The International Institute for Strategic Studies

WORKSHOP ON NUCLEAR SECURITY

Vienna, 22-23 November

Summary

On 22–23 November 2012, the International Institute for Strategic Studies (IISS) held the fourth and last workshop under a two-year MacArthur Foundation-funded project on strengthening nuclear security cooperation with China. The workshop was held in conjunction with the International Atomic Energy Agency (IAEA) at the Vienna Center for Disarmament and Non-Proliferation (VCDNP). There were 13 participants from China and a similar number collectively from Australia, Europe, the IAEA, the Republic of Korea and the US.

Half of the sessions were devoted to a table-top exercise conducted by the IAEA Office of Nuclear Security involving criminal use of radioactive material, which fostered useful discussions of different national practices, including when information is best shared with the public, and ways that nations could cooperate to address such threats. Other workshop sessions addressed current and future issues in global nuclear security, as well as challenges associated with a Chinese closed nuclear fuel cycle.

Among other insights, it was noted that China is among the leading nations in adopting international instruments on nuclear security and that cooperation arrangements with the IAEA are of mutual value. As China now seeks to share its experience with other nations, it (and other nations as well as the IAEA) might consider implementing the kind of post-export end-user assessments that are incorporated into US nuclear cooperation agreements. There was general consensus that the IAEA should take a proactive leadership position on issues of nuclear security, and that bilateral agreements and standards can serve to enhance the global framework most quickly. It was anticipated that China's new leaders would continue active policies in nuclear security cooperation regardless of whether or not the US maintains its leadership role after the 2014 Nuclear Security Summit (NSS). In a debate about the relative importance of transparency as compared to adherence to international rules and standards, it was noted that transparency is a continuum rather than a binary 'yes/no' issue. Another debate about the relative merits of the closed and open fuel cycle options focussed on the nuclear security dimension but noted other factors, including cost, safety and proliferation vulnerability.

Workshop purpose and organisation

This workshop deepened the discussions held at the first three MacArthur-supported workshops in Beijing in June 2011, London in October 2011, and Qingdao in June 2012. In Beijing, participants explored a range of issues relating to nuclear and radiological security at a general level to determine specific areas for more in-depth engagements. In London, participants shared knowledge on radiological security at major public events such as the Olympics in Beijing. The meeting in Qingdao began to address sensitive topics regarding Chinese nuclear security, including issues of transparency and the risks of reprocessing. Building on the good working relationships that had been established in the first three meetings, the fourth and final workshop held in Vienna fostered a more frank discussion on issues relating to China's nuclear security efforts and reprocessing policies.

There were two dozen participants in the workshop. The Chinese delegation included experts and officials from the China Institute of Atomic Energy (CIAE), the China Institute for Contemporary International Relations (CICIR), the Ministry of Commerce (MOFCOM), the China Institute of International Studies (CIIS), Tsinghua University, the China National Nuclear Corporation (CNNC), the Preparatory Commission for the Comprehensive Nuclear Test-Ban Treaty Organisation, and the Permanent Mission of the People's Republic of China to the IAEA. Government officials attended from Australia and the US, and retired officials and academics joined from Europe, the ROK, and US, in addition to three IAEA officials from the Office of Nuclear Security.

Like the agenda and the list of participants, this rapporteur's report is solely the responsibility of the IISS.

IAEA nuclear security and safety activities relevant to China

The first session, led by a senior official from the IAEA Office of Nuclear Security, outlined China's cooperation with the IAEA since 2002. China has hosted more than 20 training events for over 300 participants, more than almost any other country. Cooperation over the past decade was described as a 'learn/learn' experience for both parties, and it was noted that China is now itself contributing to the Nuclear Security Fund. China is also one of 20 states that support all of the core international instruments on nuclear security. Avenues of future joint nuclear security cooperation were also outlined, particularly the development of China's Nuclear Security Centre of Excellence (COE), a joint nuclear security programme for 2013 which could include national, regional and international training courses, and the expected International Physical Protection Advisory Service (IPPAS) mission to China in 2013 and 2014. Because IPPAS missions review and compare a state's physical protection system with international guidelines and best practices and make recommendations for

improvements, this is a particularly positive development for Chinese nuclear security arrangements.

