

PRESSING GLOBAL NUCLEAR SECURITY PROBLEMS AND CHINA'S RESPONSE



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LIU CHONG

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I. INTRODUCTION

In this essay, Liu Chong concludes that in addition to strengthening now-standard nuclear security and safety measures, states must go much further: "To eradicate fears of nuclear terrorism, we must treat the root cause, not only the symptoms...If human society only emphasizes protecting things like dangerous nuclear materials and facilities, and not on eliminating the root causes of terrorism, the combination of terrorism and nuclear weapons will always be our nightmare."

Liu Chong is Deputy Director, Institute of Security and Arms Control China Institute of Contemporary International Relations

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Banner Image: Conference poster for IAEA conference on nuclear safety and security, Beijing, 2014, [here](#).

II. NAPSNET SPECIAL REPORT BY LIU CHONG

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Since 9-11, the international community is increasingly concerned about the threat of nuclear terrorism. Since a new nuclear energy wave added newly nuclear-capable actors, there is an increased probability of terrorist organizations acquiring nuclear material and attacking nuclear facilities. The rapid growth of global logistics, the increasing popularity of the internet and the rapid development of technology all combined to make it more difficult to prevent nuclear smuggling and made it more difficult to prevent nuclear technology proliferation. Although the global nuclear security summits were effective in increasing the global nuclear security level, there are still grim threats to international nuclear security. China's duty, as the world's third largest generator of nuclear electricity, as the country with the largest number of neighboring countries, and as the largest trading nation in the world, in combatting nuclear terrorism is exceedingly complex and arduous. Building on existing successes, it is necessary to continue efforts to further strengthen nuclear security capacity-building, actively promote international and regional cooperation, and continuously reduce nuclear security risks.

Main Achievements of the Nuclear Security Summit

The very last Nuclear Security Summit (NSS) ended in April 2016 in Washington, D.C. The summits were highlights of the international arms control community efforts of the past few years. The NSS effectively improved the global nuclear safety level by enhancing the international community's awareness of the threat of nuclear and radiological terrorism and by adopting practical, far-reaching and durable measures to strengthen nuclear safety at all levels from national to regional to global.

First, nuclear and radioactive materials are better controlled. The Hague Nuclear Security Summit Communique (The Hague Communique), for the first time encouraged countries to reduce separated plutonium stocks to the minimum required to meet national security requirements of weapons-grade fissile material. Concerning radioactive sources, The Hague Communique points out that "seek to secure all radioactive sources, consistent with international guidance. "and for the first time to "encourage States which have not yet done so to establish appropriate security plans for the management of spent nuclear fuel and high-level radioactive waste". On the whole, each summit made it harder to access nuclear and radioactive material to prepare nuclear weapons or "dirty bombs" by increasing the security of and decreasing access to nuclear material.

Second, the legal system for international nuclear security was strengthened. First, the amendment to the “Convention on the Physical Protection of Nuclear Material” (CPPNM) entered into force. The 2005 amendment to CPPNM expands the scope of security of nuclear material and facilities from a legal point of view thus permitting the IAEA to convene regular Review Conferences in order to implement the treaty’s terms and prevent the spread of nuclear and radioactive materials. However, the amendment had to be ratified by two-thirds of the (signatory) states, or 101 states; but for a long time, it was not ratified. Prior to the first summit, only 34 countries approved the amendment. Through the summit process, 106 countries ratified the amendment and it entered into force May 8, 2016.^[1] Second, “The International Convention on Suppression of Acts of Nuclear Terrorism” became universally accepted. “The International Convention on Suppression of Acts of Nuclear Terrorism” is one of the pillars of the international nuclear security legal system. Before the inaugural summit, only 64 countries ratified the convention, after repeated calls during the summits, there are now 107 ratifying countries.^[2]

Third, the multilateral nuclear security mechanism is continuously being improved. “The Seoul Communique” put forth the concept of the “global nuclear security architecture” for the first time. “The Hague Communique” clarified the legal instruments and roles that the IAEA, the UN and other international initiatives should play in the international nuclear security system. At the fourth summit, a specific action plan was set up outside the communique for the UN, the IAEA, INTERPOL, the Global Initiative to Combat Nuclear Terrorism and the Global Partnership against the Spread of Weapons of Mass Destruction, and to guide subsequent cooperation. In addition, after The Hague summit, many countries introduced more than 10 voluntary initiatives in various fields as useful complements to global nuclear safety cooperation mechanisms.

