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Improving Nuclear Security—One Summit at a Time

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In the spring of 2016, the United States, will welcome more than fifty world leaders to cap off a series of summits focused on reducing the threat of nuclear terrorism. Begun by President Obama in 2010, the Nuclear Security Summits (NSS) have repeatedly tested these leaders' ability to make ambitious national and collective pledges to secure nuclear materials and radiological sources. This article offers a background on the three past NSS, highlights some of the notable achievements of the NSS process, and discusses the remaining difficult tasks that still lie ahead.

Introduction

In the spring of 2016, the United States, will welcome more than fifty world leaders to cap off a series of summits focused on reducing the threat of nuclear terrorism. Begun by President Obama in 2010, the biennial Nuclear Security Summits (NSS) have repeatedly tested these leaders' ability to make ambitious national and collective pledges to secure nuclear materials and radiological sources. The ongoing preparatory process for the 2016 NSS is faced with multiple challenges, including tackling the remaining "hard cases" of nuclear materials security and minimization, identifying ways to ensure the long-term sustainability of achievements to date, developing creative avenues to institutionalize future commitment making in the broader international community, and dealing with the potentially negative consequences from Russia's pullout from NSS preparations.

The 2016 NSS marks the return of the NSS process to the United States. In March 2010, President Barack Obama welcomed to Washington forty-six heads of state for the first NSS. This Summit made good on the administration's pledge to initiate a "new international effort to secure all vulnerable nuclear material around the world within four years," first introduced as a part of Obama's broader vision on nuclear security in Prague in April 2009 (The White House, Office of the Press Secretary 2009). Since that inaugural Summit, the fifty-three world leaders have convened twice more on two different continents to continue, "to strengthen nuclear security and reduce the threat of terrorism" (Office of the Press Secretary 2010a). These later Summits took place in Seoul, South Korea in 2012 and then in The Hague in 2014.

To date, the NSS process has successfully elevated the hitherto expert-level discourse over state responsibility, industry practices, and international governance, over control over nuclear and other radioactive

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materials to the level of high politics. It has allowed countries to make ambitious national, bilateral, and multilateral commitments to improve their nuclear security as well as to receive public acclaim for minimizing their stocks of weapons-usable materials. The process has also facilitated practical cooperation aimed at countering illicit trafficking, improving physical security at nuclear facilities, and strengthening relevant international institutions.

This article offers a brief introduction to high-level efforts over nuclear security and a background on the three past Nuclear Security summits. It further highlights some of the notable achievements of the NSS process. Then it discusses the difficult remaining tasks that still lie ahead.

Toward a Leader Focus on Nuclear Materials Security

The U.S. concern regarding the threats posed by nonstate or otherwise illicit acquisition of nuclear materials began in earnest after the dissolution of the Soviet Union. Policies aimed at the improvement of protection, control, and accounting of highly enriched uranium (HEU) and plutonium in the former Soviet nuclear complex as well as strengthening security culture at military and civilian facilities were seen as an important investment in "defense by other means."[1] Thus, since the 1990s, Moscow and Washington have implemented bilateral cooperation projects aimed at reducing the threats posed by weapons-usable material through the minimization of their respective stocks and the improvement in their security. And, because the United States and the Soviet Union were equally responsible for the worldwide proliferation of civilian-use HEU through the sales of research and test reactors, their bilateral cooperation also extended to the minimization and security of these potentially vulnerable materials in third countries.

Coupled with an interest at the highest political levels on the bilateral U.S.–Russian agenda, the security of nuclear materials also became an issue in the multilateral summitry context—at least as far as the developed economies were concerned. To this end, the G7 held a special meeting in Moscow with a focus on nuclear safety and security in 1996. The declaration from this gathering underscored the importance of ongoing bilateral cooperation between Moscow and Washington, especially in the area of securing military materials. It read, as follows: "The security of all nuclear material is an essential part of the responsible and peaceful use of nuclear energy. In particular, the safe management of fissile material, including material resulting from the dismantling of nuclear weapons, is imperative, not least as a safeguard against any risk of illicit trafficking in nuclear materials" (University of Toronto Library 1996).

