inspections by the Hong Kong regional government nor by any other government, including the United States, are permitted when PLA vehicles cross the Hong Kong border." The committee reported

"indications that a sizeable number of Hong Kong enterprises serve as cover for PRC intelligence services."

The report reviewed two previously-reported cases of Chinese acquisitions of machine tools from McDonnell Douglas in 1994 and of jet engine technology from Allied Signal's Garrett Engine Division in the late 1980s and early 1990s. However, the review did not assess "the degree to which the PRC has enhanced it aerospace and military industrial capabilities through the acquisition of U.S. technologies and equipment."

In addition, the report discussed Chinese attempts to acquire composite materials and structures technology. The report also noted that "the PRC probably cannot build stealth aircraft or missiles with the same capabilities as the F-117 and B-2, now or in the near future." Moreover, the report said that "even acquisition of these elements will be insufficient to permit the PRC to build effectively stealthy aircraft or missiles. System integration of stealth is a major additional task facing the PRC."

Some Questions for Further Study

There are some questions for further study raised by the Cox report. These questions pertain to findings related to nuclear weapons, missile and space technology, PRC intelligence, and dual-use transfers.

Nuclear Weapons

Publicly, the Cox Committee and the Intelligence Community agree that China has obtained classified information on more than one nuclear weapon, including the W88 and the neutron bomb, and on more than one nuclear reentry vehicle, including the Trident II SLBM. China may have successfully tested and produced at least one new nuclear warhead, based on U.S. information, but it reportedly has not deployed such a weapon in its current arsenal. According to the Intelligence Community's damage assessment as publicly reported by the Director of Central Intelligence (DCI),[8] U.S. information has likely accelerated China's program to develop *future* nuclear weapons, and there is no apparent modernization of the Chinese *deployed* nuclear missile force or new nuclear weapons. The Cox report also stated that "the main application of the stolen U.S. thermonuclear warhead information will likely be to the PRC's next-generation intercontinental ballistic missiles."

On whether China has obtained classified information on seven U.S. nuclear warheads, U.S. intelligence and the Administration have not publicly confirmed this extent of Chinese acquisition. The DCI reported that the Intelligence Community found that:

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[8]Central Intelligence Agency, "The Intelligence Community Damage Assessment on the Implications of China's Acquisition of U.S. Nuclear Weapons Information on the Development of Future Chinese Weapons," unclassified release, April 21, 1999. Hereafter, the source for the DCI's conclusions.

- China obtained at least basic design information on several modern U.S. nuclear reentry vehicles, including the Trident II (W88).
- China also obtained information on a variety of U.S. weapon design concepts and weaponization features, including those of the neutron bomb.
- We cannot determine the full extent of weapon information obtained. For example, we do not know whether any weapon design documentation or blueprints were acquired.
- We believe it is more likely that the Chinese used U.S. design information to inform their own program than to replicate U.S. weapon designs.

Responding to whether China stole classified information on every deployed U.S. warhead, Energy Secretary Richardson said on NBC's "Meet the Press" on May 30, 1999, that "certainly, they stole information relating to the W88 and another warhead," but "there is no evidence" beyond that and "the jury is still out" on the extent of the damage. He added that "there are three confirmed cases of espionage, in the '70s and the '80s, the neutron bomb, and the '90s is still being assessed." He commented further that "there is no question that the Chinese got some of our nuclear secrets. On all seven, I think that we still have to be absolutely sure."

Representative Spratt of the Cox Committee said that "it is a reach to say that `stolen U.S. nuclear secrets give the PRC design information on thermonuclear weapons on a par with our own'."[9] He also stated that "the PRC has tested a neutron bomb and a W88 derivative, but the PRC has not replicated the W70 or the W88." He noted that "there was too little time to conduct an independent investigation" of Chinese espionage targeted against U.S. nuclear weapon secrets, and "the committee relied on a few witnesses and did not substantiate their testimony with experts at the national laboratories or interagency review. As a result, there are statements in the report that will not bear scrutiny." He reported on the Intelligence Community's "best estimate of what the PRC has obtained:"

Late 1970s	design information on the W70 enhanced radiation warhead
1984-1988	design information on the W88 warhead and its reentry vehicle
1984-1988	classified (but not design) information on reentry vehicles and weight-to-yield ratios of the W62 (Minuteman II), W76 (Trident C-4), W78 (Minuteman III), and the W87 (Peacekeeper).