Pressing security challenges facing the World and China

Just because the Nuclear Security Summits are finished does not mean that the international nuclear security threat is gone. The security situation remains very serious and complex. Both China and the World still face many serious challenges. In my view, the challenges mainly include the following five aspects:

First, the “Islamic State” and other international terrorist groups are still pursuing nuclear and materials and nuclear technology. Many terrorists and al-Qaeda have placed a great deal of effort toward their goal of gaining access to WMDs. Since 2015, the Western media have covered the “Islamic State” attempts to get nuclear and radioactive material, attempts to create a “dirty bomb” and engaging in nuclear terrorist attacks. Islamic State has attempted to acquire nuclear and radioactive materials from the black market and from hospitals and research institutions in territory it occupied. Over the last few years, the Islamic State attracted a large number of foreign jihadists, but with the Islamic State cracking down, the foreign jihadists are returning home at a faster rate. The Islamic State used to swallow foreign jihadists into its “black hole”, but it is now the source of terrorists (as they return home). “East Turkistan Islamic Movement” (ETIM) and other terrorist and extremist organizations and Al Qaeda have all colluded in recent years; many ETIM groups joined the war in Syria. Once these terrorists have learned the know-how to build a dirty bomb, or acquired fissile or radioactive material from an international terrorist organization they might try to build “dirty bombs” and they pose a major threat to China’s national security.

Second, international nuclear smuggling still runs rampant. The past few years, international underground nuclear smuggling activities have been rampant. According to IAEA statistics from the “Illicit Trafficking in Nuclear and other Radioactive Material Database”, there were 257 cases of theft and illegal trafficking of nuclear and radioactive material in 2014. Many of those cases were serious. International nuclear smuggling is mainly concentrated in Central and South Asia and other countries on China’s periphery. After the disintegration of the former Soviet Union, nuclear

technology, nuclear-trained personnel, and serious amounts of nuclear material from some countries that were part of the Soviet Union, including Russia have been involved in smuggling cases. Since the Ukraine crisis, the rapid deterioration of U.S.-Russian relations spread negative effects in the nuclear security field. Russia was expelled from the G-8 in March 2014 and after that Russia declared it would no longer participate in the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction. In January 2015, Russia informed the U.S. that it would not renew the U.S.-Russian Cooperative Threat Reduction Initiative, which aimed to destroy weapons-grade fissile material. As for 2016, the Russians cancelled a nuclear security summit in 2016 and shelved a bilateral plutonium deal with the U.S. Although Russia claims it continues to pursue independent nuclear security projects, its nuclear security risks likely increased given the context of a tight Russian budget. Since we cannot completely rule out the possibility of ETIM or other terrorist organizations outside China acquiring nuclear materials from abroad, we know they pose a certain degree of real threat to China's nuclear and national security.

Third, there are a large number of potential safety hazards of radioactive sources that can be used in dirty bombs. The IAEA pointed out more than 100 countries have procedural loopholes that don't prevent radioactive material theft. It is difficult to manage all the various types of radioactive sources in the global medical, industrial, agricultural and other sectors; they are used widely, in large quantities, have different distribution modes and often have long half-lives. China has 60,000 work sites dealing with radioactive sources, and also uses over 100,000 canisters of radioactive sources as well as over 120,000 spent canisters of radioactive sources; China is one of the world's largest users of radioactive material.^[3] Terrorist organizations and criminal groups might exploit vulnerabilities in management of radioactive sources and seriously threaten China's stability and society. These facts make China's nuclear security management one of the most existential and important problems.

Fourth, network security for nuclear facilities cannot be ignored. In October 2015, a British think tank reported that global civil nuclear facilities face increasingly serious threats to network security because they are dependent on digital technology and extensively used commercial software. At present, nuclear power plants around the world generally lack training on safety, relevant rules and regulations. There is a lack of communication between network security experts, engineering designers, and nuclear power plant staff on key network security problems. In addition to the lack of communication, there are also no specific rules for managing nuclear power network security.^[4] The Stuxnet case shows that physically isolating equipment is not reliable. Most nuclear power plants have to connect to the IAEA and national regulatory authorities via the internet and are therefore at greater risk of hacking. China ranks first in the world in terms of the scale of nuclear power plants under construction which highlights the need and the risk of network security.