After the terrorist attacks of September 11, 2001, the perception of the threat of nuclear terrorism became more acute in key states concerned with the implications of such an attack on the global political and economic order. This led to the creation of the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (GP) at the 2002 G7/8 Summit in Kananaskis, Canada. The GP aimed to buttress ongoing threat reduction projects, particularly in the nuclear and chemical areas, and efforts nearing completion in Russia and the former Soviet Union. In practice, this meant that the GP provided a high-level mechanism to coordinate funding pledges

[1]*The phrase "defense by other means" was coined by then-Secretary of Defense William J. Perry* (Perry 1994).

from within the group as well as non-G8 countries that wanted to contribute to these efforts.

The 2000s brought a flurry of high-level bilateral and multilateral initiatives to counter nuclear terrorism. These initiatives included, *inter alia*: the 2002 expansion of the International Atomic Energy Agency (IAEA) activities aimed at strengthening the security of nuclear and other radioactive materials in member states; the creation in 2002 of a special Interpol task force focused on counterterrorism cooperation; the adoption in 2004 of United Nations Security Council Resolution 1540 (UNSCR 1540); the opening for signatures in 2005 of the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT); and the introduction of amendments to the Convention on the Physical Protection of Nuclear Material (CPPNM) in 2005. In the context of bilateral summitry, presidents George W. Bush and Vladimir Putin recommitted to their joint nuclear threat reduction projects, including in 3rd countries, through the Bratislava Initiative in 2005. They also announced the creation of the Global Initiative to Combat Nuclear Terrorism (GICNT) in 2006 at the G8 meeting in St. Petersburg, Russia.

By President Obama's 2009 Prague speech, all of these initiatives formed the foundation for a unifying high-level effort to strengthen nuclear security. *Prima facie* evidence of practical progress was also visible in the successes of the U.S. Department of Energy National Nuclear Security Administration's Global Threat Reduction Initiative (GTRI) effort. This program, created in 2004, facilitated the cooperative removal of civilian HEU from 3rd countries, the conversion and shut down of HEU-powered research and test reactors, and the improvement in the security of sites with potentially vulnerable nuclear materials and radiological sources. Backed by a U.S. domestic commitment to minimize certain uses of HEU, the GTRI effectively served as the "muscle" behind Obama's "four year" goal. To all these developments, the NSS process would bring momentum and high-level recognition required to solidify the global consensus on the need to counter nuclear terrorism and continue the improvement in nuclear security governance at the national and international levels.

The Practical Challenges of Nuclear Security

The chief obstacle in the development of an improvised nuclear device by illicit and malevolent actors is their ability to acquire certain amounts of HEU or weapons-usable plutonium. According to an IAEA database that tracks materials outside of regulatory control, there have been sixteen confirmed incidents of these two materials in illegal possession between 1993 and 2013 (International Atomic Energy Agency 2014). In addition, every country in the world has potentially vulnerable radiological sources. The threat posed by these sources is the ability of nonstate or other illicit actors to create a "dirty bomb."Such a device would be intended to cause mass panic and disruption and be fashioned from radioactive materials and conventional explosives. In 2013 alone, the IAEA recorded four thefts of the most dangerous categories of radiological sources (International Atomic Energy Agency 2014).

Nuclear security involves the implementation of measures aimed at "the prevention of, detection of, and response to criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive

material, associated facilities, or associated activities" (IAEA 2013). There have been recent high-profile breaches in security at nuclear sites and widely publicized instances of potentially vulnerable materials outside of regulatory control. In the United States, a nun and several other peace activists successfully broke through the perimeter fence of the heavily guarded Y-12 facility in Tennessee in July 2012. In Mexico, in December 2013, a truck carrying a Co-60 radiological source previously used in cancer treatment was stolen by armed attackers. Security challenges have also included threats from insiders and cyber actors. In Belgium, a disgruntled worker sabotaged the operations of a nuclear power plant in August 2014, effectively taking that facility offline for several months. And, in 2014, western energy companies were plagued by the Dragonfly/Energetic Bear computer virus that intended to disrupt industrial control systems equipment.

Nevertheless, the world has not yet experienced an act of nuclear terrorism or a dirty bomb incident. A significant challenge in the implementation of nuclear security measures is the absence of universal mandatory standards in this area. In contrast to nuclear security, in the area of global nuclear safety, a consensus on the threat and consequences to populations and the environment of safety incidents with nuclear power facilities has emerged. This consensus has led to the emergence of certain regulatory mandates and industry standards aimed at the prevention of Chernobyl-like accidents.