On the committee's report that China stole additional neutron bomb data from a U.S. national weapon laboratory (reported by U.S. intelligence in 1996), a news report said that the U.S. government reportedly has no evidence that China has been able to improve its neutron bomb nor that any of the nuclear weapon labs was involved in this case.[10] Representative Spratt's statement on the release of the Cox report added that "the evidence is limited" on the loss of neutron or enhanced radiation technology in the mid-1990s, and the information, if stolen, is "esoteric physics that may have little military application."

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[9]Statement of U.S. Representative John Spratt (D-SC), Release of the Select Committee Report, Technology Transfers to China, May 25, 1999.

[10]Gerth, Jeff and James Risen, "Intelligence Report Points to Second China Nuclear Leak," *New York Times*, April 8, 1999.

Beyond what specific information China obtained, there is the issue of how the threat from China's nuclear force might have increased. The committee found that China stole modern U.S. nuclear weapon information that accelerated China's nuclear modernization and "helped the PRC in its efforts to fabricate and successfully test its next generation of nuclear weapons designs," giving the PRC "small, modern thermonuclear warheads roughly equivalent to current U.S. warhead yields." The Cox report also noted that "assessing the extent to which design information losses accelerated the PRC's nuclear weapons development is complicated because so much is unknown." Moreover, "the full extent of U.S. information that the PRC acquired and the sophistication of the PRC's indigenous design capabilities are unclear," and "there is the possibility of third country assistance to the PRC's nuclear weapons program, which could also assist the PRC's exploitation of the stolen U.S. nuclear weapons information." In addition, the DCI reported that the Intelligence Community found that as of April 1999, "the aggressive Chinese collection effort has not resulted in any apparent modernization of their deployed strategic force or any new nuclear weapons deployment," while the *development* of future nuclear weapons has "probably accelerated" because of the classified U.S. information.

While the committee noted that experts believe that "the PRC currently has the technical capability to develop and deploy" silo-based ballistic missiles with MIRVs, there are still the questions of why China has not yet deployed MIRVs and when China will deploy small warheads on a MIRV system. The DCI reported in April 1999 that China has had the "technical capability to develop" a MIRV system for its "large, currently deployed ICBM for many years, but has not done so. U.S. information acquired by the Chinese could help them develop a MIRV for a future mobile missile." There could be implications for U.S. national missile defense arising from a future Chinese modern nuclear missile force with MIRVs.

There are the questions of whether China will continue its moratorium on nuclear testing and what are the implications of a lack of further testing for China's maintenance of older nuclear weapons as well as modernization of newer warheads. Representative Spratt's statement on the Cox report said that "the CTBT would impose major impediments on China, while imposing minor impediments on us." As the committee reported, "since signing the Comprehensive Test Ban Treaty (CTBT) in 1996, the PRC has faced new challenges in maintaining its modern thermonuclear warheads without physical testing." The report said that "the PRC likely does not need additional physical tests for its older thermonuclear warhead designs," but "maintenance of the nuclear weapons stockpile for these weapons does require testing." The committee judged that "the PRC has likely developed only a very modest complement of codes from inputting its own testing data into high performance computers. The PRC would, therefore, be especially interested in acquiring U.S. thermonuclear weapon codes for any new weapons based on elements of stolen U.S. design information. The Department of Energy reports that the PRC has in fact acquired some U.S. computer codes."

Indeed, since the committee approved its report at the end of 1998, the FBI discovered that the prime suspect in the W88 case, U.S. scientist Wen Ho Lee, had transferred, largely from 1994 to 1995, enormous volumes of files containing millions of lines of highly secret computer codes on nuclear weapon designs ("legacy codes")

from a classified computer to an unclassified computer.[11] The FBI made that discovery upon checking Lee's computers in March 1999 (after he was fired from Los Alamos lab on March 8), and Energy Secretary Richardson temporarily shut down the labs' computers on April 2, 1999, for security reasons. One question is whether China has accessed U.S. legacy codes.