One Chinese commentator explained that China hopes to share with other nations the lessons it has learned in the field of nuclear security. He noted that China still faces many challenges as its nuclear-security culture continues to develop. One challenge is to clearly define the difference between nuclear security and safety, which are typically described by the same word in Chinese. Clearer definitions could help the country develop a more synergistic approach to tackling issues related to both nuclear safety and security. The Fukushima accident was referred to as an event that highlights the linkage between nuclear safety and security, and the potential risks of nuclear accidents in the context of nuclear security. Finally, cyber security was highlighted as a new challenge facing the international community; countries would benefit from sharing best practices in addressing the cyber challenge.

Workshop participants were interested in exploring how nuclear export arrangements could be improved in China, as well as internationally. Chinese participants emphasised China's national commitment to upholding international nuclear export obligations, but explained that it does not yet have a mechanism like the United States' Bilateral Physical Protection Assessment Visits to follow-up and verify that international obligations are met by the end users of US origin nuclear material. In fact, the US requirement for such post-export physical protection assessments is unique. An adviser to the IAEA and a representative from a third country both said the US practice offered a useful model for their own organisations.

Participants were also eager to explore issues related to China's COE, particularly how to coordinate among other regional COEs in Japan and the Republic of Korea to prevent duplication. Some participants advocated national specialisation. Other participants noted that there does not necessarily have to be a clear division of expertise between the three COEs, which are focused on domestic training, and that a certain degree of competition between the countries could help improve the overall level of support that they offer. One participant suggested that the IAEA could help to coordinate and harmonize the efforts of the three regional COEs to prevent counterproductive overlap.

Managing the threat and consequences of a nuclear / radiological security event

After the opening session, officials from the IAEA Office of Nuclear Security administered a table-top exercise to foster a dialogue on how to best manage the threat and consequences of a nuclear / radiological security event.

The IAEA generally conducts this particular TTX as a means to examine a certain country's response to the threat and consequences of a nuclear security event. However, the IAEA

altered the TTX specifically for the IISS workshop. It proved to be an innovative and successful way to facilitate in-depth discussions and the exchange of best-practices among workshop participants. The overall objectives of the TTX were 1) to discuss best practices in a whole-of-government response to a radiological terrorism incident, and 2) to explore opportunities for future international coordination and cooperation in pre-event, event, and post-event response to incidents involving criminal or terrorist use of radioactive material.

The workshop participants were divided into three smaller groups which assumed the role of high-level government officials in charge of responding to a radiological terrorist event in a fictitious country named 'Greenmoon'. The TTX was split into two parts. In the first part, groups were given a scenario to address the threat of a radiological criminal/terrorist event. The second part examined how to manage the coordinate the response to, and minimise the consequences of, a radiological terrorist attack. At the end of each of the session, the three groups reconvened to share their thoughts.

Participants reached a consensus about the importance of a centralised national emergency response mechanism, though they disagreed as to the best way and time to inform domestic citizens and to involve neighbouring governments. Some participants favoured early pre-event public notification and foreign involvement before the threat had fully materialised into an actual radiological attack. Other participants thought it best to inform the public of a threat only once the terrorists issued a public warning. If the event were to materialise, most Chinese participants favoured withholding as much information as possible on the incident from the public and neighbouring countries until their involvement would not jeopardise the government's response efforts, though it was unclear when, exactly, this would have been. However, one Chinese participant noted that early pre-event and post-event public notification could be beneficial as citizens could provide the government with useful information about suspicious persons or activities as it formulated its response. A participant from the UK noted the importance of communicating with the public as soon as possible after a radiological event the proper procedures to prevent the spread of the radiological contamination. Another participant explained the importance of issuing decision-relevant and accurate information about the incident in a timely manner to help minimise misperceptions about the radiological consequences of the attack. Given the prevalence of social media, any information gap can promote the spread of unhelpful rumours. In the end, all participants agreed that sharing information with the public and with neighbouring countries is important to contain the spread of rumours and radiological contamination, though determining when the right time to do so is difficult.

Participants also agreed that the involvement of multilateral organisations like the IAEA, Interpol and the World Health Organisation could help to contain the consequences of a radiological terrorist event, though they again disagreed as to when the best time to notify the organisations would be. One Chinese participant said that the government would look unprepared if it appealed to international organisations for help too early.

Special attention was given to the psychological impact of a radiological terrorist event. Participants agreed that the aim of a radiological attack would be to cause disruption and economic damage rather than physical damage. A radiological attack is likely to be especially effective in causing widespread fear and anxiety among the targeted public. Using the term 'terrorism' when publicly talking about the event could instigate a negative and counter-productive public response. Therefore, public information must be carefully worded: accurate and truthful information must be disseminated, but at the same time worrying the public unnecessarily should be avoided. In discussing the various definitions of 'terrorism', it was emphasised that terrorism is a subset of criminal activity.