But in the area of global nuclear security, as opposed to nuclear safety, the consensus on the threat and consequences of illicit acquisition of nuclear and other radiological materials has been much slower to emerge. Because of the perceived sensitivities involved in the transparency of information as it relates to facility security, countries as well as industry actors have generally been reluctant to broaden information exchanges. Such exchanges would share implementation of physical protection and other nuclear security measures.

Yet another obstacle to effective nuclear security is the perception by some states that the responsibility for implementation rests largely with the handful of countries possessing nuclear materials in "military use." Such material, employed in nuclear weapons programs, represents over 85 percent of fissile material stocks worldwide (NTI 2014). To be sure, the United States and Russia carry a special responsibility as the countries with the largest stocks of HEU or weapons-usable plutonium (and so do the other seven states with declared or non-declared weapons arsenals). However, the risk of nuclear incidents is not contained to nuclear weapons states since potentially vulnerable materials can be smuggled across borders and the nuclear risks are also present in civilian use in many countries.

In the civilian sector, HEU has been used to power research and test reactors as well as produce medical isotopes essential in cancer treatment. Nonnuclear weapons states also have the technical capability to separate plutonium from fuel used up in the process of generating nuclear power. In the early 1990s, more than fifty states possessed over a kilogram of either HEU or weapons-usable plutonium. Through a range of programs, especially the U.S.-led GTRI, between 1992 and 2009, a total of sixteen countries plus Taiwan eliminated all of their fissile material stocks. Since Obama's announcement of the "four-year goal" and up until the present moment, the number of states with stocks of materials has steadily declined to just twenty-

five states. In addition, the 2014 NSS resulted in additional country commitments to continue to eliminate or minimize their civilian stocks (NTI 2014).

Another challenge is radioactive sources, which are present in every country in the world and closely linked to economic development and health care. Because of their widespread use in industry and medicine, the security of these sources at open-air industrial sites and facilities like hospitals poses a complex policy challenge. And, the process of elimination of these nuclear materials may not be as feasible. Many of these sources are essential to countries' development goals and the potentially "less dangerous" replacements carry a greater financial burden.

Finally, though the legal responsibility for nuclear security lies with individual states, in practice the implementation of these measures must occur at multiple levels. These include: the day-to-day handling of materials in the nuclear industry at the facility level; the national regulation and oversight of these industrial facilities at the state level; the practical cooperation between neighboring states; and within a region on detection and response to incidents. Finally, successful implementation requires adherence to treaty commitments as well as institutional maintenance carried out at the international level. Because of this complexity, the practical implementation record of nuclear security measures has been uneven and difficult to assess.

NSS 2010: Building Consensus on the Need for Action

The key accomplishment of the first NSS, which took place in April 12–13, 2010 was Washington's ability to solidify the group consensus on the threat of nuclear terrorism. A White House document summarized this threat as follows:

> [W]e know that al-Qa'ida, and possibly other terrorist or criminal groups, are seeking nuclear weapons –as well as the materials and expertise needed to make them. The consequences of a nuclear detonation, or even an attempted detonation, perpetrated by a terrorist or criminal group anywhere in the world would be devastating. Any country could be a target, and all countries would feel the effects. (The White House, Office of the Press Secretary 2010b)

Forty-six countries as well as three international organizations—the European Union, the IAEA, and the United Nations—participated in the 2010 NSS. The vast majority of the attendees were drawn from the list of states with fissile materials. However the Summit was made up of a diverse group of states. All of the states with nuclear weapons were in attendance. Among these countries, three—Israel, India, and Pakistan—were not parties to the NPT (Nuclear Non-Proliferation Treaty), which is the international regime that facilitates nonproliferation, disarmament, and peaceful energy worldwide. Some of the participants were states with small amounts fissile materials in civilian use, while others had no fissile materials on their territories. Iran and North Korea were not invited to participate.