Missile and Space Technology

While citing Hughes' alleged technology transfers to China, the committee nonetheless noted uncertainty about potential military implications:

> There are differing views within the U.S. Government as to the extent to which the information that Hughes imparted to the PRC may assist the PRC in its ballistic missile development. There is agreement that any such improvement would pertain to reliability and not to range or accuracy. It is not clear, at present, whether the PRC will use a fairing that was improved as a result of Hughes' disclosures in a current or future ballistic missile program. Currently-deployed PRC ballistic missiles do not use fairings, and the PRC's future mobile land-based intercontinental ballistic missiles will probably not use a fairing. However, fairings are used by the PRC in launching military communications satellites and could be used for a submarine-launched ballistic missile.

The Cox report also noted three issues for further investigation concerning Hughes:

- The kind of information that may have been passed to the PRC beyond what appeared in the materials reviewed by the Department of Defense (DOD);
- The application, if any, of coupled loads analysis to improving the accuracy and range, as well as the reliability, of PRC ballistic missiles;
- The likelihood that the PRC will in fact incorporate this know-how into their future missile and space programs.

As for Loral's assistance to China in 1996, the committee noted that the inertial measurement unit (IMU) of the LM-3B rocket is considered an "unlikely choice" for the PRC's next generation of ICBMs, which require relatively small and lightweight IMUs, although experience in improving the LM-3B's IMU will "almost certainly benefit its designs of ICBM guidance systems in the future." The Cox report noted that an interagency team concluded in July 1998 that "the technical issue of greatest concern was the exposure of the PRC to a Western diagnostic process" and that "the Long March 3B guidance system on which Loral and Hughes provided advice is not a likely candidate for use in future PRC [ICBMs]."

Representative Spratt, a member of the Cox Committee, noted that the report deals with the launch failure investigations of Hughes and Loral in detail and "concludes that China's rockets and missiles may have gained reliability, but not range, payload, or accuracy." Moreover, he added that, "China has acquired technology from Loral and Hughes that will improve the reliability of its rockets,"

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[11]Risen, James and Jeff Gerth, "U.S. Says Suspect Put Data on Bombs in Unsecure Files," *New York Times*, April 28, 1999.

"but the greatest contribution to reliability probably comes from having its rocket launches, 28 to date, paid for by someone else." He stated that "the most significant technology that Hughes transferred to China was not the structural fix proposed for the fairing, but the `tutorial' they gave their Chinese counterparts in failure analysis and diagnostic techniques. The same is true of Loral... The gain is hard to quantify, because it goes to reliability, and not the range, payload, or accuracy of Chinese rockets and missiles."[12]

The committee implied that exporting satellites to China for launch has harmed U.S. national security interests, saying that those interests "would be advanced by avoiding the need for foreign launches through increased domestic launch capability." The committee seemed to call for a reassessment of the policy of satellite exports to China:

> 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.

It is uncertain how much U.S. firms may have improved the PLA's launch operations. As the committee noted, "PLA personnel are involved in both rocket and ICBM launches in the PRC." U.S. firms have interacted with China's Commission of Science, Technology, and Industry for National Defense (COSTIND)[13] and its subordinate China Launch Tracking and Control (CLTC) and dual-use launch sites, such as the Xichang Satellite Launch Center (XSLC).

While the committee reported that China is developing two road-mobile ICBMs and one SLBM, discussion included only the DF-31 ICBM, with no mention of the DF-41 ICBM reportedly under development for later deployment.[14] The status of the development of the DF-41 is left unclear.

PRC Intelligence

There is agreement between the Cox report and the Intelligence Community's findings on the role of Chinese espionage in obtaining classified information on U.S. nuclear weapons. At the same time, the Intelligence Community found that the contribution of espionage relative to other efforts (e.g., open collection and

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[12]Statement of U.S. Representative John Spratt (D-SC), Release of the Select Committee Report, Technology Transfers to China, May 25, 1999.