The future of global and Chinese nuclear security

The penultimate session discussed current and future issues in global nuclear security. The NSS process was said to have been a success; it is hoped that the third and final NSS in 2014 will leave a positive legacy by enhancing the nuclear security framework in ways that makes the norms and rules more enforceable, cohesive, transparent, comprehensive and mandatory, as much as this is realistically achievable. By virtue of the consensus requirement, the communique coming out of the 2014 NSS will meet the lowest common denominator. Additional voluntary and bilateral standards and practices may prove more useful in the short-to-medium future than new conventions that take too long to adopt. To raise the standard of global nuclear security, the benefits of sharing international best practices were underlined. It was agreed that the IAEA should take a proactive position on issues of global nuclear security; indeed, the IAEA has recently embraced the idea of leading nuclear security efforts. The political opposition that used to be raised about the IAEA role has faded away over the past two years, and the IAEA legal office has confirmed that the agency's mandate extends to nuclear security.

Participants discussed internal and international nuclear assurance mechanisms to enhance global nuclear security. The mechanisms might look similar to the United States' Bilateral Physical Protection Assessment Visits, or could be developed through the IAEA IPPAS system. The importance of greater cooperation between government, industry, and non-governmental experts was discussed as a means to improve nuclear security arrangements in China and internationally. One European participant argued for a more ambitious framework, following the example of the International Civil Aviation Organization, which established a universal, mandatory review process that is fully supported by the aviation industry.

A number of participants challenged the opaque nuclear policies practiced by some countries. Transparency, it was noted, is an integral element in providing assurance and accountability for adequate nuclear security measures. One Chinese participant argued that adherence to international rules and standards is more important than transparency. A

British expert responded that adherence to rules is essential, but transparency to check adherence to standards is also important. It was agreed that transparency is not a binary yes/no case, but rather a continuum. Analogous to a window, shades can be open to varying degrees and the composition of the glass can allow for different degrees of clarity.

Some opinions reflected more critical views in China's policy circles about the United States and its nuclear policies. Though the US remains the leader in driving nuclear security standards and practices forward, it was argued that it needs to set a better example. Specifically, the 2005 amendment to the Convention on the Physical Protection of Nuclear Material and the International Convention for the Suppression of Acts of Nuclear Terrorism both require US ratification. In the end, all participants agreed that all countries should actively participate to strengthen global nuclear security standards, and that standards should be applicable to all countries. It was suggested that China should maintain an active role in promoting global nuclear security efforts even after the 2014 Nuclear Security Summit. One Chinese participant said China's interest would continue, regardless of whether or not the US maintained its leadership role after the 2014 NSS.

Issues related to a closed fuel cycle

The last session of the workshop explored the security and safety implications of nuclear reprocessing. A Chinese speaker noted that the majority of countries that are most invested in nuclear energy have opted for closed fuel cycles to better utilize the uranium and reduce waste volume, and said the US chose the open fuel cycle route on political grounds. Arguing that the closed fuel cycle was favourable for non-proliferation efforts, he said an open fuel cycle results in a large volume of spent fuel that can become a 'plutonium mine' vulnerable to terrorist access or proliferation use once the self-protecting radiation level has diminished. According to the speaker, by burning the plutonium in fast reactors, a closed fuel cycle 'radically' decreases the volume of plutonium stocks and therefore decreases risks of proliferation. The speaker acknowledged, however, that there are also some security and proliferation risks associated with separated plutonium.

To meet the security and safety challenges posed by a closed nuclear fuel cycle, one Chinese participant suggested strengthening IAEA nuclear safeguards. Increasing international cooperation in areas like nuclear forensics and research & development of the back end of the nuclear fuel cycle was also suggested. Multinational fuel cycle centres would obviate the need for countries to develop national enrichment and reprocessing programmes. However, it was noted that countries with ambitious nuclear programmes, like China, should want to control their own reprocessing facilities for the sake of logistical ease, safety and security.