The consensus on the threat of nuclear terrorism among this diverse group of states was reflected in the NSS Communiqué. The document began with the following declaration:

> [N]uclear terrorism is one of the most challenging threats to international security. To this end, strong nuclear security measures are the most effective means to prevent terrorists, criminals, or other unauthorized actors from acquiring nuclear materials. (Office of the Press Secretary 2010a)

Despite the Communiqué's non-binding status, there were several challenges with negotiating the document. As the U.S. sherpa for the 2010 NSS noted, these included: the references to the relationship between nuclear security and the three pillars of the NPT, as well as to military materials. (Wilke 2010) In the former case, the Communiqué language effectively balanced the concerns of the diverse set of participants. In the latter case, explicit language was included in the document that "reaffirm[ed] the fundamental responsibility of States [. . .] to maintain effective security of all nuclear materials, which includes nuclear materials used in nuclear weapons" (Wilke 2010).

The negotiation of the NSS deliverables occurred for months in the run up to the summit, in the so-called "sherpa process." In this process, designated points of contact (sherpas, sous-sherpas, yaks, and others) from key agencies in the NSS countries hammered out agreements ahead of the NSS itself. While every NSS to-date has included a negotiated Communiqué document, the first NSS was the only one of the summits to-date that featured a so-called Work Plan document to guide the actions of the participant states. In this work plan, states pledged to: continue the ratification and implementation of CPPNM(A) and ICSANT; promote the compliance with UNSCR 1540; support IAEA efforts to improve nuclear security; strengthen domestic regulations and efforts to counter nuclear terrorism; facilitate HEU minimization; and engage in regional cooperation to train nuclear security personnel.

In addition to the negotiated deliverables, over thirty participants made various pledges of practical improvements in nuclear security in their countries. These unilateral actions were referenced in the NSS process as "house gifts." For example, one of the high profile "house gifts" was Ukraine's announcement that it would remove all HEU from its territory. Other commitments included the ratification of CPPNM(A) and ICSANT and specific steps to improve nuclear security on the national, bilateral, and regional levels (U.S. Department of State n.d.).

Despite the nonbinding nature of the NSS Communiqué, the Work Plan, and national pledges, forty-six states agreed with the urgency of Obama's call to secure vulnerable nuclear materials. After the Summit, U.S. officials carefully maintained that "the Summit process [was] not intended to replace or compete with established processes, nor [was] it intended to be permanent" (Holgate 2011). This open-ended approach guided the preparations for the 2012 NSS.

2012 NSS: Broadening the Agenda

On March 26–27, 2012, heads of fifty-three states and representatives of four international organizations convened for the 2nd NSS in Seoul, South Korea (Korea). In the preparatory process, the Korean hosts added six new countries (Azerbaijan, Denmark, Gabon, Hungary, Lithuania, and Romania) to the list of attendees. They also invited the international law enforcement agency Interpol, which had developed a nuclear and radiological response team in 2011, to participate in the process. The 2012 NSS sought to build on the achievements of the 2010 NSS and broadened the agenda to include two issues important to the Korean hosts.

The 2012 NSS (2012) Communiqué promoted the implementation of the Washington Work Plan by, *inter alia*, adding timelines to important 2010

NSS commitments. Two of the most prominent of these (albeit not fully fulfilled as of 2015) included the target date of late 2013 for voluntary actions on HEU minimization and the target year of 2014 for bringing into force the CPPNM(A). Among a dozen priority areas, the document also stressed the importance of improved management of spent nuclear fuel and radioactive waste as well as the security of nuclear and other radioactive materials in transit (U.S. Department of State 2012).

The agenda and the 2012 Communiqué also featured prominently two new issues. Since the host state did not possess weapons-usable materials, Seoul saw the security of radiological sources as an important action item for the NSS. To this end, the Communiqué also highlighted "the fundamental responsibility of States to maintain effective security" of radioactive sources and laid out possible measures that states could take in order to do so. Another issue was the so-called interface between nuclear security and nuclear safety. The nuclear safety issue became rather more important in the wake of the April 2011 accident at Japan's Fukushima Daiichi nuclear power plant. That accident alerted NSS participants to the potential implications of an act of sabotage at a nuclear power facility. In addition, the Communiqué also "encourage[d] States to consider establishing appropriate plans for the management" of spent fuel (plutonium) (NSS 2012).