[13]For information on COSTIND until it became a civilian organization under the State Council in March 1998, see CRS Report 96-889, *China Commission of Science, Technology, and Industry for National Defense (COSTIND) and Defense Industries*, by (name redacted).

[14]CRS Report 97-391, *China: Ballistic and Cruise Missiles*, by (name redacted).

indigenous development) "cannot be determined." The Cox Committee also reported that China has used a "mosaic" approach in its intelligence efforts that "capitalizes on the collection of bits of information by a large number of individuals," and information on U.S. nuclear weapons "is obtained through espionage, rigorous review of U.S. unclassified technical and academic publications, and extensive interaction with U.S. scientists and Department of Energy laboratories." Issues for countering China's varied collection efforts include how successful Chinese espionage has been relative to acquiring open-source materials and how China conducts what one expert has termed an "unconventional espionage program" that tries to develop as many sources as possible.[15]

There are questions about the credibility and motivation of the "walk-in" who provided documents showing Chinese possession of U.S. nuclear weapon secrets. As the Cox report noted, "there is speculation as to the PRC's motives for advertising to the United States the state of its nuclear weapons development." Chinese intelligence could have sought to raise the credibility of the "walk-in;" increase the credibility of China's nuclear arsenal as a deterrent to U.S. intervention in a regional crisis; trigger a disruptive "spy hunt" in the United States; or raise suspicions of Chinese students working in the United States to bring them back to China.[16] Also, China could have made a major blunder or had another unknown objective. In addition, a rival of the PRC could have planted the documents in Taiwan,[17] or the "walk-in" could have sold them in self-interest. In any case, as the Cox report said, Chinese nuclear tests conducted from 1992 to 1996 had already raised suspicions in U.S. intelligence that China had stolen U.S. nuclear weapon information, and the information provided by the "walk-in" in 1995 "definitely confirmed" those suspicions.

Regarding continuing penetration by Chinese intelligence of the U.S. national laboratories, there are those who question how successful the effort will be given efforts to improve U.S. counter-intelligence. On the May 30, 1999, "Meet the Press" program, Representative Cox addressed the Energy Secretary's denial that there is penetration, by saying that "penetration means simply that there are agents in place. What Secretary Richardson, I think, will tell you is that the counterintelligence plans that we are now executing are designed to frustrate that espionage so that it's unsuccessful."

While the committee concluded that there are more than 3,000 Chinese front companies in the United States, the issues of the extent of those companies and their actual roles have been subjects of debate. Beyond the complications presented by the Chinese President's July 1998 ban on PLA businesses, estimating the total number of PLA companies in the United States depends on whether the parent companies or their proliferating subsidiaries are counted. Depending on how they are set up, it is also difficult to identify which companies are owned by the PLA. Each of the

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[15]Moore, Paul D., "Spies of a Different Stripe," *Washington Post*, May 31, 1999.

[16]Loeb, Vernon and Walter Pincus, "Planted Document Sows Seeds of Doubt," *Washington Post*, May 28, 1999.

[17]Weiner, Tim, "Nuclear Thriller With Ending As Yet Unwritten," *New York Times*, May 25, 1999.

conglomerates has dozens to hundreds of subsidiaries, including some in the United States and other countries. The two most well-known companies in the United States are Poly Technologies and Xinxing Corporation, as reported by the Defense Department. A study by the AFL-CIO found that eight of these parent companies may have a number of U.S. subsidiaries. A study by the Rand Corporation estimated that between 20-30 of the PLA's companies are operating in the United States. Some estimate that almost 800 small Chinese businesses are seeking technology and intelligence in the United States, including some PLA-owned companies.[18] Some observers say that many PRC businesses in the United States, including those owned by the PLA, are engaged in legitimate operations.

Violations of Technology Safeguards and Nonproliferation Agreements

The Cox report cited instances of violations by U.S. firms and the Chinese of the U.S.-China Technology Safeguards Agreement, including numerous lapses in security at the Chinese launch sites. Questions concern the seriousness of violations of that agreement and the appropriate U.S. response today to questions about the value of the agreement (including whether a new one should be negotiated).