Another participant noted how China's ambitious nuclear programme makes it logical to explore options for increasing the energy utilisation of uranium resources. However, many

challenges must be addressed before China can operate a closed nuclear fuel cycle safely and securely. For example, room remains to improve China's current nuclear safety conditions. China does not have an adequate cadre of qualified nuclear safety staff or a fully independent nuclear regulator to ensure that nuclear safety standards are met. Expanding a nuclear fuel cycle with reprocessing and MOX fuel fabrication facilities makes it harder to guarantee security, not least because of the longer transport routes of nuclear materials.

Furthermore, China must overcome many technical challenges before it can safely operate a closed fuel cycle with fast breeder reactors. Fast reactors are still far away from being commercially viable and the liquid cooling system presents safety and engineering challenges. It was argued that Chinese government investments and its state-controlled nuclear regulator could speed the process of producing a fast breed reactor, but doing so might also undermine nuclear safety considerations. However, one Chinese participant noted that the technology, in fact, is already mature, but that high economic costs prevent wide-spread production.

One participant expressed concern that although China is understood to have stopped fissile material production for weapons use in 1990, the reprocessing facilities of a closed nuclear fuel cycle could in theory be used in the future for this purpose. It was suggested that China's deal with Areva[1] has not yet been finalised because France did not receive the required political and technical guarantees that the reprocessing facility in question would not be used for the production of military plutonium. Another participant explained that even if China had no intention to use reprocessed plutonium for this purpose, the opaque nature of its nuclear programme reduces international confidence.

Chinese participants rejected the idea that civilian nuclear reprocessing would be used for military purposes. They argued that China's strictly defensive and limited nuclear deterrence policy means there is no need to significantly increase the weapons stockpile. It was also highlighted that producing too much plutonium could be a safety and security burden to the state.

It was argued that the Areva deal highlights how external concerns about China's public posture have already affected its nuclear fuel cycle options. Chinese participants were asked if it would be feasible for China to reassure foreign partners by announcing a (continued) moratorium on fissile material production for military use, like all other P5 countries. The response was that it is not likely for China to increase its transparency in this regard.

It was discussed how domestic considerations may affect China's nuclear reprocessing programme. Firstly, operating a closed fuel cycle is very expensive as compared to dry cask

[1] 'French EDF, Areva mull nuclear plan with China's CGNPC', Nuclear Power Daily, 13 November 2012, http://www.nuclearpowerdaily.com/reports/French_EDF_Areva_mull_nuclear_plan_with_Chinas_CGNPC_999.html

storage of spent nuclear fuel. Secondly, though proponents of a closed nuclear fuel cycle cite energy security as a major motivating factor for nuclear reprocessing, it appears that for the foreseeable future, China has secured access to uranium resources. The Chairman of China's National Nuclear Corporation (CNNC) said recently that there were 'no worries about uranium resource reserves'.[2] Thirdly, in the wake of the Fukushima accident, moving forward too quickly with nuclear plans might decrease public acceptance in China. Finally, China still has not developed a fast reactor development roadmap. Together, these issues might delay China's nuclear reprocessing plans.

One Chinese participant acknowledged that in light of the high cost, including decommissioning and the safety issues with fast-breeder reactors, interim storage of spent fuel for the next 60 to 100 years might be the best policy for China. This would allow other countries, like Russia for example, to invest time and money in refining reprocessing technologies. Another Chinese participant argued that it would be unwise for China to wait for another country to develop the technology, and that it should continue investing and developing its own capabilities. All the Chinese participants agreed that China should continue R&D on closed-fuel cycle solutions, though one Western participant suggested that R&D money would be better spent on improving general safety conditions in China and on upcoming Generation III reactors that have some key safety advantages over older reactor types.

Conclusion

This workshop attracted high-level government representatives and experts and was successful in strengthening existing relationships as well as forging new ones. The table-top exercise helped to create a depoliticised environment in which participants felt comfortable to share best-practices in response to a radiological incident. The collaborative atmosphere continued even after the table-top exercise had finished, and the subsequent discussions of nuclear security policies and fuel cycle strategies were frank and enlightening.

Discussions throughout the workshop reflected recognition among Chinese participants that even though China has made many improvements in nuclear security during the past two years there remain important aspects that are in need of strengthening. Since the Fukushima accident, China has taken several steps to improve safety. It appears that nuclear security has also benefitted from the safety improvements, as there is recognition that both safety and security events can threaten China's nuclear energy programme.

[2] Overseas Uranium Mining to be Stepped Up', *China Daily*, 13 November 2012, http://www.chinadaily.com.cn/china/2012-11/13/content_15920178.htm.

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