Since many of the 2010 NSS "house gifts" were fulfilled by the time the second Summit took place, one of the inventions of the 2012 NSS were so-called "gift baskets" or joint statements among like-minded states. Through these joint statements, NSS states pledged to develop high-density fuel that would enable conversion of remaining HEU-powered research and test reactors, thereby facilitating the minimization of HEU stocks, counter nuclear smuggling, educate personnel through IAEA nuclear security training and support centers, among other commitments. According to a civil society assessment, forty-two of fifty-three NSS participants signed on to at least one of the thirteen "gift baskets" (Cann, Davenport, and Williams 2014).

The Seoul Summit also enhanced innovation by recognizing the important contributions of industry and civil society to the effective and sustainable improvement of nuclear security. To this end, the 2012 NSS featured "side summits" of both industry and civil society representatives, organized with the support of the Korean government. The host of the 2014 NSS, The Netherlands, would take this cooperation with industry and civil society another step further.

2014 NSS: Strengthening Governance

The preparations for the 2014 NSS began early as participants had to react to the then current events. One of these was the aforementioned security incident at the Y-12 facility in the United States, which highlighted the risk of failure in the most advanced nuclear security system in the world. Another was the challenge of chemical weapons removal from Syria, which directly engaged government officials that were also participants in the NSS process. Still another was the announcement by President Obama in a June 2013 speech in Berlin that the United States would host the final NSS in 2016. Prior to that announcement, preparatory activities had been proceeding under the assumption that the 2014 NSS would be the last heads of state meeting on the issue.

On March 24–25, 2014 world leaders gathered in The Hague for the 3rd NSS. With a background international peace and justice as well as an active nuclear industry, The Netherlands was an ideal host for the 2014 NSS. This Summit made important advances in nuclear governance, promoted additional state commitments that built on the achievements of the 2010 and 2012 NSS, and developed a bridge to the nuclear industry.

The Communiqué, which "recognized the need for a strengthened and comprehensive international nuclear security architecture, consisting of legal instruments, international organizations and initiatives, internationally accepted guidance and good practices," brought additional definition to ways in which states could strengthen their implementation of nuclear security measures. Among these, it recognized the important role of the IAEA, especially its peer-review mechanisms and advisory services, and identified "voluntary measures" that states could take to build international confidence in their security practices (NSS 2014b).

As in the previous Seoul Summit, various "gift baskets" were also presented in The Hague. Among these was a joint statement by the three NSS hosts that created a "commitment to embed the objectives of the nuclear security fundamentals and the IAEA recommendations in national rules and regulations and to host peer reviews to ensure effective implementation" (NSS 2014a). Supported by more than thirty participants at the 2014 NSS, this document has since been opened for signatures through the IAEA system beyond the fifty-three participants in the NSS process. By opening the document to the IAEA system, it became available for adherence by over 162 Member States.

At the 2014 NSS, states announced their progress or commitment to the minimization of their civilian stocks of HEU and separated plutonium. In the preparatory process, the Dutch hosts also sought "get more attention for the security of nuclear material in military use" (de Klerk 2014). While the effort to make the nuclear security architecture more "comprehensive" did not result in concrete outcomes at the 2014 NSS, it set up the possibility for a substantive discussion on military materials security for the 2016 Summit. The Dutch hosts also pushed the conversation regarding plutonium. To this end, the Hague Communiqué encouraged states to "keep their stockpile of separated plutonium to the minimum level, both as consistent with national requirements" (NSS 2014b).

As in Seoul, the 2014 NSS featured official parallel summits of civil society and nuclear industry executives. An important priority for the Dutch government in the NSS process involved "improving the efficiency and effectiveness of the relationship between governments and industry" (de Klerk 2014). There was also an effort to promote the interaction between governments, industry, and civil society through the official NSS process. Representatives of these latter two constituencies were invited to brief sherpa teams.

The Summit proved to be dynamic for several other reasons as well. The first of these was the conduct of a scenario-based policy exercise among the heads of state participants, which focused on the coordination of a response to a radiological incident. The second reason was the ongoing crisis in Ukraine, which foreshadowed a major challenge to the 2016 NSS process—the deterioration of the U.S.–Russian relationship, including on the issue of nuclear security.