The committee noted that "the PRC has proliferated nuclear, missile, and space-related technologies to a number of countries." Questions concern whether China has engaged in weapon proliferation and the Administration's response and whether China might pass U.S. nuclear weapon secrets to third countries, such as Pakistan and Iran which have benefitted from Chinese arms sales and other cooperation.[19] The Intelligence Community's assessment noted that the answer is not known, but cautioned that "having obtained more modern U.S. nuclear technology, the Chinese might be less concerned about sharing their older technology." The committee also reported that there is information on further PRC proliferation of missile and space technology, but the Clinton Administration determined that the information "cannot be publicly disclosed without affecting national security." Chinese re-transfers of U.S. nuclear or missile know-how could present additional or greater threats to U.S. security.

Dual-Use Export Controls

The committee reported that, while China agreed in June 1998 to allow U.S. post-shipment verification for dual-use exports, including HPCs, the U.S.-PRC agreement is "wholly inadequate;" the Clinton Administration denied the committee

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[18]CRS Report 98-197, *China's Military-Owned Businesses*, by (name redacted); Hearing of the Senate Foreign Relations Committee, November 6, 1997; Fiedler, Jeff, *China's People's Liberation Army: Where to Find PLA Companies in America, What Products the PLA Sells in America, and Who are the PLA's Customers*, June 1997; Mulvenon, James, *Chinese Military Commerce and U.S. National Security*, Rand Center for Asia-Pacific Policy Working Paper, June 1997; Greenberger, Robert S. "Chinese Find Bargains in Defense Equipment As Firms Unload Assets," *Wall Street Journal*, Oct. 21, 1996; Fialka, John J., *War by Other Means* (New York: W.W. Norton & Company, 1997).

[19]For more information, see CRS Issue Brief 92056, *Chinese Proliferation of Weapons of Mass Destruction: Current Policy Issues*, by (name redacted).

permission to make the agreement public because the PRC would object; the agreement applies to only HPCs shipped after June 26, 1998; and only one post-shipment check was done and one was pending as of November 12, 1998. Moreover, the committee called into question the value of verifications in China, noting that post-shipment verifications "establish only the physical presence of an HPC, not its actual use."

As for the committee's concerns about the PRC's acquisition of militarily sensitive technology through Hong Kong, the report noted that State Department officials say that the current level of diversion activity is consistent with that which occurred before Hong Kong's reversion to PRC rule. The PLA's new role in Hong Kong and Hong Kong's post-1997 customs enforcement may require closer monitoring.

Recommendations

Upon approving the final report in late 1998, the Cox Committee made 38 recommendations for action by Congress and the Clinton Administration. The Administration has acted or responded to some of them. The following is a summary of committee's recommendations. The committee:

Nuclear Weapons

1. Recommended that the President provide semi-annual reports on the steps being taken by the DOE, DOD, FBI, CIA, and all other relevant departments and agencies to respond to Chinese espionage as typified by the theft of sophisticated U.S. nuclear weapons design information and targeting of U.S. nuclear weapons codes and other national security information of strategic concern.

2. Believed that DOE must implement as quickly as possible and then sustain an effective counterintelligence program.

3. Recommended that the appropriate congressional committees review, as expeditiously as possible, the steps the Executive Branch is taking to implement Presidential Decision Directive 61 (on strengthening counterintelligence at the DOE labs) and determine whether the Administration is devoting, and Congress is providing, sufficient resources to such efforts and whether additional measures are required to put an adequate counterintelligence program in place at DOE at the earliest possible date.

4. Recommended that the appropriate departments and agencies conduct a comprehensive damage assessment of the strategic implications of the security breaches that have taken place at the national laboratories since the late 1970s.

5. Recommended that the appropriate congressional committees report legislation, if necessary, to facilitate accomplishment of the above objectives.