Fifth, risks from emerging nuclear powers. In January 2016, the U.S. think tank "Nuclear Security Index" reported emerging nuclear powers as one of the three biggest risks in the future. In the newest round of nuclear power development, places in the Middle East, Central Asia, Southeast Asia, Latin America and others were involved for the first time in nuclear technology. However, they are completely dependent on imported technology, reactor design, have a weak industrial base, poorly developed technology, a lack of talent and no experience supervising nuclear plants. Many countries desiring nuclear power also face geographic challenges and face security threats. Chinese nuclear power industry faces many hidden dangers if it exports nuclear power plants to those countries. Emerging markets are the main target for China's nuclear power equipment exports - especially China's Hualong-1 type reactor. If there is an accident due to lack of supervision or other reasons, such incidents are about to damage China's nuclear safety image and of course it will also damage the healthy development of China's nuclear power industry.

Analyzing the effectiveness of China's nuclear security measures

Prior to the Fourth Nuclear Security Summit, China submitted a document "National Progress Report on Nuclear Security of the People's Republic of China" in which China committed to improving its national nuclear security system and strengthening international nuclear security architecture, and has made significant progress in areas such as construction and operation of the national Center of Excellence on Nuclear Security, strengthening management of nuclear and radioactive material, combating illicit trafficking of nuclear material, enhancing nuclear emergency response capability, improving nuclear cyber security and establishing a radiation environment monitoring system.

As regards regulating radioactive sources, the Chinese government continually endeavors to ensure radioactive sources are managed effectively and everywhere (universally). As early as 1989, China's government promulgated "Regulations on Safeguarding Radioactive Isotopes and Radiation Equipment". In 2003, China's government, promulgated "Law of the People's Republic of China on Preventing and Controlling Radioactive Pollution". Following that, China also introduced "Rules for Coding Radioactive Sources", "Licensing Requirements to Import and Export Radioactive Sources" and other Departmental-level regulations. These rules and regulations form the basis for enhancing management of radioactive sources. On the basis of actively promoting unified storage of radioactive sources and waste, China's Ministry of Environmental Protection established a comprehensive national plan for urban radioactive waste and presently has radioactive waste repositories in 25 cities. Chinese Customs also stepped up to a new level by establishing relevant technical tools and methods as well as increasing the amount of inspections of imports and exports for radioactive sources.^[5] China strictly follows the security standards of radioactive sources management, which cover all related aspects including production, sales, transportation, use and storage of the radioactive sources. ; China has made comprehensive efforts to upgrade the security level of radioactive waste repositories in various cities in China, completed compilation of the document "Security Requirements for Radioactive Waste Repositories in Cities" and conducted cooperation with the United States on radioactive sources security.

China conducted security inspections of over 15,000 users of radioactive sources and properly disposed of disused radioactive sources. China also works to promote capacity building of radioactive sources security, actively hosts training courses and field exercises, promotes research and development of radioactive sources security technologies, and is conducting research on a tracking system of high-risk mobile radioactive sources, as well as technical protection measures of radiation devices.. ^[6]

In a remarkable achievement, China decreased its accident rate involving radioactive sources from about 6 per 10,000 per year in 2003 to about 1 per 10,000 per year at present. In 2013, the annual accident rate was less than one in ten thousand with only 5 instances of radioactive material lost.^[7] However, it is still difficult to completely eliminate all possibility of theft given that there is a large amount of radioactive material in China, and there are large numbers of terrorists and extremists in the world. To prevent the large amount of radioactive sources from falling into the hands of terrorists, China will, in the coming five years, review the radioactive sources within China, improve the security system and give priority to conducting real-time monitoring of high-risk mobile radioactive sources.^[8]