2016 NSS: Challenges and Opportunities

The preparatory process for 2016 NSS is faced with a broad range of challenges. These include: dealing with the potentially negative implications of Russia's pullout from NSS preparations; tackling the remaining "hard cases" of nuclear materials security and minimization; identifying ways to ensure the long-term sustainability of achievements to date; and developing creative avenues to institutionalize future commitment making in the broader international community.

Prior to the first sherpa meeting in late October for the 2016 NSS, Russia announced that it would not "take part in the preparations" for this NSS. The officially stated rationale for Moscow's suspension was Russia's "doubts regarding the added value" of the high-level meeting (MFA of Russia 2014). However, the broader deterioration of the U.S.–Russian political relationship over the Ukraine crisis is likely a better explanation for Moscow's withdrawal. This is an unprecedented situation, especially since the longstanding bilateral cooperation between Washington and Moscow on nuclear security—an important foundation of the NSS process—officially concluded in December 2014.

Despite the withdrawal from NSS preparations, Russia has not completely closed the door to its participation in the NSS. Thus, its actions do not appear to have eroded the NSS consensus on the importance of countering nuclear terrorism. However, it appears that, to Moscow, nuclear security cooperation may be linked to bilateral cooperation on nuclear energy issues, which were cut off by Washington earlier in 2014. Russia's perception of threat from Islamic State terrorism—a point of shared concern with the West—may offer, however, an opportunity to bring it back into the NSS fold.

The NSS process can celebrate the success of practical steps to minimize civilian nuclear materials and the improvement in the security of nuclear materials worldwide. This reduction in the number of countries 'cleaned out' of HEU and plutonium will be a testament to the importance of the "Prague agenda." The challenge for 2016, however, lies in the ability to advance fissile material minimization even further. Can the NSS be extended to the security of military materials and the management of plutonium? Both issues have been mentioned in the consensus documents to date, but have not been successfully tackled in the NSS process.

There is clearly an opportunity for some progress on military materials. Some have pointed out the importance of a dialogue in the NSS context that would "identify the key baseline measures [that states could] take to ensure the highest standards of security" as well as the ability to undertake "measures that not only strengthen the security of military materials but build the confidence of others that these materials are effectively secured" (Pitts-Kiefer 2015). Given its inclusion of all states with nuclear arsenals (with the exception of North Korea), the NSS process may provide a useful foundation for the issue in other venues, for example, a substantive P5 dialogue on nuclear security measures.

Despite the sense prior to the 2014 NSS that Summit participants were experiencing "summit fatigue," there appears to be an interest in continuing the political process on nuclear security, including possibly beyond 2016. The evolution of the role of the IAEA is an important issue to watch in this respect. The Agency organized a ministerial-level nuclear security meeting

in Vienna, Austria in July 2013 and has also indicated that it would host a follow up meeting after the 2016 NSS. It is clear that the IAEA will continue to play an important role in the future of nuclear security. However, there is no consensus among NSS process participants regarding the IAEA's ability to carry the full weight of the political process as well as its ability to sustain attention, secure funding, and facilitate innovation in nuclear security (Findlay 2014).

To date, the NSS process has resulted in visible improvements to the nuclear security regime. However, an important part of the preparatory process for the 2016 NSS is the ability of NSS leaders to build consensus on a political approach that would bring together the fragmented initiatives and efforts that make up the nuclear security regime, including the IAEA, the United Nations, the GICNT, the GP, Interpol, and others. But nuclear security governance remains an issue. In the near term, a successful completion of Washington's long-delayed accession to CPPNM(A) and ICSANT could have the potential to facilitate this conversation and also provide a boost of morale to NSS process participants. In the medium to long term, some have proposed a binding agreement that would frame a comprehensive regime and develop a conference of parties' mechanism for "decision making and improvement" (Bernhard et al. 2015).

The three past Summits have provided high-level recognition to states' achievements, promoted a sense of universal responsibility for nuclear security, and built momentum for further commitments. Recognizing the accomplishments of the past Summits, an effective political process will also require the engagement of nuclear industry and civil society actors.

Finally, to sustain the collective achievements of the NSS process, the 2016 NSS must also conclude with a concrete agreement on the importance of standards and metrics as well the acceptance of peer review and information exchanges regarding the implementation of nuclear security measures.

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