6. Recommended that the Secretaries of State, Defense, and Energy, the Attorney General, and the DCI direct their inspectors general and counterintelligence officials

to examine the risks to U.S. national security of international scientific exchange programs between the United States and the PRC that involve the national laboratories; and report the results of these examinations to Congress no later than July 1, 1999.

7. Recommended that the appropriate congressional committees consider whether the current arrangements for controlling U.S. nuclear weapons development, testing, and maintenance within the DOE are adequate to protect such weapons and related research and technology from theft and exploitation.

8. Urged that, in light of the fact that the heads of executive branch departments and intelligence agencies failed adequately to comply with congressional notification requirements of the National Security Act with respect to the theft of secrets from the national laboratories, Congress insist again on strict adherence to such legal obligations.

International Actions

9. Recommended that the United States insist on Chinese adherence to the Missile Technology Control Regime (MTCR) and all applicable guidelines.

10. Recommended that the United States vigorously enforce, and seek multilateral compliance with, the MTCR.

11. Recommended that, in light of the demise of the Coordinating Committee on Multilateral Export Controls (COCOM) and the insufficiency of the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies, the United States work, including during the 1999 review of the Wassenaar Arrangement, to establish new binding international controls on technology transfers that threaten international peace and U.S. national security.

12. Recommended that, in light of the demise of the Coordinating Committee on Multilateral Export Controls (COCOM) and the insufficiency of the Wassenaar Arrangement, the United States take appropriate action, including during the 1999 review of the Wassenaar Arrangement, to improve the sharing of information by nations that are major exporters of technology so that the United States can track movements of technology and enforce U.S. technology control and re-export requirements.

13. Recommended that, in light of the PRC's aggressive military technology acquisition campaign and its record as a proliferator, the United States work to reduce transfers of weapon systems and other militarily significant technologies from Russia and other nations to China.

14. Recommended that appropriate congressional committees report legislation requiring the Secretary of State, DCI, and the heads of other relevant executive departments and agencies to report in a timely fashion to appropriate congressional committees, including those on intelligence, on technology transfers that raise a proliferation concern and on the implementation of all the foregoing recommendations for international actions by the United States.

Satellite Launches

15. Expected that the executive branch will aggressively implement the Satellite Export Control provisions of the Strom Thurmond National Defense Authorization Act for FY 1999.

16. Stated that the congressional judgment that the Department of State is the appropriate agency for licensing both exports of satellites and any satellite launch failure investigations must be faithfully and fully implemented.

17. Stated that the Department of State must ensure, consistent with national security, that satellite export licenses and notices to Congress are acted on in a timely fashion and that exporters are informed about the progress of their applications and have access to appropriate dispute resolution procedures. The executive branch and Congress should ensure that the Department of State has adequate personnel and resources devoted to processing export license applications.

18. Recommended that congressional committees report legislation to ensure that satellite manufacturers are not disadvantaged in collateral areas such as tax credits by the transfer of licensing responsibility to the Department of State.

19. Stated that DOD must give high priority to obligations under the Strom Thurmond National Defense Authorization Act, including requirements for monitoring launches and technology control plans.

20. Recommended that congressional committees report legislation providing that, in connection with foreign launches of U.S. satellites, DOD shall contract for security personnel who have undergone background checks to verify their loyalty and reliability. The number of guards shall be sufficient to maintain 24-hour security of the satellites and all related missile and other sensitive technology. The satellite export licensee shall be required to reimburse DOD for all associated costs of such security.

21. Recommended that DOD shall ensure sufficient training for space launch campaign monitors and the assignment of adequate numbers of monitors to space launch campaigns.

22. Recommended that DOD monitors shall maintain logs of all information authorized for transmission to the PRC, and such information shall be transmitted to DOD, State, Commerce, and the CIA.

23. Recommended that relevant departments and agencies ensure that the laws and regulations on export controls are applied in full to communications among satellite manufacturers, purchasers, and the insurance industry, including communications after launch failures.

24. Recommended that, in light of the impact on U.S. national security of insufficient domestic, commercial space launch capacity and competition, congressional committees report legislation to encourage and stimulate further the expansion of such capacity and competition.