China continuously strengthens its open ports to prevent illegal traffic in nuclear and other radioactive material. It has installed more than 1,000 sets of various types of radiation detection equipment at important harbors, airports, highways and railway ports throughout the country. China has been continuously strengthening the construction of the gateway ports in taking precautions against illicit trafficking of nuclear and other radioactive material, and has installed

nationwide over 1000 pieces of radiation detecting equipment of various types at sea, air, highway and railway ports. China has enlarged the radiation inspection and detection coverage in key ports of large scale, and will soon achieve 100% radiation inspection and detection of all the inbound and outbound containers at Yangshan Port in Shanghai and Dongjiang Bonded Port in Tianjin. China has improved the law enforcement personnel's ability and has held in China Customs Training Center for Radiation Detection 45 training courses on radiation detection and commodity identification for over 1280 officials from both domestic and abroad, as well as about 30 customs' part-time trainers. China has timely amended and strictly implemented The Nuclear and Nuclear Dual-Use Items Export Control List with reference to the latest control list of the Nuclear Suppliers Group, and started to implement the latest Nuclear Export Control List from January 1st, 2016. China has signed cooperation documents with the U.S. and Russia on preventing illicit trafficking of nuclear and other radioactive material, and conducted joint exercise with Russia on preventing illicit trafficking of nuclear and other radioactive material on borders in October 2015^[9] But, with a border of up to 24,000 kilometers (about 15,000 miles) and 15 neighbors, China has the world's longest land borders and the world's most neighboring countries. Intelligence gathering and international intelligence cooperation must be strengthened to prevent trouble in the first place since if terrorists circumvent authorized ports of entry and smuggle nuclear and radioactive material into the country, it is difficult to prevent them using only passive means such as detecting radiation.

In terms of nuclear cyber security, China attaches great importance to cyber security, and unceasingly strengthening legal work to strengthen Industrial Control Systems, information security, manage Internet security capabilities, improve industry information security and network security capabilities, strengthen internet infrastructure, protecting business systems security, regularly conducting risk assessments, enhancing response capabilities in the event of a network security incident, strengthening organizations by conducting network security emergency drills. It also works to strengthen the public Internet by improving network security management, improving capabilities to prevent network attacks, and strengthening cyber data protection.^[10] However, since the safety of nuclear facilities is an emerging issue and the global nuclear cyber security standards and mechanisms is still relatively preliminary, China still needs to strengthen cooperation with other countries to further improve standards, mechanisms and technologies in those relevant fields.

A more complex issue is that of help to strengthen the nuclear safety and security status of the nuclear power importer countries. Nuclear safety and security regulations are sovereign rights, but many countries have weak foundations and will continue to need aid. Both the recipient and donor country need mutual trust and close coordination. Chinese Chairman Xi Jinping pointed out in his speech that he would promote Chinese National Nuclear Power Safety Regulatory System. China only implements the most stringent safety regulations to ensure only the safest, most reliable, most foolproof nuclear power plants are exported from China. China's National Nuclear and Radiation Safety Research and Development center will be relied on to help countries enhance their safety regularity capacity and to improve global nuclear power by contributing to security.^[11] In this regard, China's ability is limited compared to the IAEA, U.S., Russia, France and other nuclear powers but all should continue providing public goods to the world.

In addition, we need to focus on insider threats. When talking about nuclear security risks, most people tend to focus on external threats while ignoring insider threats. Broadly speaking, in April 2014, China has brought nuclear security into its general national security system, and defined the strategic significance of nuclear security. The National People's Congress has passed State Security Law in July 2015 and Anti-Terrorism Law in December 2015, which made it clear in legal terms that nuclear security is a vital aspect of national security and anti-terrorism issues, and formulated specific tasks and measures of nuclear security. China is making steady progress in promoting

legislations on atomic energy and on nuclear safety, both of which have been included in the legislative agenda of the National People's Congress. In addition, China has been in the process of drafting Nuclear Security Regulations, which is being reviewed by the State Council. China has promulgated series of standardization documents such as administrative measures on inspection of nuclear material management, reporting of nuclear materials management, and registration of nuclear material. China has also amended the Regulations on Emergency Response to the Nuclear Accidents at Nuclear Power Plants.^[12] China's National Atomic Energy Agency also translated (into Chinese) and published the IAEA Nuclear Security Series #8 "Implementing Guide - Preventive and Protective Measures against Insider Threats". I believe China's "Nuclear Security Regulations" and formulating relevant standards should accord with the issues raised above.

It is worth noting that even though we are facing similar insider nuclear security threats because national conditions, social conditions and people vary widely, control and safety measures should NOT be generalized. For example, NTI's "Nuclear Security Index, 2014" claimed that because China did not test nuclear workers for drug use but no one should believe that this is a major hole in China's nuclear regulatory system.^[13] Because the author does not understand the situations, let us assume that the index is not wrong. According to the UN Annual Report on Drugs and Crime, 8 % of the U.S. population uses marijuana and has the world's highest rates of abusing other drugs; China does not even have a statistically significant drug abuse population, only a few individual users and only about 0.1% using other drugs.^[14] Therefore, the possibility that the persons with drug problems succeed in cheating and passing the test or the possibility of the persons that relapse between the routine tests in U.S., could be much higher than Chinese nuclear personnel recruit a person with drug problem. Because national conditions are different, the focus must be different or there will be ridiculous and distorted results if one attempts to judge both with the same ruler.

Chinese promotion of international cooperation in nuclear security should be considered the main direction for the future.

Nuclear security is a globally linked problem, no country is isolated from the problem. China needs to further strengthen international cooperation from the following four aspects.

1. Further strengthen Sino-U.S. cooperation. Sino-U.S. cooperation has been one of the highlights of international security cooperation. Since 2006, China and the U.S. have conducted nuclear protection exercises and engaged in other related cooperation.^[15] In early 2011, China and the U.S. jointly established a radiation detection training center in Qinhuangdao to prevent illegal trafficking in nuclear materials.^[16] At the end of 2011 at Shanghai's Yangshan Deepwater Port, China and the U.S. launched a pilot program the "Large Port Program" which installed nuclear radiation detection equipment to prevent nuclear and other radioactive material from being trafficked through the port.^[17] In addition, China and the U.S. co-published "Technical Guidelines on Nuclear Export Control Lists" to help nuclear export control staff improve their professional knowledge. China, in cooperation with the U.S., upgraded the security facilities of regional radioactive storage centers and collected dozens of extremely high-risk sources of radioactivity.^[18] In January of 2011 China and the U.S. signed a "Memorandum of Understanding on Establishing a Nuclear Security Center of Excellence". In November of 2011, China established the National Nuclear Security Technology Center to construct, operate and manage the demonstration center. The Center will be the largest, most complete, most advance center in the Asia-Pacific region, and even the world, for nuclear safety exchanges and training. The center will be equipped with world-class equipment, staffed by a technical force able to conduct nuclear material analysis, testing nuclear equipment, rehearsing and conducting drills for response forces, and more. It was officially commissioned in 19 March, 2016.^[19] In September 2015, Chairman Xi Jinping reached broad consensus during an official state visit to the U.S. and therefore achieved a series of important outcomes. China and the U.S. signed an

“Agreement between the People’s Republic of China National Atomic Energy Agency and the Energy Department of the United States of America for the Purpose of Further Strengthening Cooperation in the Field Nuclear Security”, and plans to hold an annual bilateral dialogue on nuclear security issues.^[20] On February 20, 2016, China and the U.S. held the first Vice-Ministerial level dialogue on nuclear safety. The participants on the Chinese side included representatives from the Ministry of Foreign Affairs, the Ministry of Industry and Information Technology, the Ministry of Environmental Protection, the General Administration of Customs. The U.S. participants included personnel from The White House National Security Council, State Department, and the Departments of Energy and Homeland Security. Both sides exchanged views on summit preparations, Sino-U.S. cooperation in nuclear security and pragmatic cooperation, international nuclear security affairs, nuclear security policies and practices of each side and other in-depth exchange of views.^[21]

Since this is a major common interest where China and the U.S. have the potential to play a more important role than ever before, both countries should continue expanding cooperation, expanding technical cooperation and mechanism building and providing more goods to the global commons.

2. Take the lead in developing regional cooperation. East Asia is the future focus of global nuclear power: China, South Korea and several Southeast Asian countries proposed large-scale nuclear power development plans. There is a need to strengthen regional co-operation.