High Performance Computers (HPCs)

25. Recommended that congressional committees report legislation directing DOE, in consultation with DOD, to conduct a comprehensive review of the national security implications of exporting HPCs to China.

26. Recommended that congressional committees report legislation directing the Intelligence Community to conduct an annual comprehensive threat assessment of the national security implications of the export of HPCs to China.

27. Recommended that congressional committees report legislation requiring:

- as a condition to U.S. HPC export licensing, the PRC's establishment of an open and transparent system by September 30, 1999, which provides for effective end-use verification for HPCs sold or to be sold to the PRC and, at a minimum, provides for on-site inspection of the end-use and end-user of such HPCs, without notice, by U.S. nationals designated by the U.S. Government.
- Failure to establish such a system by that date should result in the U.S. Government's lowering the performance level of HPCs that may be exported to the PRC, the denial of export licenses for computers destined to the PRC, or other appropriate measures.
- An independent evaluation of the feasibility of improving end-use verification for HPCs in the PRC, and preventing the use of such HPCs for military purposes.

28. Recommended that congressional committees report legislation that requires efforts by the executive branch to encourage other computer-manufacturing countries to adopt similar policies toward HPC exports to the PRC.

Export Legislation and Other Technology Controls

29. Recommended that congressional committees report legislation to reenact the Export Administration Act, with particular attention to re-establishing the higher penalties for violation of the Act that have been allowed to lapse since 1994.[20]

30. Recommended that departments and agencies establish a mechanism to identify, on a continuing basis, those controlled technologies and items that are of greatest national security concern.

31. Recommended that, with respect to those technologies and items of greatest national security concern, current licensing procedures should be modified to provide longer periods of review and to require a consensus by all reviewing departments and agencies for approvals of licenses.

32. Recommended that, with respect to those technologies and items not of greatest national security concern, current licensing procedures should be modified to streamline the process and provide greater transparency, predictability, and certainty.

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[20]For information, see: CRS Report RL30169, *Export Administration Act of 1979 Reauthorization*, by Helit Barel, Robert Shuey, Craig Elwell, and Jeanne Grimmett.

33. Recommended that congressional committees report legislation requiring appropriate departments and agencies to conduct an initial study, followed by periodic reviews, of the sufficiency of customs arrangements maintained by Hong Kong with respect to the PRC and the appropriateness of continuing to treat Hong Kong differently from the PRC for U.S. export control purposes. Such a study should consider, among other things, the implications of unmonitored border crossings by PLA vehicles.

34. Recommended that congressional committees report legislation amending the Defense Production Act of 1950 to require notice to the Committee on Foreign Investment in the United States (CFIUS) (an interagency group) by all U.S. companies that conduct national security-related business of any planned merger, acquisition, or takeover of the company by a foreign entity or by a U.S. entity controlled by a foreign entity. The amendment should also require departments and agencies to notify CFIUS of their knowledge of any such merger, acquisition, or takeover.

Intelligence/Counterintelligence Issues

35. Recommended that departments and agencies with counterintelligence expertise undertake a comprehensive counterintelligence threat assessment of PRC espionage targeted against U.S. public and private entities.

36. Recommended that congressional committees report legislation to authorize and direct the Department of Justice to promptly share national security information, on a classified basis, with appropriate departments, agencies, and entities, including the creation of an appropriate interagency mechanism.

37. Recommended that congressional committees require the Secretaries of State, Defense, Commerce, and the Treasury, and the DCI to direct their respective Inspector Generals to investigate the adequacy of current export controls and counterintelligence measures to protect against the acquisition by the PRC of militarily-sensitive U.S. technology, and to report to Congress by July 1, 1999, regarding their findings and measures being undertaken to address deficiencies in these areas.

38. Recommended that congressional committees report legislation directing the Intelligence Community to undertake and maintain a current, all-source analysis of PRC aims, goals, and objectives with respect to the acquisition of foreign, and particularly U.S. technologies, including, for example, PRC efforts to exploit the open character of U.S. society by penetrating business, academic and social institutions, and political practices.