In 2008, China, Japan and South Korea started the China-Japan-ROK “Nuclear Safety Supervisory Senior Officials Meeting Mechanism”. During the 4th meeting in November 2011 in Tokyo, the three Parties signed the “China-Japan-South Korea Nuclear Security Cooperation Initiative” committing all Parties to establish cooperative frameworks and actions in areas such as regional nuclear safety standards, regional emergency response mechanism, regulatory capacity and laid the foundation for achieving regional nuclear safety.^[22] At the Sixth meeting of the Senior Supervisory Officials on Nuclear Security in November 2013 the three countries agreed to a phased approach toward exchanging information, trilateral nuclear emergency training and coordination, developing a trilateral video conference system, and creating a platform for sharing network data and other projects that will all be important contents of implementing a China-Japan-South Korea Nuclear Safety Cooperation Initiative.^[23]

ASEAN countries have also been active in establishing multilateral coordination mechanisms for nuclear security oversight. At the end of 2011 at the ASEAN Summit, Thailand proposed establishing a framework for an ASEAN nuclear safety regulatory cooperation network (ASEANTOM), it was unanimously supported by all countries in ASEAN. In August 2012, 10 ASEAN countries finalized the ASEANTOM charter. In September 2013, ASEANTOM’s first meeting was held in Thailand. Participating countries also developed a two-year work plan (2014-2015) to lay a good foundation for deepening ASEAN nuclear safety cooperation.^[24]

China might consider leading the integrating and promoting better regional cooperation on nuclear security, based on the current regional cooperation structure.

3. Rely on the Nuclear Security Center of Excellence to provide developing countries with more nuclear security public goods. China and the U.S. completed the China Nuclear Security COE in December 2015 ahead of scheduled completion and in March 2016 formally placed it into operation. The COE has integrated mature and advanced technology and equipment from both China and other countries, including technology demonstration and training building, analytical laboratory, environmental laboratory, mock nuclear material bunker, mock facility for nuclear material accounting and control, response force training and drill facility, testing field for physical protection, international first class education & training facility as well as supporting facilities. The main functions of the COE include personnel training, research and development, international exchange,

as well as testing and certification, covering a variety of areas such as nuclear security, nuclear safeguards and inspection, nuclear material control, physical protection and other topics. The COE is a nuclear security exchange and training center with the largest scale, most comprehensive equipment and most advanced facilities in Asia Pacific Region and even beyond. In the future, China should use this center as a platform to expand exchanges and cooperation with other countries and international organizations such as the IAEA with a focus on assisting other countries with weak nuclear security capabilities thus making greater contributions to enhancing nuclear security level in the Asia-Pacific and globally.

4. The international community should work together to eradicate the root causes of terrorism. To eradicate fears of nuclear terrorism, we must treat the root cause, not only the symptoms. Governments have always believed that conflict and instability are the hotbeds of terrorism. Poverty and backwardness also provides fertile soil for terrorism. To completely eradicate terrorism, we should work simultaneously to ease regional and international tensions, eradicate poverty and strengthen anti-terrorism cooperation. We should take comprehensive political, economic, cultural and social measures. We must focus on resolving developmental problems, eliminating the disparity between the rich and the poor and social injustice, narrowing the gap between the South and the North and resolving regional conflicts properly. We cannot rely solely on military means and passive protection measures.

If human society only emphasizes protecting things like dangerous nuclear materials and facilities, and not on eliminating the root causes of terrorism, the combination of terrorism and nuclear weapons will always be our nightmare. Therefore, the principles for eliminating nuclear terrorism should be the same principles for eliminating all kinds of terrorism. As China's President Xi Jinping, pointed out that "we need to foster a peaceful and stable international environment, encourage harmonious and friendly relations between countries, and conduct exchanges among different civilizations in an amicable and open-minded manner. This is the only way to tackle the root causes of nuclear terrorism and nuclear proliferation, and to achieve lasting security and development of nuclear power."

III. ENDNOTES

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IV. NAUTILUS INVITES YOUR RESPONSE

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Nautilus Institute
608 San Miguel Ave., Berkeley, CA 94707-1535 | Phone: (510) 423-0372 | Email:
nautilus@nautilus.org